The Pennsylvania State University

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PERCEPTIONS OF AGRICULTURE AND PERCEIVED ENROLLMENT BARRIERS TO COLLEGES OF AGRICULTURE OF SOUTHERN NEW JERSEY HIGH SCHOOL STUDENTS

A Thesis in

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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. Identifying potential barriers to enrollment and the level of awareness of agricultural programs/organizations and careers may help secondary agriculture programs and colleges of agriculture increase enrollment numbers by developing new recruitment strategies for an increasingly diverse population of students.

The population of this study included currently enrolled junior and senior level high school students from select high schools in southern New Jersey. The data was collected using a four-part survey instrument concerning: awareness of agricultural programs/organizations; awareness of careers in agriculture; perceived barriers to enrollment to agriculture programs; and demographic characteristics. The survey generated 89 usable responses, yielding a response rate of 51.1%. Descriptive and inferential statistics were used to analyze the data.

The majority of respondents were White/Caucasian females who grew up or currently live in a suburban residential area. Males were found to be more aware of programs/organizations related to agriculture than females, and whites were found to be more aware programs/organizations than non-whites. Respondents were generally found to be slightly unaware of career opportunities in agriculture overall, however, there were no significant differences found between gender, race/ethnicity, family involvement in agriculture, or residential area.

Perceived barriers to enrollment were ranked according to mean scores and the top three barriers were “lack of contact with recruiters, interest in agriculture, and lack of opportunity to work on a farm growing up.” Males and females differed in their perception of potential barriers to enrollment. Non-whites were found to perceive specific barriers as being more of a potential barrier to enrollment in colleges of agriculture than whites.

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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Chapter 1

INTRODUCTION

Problem Statement

In recent decades there has been an alarming decline in the number of students choosing to pursue careers in agriculture. As a result, there will be a shortage of qualified professionals educated in agriculture and related fields to pursue the expected increase in available career opportunities in this field. Researchers have also found that there is a significant decline in the number of minority students entering agricultural programs at the secondary and postsecondary level (Esters, 2007; Scott & Lavergne, 2004). There is evidence that many urban and suburban schools lack agricultural programs or agricultural courses. Consequently, many students in urban and suburban schools have very little exposure to agriculture. Therefore, educators must develop more effective methods to improve the recruitment and retention of minority and non-minority students, or this trend will continue in its current direction.

Research on this issue must address the barriers, influences, and students' perceptions of agriculture to determine why students choose to enroll or not to enroll in agricultural programs. It is vital that effective methods are developed to encourage more students, both minority and non-minority, to pursue careers in agriculture to ensure that agricultural issues can be addressed by educated professionals in the future of the agricultural industry.

Need for Study

The significant decline in the number of agricultural education students has raised much concern in the last few decades (Wildman & Torres, 2001; Scott & Lavergne, 2004; Mallory & Sommer, 1986), while the opportunities in agriculture and agriculture-related careers are continuing to increase (Jones & Larke, 2001). Administrators and educators in each level of education must develop new methods to recruit more minority and non-minority students to enroll in secondary agricultural programs and continue through to post-secondary agricultural programs and/or careers. These methods should focus on specific factors that influence student enrollment. The negative perceptions of agriculture and the lack of agricultural literacy of the general public appear to be one of the underlying reasons students are discouraged from enrolling in agricultural programs and pursuing agricultural careers. According to Jackson and Williams (2003) and Mallory and Sommer (1986), past negative associations of jobs in agricultural fields are typically thought of as being labor intensive and not prestigious. "The misconceptions about modern agricultural science must be due in part to the image that we in agriculture project" (National Research Council [NRC], 1992, p.199).

Agricultural production programs often decorate their facilities with rusty equipment and old black-and-white photos to depict the history of agriculture. Agriculture is often displayed to the general public in this same manner and students are rarely exposed to the advanced science and technology utilized in today's agricultural industry. With a higher level of knowledge and a better understanding of agriculture, students can develop a positive perception of agriculture and may be more inclined to pursue career opportunities in the agriculture industry (Cannon, Broyles, Seibel, & Anderson, 2009). Jones and Larke (2001)

suggested that, “to enhance recruitment, more effective recruitment strategies must be implemented” (p. 39). It is imperative that methods are developed or improved to encourage more students to pursue careers in agriculture for the sustainability of the agriculture industry.

Purpose

The purpose of this study was to identify the level of awareness of agricultural related programs and organizations; the level of awareness of career opportunities in agriculture; and barriers to enrollment in agricultural programs of minority and non-minority students. By identifying these factors, high school agriculture programs and colleges of agriculture can improve current recruitment strategies or develop new recruitment strategies to encourage more students to enroll in agricultural programs and/or pursue careers in agriculture.

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 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 of career opportunities in agriculture and related fields by gender, race/ethnicity, family involvement in agriculture, and residential area?

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

Limitations of the Study

This study was conducted with the following limitations:

1. This study was limited to high schools in southern New Jersey.
2. This study had limited participation based upon parental consent for students less than 18 years of age.

Assumptions of the Study

This study was conducted under the following assumptions:

1. All participants answered the survey truthfully.
2. Currently enrolled high school students completed the survey.
3. Students under 18 years of age received parental consent to participate in this study.

Operational Definitions

Agriculture: the science, art, business, and technology of the plants, animals, and natural resources systems (Talbert, Vaughn, Croom, & Lee, 2007).

Agricultural education: a program of instruction in and about agriculture and related subjects commonly offered in secondary schools, through some elementary and middle schools and some postsecondary institutes/community colleges also offer such instruction (Talbert et al., 2007).

Agricultural Literacy: education about agriculture; above-average knowledge pertaining to the plants, animals, and natural resources systems (Talbert et al., 2007).

Career Exploration: the use of investigative activities to help students identify potential career interests and gain the information relevant to those interests; offers students the opportunity to learn about agricultural careers and the skills needed in those careers (Talbert et al., 2007).

Enrollment barrier: an element in the school or community that prevents enrollment in agricultural education; some barriers include schedule conflicts, stricter enrollment requirements, and negative perceptions of the program (Talbert et al., 2007).

Experiential learning: learning by doing; knowledge gained through experience (Talbert et al., 2007).

Recruitment: the process of seeking and soliciting students to enroll in agricultural education courses; the process consists of six key variables: the agriculture program, the recruitment program, student characteristics, parents, school support, and community support (Talbert et al., 2007).

Secondary education: typically a school with grades 9 through 12 (Talbert et al., 2007).

Stereotype: a conception or opinion resulting from the assignment of oversimplified characteristics to an entire group (Talbert et al., 2007).

Chapter 2

REVIEW OF LITERATURE

Agriculture in New Jersey

In the 18th century, New Jersey was nicknamed "The Garden State" due to its highly fertile soils and potential for agricultural growth (Kerney Jr., McLaughin, & Wacker, 2009). Today, New Jersey is a leading state in agricultural income per acre (New Jersey: Economy, 2011). Throughout the colonial era most of the state was agrarian and rural with only sporadic commercial farming. However, due to the state's geographic location between New York City and Philadelphia which both had a major impact on the population and economic growth of New Jersey, an expanding industrial base within major cities throughout the state continued to grow with increasing populations of European immigrants entering the state (Shaw, 1994).

During the Industrial Revolution in the early 1900s, New Jersey's population increased drastically as large numbers of immigrants from Europe traveled to the U.S. Large numbers of people migrated from the farms and rural areas to major cities and surrounding areas for work in the growing number of industrial and manufacturing factories (State of New Jersey, 2011). As a result, New Jersey became one of the most urbanized, industrial, and ethnically diverse states in the nation (Clemens, n.d.; Kerney et al., 2009). After World War II and the Great Depression, however, much of the population shifted from the urban cities to the bordering suburbs, specifically white residents (Clemens, n.d.; State of New Jersey, 2011). Today, as with most cities throughout the country, New Jersey's cities consist

primarily of minority groups, specifically African Americans and Hispanic/Latino populations.

Although most of the state's farmland has been lost due to urban- and suburbanization, New Jersey's agriculture ranks third in the state's economic importance (New Jersey Agricultural Society, 2010) largely in the production of fruit, vegetables, and one of the largest equine industries in the United States, as well as some dairy and seafood production. Between 1997 and 2007, the total acreage of farmland decreased from 856,909 acres to 733,450 acres, approximately 123, 459 acres (New Jersey Department of Agriculture [NJDA], 2010a) largely due to land development for housing units and shopping centers for the populations leaving the cities (Hasse, Lathrop, & Reiser, 2011). According to Kerney et al. (2009), farm land now covers about one-sixth of the state's land area, however, less than one percent of the population are engaged or at least involved in agriculture.

Demographic Trends in New Jersey

Due to the increased population in New Jersey's cities, the state is comprised of a variety of ethnicities. New Jersey is ranked 9th in the nation in population and has the highest population density of any U.S. state" (New Jersey: Economy, 2011, Kerney et al., 2009). New Jersey's population is made up of White/Caucasian, African American, Hispanic/Latino ethnicity, Asian, Native American/Alaska Native, and a small percentage of ethnic groups categorized as "Two or more races" and "Other." Table 1 lists each ethnicity currently living in New Jersey and the percentage of the total population.

Table 1
New Jersey: State Population by Race/Ethnicity 2010 Census Data

Race/Ethnicity	Percentage	Percent Change
White	68.6	-1.2
African American	13.7	+5.5
Hispanic/Latino Ethnicity	17.7	+39.2
Asian	8.3	+51.1
Native American/Alaska Native	0.3	+48.9
Native Hawaii/Pacific Islander	0.0	-8.6
Non-Hispanic/Latino Ethnicity	6.4	-24.1
Two or More Races	2.7	+12.4
Some Other Race alone	6.4	+24.1
Total Population: 8,791,894		

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.

New Jersey currently has 39 agriculture programs offered at middle schools (n = 2), public secondary schools (n = 17), and vocational/technical schools (n = 20). Approximately 3,000 students in over 40 school districts are enrolled in agriculture education programs throughout the state (NJDA, 2010b). Southern New Jersey specifically (includes Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem counties), has 79 public secondary schools. Out of these 79 public schools, only 9 schools offer an agriculture program (New Jersey Department of Education, 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 every other state, must provide greater students access to agriculture programs (NJDA, 2000).

The remainder of this chapter will identify and discuss various factors and issues experienced throughout the country influencing student enrollment in secondary agriculture programs and colleges of agriculture.

Enrollment Issues in Agricultural Programs

Over the past 20 years, enrollment in agricultural education programs has undergone major changes (Dyer, Breja, & Andreasen, 1999). A significant decline in the number of agricultural education students has raised much concern in the last few decades (Wildman & Torres, 2001; Scott & Lavergne, 2004), while the opportunities in agriculture and agriculture-related careers are continuing to increase (Jones & 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, Smith, Smith, & Goetz, 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 & Larke, 2001).

Exposure to Agriculture and Agricultural Practices

Many people have 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 & Barrick, 1993). Exposure to agricultural practices has been found to have an important influence on enrollment behaviors and career choice (Mallory & Sommer, 1986). Wildman and Torres (2001) found that prior experiences in agriculture provided a strong positive influence on student enrollment into agricultural programs. They also specified that some students gained these experiences by living on a farm, being involved with 4-H and FFA programs, hunting, or working with animals. Esters (2007) indicated that specialized urban agricultural education programs are one of the most successful recruitment approaches to increase diversity within colleges of agriculture. Also, 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; NRC, 1992; Cannon et al., 2009).

Lack of Agricultural Literacy

In today's society, the general lack of scientific and agricultural literacy, ranging from elementary school students to experienced scientists, has raised much concern. Science educators have unfortunately created a system that alienates students early in their education (NRC, 1992). The NRC report further implied that elementary students learn that science is difficult, boring, and irrelevant to their daily lives, creating a tendency for more student disinterest in the scientific fields. According to Balschweid (2002), "to improve science

literacy and students' understanding about the nature of science, students must be challenged to think about science as something more than just sitting in the traditional classroom" (p. 56). Poudel, Vincent, Anzalone, Huner, Wollard, Clement, DeRamus, and Blakewood (2005) stated:

> Cultivating a better understanding of the problems, enhancing critical thinking, and increasing scientific literacy with respect to contemporary agricultural and environmental issues, will help future leaders develop the enthusiasm and positive attitudes needed for practical and sustainable solutions to these issues (p.21).

