Perceptions of Agriculture and Perceived Enrollment Barriers to Agricultural Programs of Select Southern New Jersey High School Students

Brittany S. Smith[1] and Connie D. Baggett[2]
The Pennsylvania State University
University Park, PA

Abstract

The purpose of this study was to assess the level of awareness of agricultural organizations and careers and perceived barriers to enrollment in agricultural programs of high school students in southern New Jersey. The students surveyed were selected based on teacher willingness to participate in the study. Therefore, the results are specific to this sample and should not be generalized to the larger population. The results showed the selected respondents were primarily female, white/Caucasian, lived in suburban areas, and had no family members involved in agriculture. Males were found to differ significantly from females in their awareness of outreach programs related to agriculture, and the same was found between whites and non-whites. The study also revealed that the selected respondents had a general lack of awareness in careers in agriculture. Three barriers emerged as the highest ranking barriers to enrollment in agriculture programs: lack of contact with program recruiters, interest in agriculture, and lack of opportunity while growing up to work on a farm. Males and females differed significantly in their perception of "image of agriculture barriers" and a significant difference was also found between whites and non-whites in their perception of "individual related barriers" to enrollment in agricultural programs.

Introduction

The significant decline in the number of agricultural education students has raised much concern in the last few decades (Mallory and Sommer, 1986; Scott and Lavergne, 2004; Wildman and Torres, 2001), while the opportunities in agriculture and agriculture-related careers are continuing to increase (Jones and Larke, 2001). The United States Department of Agriculture (USDA) estimates that between 2010 and 2015, there will be 54,400 annual employment openings for individuals with baccalaureate or higher degrees within the agriculture, food, and renewable natural resources sectors, creating a large demand for anticipated graduates with college degrees or related work experiences, (Goecker, et al., 2010). However, as opportunities in agriculture-related fields are continuing to expand, the number of individuals pursuing agricultural careers through college is steadily declining, especially within minority populations (Jones and Larke, 2001).

This decline can be attributed to many people having little agricultural knowledge due to large populations moving from rural farm areas to more urbanized areas, which supports the need for agricultural education in today's schools (Gibbs, 2005; Hughes and Barrick, 1993). Bricknell (1996) supported these views stating that "young people [reared] in urban centers and suburbia have little direct contact with agricultural lands and ways of life and thus know very little about where their food comes from and how it is produced" (p.107). Although more populations are continuing to move out of the cities, very few are moving to rural areas. As a result, there is still a gap in the knowledge and involvement in agriculture of these populations. For the populations remaining in urban areas, the gap is even larger and continuing to grow as more generations know less and less about agriculture.

Today, approximately 94% of public school students receive no formal in-school instruction regarding agriculture and natural resource systems (Talbert et al., 2007). Early development of agricultural literacy and exposure to opportunities should be implemented to broaden students' perceptions of agriculture (Scott and

[1]Masters of Science Graduate, Department of Agricultural and Extension Education, The Pennsylvania State University, University Park, PA 16802
[2]Associate Professor, Department of Agricultural and Extension Education, The Pennsylvania State University, University Park, PA 16802

Lavergne, 2004). According to Powell, et al. (2008), agricultural literacy should be viewed as a driving force in the K-12 curriculum by thematically weaving agricultural materials through academic courses. Blackburn (1999) supported this view by stating that teaching agriculture to students at an earlier age may help develop a better understanding and perception of agriculture as students get older. With a higher level of knowledge and a more positive perception of agriculture, students may be more interested and encouraged to pursue a career in agriculture (Cannon, et al., 2009).

New Jersey, for example, currently has 39 agriculture programs offered at public middle schools (n = 2), public secondary schools (n = 17), and public vocational/technical schools (n = 20). Approximately 3,000 students in over 40 school districts are enrolled in agriculture education programs throughout the state (New Jersey Department of Agriculture [NJDA], 2010). Southern New Jersey specifically (which includes Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem counties), has 79 public secondary schools. Out of these 79 public schools, only nine schools offer an agriculture program (New Jersey Department of Education [NJDOE], 2010). Therefore, there are a large number of students attending public schools in southern New Jersey who do not have the opportunity to learn about agriculture and are also less likely to be introduced to agriculture in an academic setting. To address this issue, New Jersey, along with other states, must provide students with greater exposure and access to agriculture programs (NJDA, 2000), agriculture courses (elective options), and/or agriculture related coursework.