Agricultural education can serve as a vehicle to help students understand agriculture and science as well as demonstrate their practical implications to daily life.

Agricultural education should contribute to the development of agricultural literacy (NRC, 1988). Therefore, agricultural education should be introduced at earlier stages of education. According to Blackburn (1999), teaching agriculture to students at an earlier age may help develop a better understanding and perception of agriculture as students get older. Scott and Lavergne (2004) also support this notion by recommending early inclusion of an agricultural course at the junior high level. Early development of agricultural literacy and exposure to opportunities should be implemented to broaden students' perceptions of agriculture (Scott & Lavergne, 2004). 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).

Today, approximately 94% of public school students receive no formal in-school instruction regarding agriculture and natural resource systems, (Talbert et al., 2007). According to Powell, Agnew, and Trexler (2008) agricultural literacy should be viewed as a driving force in the K-12 curriculum by thematically weaving agricultural materials through academic courses. Balschweid (2002) studied the effects of teaching a traditional biology course using agricultural science as the context for scientific principles on students' perceptions of agriculture. He found that "over 90% of the students reported that they either agreed or strongly agreed that participating in a biology class that used agriculture as the context helped them understand the relationship between science and agriculture" (p. 64). Incorporating agriculture into a required course is an effective approach to introduce more students to agricultural sciences.

Agriculture in the Curriculum

Powell et al. (2008) noted that agricultural knowledge acquired by the vast majority of public school students not enrolled in an agriculture course is somewhat limited. This limited knowledge among students may be the result of standards placed upon their teachers. Teachers are often limited in their ability to teach beyond the required curriculum due to state testing evaluations and time constraints (Blackburn, 1999; Talbert et al., 2007; NRC, 1992). Although there are various programs and resources available to foster agricultural literacy through classroom curriculum integration, such as *Project Food, Land, and People* (FLP) (Bricknell, 1996), and *Agriculture in the Classroom* (NRC, 1992), elementary and secondary teachers have little incentive to use these resources or have the time to go through them. Talbert et al. (2007) also noted that many teachers do not know where to find these programs

and resources. Ultimately, however, the utilization of these resources will not increase until teaching agricultural content is mandated by state education agencies (NRC, 1992).

Another potential cause that prevents or discourages teachers from integrating agriculture in the classroom is the teacher's lack of knowledge or experience in agriculture. "Teachers need awareness of agriculture before they can be successful teaching it" (Talbert et al., 2007, p. 294). Poudel et al. (2005) support this view; they stated that exposing teachers to agricultural and environmental challenge programs may help teachers understand new, motivational teaching approaches using agricultural and environmental resources in their classrooms. If more teachers are confident in teaching agricultural content in their classrooms, students can receive more education in agriculture over time. With a stronger foundation of knowledge in agriculture and an understanding of how it is important to many of the world's current and future issues, students may be encouraged to enroll in agricultural programs to address these issues.

Career Awareness and Exploration

Another important issue to be addressed with agricultural education is how to increase the level of awareness of career opportunities in agriculture (Wildman & Torres, 2001). Agricultural programs may not be adequately preparing students to efficiently explore career opportunities or to enter the workforce (Esters & Bowen, 2005). Due to the lack of adequate information, many students are unaware of the wide variety of employment opportunities within agriculture-related fields (Mallory & Sommer, 1986). Fritz, Husmann, Reese, Stowell, and Powell (2007) found that the results of their study support the need for increased awareness about agricultural career opportunities. Esters (2007) suggested the

potential of career development experiences being integrated into the curriculum through a comprehensive careers course at the secondary level. A careers course would "provide students with the opportunity to gain self-knowledge, engage in educational and occupational exploration, and develop career planning strategies" (Esters, 2007, p. 93). 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. Mallory and Sommer (1986) found through their study that students were often surprised to learn about the breadth of career opportunities in agriculture and some were disappointed that they were not taught about these opportunities until their senior year in high school. Therefore, their study supports the need for teachers, guidance counselors to educate students of career opportunities beginning at earlier stages of education so that students can make more informed decisions about their futures.

According to Wildman and Torres (2001) to attract students to agriculture, "they should be made aware of the various and numerous career opportunities in agriculture by implementing career fair presentations to the general student body" (p. 54). One major obstacle 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 & Sommer, 1986). Students need to be aware of related fields within the agricultural industry, such as biotechnology, microbiology, veterinary science, agribusiness, management, landscape design, food science, etc. (Jackson & Williams, 2003).

Minority Student Enrollment in Agricultural Programs

Over the past four decades, there have been significant changes particularly in the number of African Americans and other minority groups in agriculture and related fields. These changes in minority numbers are believed to have occurred after the desegregation of public schools, which resulted in the decline of African American agricultural teachers, and eventually a decline in African American students (Talbert et al., 2007).

Urban areas and inner cities have been known to be heavily populated by minority populations. Esters (2007) noted that the increase in the number of people living in urban areas has had an impact on colleges of agriculture. This shift in the population from rural areas to urban/suburban areas has thus affected the food and agriculture system (Wildman & Torres, 2001) and students' knowledge and interest in agriculture. 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). This situation is becoming more prevalent with minority student populations in urban schools and potentially affecting their decisions to enroll in agricultural programs (Jones & Bowen, 1998).

Students living in urban communities generally have limited exposure to agriculture and many urban school systems lack agricultural education programs. Many students who live in urban communities have never experienced animal agriculture firsthand or considered the science involved in animal agriculture (Balschweid, 2002). As a result, students in urban and suburban areas often find it difficult to identify any connections with agriculture and their community (Powell et al., 2008; Mallory & Sommer, 1986). For example, obesity has

become a very important issue in recent years, especially among minority populations of different cultures within urban areas. Nutrition is a large aspect of agriculture; therefore a lesson in nutrition can appeal to students from different cultural backgrounds by demonstrating how agriculture is very relevant to their communities.

Agricultural educators should focus on addressing the needs of culturally diverse students (Luft, 1996), by providing examples and visuals to demonstrate how agriculture relates to the students' different cultural backgrounds (Talbert et al., 2007). According to Balschweid (2002) students need exposure to multiple opportunities to think scientifically and multiple opportunities to apply scientific reasoning to everyday, complex problems. Talbert et al. (2007) also believed that students need real world experiences to build a foundation for learning. If students understand how agriculture is personally relevant to their daily lives, students may develop a strong interest in agriculture and agriculture-related fields (Jones, 1997). This theory supports potential incentives for more students to enroll in agricultural programs where they can learn how to address agriculture-related issues in their communities.

To address the continuing issue of diminishing enrollment numbers, innovative recruitment strategies must be developed that first focus on changing the negative perception of agriculture (Jones, 1997; Jones & Larke, 2001). Wildman and Torres (2001) stated that "recruitment begins with identifying the various student populations and discovering what has the greatest influence on their decision to select an agriculture major" (p. 46). At the secondary level, agriculture education programs should be more science based rather than primarily vocational as they have been in the past (NRC, 1988; NRC, 1992). Balschweid

(2002) stated "by approaching students with diverse interests in various disciplines with curriculum that supports formal science education, science could be relevant to those who are disengaged with traditional approaches to teaching science" (p. 57). Secondary agricultural science teachers should also include more non-production areas of the agricultural industry within the curriculum to appeal to more nontraditional students (Jones & Bowen, 1998; Conroy, Scanlon, & Kelsey, 1998).

Summary

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. As more people are becoming further removed from agricultural practices and issues, educators need to find innovative methods to reintroduce these disciplines to their students. The review of literature revealed that students' decisions to enroll in agricultural programs are influenced by a number of factors as previously mentioned. This research focused on currently enrolled high school students': (1) level of awareness of agricultural programs/organizations; (2) level of awareness of career opportunities in agriculture; and (3) perceived barriers to enrollment to agriculture programs. 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.

Chapter 3

RESEARCH METHODOLOGY

Purpose of the Study

The purpose of this study was to identify and describe the perceptions of agriculture and perceived barriers to enrollment in secondary agriculture programs and colleges of agriculture among high school students in southern New Jersey. This study also identified and described demographic characteristics of students in southern New Jersey high schools. Additionally, this study sought to determine if there is a relationship between the demographic characteristics of the students and their level of awareness in agricultural programs/organizations and careers, as well as any perceived barriers to enrollment in secondary agricultural programs and colleges of agriculture.

Design of Study

This study addressed the research questions using a descriptive-correlational research methodology (Smith-Hollins, 2009). The major goals of this research were to identify the demographic characteristics and perceptions of agriculture, and to describe any relationships between the demographic characteristics and perceived barriers to enrollment in agricultural programs. The researcher identified the independent variables and dependent variables based upon the review of literature. The dependent and independent variables are illustrated in Figure 1. Research questions were developed to guide this study. The conceptual framework for the basis of this study is displayed with the key variables in Figure 1.

Population and Sample

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 utilized 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. The final sample consisted of three high schools from Camden and Gloucester County, New Jersey depicted in Figure 2. The participating schools are also listed. Within each school, 11th and 12th grade classes were selected. Individual classes were then chosen based upon teacher participation. The final sample resulted in two classes from Timber Creek High School, four classes from Triton Regional High School, and two classes from Washington Township High School. The sample selection process is depicted in Figure 2.

Identification of Variables

The figure below depicts the variables being observed and analyzed in this study.

Independent Variables Dependent Variables

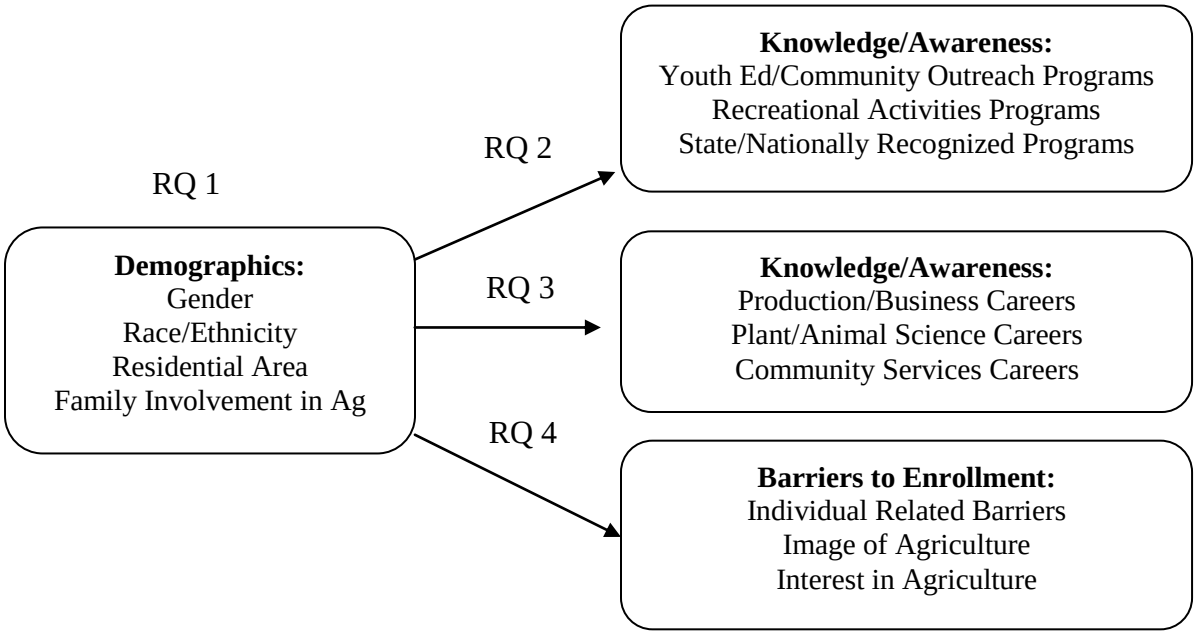

Figure 1 Conceptual Framework of the Study

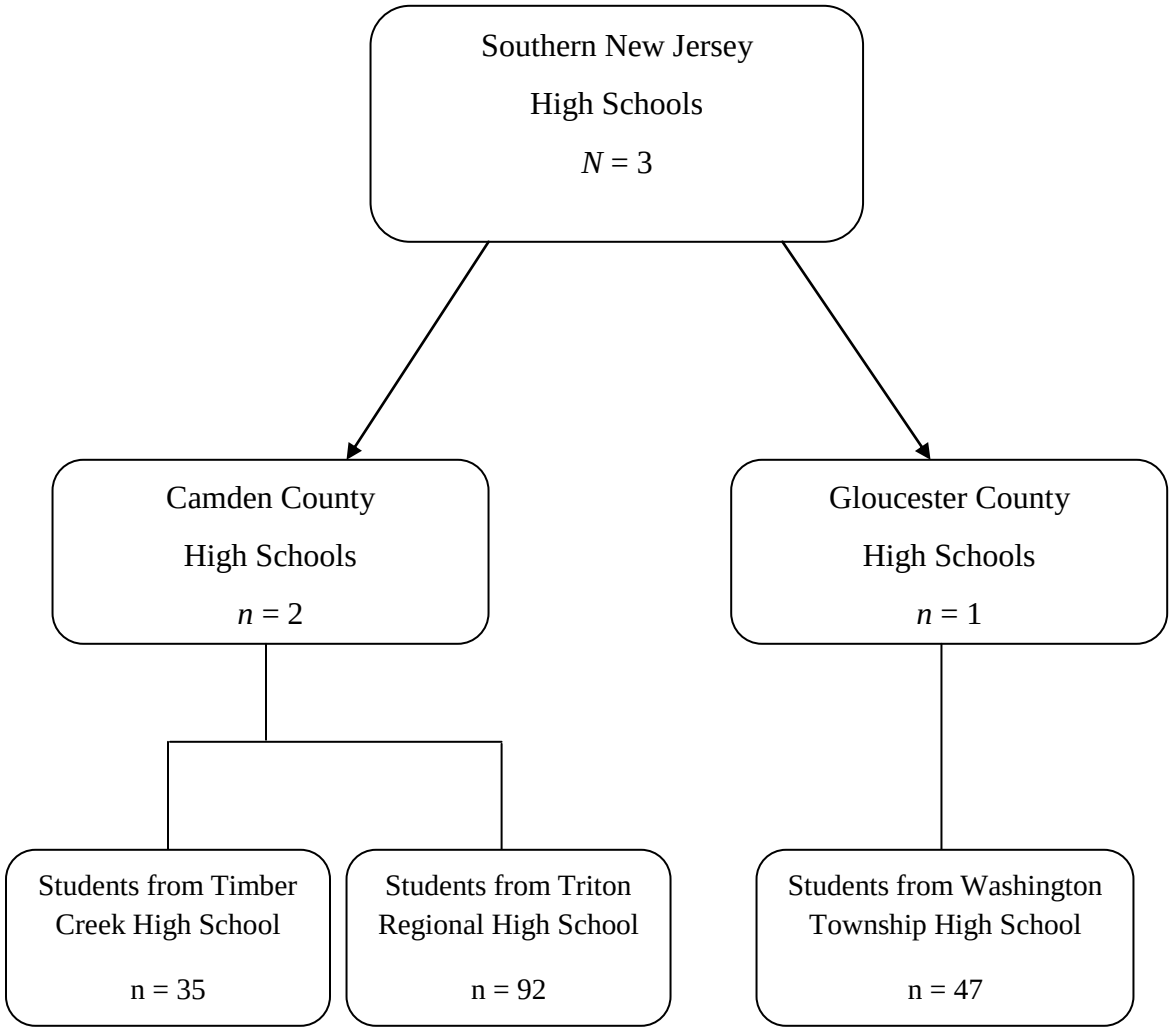

Figure 2 Purposive Sampling Strategy

Instrumentation

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 & Baggett, 2007). The original instrument consisted of five parts. Part one sought to gather information related to awareness of agriculture related programs/organizations prior to college enrollment. Part two sought to gather information about awareness of career opportunities in agriculture prior to enrolling in college. Respondents were also asked to indicate whether they have considered a career in any of the listed employment areas and where they obtained information about career opportunities in agriculture. Part three sought to gather information about perceived barriers to enrollment in colleges of agriculture prior to enrolling in a college of agriculture. Part four focused on factors influencing enrollment; respondents were asked to indicate who most influenced their decision to enroll in a college of agriculture and who most influenced their decision to choose a career in agriculture. Part five sought to identify demographic information from the respondents.

The survey instrument used in this study was modified based upon the review of literature and the level of education of the respondents. Part one consisted of 15 statements and was modified to include one additional agricultural program/organization and an "Other" statement for respondents to indicate awareness of a program/organization not included in the list. This section was measured using a seven-point Likert-type scale ranging from 1 = Completely Unaware to 6 = Completely Aware to 7 = Don't know. Part two consisted of 17 statements, modified by omitting certain agricultural careers and modifying the names of

certain careers to be better understood by secondary education students, as well as the addition of other careers. An "Other" statement was included for respondents to indicate awareness of a career in agriculture not included in the list. The statement regarding the source of information about career opportunities in agriculture was also modified to serve secondary education respondents. This section was measured using the same seven-point Likert-type scale from part one, ranging from 1 = Completely Unaware to 6 = Completely Aware to 7 = Don't Know. Part three consisted of 13 statements and was modified to include an "Other" choice for respondents to indicate a perceived barrier to enrollment in agricultural programs not included in the list. This section was measured using a five-point Likert-type scale ranging from 1 = Not at all a Barrier to 5 = Very Much a Barrier. Part four regarding demographic characteristics of respondents consisted of 8 multiple choice and open-ended response questions also modified to serve secondary education respondents. Part four of the original instrument regarding influences on the decision to enroll in colleges of agriculture was not utilized in this study (See Appendix A).

Instrument Reliability and Validity

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 final survey with modifications used for this study was

reviewed and cleared by the Office of Research Protections (IRB# 36151) at The Pennsylvania State University prior to the collection of data.

A post hoc reliability analysis was obtained after the data was collected by comparing the Cronbach's alpha to the original instrument to establish content validity of the modified instrument (See Table 2). The original instrument received an overall alpha score of .89 (very good reliability). The alpha scores received for each major subset of the original study were as follows: knowledge of agriculture related programs (.90 = excellent reliability); knowledge of career opportunities (.95 = excellent reliability); and barriers to enrollment (.85 = very good reliability). The modified instrument received an overall alpha score .98 (excellent reliability). The alpha scores received for each major subset of the modified study were as follows: knowledge of agriculture related programs (.95 = excellent reliability); knowledge of career opportunities in agriculture (.96 = excellent reliability); and barriers to enrollment (.92 = excellent reliability). (R. Radhakrishna, personal communication, April 4, 2011).

Table 2 Reliability for Study Instrument

Subsection	Number of Items	Alpha
Awareness of Agriculture Related Programs/Organizations	15	.95
Awareness of Career Opportunities in Agriculture	17	.96
Perceived Barriers to Enrollment	13	.92
Overall	45	.98

Data Collection

The usable response rate for this study was 51.1% (89 surveys). Participation agreement letters were hand delivered to each school district. The participation letters described the need for the study, how their participation would be useful, and how this study will potentially further the understanding of student enrollment behavior in agricultural programs. The first contact was made to the superintendent of each school district, followed by the principal of each high school approved to participate in the study, followed by the 11th grade or 12th grade teacher of the participating classes. The researcher explained the purpose of the study to the students in each class approved to participate and provided each student with a parent/guardian permission and child assent form to be signed and returned before participating in the survey. The researcher returned to each class after one week to administer the survey to each student who received parental permission. Any student without a signed parent/guardian permission form was not permitted to participate in completing the survey (See Appendix B).

Data Analysis

The surveys were coded and analyzed using the IBM Statistical Package for the Social Sciences (SPSS, version 19.0) for Microsoft Windows provided by The Pennsylvania State University. The researcher also obtained assistance from the Statistical Consulting Center provided by The Pennsylvania State University's Department of Statistics. Descriptive statistics were used to analyze the data which included frequency distributions, means, and standard deviations. The data were further analyzed using independent sample t-test tests for 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). The independent sample t-test was utilized because the researcher sought to compare the mean scores between two groups within each independent variable. One-way analysis of variance (ANOVA) was also used to compare the mean scores of scales computed by factor analysis for residential areas (Smith-Hollins, 2009). The ANOVA statistic was utilized because the researcher sought to compare the mean scores between four groups within a variable. Before conducting data analysis, choice "7 = Don't know," was removed from the raw data due to its potential to skew the data as a result of its placement on the scale. Significant differences were determined by comparison of the alpha scale of $p < .05$ based on a 95% Confidence Interval. 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 3
Summary of Research Questions, Variables, and Scale of Measurement

Research Questions	Variables	Scale of Measurement	Analysis Technique
1. What are the demographic characteristics of the students in select high schools in Southern New Jersey?	*Independent* • Gender • Race/Ethnicity • Community Type • Age • Classification • Family Involvement in Agriculture	Nominal Nominal Nominal Ratio Nominal Nominal	*Descriptive statistics:* Frequency and percent
2. Is there any difference in the level of students' exposure to agriculture and awareness of agricultural programs/organizations by gender, race/ethnicity, family involvement in agriculture, and community type?	*Dependent* • Awareness 1 = Completely Unaware 2 = Unaware 3 = Slightly Unaware 4 = Slightly Aware 5 = Aware 6 = Completely Aware 7 = Don't Know *Independent* • Gender • Race/Ethnicity • Community Type • Family Involvement in Agriculture	Ordinal Nominal	*Descriptive statistics:* Frequency, mean, and standard deviation *Inferential statistics:* Factor Analysis Independent t-tests ANOVA
3. Is there any difference in the level of student awareness of career opportunities in agriculture and related fields by gender, race/ethnicity, family involvement in agriculture, and community type?	*Dependent* • Awareness 1 = Completely Unaware 2 = Unaware 3 = Slightly Unaware 4 = Slightly Aware 5 = Aware 6 = Completely Aware 7 = Don't Know *Independent* • Gender • Race/Ethnicity • Community Type • Family Involvement in Agriculture	Ordinal Nominal	*Descriptive statistics:* Frequency, mean, and standard deviation *Inferential statistics:* Factor Analysis Independent t-tests ANOVA

Table 3 (continued)
Summary of Research Questions, Variables, and Scale of Measurement

Research Questions	Variables	Scale of Measurement	Analysis Technique
4. What are the students' perceived barriers to enrollment in agricultural programs and is there any difference by gender, race/ethnicity, family involvement, and community type?	*Dependent* • Barrier Statements 1 = Not at all a Barrier 2 = Somewhat a Barrier 3 = Neutral 4 = Barrier 5 = Very much a Barrier *Independent* • Gender • Race/Ethnicity • Community Type • Family Involvement in Agriculture	Ordinal Nominal	*Descriptive statistics:* Rank, frequency, mean, and standard deviation *Inferential statistics:* Factor Analysis Independent t-tests ANOVA

Chapter 4

FINDINGS

Demographic Profile of Respondents

There were 89 students who completed the survey instrument, yielding a 51.1% response rate. Although all of the surveys were usable for the data analysis, some questions were not answered which caused variation in the frequencies for certain responses. A complete profile of the demographic characteristics can be found in Table 4.

Gender and Age

Thirty-two percent of the students who participated in the survey were male, while 68% were female. The ages of the respondents ranged from age 15-19 and followed a normal distribution 4.5%, 24.7%, 36%, 31.5%, and 3.4% respectively.