Exposure to agricultural practices has been found to have an important influence on enrollment behaviors and career choices (Mallory and Sommer, 1986). Wildman and Torres (2001) found that prior experiences in agriculture provided a strong positive influence on student enrollment into agricultural programs. Introducing students to agriculture through programs such as the USDA's agricultural literacy initiative, Agriculture in the Classroom (Talbert et al., 2007), and Ag Science Fairs, can serve as vehicles for students to learn about agriculture (Blackburn, 1999; Cannon, et al., 2009; National Research Council, 1992).

Another important issue to be addressed in agri-science education is how to increase the level of awareness of career opportunities in agriculture (Wildman and Torres, 2001). Due to the lack of adequate information, many students are unaware of the wide variety of employment opportunities within agriculture-related fields (Mallory and Sommer, 1986). One of the major obstacles found in encouraging students to pursue careers in agriculture is the negative perception of the quality of work and potential of success (financial reward) in agricultural fields (Mallory and Sommer, 1986). Through their study, Jones and Larke (2001) found that students chose careers in other fields unrelated to agriculture after experiencing limited employment opportunities within fields of agriculture that suited their "ideal" career. Therefore, students need to be aware of career fields within the agricultural industry, such as biotechnology, microbiology, veterinary science, agribusiness, management, landscape design, food science, etc. (Jackson and Williams, 2003).

Each of the issues mentioned above can contribute as potential barriers to enrollment in high school and college agriculture programs. For example, although New Jersey's agriculture ranks third in the state's economic importance (New Jersey Agricultural Society [NJAS], 2010), as previously stated, only 39 secondary agriculture programs are offered throughout the state and unfortunately, only nine of those are offered in southern New Jersey (NJDA, 2010). As a result, various factors can negatively influence students in these areas from enrolling in colleges of agriculture due to a lack of knowledge and misinformation. Secondary educators and colleges of agriculture must identify these various factors that may pose as barriers to enrollment and develop recruitment strategies that focus on these factors (Jones, 1997; Jones and Larke, 2001).

This study was guided by addressing the following research questions:

1. What are the demographic characteristics of the students in select high schools in southern New Jersey?

2. Are there any differences in the level of student awareness from selected high schools of agricultural related programs/organizations by gender, race/ethnicity, family involvement in agriculture, and residential area?

3. Are there any differences in the level of student awareness from selected high schools of career opportunities in agriculture and related fields by gender, race/ethnicity, family involvement in agriculture, and residential area?

4. What are the students' from selected high schools perceived barriers to enrollment in agricultural programs and are there any differences by gender, race/ethnicity, family involvement, and residential area?

Methods and Materials

This study addressed the research questions using a descriptive-correlational research methodology (Smith-Hollins, 2009). The population for this study consisted of currently enrolled students in southern New Jersey public high schools' 11th grade and 12th grade classes. The researcher used a purposive sample that consisted of high schools within school districts that granted approval for their students to participate in the study. This sample was also chosen due to time constraints, geographic convenience, and allowed for more efficient use of limited financial resources for the study. Therefore, results of this study are specific to this sample and should not be generalized to the larger population.

The sample consisted of three high schools: two in Camden County and one in Gloucester County, New Jersey. Individual classes in the 11th and 12th grades were chosen based upon teacher participation. The final sample resulted in two classes from Timber Creek Regional High School (Camden County), four classes from Triton Regional High School (Camden County), and two classes from Washington Township High School (Gloucester County). Timber Creek Regional High School has an enrollment of 1,434 students, with 375 students in 11th grade and 313 students in 12th grade (NJDOE, 2010a); Triton Regional High School has an enrollment of 1,652 students with 380 students in 11th grade and 409 students in 12th grade (NJDOE, 2010b); and Washington Township High School has an enrollment of 2,773.5 students with 659 students in 11th grade and 706.5 students in 12th grade (NJDOE, 2011). All three schools are located within primarily suburban areas in very close proximity to urban areas as well as rural areas. None of the three schools offer an Agricultural Program or agricultural courses. All students in attendance within each class who received parental consent were invited to participate in the study (n = 174). The final instrument was reviewed and cleared by The Pennsylvania State University Institution Review Board and all students were provided with parental consent/child assent forms prior to being permitted to complete the instrument.