Race/Ethnicity

A large majority of the respondents were white (70.8%), with the remainder of respondents being African American,11.2%, Asian, 4.5%, Hispanic/Latino Ethnicity, 3.4%, and Native Hawaii/Other Pacific Islander, American Indian/Alaska Native, Egyptian, and Pakistani made up the remaining categories with each making up 1.1%, respectively. Almost 6 percent (5.6%) of the respondents classified themselves as being of two or more races; another 1.1% was classified themselves as other.

Residential Area

Participants were asked to identify the residential area where they grew up or spent the majority of their lives. Seventy-seven point five percent (n=69) of the respondents

live/lived in suburban areas, while 3.4% live/lived in rural/farm areas, 4.5% in rural/non-farm areas, and 14.6% (n=13) in urban/city areas.

Academic Classification

In this study, the researcher focused on junior and senior grade level students who were in the process of deciding what major to pursue in college. Therefore, participants were asked to identify their academic classification. Almost sixty-five percent (64.8%) of the respondents were juniors, 33% were seniors, and freshmen and sophomores made up 1.1% and 1.1%, respectively.

Family Involvement in Agriculture

The majority of respondents, 71.9% (n=64), indicated that they had no adults in their family involved in an agriculture careers or lifestyle while 28.1% (n=25) indicated that they had/have an adult in their family involved in an agriculture related career or lifestyle.

Favorite Academic Subject

Respondents were asked to identify their favorite academic subject in an attempt to identify the students' interests. The top three subject identified were history at 25.3% (n = 22), science at 24.1% (n = 21), and mathematics at 18.4% (n = 16). A small number of respondents also identified academic subjects related to agriculture as being their favorite subjects. These subjects were environmental science at 2.3% (n = 2) and horticulture at 1.1% (n = 1). See Table 4 continued.

Table 4
Demographic Profile of Respondents

Characteristic	f	Percent
Gender:		
Male	28	31.5
Female	61	68.5
Total	89	100.0
Age		
Fifteen (15)	4	4.5
Sixteen (16)	22	24.7
Seventeen (17)	32	36.0
Eighteen (18)	28	31.5
Nineteen (19)	3	3.4
Total	89	100.0
Race/Ethnicity		
White	63	70.8
Black	10	11.2
Asian	4	4.5
Hispanic/Latino Ethnicity	3	3.4
Native Hawaii/Other Pacific Islander	1	1.1
American Indian/Alaska Native	1	1.1
Egyptian	1	1.1
Pakistani	1	1.1
Two or more races	5	5.6
Other	1	1.1
Total	89	100.0
Residential Area		
Rural/Farm	3	3.4
Rural/Non-farm	4	4.5
Suburban	69	77.5
Urban/City	13	14.6
Total	89	100.0
Academic Classification		
Freshman	1	1.1
Sophomore	1	1.1
Junior	57	64.8
Senior	29	33.0
Total	88	100.0
Family Involvement in Agriculture		
Yes	25	28.1
No	64	71.9
Total	89	100.0

Table 4 (continued)
Demographic Profile of Respondents

Characteristic	f	Percent
Favorite Academic Subject		
Math	16	18.4
Science	21	24.1
English	12	13.8
History	22	25.3
Foreign Language	6	6.9
Art	2	2.3
Environmental Science	2	2.3
Horticulture	1	1.1
Physics	1	1.1
Psychology	3	3.4
Gym	1	1.1
Total	87	100.0

Awareness of Agricultural Programs/Organizations

Participants were asked to indicate their level of awareness of programs/organizations related to agriculture. There were 15 variables in the survey instrument. Factor analysis was used to reduce the number of variables into smaller, workable scales. Principal Component Analysis (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 for to be used for further analysis (Smith-Hollins, 2009). The factor analysis resulted in four scales: "Natural Resources, Youth Education Programs, Community Outreach Programs, and Nationally Recognized Agriculture Programs." See Table 5. The items Farm Shows/Country Fairs and Farm Bureau were excluded from the scales due to the factor analysis results and the recommendation of the Statistical Consulting Center at Pennsylvania State University.

A Cronbach's alpha was conducted to determine the reliability of each scale. The alpha levels were compared to the original study (Smith-Hollins, 2009) and were found to score closely to the original results. The original instrument received the following alpha scores: awareness of natural resources (.843 = very good reliability); awareness of youth education programs (.837 = very good reliability); and awareness of nationally recognized agriculture programs (.704 = good reliability). The modified instrument received the following alpha scores: awareness of natural resources (.925 = excellent reliability); awareness of youth education (.859 = very good reliability); awareness of community outreach programs (.594 = unacceptable) and awareness of nationally recognized agriculture programs (.808 = very good reliability). See Table 5. Due to the unacceptable reliability score obtained for "awareness of community outreach programs" (less than .700), the results related to this scale should be interpreted with caution throughout this study. Also, this scale was not excluded from the study because the items within the scale were important to the study. Frequency, mean, and standard deviation are reported for each item on the survey (See Table 6).

Table 5
Reliability for Factor Analysis of Awareness of Agriculture Related Programs/Organizations

Factors	Items on Survey	Number of Items	Alpha
Awareness of Natural Resources	Fishing, Hunting	2	.925
Awareness of Youth Education Programs	EFNEP, National FFA Org., High School Ag Programs, Soil Conservation Service, MANRRS	5	.825
Awareness of Community Outreach Programs	4-H, Cooperative Extension	2	.594
Awareness of State/Nationally Recognized Agriculture Programs	Farm Shows/County Fairs, USDA, EPA	3	.808

Table 6
Frequency, Mean, and Standard Deviation for Students' Awareness of Programs/Organizations in Agriculture

Factors	n	M	SD
Awareness of Natural Resources			
Fishing	89	4.94	1.21
Hunting	89	4.78	1.41
Community Outreach Programs			
EFNEP	81	2.35	1.45
National FFA Organization	80	2.30	1.56
High School Agriculture Programs	81	3.43	1.72
MANRRS	81	2.44	1.57
Awareness of Youth Education			
4-H	79	2.15	1.68
Cooperative Extension	78	1.77	1.19
Awareness of Nationally Recognized Agriculture Programs			
State/National Parks	86	4.60	1.65
USDA	86	3.98	1.67
EPA	85	3.80	1.79

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Gender

There was a significant difference found between males and females in the level of awareness of community outreach programs related to agriculture. Male respondents were found to be significantly more aware of community outreach programs than female respondents (t = -2.10, p = .040). The mean scores for males were significantly higher (M = -.476, SD = .875) than for females (M = .148, SD = .999) for their awareness of community outreach programs. However, there were no significant differences in the mean scores between males (M = -.122, SD = .664) and females (M =.038, SD = 1.09) toward awareness

of natural resources, awareness of nationally recognized agriculture programs between males (*M* = .084, *SD* = 1.12) and females (*M* = -.026, *SD* = .974), or awareness of youth education programs between males (*M* =.443, *SD* = 1.06) and females (*M* = -.135, *SD* = .950). See Table 7

Table 7
Independent t Test Results for Awareness of Programs/Organizations by Gender

Awareness Factor By Gender	n	Mean	SD	T	p
Awareness of Natural Resources					
Male	14	-.122	.664	-.517	.607
Female	45	.038	1.09		
Total	59				
Awareness of Youth Education Programs					
Male	14	.433	1.06	1.09	.063
Female	45	-.135	.950		
	59				
Community Outreach Programs					
Male	14	-.476	.875	-2.10	.040*
Female	45	.148	.999		
Total	59				
Awareness of Nationally Recognized Agriculture Programs					
Male	14	.084	1.12	.359	.721
Female	45	-.026	.974		
Total	59				

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Aware, 6= Completely Aware, and 7= Don't Know. *p < .05, two-tailed.

Race/Ethnicity

There was a significant difference found between whites and non-whites in their awareness of community outreach programs. Whites (*M* = .114, *SD* = 1.10) were significantly higher than non-whites (*M* = -.335, *SD* = .533). Due to the low alpha score

received for this scale, these results should be interpreted with caution. There were no significant differences found between the mean scores of whites and non-whites for awareness in natural resources, awareness of youth education, or awareness of nationally recognized programs. See Table 8.

Table 8
Independent t Test Results for Awareness of Programs/Organization by Race/Ethnicity

Awareness Factor By Race/Ethnicity	N	Mean	SD	T	p
Awareness of Natural Resources					
White	44	.084	.127	1.10	.274
Non-White	15	1.37	.355		
Total	59				
Awareness of Youth Education					
White	44	.056	1.050	.729	.469
Non-White	15	-.163	.831		
Total	59				
Community Outreach Programs					
White	44	.114	1.100	2.09	.042*
Non-White	15	-.335	.533		
Total	59				
Awareness of Nationally Recognized Agriculture Programs					
White	44	.137	.930	1.84	.071
Non-White	15	-.402	1.120		
Total	59				

Note. Scale: 1= Completely Unaware, 2= Unaware, 3= Slightly Unaware, 4= Aware, 5= Aware, 6= Completely Aware, and 7= Don't Know. *p < .05, two-tailed.

Family Involvement in Agriculture

There were no significant differences found between respondent's family involvement in agriculture and their awareness of any of the four scales. There was a notable difference between those who responded "yes" to having any family involved in agriculture

(*M* = .407, *SD* = 1.15) and those who responded "no" (*M* = -.127, *SD* = .928) in their awareness of community outreach programs. However, these results were not significant and should be interpreted with caution due to the low Cronbach's alpha score (See Table 9).

Table 9
Independent t Test Results for Awareness for Program/Organization by Family Involvement in Agriculture

Awareness Factor By Family Involvement in Agriculture	N	Mean	SD	t	p
Awareness of Natural Resources					
Yes	44	-.348	1.24	-1.51	.137
No	15	.108	1.00		
Total	59				
Awareness of Youth Education					
Yes	44	-.139	1.34	-.596	.554
No	15	.043	.884		
Total	59				
Community Outreach Programs					
Yes	44	.407	1.150	1.78	.081
No	15	-.127	.928		
Total	59				
Awareness of Nationally Recognized Agriculture Programs					
Yes	44	.147	.929	.627	.533
No	15	-.046	1.030		
Total	59				

Note. Scale: 1= Completely Unaware, 2=Unaware, 3= Slightly Unaware, 4= Slightly Aware, 5= Aware, 6= Completely Aware.

Residential Area

The one-way ANOVA analysis compared the mean scores between the four residential areas for each scale and found no significant differences among the respondent's residential area and their awareness of programs/organizations related to agriculture (See Table 10).

Table 10
Means, Standard Deviations and ANOVA Results for Awareness of Programs/Organizations Related to Agriculture

Factors	Residence prior to college	N	*Mean	SD	F	p
Awareness of Natural Resources						
	Rural/Farm	2	-.089	.889	.408	.748
	Rural/Non-Farm	2	-.466	.906		
	Suburban	43	.083	.975		
	Urban	12	-.206	1.180		
	Total	59				
Awareness of Youth Education						
	Rural/Farm	2	1.310	.401	1.82	.154
	Rural/Non-Farm	2	.056	1.140		
	Suburban	43	-.141	.802		
	Urban	12	.277	1.480		
		59				
Community Outreach Programs						
	Rural/Farm	2	.779	.879	.577	.633
	Rural/Non-Farm	2	.365	1.140		
	Suburban	43	.018	1.040		
	Urban	12	-.261	.850		
	Total	59				
Awareness of Nationally Recognized Ag Programs						
	Rural/Farm	2	.265	.022	.283	.837
	Rural/Non-Farm	2	.052	1.160		
	Suburban	43	-.072	1.030		
	Urban	12	.206	1.010		
	Total	59				

Note. Scale: 1= Completely Unaware, 2=Unaware, 3= Slightly Unaware, 4= Slightly Aware, 5= Aware, 6= Completely Aware.

Awareness of Careers Opportunities in Agriculture

Respondents were asked to rate their level of awareness of career opportunities in agriculture. This section of the survey included 17 items. The "Other" choice was eliminated based on a high frequency of missing data. A factor analysis was performed that reduced the dependent variables to three scales: "Production/Business, Traditional Careers in Agriculture, and Animal Sciences."

A Cronbach's alpha was run to determine the reliability of the scales and compared to the original instrument. The original instrument received excellent reliability scores of .918 and .900, respectively, for both awareness of traditional agriculture careers and awareness of non-traditional agriculture programs. The modified instrument received a very good reliability score of .892 for awareness of production/business careers related to agriculture and good reliability scores for awareness of animal science careers, reliability of .797 and awareness of traditional careers in agriculture, reliability of .783 (See Table 11). Frequency, mean, and standard deviation are noted for each item on the survey within each factor scale (See Table 12).

Table 11
Reliability for Factor Analysis of Awareness of Career Opportunities in Agriculture

Factors	Items from Survey	Number of Items	Alpha
Awareness of Production & Business Careers Related to Agriculture	Food Processing, Animal Breeder, Greenhouse/Gardening, Landscaping Specialist, Fruit and Vegetable Production, Agriculture Business Management, Agricultural Law	7	.892
Awareness of Animal Science Careers in Agriculture	Animal Scientist, Wildlife & Fisheries Sciences, Veterinary Medicine	3	.797
Awareness of Traditional Careers in Agriculture	Agricultural Engineer, Agriculture Science Teacher, Community Educator, Forestry Scientist, Dairy Production	5	.783

Table 12
Frequency, Mean, and Standard Deviation for Students' Awareness of Careers in Agriculture

Factors	n	M	SD
Awareness of Production/Business Careers Related to Agriculture			
Food Processing	86	4.26	1.50
Animal Breeder	86	4.47	1.49
Greenhouse/Gardening	85	4.71	1.19
Landscaping Specialist	84	4.50	1.42
Fruit and Vegetable Production	85	4.46	1.31
Agriculture Business Management	88	3.45	1.55
Agricultural Law	86	2.94	1.51
Awareness of Animal Science Careers in Agriculture			
Animal Scientist	86	4.52	1.35
Wildlife & Fisheries Scientist	87	4.13	1.63
Veterinary Medicine	86	4.43	1.61
Awareness of Traditional Careers in Agriculture			
Agricultural Engineer	89	2.97	1.60
Agriculture Science Teacher	89	3.56	1.75
Community Educator	88	3.92	1.63
Forestry Scientist	89	3.51	1.86
Dairy Production	85	4.51	1.34

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Gender

There were no significant differences found between males and females in their awareness of career opportunities in agriculture. The mean scores of males (M = -.198, SD = 1.130) and females (M = .074, SD = .949) displayed no significant differences in awareness of production and business careers related to agriculture. There was no significant difference in the mean scores of males (M = -.224, SD = .846) and females (M = .083, SD = 1.050) in their awareness of careers in animal sciences. There was also no significant difference

between males (*M* = .210, *SD* = 1.07) and females (*M* = .078, *SD* = .973) in their awareness of traditional careers in agriculture (See Table 13).

Table 13
Independent t Test Results for Awareness of Career Opportunities by Gender

Awareness Factor By Gender	n	Mean	SD	t	P
Awareness of Production & Business Careers Related to Agriculture					
Male	19	-.198	1.130	-1.01	.315
Female	51	.074	.949		
Total	70				
Awareness of Animal Science Careers in Agriculture					
Male	19	-.210	1.070	-1.07	.287
Female	51	.078	.973		
Total	70				
Awareness of Traditional Careers in Agriculture					
Male	19	-.224	.846	-1.15	.256
Female	51	.083	1.050		
Total	70				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Race/Ethnicity

No significant differences were found between whites and non-whites in their awareness of career opportunities in agriculture. The mean scores between whites (*M* = -.020, *SD* = .970) and non-whites (*M* = -.061, *SD* = 1.12) indicated that there was no significant difference in their awareness of production and business careers related to agriculture. There was a slight difference found in the awareness of animal science careers between whites (*M* = .007, *SD* = .881) and non-whites (*M* = -.021, *SD* = 1.34). There was also no significant difference found between whites (*M* = .122, *SD* = .951) and non-whites

(*M* = -.379, *SD* = 1.08) in their awareness of traditional career opportunities in agriculture (See Table 14).

Table 14
Independent t Test Results for Awareness of Career Opportunities by Race/Ethnicity

Awareness Factor By Race/Ethnicity	n	Mean	SD	t	p
Awareness of Production & Business Careers Related to Agriculture					
White	53	.020	.970	.286	.775
Non-White	17	-.061	1.120		
Total	70				
Awareness of Animal Science Careers in Agriculture					
White	53	.007	.881	.099	.922
Non-White	17	-.021	1.34		
Total	70				
Awareness of Traditional Careers in Agriculture					
White	53	.122	.951	1.83	.072
Non-White	17	-.379	1.080		
Total	70				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Family Involvement in Agriculture

There were no significant differences found between respondents who answered "yes" to having any family member(s) involved in agriculture and respondents who answered "no" to having any family member(s) involved in agriculture regarding their awareness of career opportunities in agriculture. The mean scores for those who answered "yes" (*M* = -.105, *SD* = 1.19) and those who answered "no" (*M* = .042, *SD* = .924) showed no significant difference in their awareness of careers in production and business related to agriculture. There was no significant difference in the mean scores of those who answered "yes" (*M* = .230, *SD* = 1.10) and those who answered "no" (*M* = -.092, *SD* = .951) in their awareness of

animal science careers in agriculture. There was also no significant difference in mean scores of those who answered "yes" (*M* = -.680, *SD* = 1.16) and those who answered "no" (*M* = .027, *SD* = .940) in their awareness of careers in traditional careers in agriculture (See Table 15).

Table 15
Independent t Test Results for Awareness of Career Opportunities in Agriculture by Family Involvement in Agriculture

Awareness Factor By Family Involvement in Agriculture	n	Mean	SD	t	p
Awareness of Production & Business Careers Related to Agriculture					
Yes	20	-.105	1.190	-.552	.583
No	50	.042	.924		
Total	70				
Awareness of Animal Science Careers in Agriculture					
Yes	20	.230	1.010	1.22	.226
No	50	-.092	.951		
Total	70				
Awareness of Traditional Careers in Agriculture					
Yes	20	-.068	1.160	-.357	.722
No	50	.027	.940		
Total	70				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Residential Area

An ANOVA was conducted to analyze the difference between the awareness of career opportunities in agriculture. The ANOVA found no significant differences in awareness of career opportunities in agriculture between residential areas (See Table 16).

Table 16
Means, Standard Deviations and ANOVA Results for Awareness of Career Opportunities Related to Agriculture

Awareness Factors	Current Residence	n	Mean	SD	F	p
Awareness of Production & Business Careers Related to Ag						
	Rural/Farm	3	-.139	.214	.692	.560
	Rural/Non-Farm	3	-.547	.890		
	Suburban	52	.095	.959		
	Urban	12	-.238	1.290		
	Total	70				
Awareness of Animal Science Careers in Ag						
	Rural/Farm	3	-.230	.872	.108	.955
	Rural/Non-Farm	3	.079	1.500		
	Suburban	52	.031	.976		
	Urban	12	-.095	1.130		
	Total	70				
Awareness of Traditional Careers in Ag						
	Rural/Farm	3	.796	.823	.877	.458
	Rural/Non-Farm	3	.265	.623		
	Suburban	52	-.087	.980		
	Urban	12	.110	1.180		
	Total	70				

Note. Scale: 1=completely unaware, 2=unaware, 3=slightly unaware, 4=slightly aware, 5=aware, 6=completely aware, and 7=don't know.

Perceived Barriers to Enrollment in Colleges of Agriculture

Respondents were asked to respond to dependent variables regarding potential barriers to enrollment in agricultural programs. Each variable was ranked according to the mean score of the overall respondent group (See Table 17). Overall, respondents indicated that "lack of contact with recruiters in agriculture" (M = 3.29) as being more of a barrier than the other variables.

Table 17
Perceived Barriers to Enrollment in Agricultural Programs

Barriers	Rank	M	SD
Lack of contact with recruiters in agriculture	1	3.29	1.31
Interest in agriculture	2	3.25	1.34
Lack of opportunity to work on a farm growing up.	3	3.21	1.46
Lack of career opportunities available in agriculture.	4	3.05	1.26
Lack of promotional materials about agriculture.	5	3.00	1.31
Lack of mentors/role models in agriculture	6	2.97	1.28
Lack of relatives/significant others involved in agriculture.	7	2.82	1.36
Lack of discussion from guidance counselors.	8	2.71	1.40
Lack of parental support.	9	2.36	1.50
Society's negative image of agriculture.	10	2.23	1.30
Lack of people of color in agriculture.	11	2.03	1.41
Ridicule by peers regarding agriculture.	12	2.03	1.22

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier.

A factor analysis was conduct to reduce the variables to factor scales. Three factor scales resulted from the factor analysis: "Individual Related Barriers, Image of Agriculture, and Interest in Agriculture" (See Table 18). The variable "Interest in Agriculture" was

separated into its own scale; therefore, it was assigned as a single variable. A Cronbach's alpha was employed to determine the reliability of the scales. The original instrument received good reliability alpha scores for individual related barriers (Cronbach's alpha = .770) and image of agriculture barriers (Cronbach's alpha = .778). Career related barriers received an unacceptable Cronbach's alpha score of .681 because it did not meet the .70 criteria. The modified instrument received the following alpha scores: individual related barriers (Cronbach's alpha of .868 = very good reliability) and image of agriculture barriers (Cronbach's alpha of.785 = good reliability). Interest in agriculture was used as a stand-alone variable as a result of the factor analysis and was not excluded because it is a very important component of this study. As a single variable, "Interest in Agriculture" did not generate an alpha score (See Table 18). Frequency, mean, and standard deviations are reported for perceived barriers to enrollment in colleges of agriculture (See Table 19).

Table 18
Reliability for Factor Analysis of Barriers to Enrollment

Factors	Items from Survey	Number of Items	Alpha
Individual Related Barriers	Lack of mentors/role models, Lack of relatives/significant others involved in ag, Lack of opportunity to work on a farm growing up, Lack of contact with recruiters in ag, Lack of career opportunities available in ag, Lack of discussion from guidance counselors, Lack of promotional materials about ag	7	.868
Image of Agriculture Barriers	Lack of parental support, Lack of people of color in agriculture, Society's negative image of agriculture, Ridicule by peers regarding agriculture	4	.785
Interest in Agriculture Barriers	Interest in agriculture	1	

Table 19
Frequency, Mean, and Standard Deviation for Students' Perceived Barriers to Enrollment in Colleges of Agriculture

	n	M	SD
Individual Related Barriers			
Lack of mentors/role models	87	2.97	1.28
Lack of relatives/significant others involved in agriculture	87	2.82	1.36
Lack of opportunities to work on a farm growing up	87	3.21	1.46
Lack of contact with recruiters	85	3.29	1.32
Lack of career opportunities available in agriculture	87	3.05	1.26
Lack of discussion from guidance counselors	87	2.71	1.40
Lack of promotional materials about agriculture	86	3.00	1.31
Image of Agriculture Barriers			
Lack of parental support	87	2.36	1.50
Lack of people of color in agriculture	87	2.03	1.41
Society's negative image of agriculture	87	2.23	1.31
Ridicule by peers regarding agriculture	87	2.03	1.22
Interest in Agriculture	87	3.25	1.34

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier.

Gender

A significant difference was found between males and female students (t = 2.54, p = .016) in the image of agriculture barriers to enrollment in colleges of agriculture (See Table 19). The mean score for males on image of agriculture barriers (M = .482, SD = 1.18) was significantly higher than for females (M = -.192, SD = .855). There were no significant differences found between males (M = .217, SD = 1.25) and females (M = -.087, SD = .875) in individual related barriers. There was also no significant difference found between males

(*M* = -.040, *SD* = .750) and females (*M* = .016, *SD* = 1.09) for interest in agriculture (See Table 20).