The data were gathered from the participants using a multi-part instrument adapted from a previously developed instrument to assess the perceptions of underserved populations about agriculture (Smith-Hollins and Baggett, 2007). The original instrument used in this study developed by Smith-Hollins (2009) was reviewed by a panel of experts that consisted of five faculty members and two graduate students in the Department of Agricultural and Extension Education at The Pennsylvania State University. The panel of experts reviewed the instrument to establish content and face validity. Smith-Hollins (2009) obtained acceptable Cronbach's alpha scores for each major subsection of the instrument. The survey instrument was then modified based upon the review of literature and the level of education of the respondents for this study. Part one consisted of 15 statements that sought to assess Awareness of Agriculture-related Programs/ Organizations. This section was measured using a 6-point Likert-type scale ranging from 1 = Completely Unaware to 6 = Completely Aware.

Part two consisted of 17 statements that sought to assess Awareness of Career Opportunities in agriculture. This section was modified by omitting, adding, and adjusting the names of specific agricultural careers to reflect the knowledge level of secondary education students. The researcher utilized the same 6-point Likert-type scale from part one for this Awareness of Career Opportunities section.

Part three consisted of 13 statements that sought to assess perceived Barriers to Enrollment to high school and college programs in agriculture. This Barriers to Enrollment section used a five-point Likert-type scale ranging from 1 = Not at all a Barrier to 5 = Very Much a Barrier. It was also modified from the original instrument with the addition of an "Other" choice for the selected respondents to identify any factors they perceive to be enrollment barriers in agricultural programs not included in the original list of 13 statements. The results were used to rank the barriers as perceived by the selected students and analyzed between the independent variables in the same manner as sections one and two.

Part four regarding demographic characteristics of respondents consisted of eight multiple choice and open-ended-type response questions and was also modified to better serve secondary school respondents. Five multiple choice questions sought to identify general demographic information about the selected students (gender, race/ethnicity, age, residential area, and academic classification). The remaining three open-ended-type response questions sought to identify the selected students' academic interests and experiences (favorite subject, college plans and intended major, and any family involvement in agriculture).

The completed instruments were coded and analyzed using the Statistical Package for the Social Sciences (SPSS, v. 19.0, 2010) for Windows provided by The Pennsylvania State University. Descriptive statistics (frequency distributions, means, and standard deviations) were used to analyze the data. The data were further analyzed using the independent sample

Table 1. Frequency, Mean, and Standard Deviation for Selected Students' Awareness of Agriculture

Related Programs/Organizations	n[z]	Mean	SD[y]
Awareness of Natural Resources			
Fishing	89	4.9	1.2
Hunting	89	4.7	1.4
Overall Mean		4.8	
Awareness of Community Outreach Programs			
Expanded Food and Nutrition Education Program (EFNEP)	81	2.3	1.4
National FFA Organization	80	2.3	1.5
High School Agriculture Program	81	3.4	1.7
Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS)	81	2.4	1.5
Overall Mean		2.3	
Awareness of Youth Education			
4-H	79	2.1	1.6
Cooperative Extension	78	1.7	1.1
Overall Mean		1.9	
Awareness of Nationally Recognized Agriculture Programs			
State/National Parks	86	4.6	1.6
United States Department of Agriculture (USDA)	86	3.9	1.6
United States Environmental Protection Agency (EPA)	85	3.8	1.7
Overall Mean		4.1	

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, and 6=completely aware.

[z]n=number (frequency) of respondents;

[y]SD=standard deviation.

Selected high school students' age 16-19, southern New Jersey, 2011.