Table 20
Independent t Test Results for Barriers to Enrollment by Gender

Barriers by Gender	n	Mean	SD	t	p
Individual Related Barriers					
Male	24	.217	1.250	1.09	.285
Female	60	-.087	.875		
Total	84				
Image of Agriculture Barriers					
Male	24	.482	1.180	2.54	.016*
Female	60	-.192	.855		
Total	84				
Interest in Agriculture Barriers					
Male	24	-.040	.750	-.276	.783
Female	60	.016	1.090		
Total	84				

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. *p > .05, two-tailed.

Race/Ethnicity

A significant difference was found between whites and non-whites (*t* = -1.99, *p* > .050) for the individual related barriers to enrollment in colleges of agriculture (See Table 20). The mean scores for the non-whites (*M* = .348, *SD* = 1.10) was significantly higher than for whites (*M* = -.131, *SD* = .936). There were no significant differences found in the mean scores between whites (*M* = -.085, *SD* = .974) and non-whites (*M* = .227, *SD* = 1.05) for image of agriculture barriers. There were also no significant differences found in the interest in agriculture between whites (*M* = -.014, *SD* = .982) and non-whites (*M* = .037, *SD* = 1.07). See Table 21.

Table 21
Independent t Test Results for Barriers to Enrollment by Race/Ethnicity

Awareness Factor By Race/Ethnicity	n	Mean	SD	t	p
Individual Related Barriers					
White	61	-.131	.936	-1.99	.050*
Non-White	23	.348	1.100		
Total	84				
Image of Agriculture Barriers					
White	61	-.085	.974	-1.28	.204
Non-White	23	.227	1.050		
Total	84				
Interest in Agriculture					
White	61	-.014	.982	-.209	.835
Non-White	23	.037	1.070		
Total	84				

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier. *p < .05, two-tailed.

Family Involvement in Agriculture

There were no significant differences found between respondents who answered "yes" to having any family involved in agriculture and respondents who answered "no" to having any family involved in agriculture. There was no significant difference in mean scores between those who answered "yes" (*M* = .011, *SD* = .939) and those who answered "no" (*M* = -.004, *SD* = 1.03) for individual related barriers. No significant difference was found in the mean scores between those who answered "yes" (*M* = .145, *SD* = 1.06) and those who answered "no" (*M* = -.051, *SD* = .980). The mean scores between the "yes" (*M* = .178, *SD* = 1.04) and "no" (*M* = -.063, *SD* = .985) respondents also indicated no significant difference for interest in agriculture (See Table 22).

Table 22
Independent t Test Results for Barriers to Enrollment by Family Involvement in Agriculture

Awareness Factor By Family Involvement in Agriculture	n	Mean	SD	t	p
Individual Related Barriers					
Yes	22	.011	.939	.061	.951
No	62	-.004	1.030		
Total	84				
Image of Agriculture Barriers					
Yes	22	.145	1.060	.790	.432
No	62	-.051	.980		
Total	84				
Interest in Agriculture					
Yes	22	.178	1.040	.974	.333
No	62	-.063	.985		
Total	84				

Note. Scale: 1=not at all a barrier, 2=somewhat a barrier, 3=neutral, 4=barrier, and 5=very much a barrier.

Residential Area

An ANOVA was conducted to compare the means score for barriers to enrollment which showed that there were no significant differences among the residential areas (See Table 23).

Table 23
Means, Standard Deviations and ANOVA Results for Barriers to Enrollment in Colleges of Agriculture

Barriers to Enrollment	Current Residence	n	Mean	SD	F	p
Individual Related Barriers						
	Rural/Farm	3	-.364	.302	.352	.788
	Rural/Non-Farm	4	.179	.273		
	Suburban	66	.040	1.050		
	Urban	11	-.203	.961		
	Total	84				
Image of Agriculture						
	Rural/Farm	3	.716	.122	1.22	.309
	Rural/Non-Farm	4	.389	.895		
	Suburban	66	-.101	1.010		
	Urban	11	.270	1.000		
	Total	84				
Interest in Agriculture						
	Rural/Farm	3	-.623	.363	1.38	.255
	Rural/Non-Farm	4	-.804	1.190		
	Suburban	66	.067	.964		
	Urban	11	.061	1.180		
	Total	84				

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter includes a restatement of the purpose and research questions, a summary of procedures, and the conclusions and recommendations of this study. The chapter is organized as follows: purpose and research questions, procedures, summary of findings, conclusions and discussion, recommendations, and recommendations for future research.

Purpose and Research Questions

The purpose of this study was to identify and describe the level of awareness of agricultural related programs and organizations; the level of awareness of career opportunities in agriculture; and barriers to enrollment in agricultural education programs of minority and non-minority students. By identifying these factors, high school agriculture programs and colleges of agriculture can improve current recruitment strategies or develop new recruitment strategies to encourage more students to enroll in agricultural programs and/or pursue careers in agriculture.

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 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 of career opportunities in agriculture and related fields by gender, race/ethnicity, family involvement in agriculture, and residential area?

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

The population for this study consisted of currently enrolled students in southern New Jersey public high schools' 11th grade and 12th grade classes. The survey instrument used in this study was modified based on the review of literature and the level of education of the respondents. Part one consisted of 15 statements and was modified to include one additional agricultural program/organization and an "Other" statement for respondents to indicate awareness of a program/organization not included in the list. This section was measured using a seven-point Likert-type scale ranging from 1 = Completely Unaware to 7 = Don't know. Part two consisted of 17 statements and was modified by omitting certain agricultural careers, modifying the names of certain careers to be better understood by secondary education students, and the addition of other careers. The statement regarding the source of information about career opportunities in agriculture was also modified to serve secondary education respondents. This section was measured using the same seven-point Likert-type scale from part one, ranging from 1 = Completely Unaware to 6 = Aware to 7 = Don't Know. Part three consisted of 13 statements and was modified to include an "Other" choice for

respondents to indicate a perceived barrier to enrollment in agricultural programs not included in the list. This section was measured using a five-point Likert-type scale ranging from 1 = Not at all a Barrier to 5 = Very Much a Barrier. Part four regarding demographic characteristics of respondents consisted of 8 multiple choice and open-ended questions also modified to serve secondary education respondents.

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 modified survey used for this study was reviewed and approved by the Office of Research Protections (IRB# 36151) at The Pennsylvania State University prior to the collection of data. The data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS, v. 19.0). Descriptive statistics included frequencies, percentages, mean, and standard deviations. Inferential statistics included independent samples t-test and one-way analysis of variance (ANOVA). A post hoc reliability analysis was obtained after the data was collected by comparing the Cronbach's alpha to the original instrument to establish content validity of the modified instrument used in this study.

Summary of Findings

Research Question One – Demographic Characteristics

Research question one sought to identify the demographic characteristics of currently enrolled high school students in select southern New Jersey high schools. 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%). These demographic characteristics were consistent with the demographic characteristics found in the original study (Smith-Hollins, 2009) as well as Balschweid (2002) and Esters and Bowen (2005). The race/ethnicity demographics of the respondents were also representative of the population of New Jersey according to the United State Census Bureau (2010). 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 that of Balschweid (2002). The majority of respondents were found to be between the ages of 16-18 years of age, 24.7%, 36.0%, and 31.5%, respectively. Most of the academic classifications of the respondents were juniors at 64.8% and seniors at 33.0% (See Table 5).

Research Question Two – Awareness of Agricultural Programs/Organizations

Respondents were compared based upon gender, race/ethnicity, family involvement, and residential area. Respondents were asked to rate their level of awareness of agricultural programs and organizations. Factor analysis was employed to reduce the large number of dependent variables down to smaller subsets (or scales) to use for the data analysis. The four scales that resulted from the factor analysis were: awareness of Natural Resources (fishing

and hunting); awareness of Youth Education Programs (EFNEP, National FFA Organization, High School Agriculture, MANRRS, and Soil Conservation Service); awareness of Nationally Recognized Programs Related to Agriculture (State/National Parks, USDA, and EPA); and awareness of Community Outreach Programs (4-H and Cooperative Extension).

The mean scores for males higher (M = -.476, SD = .875) were significantly than females (M = .148, SD = .999) on their awareness of community outreach programs. However, males and females were found to have little awareness of natural resources, nationally recognized programs, and community outreach programs overall (See Table 7). Due to the low Cronbach's alpha score for awareness of community outreach programs, these results should be interpreted with concern. Whites (M = .114, SD = 1.10) were significantly higher than non-whites (M = -.335, SD = .533) for awareness of community outreach programs (See Table 8). There were no significant differences found between respondent's family involvement in agriculture and their awareness of any of the four scales (See Table 9).

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 generally found to be slightly aware of natural resources (M = 4.82), unaware of community outreach programs (M = 2.63), completely unaware of youth education programs (M = 1.96), and slightly aware of nationally recognized programs (M = 4.13). See Table 6.

Research Question Three – Awareness of Career Opportunities in Agriculture

Respondents were asked to rate their level of awareness of careers in agriculture. These data were reduced to three scales: awareness of Production/Business Careers (Food

Processing, Animal Breeder, Greenhouse/Gardening, Landscaping Specialist, Fruit and Vegetable Production, Agriculture Business Management, Agricultural Law); awareness of Animal Science Careers (Animal Scientist, Wildlife & Fisheries Scientist, Veterinary Medicine); and awareness of Traditional Careers (Agricultural Engineer, Agriculture Science Teacher, Community Educator, Forestry Scientist, Dairy Production). There were no significant differences found between the independent variables for any of the three scales (See Tables 13-15). There were also no differences found between residential areas (See Table 16).

Overall, respondents were generally found to be slightly aware of production/business careers in agriculture (M = 4.11) and animal science careers (M =4.36), and were slightly unaware of traditional careers in agriculture (M = 3.69). See Table 12.

Research Question Four – Barriers to Enrollment

Respondents were asked to rate how much of a barrier certain variables were to enrollment in colleges of agriculture or agriculture programs. According to the overall mean scores, "lack of contact with recruiters" (M = 3.29), "interest in agriculture" (M = 3.25), and "lack of opportunity to work on a farm growing up" (M = 3.21), were ranked as the top three potential barriers to enrollment in colleges of agriculture (See Table 17). A factor analysis was employed to reduce the variables into three scales: individual related barriers, image of agriculture barriers, and interest in agriculture (See Table 18). Males and females differed significantly in their perception of image of agriculture barriers (t = 2.54, p < .016). See Table 20. There was also a significant difference found between whites and non-whites (t = -1.99, p < .050) for individual related barriers to enrollment in colleges of agriculture (See

Table 21). There were no significant differences found in potential barriers to enrollment for family involvement and residential area (See Tables 22 and 23).

Overall, respondents were found to have a neutral perception of individual related barriers (M = 3.0) as being potential barriers to enrollment. Respondents perceived image of agriculture barriers as being "somewhat a barrier" to enrollment (*M* = 2.16), and were generally neutral in regard to interest in agriculture (*M* = 3.25). See Table 19.

Conclusions and Discussion

This study utilized a purposive sample to assess the level of agricultural awareness and perceived barriers to enrollment in colleges of agriculture of high school students in southern New Jersey. Therefore, the following conclusions are specific to the respondents of this study and should not be generalized to the larger population. The findings showed respondents were primarily female, white, from suburban areas, and had no family members involved in agriculture. The findings also revealed that the respondents had a general lack of awareness in both agriculture related programs/organizations and careers in agriculture.

This study identified three barriers that were perceived as the highest ranking barriers to enrollment in colleges of agriculture. These three barriers were: lack of contact with recruiters, interest in agriculture, and lack of opportunity to work on a farm growing up. These findings indicate that students lack exposure to both recruiters for colleges of agriculture and exposure to agricultural experiences. Both of these barriers can have an influence on the students' lack of interest in agriculture. A general lack of knowledge and

awareness of programs/organizations and careers available through agriculture may also be the driving force behind students' lack of interest in agriculture.

Colleges and universities should allocate more recruiters specifically for colleges of agriculture which was also suggested by Smith-Hollins (2009) and Jones and Larke (2001) as a result of similar findings. Students may have 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, high school teachers need to integrate agriculturally related materials into their curricula to expose their students to concepts and practices within and around agriculture. Various agricultural resources such as the website, *Marketplace for the Mind* provided by the Pennsylvania Department of Agriculture which provides teachers, students, and community and local government leaders with a variety of lessons, activities, and information for each group. Student interest in agriculture is a very important factor in enrollment to agricultural programs for the secondary and collegiate levels. The demographic characteristics revealed that 24.1% of the students favored science and 18.4% of the students favored mathematics. High school teachers and college recruiters should focus on students with these interests by introducing students to the vast career opportunities within and related to agriculture and the importance of these subjects in essentially every field of agriculture.

Recommendations

The following recommendations were made based on the findings and conclusions of this study:

1. Students should be introduced to various programs/organizations related to agriculture at earlier stages of education to develop a better understanding of agriculture throughout life.
2. Educators in each level of education should incorporate agricultural topics and learning exercises into the curriculum to increase student knowledge in and about agriculture and to provide agriculture related experiences.
3. To increase student interest in agriculture, educators should utilize teaching materials and curricula that demonstrate the importance and relevance of agriculture to the students' daily lives.
4. Secondary school educators should provide more opportunities for career exploration in agricultural fields which are expected to increase over the next 5-10 years.
5. Secondary agriculture programs and colleges of agriculture should focus their recruitment efforts towards more "non-traditional" students.
6. Colleges and universities should develop strategies to provide more opportunities for students to meet with recruiters via college fairs, career fairs, school/community events, classroom presentations, etc.
7. Educators, administrators, New Jersey Department of Education, and New Jersey Department of Agriculture should collaborate to develop a universal curriculum that emphasizes agricultural learning experiences to be used in each level of education.

8. New Jersey Department of Education should establish specific educational standards to ensure that agriculture education is provided within any curriculum throughout the state.
9. New Jersey Department of Education should establish an agricultural school such as W.B. Saul in Philadelphia within various regions throughout the state to provide opportunities for interested students to focus their education in agricultural fields.

Recommendations for Future Research

1. Future research should replicate this study to include more high schools in southern New Jersey using random sampling in order to generalize the results.
2. This study should be replicated in southern New Jersey high schools and include an assessment of factors that influence students to enroll in secondary agriculture programs or colleges of agriculture.
3. Future research should ensure that the sample population includes schools from the four residential areas examined in this study (rural/farm, rural/non-farm, suburban, urban) to get a better comparison of agricultural awareness and barriers to enrollment between the groups.
4. Future research should replicate this study to identify if there are any additional barriers to enrollment in colleges of agriculture.
5. Future research should use middle school students to identify what they perceive as barriers to enrollment in secondary agriculture programs and/or colleges of agriculture.

6. Future research should use middle school students to assess their awareness of programs/organizations and career opportunities related to agriculture.

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Appendix A

INSTRUMENTATION

BARRIERS TO ENROLLMENT IN COLLEGES OF AGRICULTURE: PERCEPTIONS OF HIGH SCHOOL STUDENTS IN SOUTHERN NEW JERSEY

Part I: Awareness of Agricultural Related Programs/Organizations
DIRECTIONS: For each of the following, please rate your level of awareness with the agriculturally related program by circling the corresponding number.

1. Please indicate your awareness of the following agriculturally related programs.

Agriculture Programs/Organizations	Completely Unaware	Unaware	Slightly Unaware	Slightly Aware	Aware	Completely Aware	Don't Know
4-H	1	2	3	4	5	6	7
Cooperative Extension	1	2	3	4	5	6	7
Expanded Food and Nutrition Education Program(EFNEP)	1	2	3	4	5	6	7
Farm Shows/County Fairs	1	2	3	4	5	6	7
National FFA Organization	1	2	3	4	5	6	7
Fishing	1	2	3	4	5	6	7
Hunting	1	2	3	4	5	6	7
High School Agriculture Programs	1	2	3	4	5	6	7
Farm Bureau	1	2	3	4	5	6	7
Soil Conservation Service	1	2	3	4	5	6	7
State/Federal Parks	1	2	3	4	5	6	7
Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS)	1	2	3	4	5	6	7
United States Department of Agriculture (USDA)	1	2	3	4	5	6	7
United States Environmental Protection Agency (USEPA)	1	2	3	4	5	6	7
Other _____	1	2	3	4	5	6	7

Part II: Career Opportunities in Agriculture

2. Please indicate your awareness level of the following employment opportunities in agriculture.

Career Opportunity	Completely Unaware	Unaware	Slightly Unaware	Slightly Aware	Aware	Completely Aware	Don't Know
Agricultural Engineer	1	2	3	4	5	6	7
Agriculture Science Teacher	1	2	3	4	5	6	7
Soil Scientist	1	2	3	4	5	6	7
Animal Scientist	1	2	3	4	5	6	7
Dairy Production	1	2	3	4	5	6	7
Community Educator	1	2	3	4	5	6	7
Forestry Scientist	1	2	3	4	5	6	7
Fruit and Vegetable Production	1	2	3	4	5	6	7
Landscaping Specialist	1	2	3	4	5	6	7
Greenhouse/Gardening	1	2	3	4	5	6	7
Veterinary Medicine	1	2	3	4	5	6	7
Wildlife & Fisheries Sciences	1	2	3	4	5	6	7
Agriculture Business Management	1	2	3	4	5	6	7
Agricultural Law	1	2	3	4	5	6	7
Food Processing	1	2	3	4	5	6	7
Animal Breeder	1	2	3	4	5	6	7
Other _____	1	2	3	4	5	6	7

3. Have you considered any of the above areas as a possible career choice?____Yes___ No

If yes, what attracted you to this career area? _____

If no, are there other agriculture related career areas you are interested in? (Please explain.)

_____

4. Please indicate where you received information about career opportunities in agriculture. (Check all that apply)

- ⧉ Parent(s)
- ⧉ Other Family Member(s) (Sibling, Aunt/Uncle, etc.)
- ⧉ Friend(s)
- ⧉ High School Agriculture Teacher(s)
- ⧉ Other High School Teacher(s)
- ⧉ High School Guidance Counselor
- ⧉ Middle School Teacher(s)
- ⧉ Middle School Guidance Counselor(s)
- ⧉ College Recruiter(s)
- ⧉ College Website(s)
- ⧉ Other (Please specify: _____)

Part III: Barriers to Enrollment in Colleges of Agriculture

5. Please indicate to what extent the following are/may be potential barriers to your enrolling in agricultural programs or pursuing careers in agriculture.

Barriers	Not at all a Barrier	Somewhat a Barrier	Neutral	Barrier	Very much a Barrier
Lack of mentors/role models in agriculture	1	2	3	4	5
Lack of relatives/significant others involved in agriculture	1	2	3	4	5
Lack of opportunity to work on a farm growing up	1	2	3	4	5
Lack of contact with recruiters in agriculture	1	2	3	4	5
Lack of career opportunities available in agriculture	1	2	3	4	5
Lack of parental support	1	2	3	4	5
Lack of people of color in agriculture	1	2	3	4	5
Society's negative image of agriculture	1	2	3	4	5
Ridicule by peers regarding agriculture	1	2	3	4	5
Lack of discussion from guidance counselors	1	2	3	4	5
Lack of promotional materials about agriculture	1	2	3	4	5
Interest in agriculture	1	2	3	4	5
Other _____	1	2	3	4	5

Part IV: Demographic Information

Directions: Please check one response for each item.

6. What is your gender?

- ⧉ Male
- ⧉ Female

7. What is your race/ethnicity?

- ⧉ White
- ⧉ Black/African American
- ⧉ Asian
- ⧉ Hispanic or Latino Ethnicity
- ⧉ Native Hawaii and Other Pacific Islander
- ⧉ American Indian or Alaska Native
- ⧉ Other (specify) _____

8. How would you describe where you grew up?

- ⧉ Rural/Farm
- ⧉ Rural/Non-Farm
- ⧉ Suburban
- ⧉ Urban/City

9. What is your age? _____

10. What is your current academic classification?

- ⧉ Freshmen
- ⧉ Sophomore
- ⧉ Junior
- ⧉ Senior

11. What is your favorite academic subject? _____

12. Have any of the adults in your family been involved in an agriculture related career or lifestyle (ex. lived on a farm)?

- ⧉ Yes
- ⧉ No

If **yes**, please specify who and what their career/lifestyle is/was in agriculture. (Ex. Grandfather, farmer) _____

13. Do you plan to attend college?

- ⧉ Yes
- ⧉ No

If **yes**, please specify which **major** you would like to pursue? _____

Thank you for participating in this survey!!!

Appendix B

CORRESPONDENCE

Informed Consent Form for Social Science Research
The Pennsylvania State University

Title of Project: The Perceptions of Agriculture and Barriers to Enrollment in Agricultural Programs of High School Students in Southern New Jersey

Principal Investigator: Brittany S. Smith
Pennsylvania State University
009 Ferguson Building
University Park, PA 16802-2601
Email: bss201@psu.edu
Phone: (609) 315-1142

Advisor: Dr. Connie D. Baggett
Pennsylvania State University
207 Ferguson Building
University Park, PA 16802-2601
Phone: (814) 863-7415
Fax: (814) 863-4753
Email: bbc@psu.edu

1. **Purpose of the Research:** The purpose of this study is to assess perceived barriers to enrollment in agricultural programs and to analyze the level of knowledge and exposure of high school students to agriculture in Southern New Jersey (students in high schools located South of Mercer and Monmouth Counties, and excluding Ocean County which is considered a county within Central New Jersey). The research questions are as follows:

   1. What are the demographics of the students in selected Southern New Jersey high schools?

   2. What are the perceived barriers that prevent or discourage high school students from enrolling in agricultural programs?

   3. What is the level of agricultural knowledge, exposure to agriculture, and knowledge of career opportunities in agriculture and agriculture-related fields?

2. **Procedures to be followed:** You will be asked to complete a brief survey to rate your awareness of agriculture-related programs/organizations and careers in agriculture. You will also be asked to rate a number of factors that may be considered as barriers that influence students' decisions to enroll in agricultural programs in college. The survey will conclude with a few multiple choice questions regarding your demographic characteristics.

3. **Discomforts and Risks:** There are no risks in participating in this study beyond those experienced in everyday life. Some of the questions are personal and might cause discomfort.

4. **Benefits:** The benefits to your child include being introduced to agriculture-related programs and organizations as well as some of the diverse careers in agriculture-related fields through the survey instrument. If you or your child has any questions regarding any interests or career

aspirations in agriculture after completing this survey, I strongly encourage you and your child to speak with your child's school guidance counselor. The benefits to society include the potential to improve recruitment strategies for colleges of agriculture, environmental sciences, and natural resources; good land stewardship; as well as careers and professions within these fields.

5. **Duration/Time:** The study survey should take approximately 5-10 minutes to complete. The survey instrument will be administered during an allotted time during a regular class period at school.

6. **Statement of Confidentiality:** Your child's participation in this research is confidential. The data will be stored and secured at Pennsylvania State University in a password protected file. The Pennsylvania State University's Office for Research Protections, the Institutional Review Board and the Office for Human Research Protections in the Department of Health and Human Services may review records related to this research study. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared. Each survey will have a coded number. A code sheet will contain the coded numbers of the surveys which will be stored in computer password protected file. The surveys will be stored in a separate secured location. There will be no association between the identities of the participants, the surveys, or the coded numbers. The principal investigator, Brittany Smith, and her advisor, Dr. Connie Baggett, will have access to the parental consent forms and access to the data.