Table 2. Independent t-Test Results for Awareness of Programs/Organizations by Gender

Awareness Factor by Gender	n[z]	Mean[†]	SD[y]	t[x]	p[w]
Awareness of Natural Resources					
Male	14	-.12	.66	-.52	.61
Female	45	.03	1.10		
Total	59				
Awareness of Youth Education Programs					
Male	14	.43	1.10	1.10	.06
Female	45	-.14	.95		
Total	59				
Awareness of Community Outreach Programs					
Male	14	-.48	.88	-2.10	.04*
Female	45	-.03	.97		
Total	59				
Awareness of Nationally Recognized Agriculture Programs					
Male	14	.08	1.1	.36	.72
Female	45	-.03	.97		
Total	59				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, and 6=completely aware. Selected high school students age 16-19, southern New Jersey, 2011.

*p< .05, two-tailed independent t-test.

[z]n=number (frequency) of respondents.

[y]SD=standard deviation.

[x]t= statistical difference.

[w]p=probability (significant difference).

[†]Mean scores were calculated based upon the results of the Principal Component Analysis results instead of the raw data to obtain a more precise measurement of differences between the independent variables.

t-test to evaluate the independent variables: gender, race/ethnicity, and family involvement in agriculture. Given that the dependent variables were measured on an interval scale, nonparametric statistics were necessary to analyze the data (Wadsworth Cengage Learning, 2005). Analysis of variance (ANOVA) was also used to compare the multiple mean scores of scales computed by factor analysis for residential areas (Smith-Hollins, 2009). The ANOVA statistic was used to compare the mean scores among four factors generated through factor analysis (via direction from The Pennsylvania State University Statistical Consulting Center). Significant differences were pre-set at $p < .05$ based on a 95% confidence interval. Mean scores were calculated based upon the results of the Principal Component Analysis (PCA), (DeCoster, 1998) instead of the raw data to obtain a more precise measurement of differences among the independent variables. PCA was used to reduce the number of variables into smaller scales based on the pattern and strength of the relationship between each variable and each observed measure (DeCoster, 1998). Reducing the variables into a smaller subset of scales simplified the data to be used for further analysis (Smith-Hollins, 2009).

Results and Discussion

There were 89 students who completed the survey instrument, yielding a 51.1% response rate (n=174). The majority of respondents were female (68.5%), white/Caucasian (70.8%), and live/lived in a suburban residential area for the majority of their lives (77.5%). The race/ethnicity demographics of the selected respondents were found to be comparatively representative of the population of Camden County

and Gloucester County where the schools were located, according to the United State Census Bureau (2010). These demographic characteristics were also consistent with the demographic characteristics found in the original study (Smith-Hollins, 2009) as well as the studies of Balschweid (2002) and Esters and Bowen (2005). The majority of the academic classifications of the respondents were juniors at 64.8% and with 33.0% being seniors. Family involvement in agriculture differed from the original study; the majority of students responded "no" (71.9%) to having any family involved in agriculture, while 28.1% responded "yes" to having any family involved in agriculture; these results support findings of Balschweid (2002).

Respondents were compared based upon gender, race/ethnicity, family involvement, and residential area. Respondents were asked to rate their level of awareness of agriculture related programs/organizations. PCA was used to reduce the number of variables into smaller, workable scales. The PCA resulted in four scales: "Natural Resources, Youth Education Programs, Community Outreach Programs, and Nationally Recognized Agriculture Programs." To obtain a broad view of the respondents' awareness of Agriculture-related Programs/Organizations, a mean score was calculated based upon the means within each scale. Overall, respondents were "slightly aware" of natural resources (Mean [M] = 4.8 out of 6 with 1 = completely unaware and 6 = completely aware), "unaware" of community outreach programs (Mean [M] = 2.3 out of 6 with 1 = completely unaware and 6 = completely aware), "completely unaware" of youth education programs (Mean [M] = 1.9 out of 6 with 1 = completely unaware and

Table 3. Independent t-Test Results for Awareness of Programs/Organizations by Race/Ethnicity

Awareness Factor by Race/Ethnicity	n[z]	Mean[†]	SD[y]	t[x]	p[w]
Awareness of Natural Resources					
White	44	.08	.13	1.10	.27
Non-white	15	1.40	.36		
Total	59				
Awareness of Youth Education Programs					
White	44	.06	1.10	.73	.47
Non-white	15	-.16	.83		
Total	59				
Awareness of Community Outreach Programs					
White	44	.11	1.10	2.10	.04*
Non-white	15	-.34	.53		
Total	59				
Awareness of Nationally Recognized Agriculture Programs					
White	44	.14	.93	1.80	.07
Non-white	15	-.40	1.10		
Total	59				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, and 6=completely aware. Selected high school students age 16-19, southern New Jersey, 2011.

*p< .05, two-tailed independent t-test.

[z]n=number (frequency) of respondents.

[y]SD=standard deviation.

[x]t= statistical difference.

[w]p=probability (significant difference).

[†]Mean scores were calculated based upon the results of the Principal Component Analysis results instead of the raw data to obtain a more precise measurement of differences between the independent variables.

Table 4. Frequency, Mean, and Standard Deviation for Selected Students' Awareness of Careers in Agriculture

	n[z]	Mean	SD[y]
Awareness of Production/Business Careers in Agriculture			
Food Processing	86	4.2	1.5
Animal Breeder	86	4.4	1.4
Greenhouse/Gardening	85	4.7	1.1
Landscaping Specialist	84	4.5	1.4
Fruit and Vegetable Production	85	4.4	1.3
Agriculture Business Management	86	3.4	1.5
Agricultural Law	86	2.9	1.5
Overall Mean		4.1	
Awareness of Animal Science Careers in Agriculture			
Animal Scientist	86	4.5	1.3
Wildlife & Fisheries Scientist	87	4.1	1.6
Veterinary Medicine	86	4.4	1.6
Overall Mean		4.3	
Awareness of Traditional Careers in Agriculture			
Agricultural Engineer	89	2.9	1.6
Agriculture Science Teacher	89	3.5	1.7
Community Educator	88	3.9	1.6
Forestry Scientist	89	3.5	1.8
Dairy Production	85	4.5	1.3
Overall Mean		3.6	

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, and 6=completely aware. Selected high school students age 16-19, southern New Jersey, 2011.

[z]n = number (frequency) of respondents.

[y]SD=standard deviation.

6 = completely aware), and "slightly aware" of nationally recognized programs (Mean [M] = 4.1 out of 6 with 1 = completely unaware and 6 = completely aware) (See Table 1).

There was a significant difference found between males and females in the level of awareness of community outreach programs related to agriculture. (Significant differences were determined by comparison of the alpha scale of $p < .05$ based on a 95% Confidence Interval). Male respondents were found to be significantly more aware of community outreach programs than female respondents ($t = -2.10$, $*p = .04$) (See Table 2). Due to the low Cronbach's alpha reliability score for awareness of community outreach programs, these results should be interpreted with concern (Santos, 1999). However, males and females were both found to have "little awareness" of natural resources, nationally recognized programs, and youth education programs. Whites were significantly higher than non-whites in their awareness of community outreach programs ($t = 2.10$, $*p = .04$) (See Table 3). No significant differences were found between family involvement in agriculture and residential area.

Respondents were asked to rate their level of Awareness of Careers in Agriculture which was reduced to three scales using factor analysis (Decoster, 1998): Production/Business Careers, Animal Science Careers; Traditional Careers. Overall, respondents were generally found to be "slightly aware" of production/business careers in agriculture (Mean [M] = 4.1 out of 6 with 1 = completely unaware and 6 = completely aware) and animal science careers (Mean [M] =4.3 out of 6 with 1 = completely unaware and 6 = completely aware), and were "slightly unaware" of traditional careers in agriculture (Mean [M] = 3.6 out of 6 with 1 = completely unaware and 6 = completely aware) (See Table 4). However, there were no significant differences found between the independent variables for any of the three scales. Scott and Lavergne (2004) also had similar findings in their study in which students were "less confident" in their knowledge of agriculture careers and how to prepare for them.

Respondents were asked to rate how much of a barrier the listed statements were to enrollment in colleges of agriculture. According to the overall mean scores, "lack of contact with recruiters" (Mean [M] = 3.29 out of 5 with 1 = not at all a barrier and 5 = very much a barrier), "interest in agriculture" (Mean [M] = 3.25 out of 5 with 1 = not at all a barrier and 5 = very much a barrier), and "lack of opportunity to work on a farm growing up" (Mean [M] = 3.21 out of 5 with 1 = not at all a barrier and 5 = very much a barrier) were ranked as the top three potential barriers to enrollment in colleges of agriculture (See Table 5).

A factor analysis was employed to reduce the variables into three scales: individual related barriers, image of agriculture barriers, and interest in agriculture (Decoste, 1998). Overall, respondents were found to have a neutral perception of individual related barriers (Mean [M] = 3.0 out of 5 with 1 = not at all a barrier and

Table 5. Selected Students' Perceived Barriers to Enrollment in Agricultural Programs

Barriers	Rank[z]	Mean	SD[y]
Lack of contact with recruiters in agriculture	1	3.2	1.3
Interest in agriculture	2	3.2	1.3
Lack of opportunity to work on a farm growing up.	3	3.2	1.4
Lack of career opportunities available in agriculture.	4	3.0	1.2
Lack of promotional materials about agriculture.	5	3.0	1.3
Lack of mentors/role models in agriculture	6	2.9	1.2
Lack of relatives/significant others involved in agriculture.	7	2.8	1.3
Lack of discussion from guidance counselors.	8	2.7	1.4
Lack of parental support.	9	2.3	1.5
Society's negative image of agriculture.	10	2.2	1.3
Lack of people of color in agriculture.	11	2.0	1.4
Ridicule by peers regarding agriculture.	12	2.0	1.2

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. Selected high school students age 16-19, southern New Jersey, 2011.

[z]Rank = the listed barriers to enrollment in agricultural programs was ranked based on the selected students' mean scores.

[y]SD= standard deviation.

Table 6. Frequency, Mean, and Standard Deviation for Selected Students' Perceived Barriers to Enrollment in Colleges of Agriculture

	n[z]	Mean	SD[y]
Individual Related Barriers			
Lack of mentors/role models	87	2.9	1.2
Lack of relatives/significant others involved in agriculture	87	2.8	1.3
Lack of opportunities to work on farm growing up	87	3.2	1.4
Lack of contact with recruiters	85	3.2	1.3
Lack of career opportunities available in agriculture	87	3.0	1.2
Lack of discussion from guidance counselors	87	2.7	1.4
Lack of promotional materials about agriculture	86	3.0	1.3
Overall Mean		3.0	
Image of Agriculture Barriers			
Lack of parental support	87	2.3	1.5
Lack of people of color in agriculture	87	2.0	1.4
Society's negative image of agriculture	87	2.2	1.3
Ridicule by peers regarding agriculture	87	2.0	1.2
Overall Mean		2.1	
Interest in Agriculture	87	3.2	1.3

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. Selected high school students age 16-19, southern New Jersey, 2011.

[z]n=number (frequency) of respondents.

[y]SD=standard deviation.

5 = very much a barrier) as being potential barriers to enrollment, perceived "image of agriculture" as being somewhat a barrier to enrollment (Mean [M] = 2.1 out of 5 with 1 = not at all a barrier and 5 = very much a barrier), and were generally neutral in regard to "interest in agriculture" (Mean [M] = 3.2 out of 5 with 1 = not at all a barrier and 5 = very much a barrier) (See Table 6). Males and females differed significantly (t = 2.50, p = .02) in their perception of "image of agriculture barriers" (See Table 7). There was also a significant difference found between whites and non-whites (t= -2.00, *p < .05) for individual related barriers to enrollment in colleges of agriculture (See Table 8).

Table 7. Independent t-Test Results for Barriers to Enrollment by Gender

Barriers by Gender	n[z]	Mean[†]	SD[y]	t[x]	p[w]
Individual Related Barriers					
Male	24	.22	1.30	1.10	.29
Female	60	-.09	.88		
Total	84				
Image of Agriculture Barriers					
Male	24	.48	1.20	2.50	.02*
Female	60	-.19	.86		
Total	84				
Interest in Agriculture Barriers					
Male	24	-.04	.75	- .28	.78
Female	60	.02	1.10		
Total	84				

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. Selected high school students age 16-19, southern New Jersey, 2011. *p< .05, two-tailed independent t-test

[z]n=number (frequency) of respondents.

[y]SD=standard deviation.

[x]t= statistical difference.

[w]p=probability (significant difference).

[†]Mean scores were calculated based upon the results of the Principal Component Analysis results instead of the raw data to get a more precise measurement of differences between the independent variables.

Table 8. Independent t-Test Results for Barriers to Enrollment by Race/Ethnicity

Barriers by Race/Ethnicity	n[z]	Mean[†]	SD[y]	t[x]	p[w]
Individual Related Barriers					
White	61	-.13	.94	-2.00	.05*
Non-White	23	.35	1.10		
Total	84				
Image of Agriculture Barriers					
White	61	-.09	.97	1.30	.20
Non-White	23	.28	1.10		
Total	84				
Interest in Agriculture Barriers					
White	61	-.01	.98	-.21	.84
Non-White	23	.04	1.20		
Total	84				

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. Selected students age 16-19, southern New Jersey, 2011. *p< .05, two-tailed independent t-test

[z]n=number (frequency) of respondents.

[y]SD=standard deviation.

[x]t= statistical difference.

[w]p=probability (significant difference).

[†]Mean scores were calculated based upon the results of the Principal Component Analysis results instead of the raw data to get a more precise measurement of differences between the independent variables.

Summary

The findings showed that the selected respondents were primarily female, white/ Caucasian, from suburban areas, and had no family members involved in agriculture. Males were found to be more aware of outreach programs related to agriculture than females, and white students were found to be more aware of outreach programs related to agriculture than non-white students. The findings also revealed that the selected respondents had a general lack of awareness in careers in agriculture. The selected students identified three barriers as being the highest ranking barriers to enrollment in colleges of agriculture: (1) lack of contact with recruiters; (2) interest in agriculture; and (3) lack of opportunity to work on a farm growing up. These findings indicate that the selected students lack exposure to both recruiters for colleges of agriculture and exposure to agricultural experiences and both of these barriers can ultimately have an influence on the students' lack of interest in agriculture. A general lack of knowledge and awareness of programs/organizations and available careers related to agriculture may also be the driving force behind the selected students' lack of interest in agriculture.

The selected students had a lack of "interest in agriculture" as a result of a lack of knowledge in and about agriculture. Students cannot develop an interest in agriculture without knowledge and information in the subject. Therefore, educators should integrate agriculturally related subject matter into their curricula to expose their students to concepts and practices within and around agriculture. Student interest in agriculture is a very important factor in enrollment to agricultural programs for the secondary and collegiate levels. Students selected in this study perceived the image of agriculture as being somewhat a potential barrier to enrollment in colleges of agriculture. This too is a result of a general lack of sufficient information for students to make more informed inferences about agriculture and its importance and potential for success.

There are various factors that must be addressed to increase enrollment numbers in agricultural programs for both minorities and non-minorities including: promoting a positive perception of

agriculture, increasing the level of agricultural literacy and awareness, and enhancing exploration in career opportunities. Evaluation of these factors may help educators understand students' perceptions of agriculture and develop approaches to break down potential barriers to increase enrollment in secondary agricultural programs and colleges of agriculture. As more people are becoming further removed from agricultural practices and issues, educators must find innovative methods to reintroduce these disciplines to their students.

To address the issues found in this study, educators in secondary education should integrate more agriculturally related topics into the curriculum and provide more opportunities for career exploration in agricultural fields. Also, secondary agriculture programs and colleges of agriculture should develop new strategies to focus their recruitment efforts towards more "non-traditional" students and provide more opportunities for students to have contact with recruiters specifically for secondary agriculture programs and colleges of agriculture. Most importantly, New Jersey Department of Education should collaborate with teachers and administrators interested in providing agricultural education in their schools to develop a universal curriculum that includes agriculture to be used throughout the state.

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