7. **Right to Ask Questions:** Please contact Brittany Smith at (609) 315-1142 of Dr. Connie Baggett at (814) 863-7415 with questions, complaints or concerns about this research. You can also call these numbers if you feel this study has harmed you or your child. If you have any questions, concerns, problems about your child's rights as a research participant or would like to offer input, please contact The Pennsylvania State University's Office for Research Protections (ORP) at (814) 856-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

8. **Voluntary Participation:** Your child's decision to be in this research is voluntary. He/she can stop at any time. He/she does not have to answer any questions he/she does not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits your child would receive otherwise.

Any child under 18 years of age must receive parental consent to participate in this research study. If you as the parent/guardian agree that your son/daughter can take part in this research study and the information outlined above, please complete the bottom portion of this page, sign your name and indicate below. Please have your son or daughter sign their name below if they wish to participate in this research study. Return the completed form to the principal investigator.

You will be given a copy of this consent form for your records. Please sign and return one copy of this form only.

_____, parent/guardian of _____, grants permission
Print first and last name of parent Print first or last name of child

for my son/daughter to participate in this research study.

-or-

,_____, parent/guardian of _____, **DOES NOT**
Print first and last name of parent Print first or last name of child
grant permission for my son/daughter to participate in this study.

PARENT CONSENT: Signature of Parent / Guardian	Date
ASSENT: Teenagers age 13 and Older Signature	Date
Signature of Principal Investigator / Person Obtaining Consent	Date

Text to Principal for School Participation

NOTE: THIS CONSENT FORM WILL NOT BE USED FOR RESEARCH PURPOSES.

<Today's Date>

<Principal Name>
<High School Name>
<Address

Dear Principal:

I am a Master of Science student, from New Jersey, in Agricultural and Extension Education attending The Pennsylvania State University. I am conducting research to identify factors that influence secondary education students' perceptions of agriculture and perceived barriers to enrollment in agricultural programs. This research is being conducted to satisfy the thesis requirements for my degree program. With this letter, I am requesting your permission to survey students in your high school.

My research has been approved by the Pennsylvania State University Institution Review Board (IRB) to work with high school students. Participation by high school students is entirely voluntary and the students may decline answering any questions or completing the survey at any time. The identities of any student will remain completely confidential and all data will be summarized in a group data format.

I have included a packet of material requesting the teacher's participation as well as the parental permission form for their child's participation in the study. If you are interested in receiving the results of this study, I will be glad to provide that material to you.

If you have any concerns regarding the study, please contact me, Brittany Smith at bss201@psu.edu, or my academic advisor, Dr. Connie Baggett at bbc@psu.edu. Please keep this letter for your records for future reference or inquiry.

Sincerely,

Brittany S. Smith
MS Graduate Student
College of Agricultural Sciences
The Pennsylvania State University
012 Ferguson Bldg, University Park, PA 16802
Phone:(609)315-1142, Email: bss201@psu.edu

Connie D. Baggett
Associate Professor and Thesis Advisor
College of Agricultural Sciences
The Pennsylvania State University
207 Ferguson Bldg, University Park, PA 16803
Phone: (814)863-7415, Email: bbc@psu.edu

Text to Teacher for Class Participation

NOTE: THIS CONSENT FORM WILL NOT BE USED FOR RESEARCH PURPOSES

<Date>

<High School Name>
<Address>

Dear Teacher:

With this letter, I am requesting your cooperation to survey students in your high school class. <Principal name>, Principal of <High School Name>, has granted me permission to conduct this study in your school.

I am a Master of Science student, from New Jersey, in Agricultural and Extension Education attending The Pennsylvania State University. I am conducting research to identify factors that influence secondary education students' perceptions of agriculture and perceived barriers to enrollment in agricultural programs. This research is being conducted to satisfy the thesis requirements for my degree program.

My research has been approved by the Pennsylvania State University Institution Review Board (IRB) to work with high school students. Participation by high school students is entirely voluntary and students may decline answering any questions or completing the survey at any time. The identities of any student will remain completely confidential and all data will be summarized in a group data format. If you are interested in receiving the results of this study, I will be glad to provide that material to you.

If you have any concerns regarding the study, please contact me, Brittany Smith at bss201@psu.edu, or my academic advisor, Dr. Connie Baggett at bbc@psu.edu. Please keep this letter for your records for future reference or inquiry.

Sincerely,

Brittany S. Smith
MS Graduate Student
College of Agricultural Sciences
The Pennsylvania State University
012 Ferguson Bldg, University Park, PA 16802
Phone:(609)315-1142, Email: bss201@psu.edu

Connie D. Baggett
Associate Professor and Thesis Advisor
College of Agricultural Sciences
The Pennsylvania State University
207 Ferguson Bldg, University Park, PA 16803
Phone: (814)863-7415, Email: bbc@psu.edu

Verbal Script of Instructions to Participants

Recruitment Script (One week before administering survey instrument)

Good morning/Good afternoon students.

My name is Brittany Smith. I am a graduate student at Pennsylvania State University pursuing a Masters of Science degree in Agricultural Education. As a graduation requirement, I must complete a thesis research study. Therefore, I am conducting a study surveying high school students throughout southern New Jersey about agriculture and how much students know about agricultural programs/organizations as well as career opportunities in the agriculture industry.

I have received permission from your principal and your teacher to allow you the opportunity to participate in this important study. To participate in the survey, you must receive permission from your parent/guardian if you are under the age of 18. Please ask your parent/guardian to read the consent form which describes the survey and standards associated with your participation as a student. If your parent/guardian understands and agrees with the standards, they will need to fill out this section on the bottom indicating if their permission for you to participate in the study. You will also need to sign your name under your parent/guardian's signature indicating that you wish to participate in the research study. Return the signed form to me or place it in the folder labeled "Consent Forms" that I will be leaving in your classroom.

You may participate in this study by completing a brief survey for my research study. Your participation is completely voluntary, so if you do not receive permission from your parent/guardian or simply wish not to participate, I will have another activity for you to do while the survey is in progress.

I will give each of you a copy of the parent/guardian consent form for you to take home for your parent's record. I will return to your class on <day > to conduct the survey.

Survey Instructions (Day administered)

Hello class,

Today I will be handing out the surveys. If you received permission from your parent/guardian to participate in the survey, you will receive a copy of the survey. I have some interesting reading material about Penn State for those who are not participating in the survey.

If you are participating in the survey, please answer all of the questions truthfully. There are no right or wrong answers. Your participation is completely voluntary. It is very important that you understand that you have the option not to answer any question if you do not want to as well as the option to stop taking the survey at any time.

Please take your time in filling out the survey. It will probably only take about 5 minutes to complete, but if you need a little more time to complete the survey that will be fine. When you are finished, please turn the survey over on your desk and I will collect them when everyone is finished.

After collecting surveys

If you have any questions regarding any interests or career aspirations in agriculture after completing this survey, I strongly encourage you to speak with your guidance counselor.

I want to thank you for participating in my survey and helping me to complete my research. Good luck with your classes and I hope you enjoy the rest of the school year.

Have a good day.

IRB-Approval

Date: March 31, 2011

From: Dolores W. Maney, Compliance Coordinator

To: Brittany S. Smith

Subject: Results of Review of Proposal - Expedited **(IRB #36151)**
Approval Expiration Date: February 29, 2012
"Perceptions of Agriculture and Barriers to Enrollment in Agricultural Programs of High School Students in Southern New Jersey"

The Institutional Review Board (IRB) has reviewed and approved your proposal for use of human participants in your research. By accepting this decision, you agree to obtain prior approval from the IRB for any changes to your study. Unanticipated participant events that are encountered during the conduct of this research must be reported in a timely fashion.

Attached is/are the dated, IRB-approved informed consent(s) to be used when recruiting participants for this research. Participants must receive a **copy** of the approved informed consent form to keep for their records.

If signed consent is obtained, the principal investigator is expected to maintain the original signed consent forms along with the IRB research records for this research at least three (3) years after termination of IRB approval. For projects that involve protected health information (PHI) and are regulated by HIPAA, records are to be maintained for six (6) years. The principal investigator must determine and adhere to additional requirements established by the FDA and any outside sponsors.

If this study will extend beyond the above noted approval expiration date, the principal investigator must submit a completed Continuing Progress Report to the Office for Research Protections (ORP) to request renewed approval for this research.

On behalf of the IRB and the University, thank you for your efforts to conduct your research in compliance with the federal regulations that have been established for the protection of human participants.

Please Note: The ORP encourages you to subscribe to the ORP listserv for protocol and research-related information. Send a blank email to: L-ORP-Research-L-subscribe-request@lists.psu.edu

DWM/dwm
Attachment
cc: Connie D. Baggett

Appendix C

SELECTED DATA ANALYSIS TABLES

Table C1 Awareness of Programs/Organizations Related to Agriculture

Component	Initial Eigenvalues			Extraction Sums of Square Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.235	44.537	44.537	6.235	44.537	44.537	3.162	22.588	22.588
2	1.403	10.020	54.556	1.403	10.020	54.556	2.543	18.161	40.749
3	1.257	8.979	63.535	1.257	8.979	63.535	2.331	16.651	57.400
4	1.154	8.243	71.778	1.154	8.243	71.778	2.013	14.378	71.778
5	.712	5.085	76.863						
6	.626	4.474	81.337						
7	.586	4.187	85.524						
8	.449	3.208	88.732						
9	.431	3.076	91.808						
10	.343	2.451	94.260						
11	.282	2.015	96.274						
12	.229	1.636	97.910						
13	.199	1.422	99.332						
14	.094	.668	100.00						

Extraction Method: Principal Component Analysis.

Table C2 Awareness of Programs/Organizations Related to Agriculture

Rotated Components Matrix

	Component			
	1	2	3	4
Level of Awareness: 4-H				.890
Level of Awareness: Cooperative Extension				.619
Level of Awareness: EFNEP	.777			
Level of Awareness: National FFA Organization	.608			
Level of Awareness: Fishing			.909	
Level of Awareness: Hunting			.875	
Level of Awareness: High School Agriculture Programs	.623			
Level of Awareness: Soil Conservation Service	.653			
Level of Awareness: State/Federal/National Parks		.671		
Level of Awareness: Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS)	.739			
Level of Awareness: United States Department of Agriculture (USDA)		.783		
Level of Awareness: United States Environmental Protection Agency (EPA)		.852		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 interactions.

Table C3 Awareness of Career Opportunities in Agriculture

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Square Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.836	44.973	48.973	7.836	48.973	48.973	4.286	26.789	26.789
2	1.582	9.887	58.860	1.582	9.887	58.860	3.279	20.495	47.284
3	1.268	7.927	66.788	1.268	7.927	66.788	3.121	19.504	66.788
4	.873	5.457	72.245						
5	.802	5.013	77.257						
6	.687	4.294	81.552						
7	.561	3.509	85.061						
8	.452	2.826	87.887						
9	.400	2.498	90.385						
10	.343	2.147	92.532						
11	.262	1.639	94.171						
12	.252	1.573	95.745						
13	.235	1.469	97.213						
14	.197	1.232	98.445						
15	.148	.926	99.371						
16	.101	.629	100.00						

Extraction Method: Principal Component Analysis

Table C4 Awareness of Career Opportunities in Agriculture

Related Component Matrix

	Component		
	1	2	3
Level of Awareness: Agricultural Engineer		.801	
Level of Awareness: Agriculture Science Teacher		.813	
Level of Awareness: Animal Scientist			.814
Level of Awareness: Dairy Production		.527	
Level of Awareness: Community Educator		.563	
Level of Awareness: Forestry Scientist		.511	
Level of Awareness: Fruit and Vegetable Production	.703		
Level of Awareness: Landscaping Specialist	.686		
Level of Awareness: Greenhouse/Gardening	.819		
Level of Awareness: Veterinary Medicine			.751
Level of Awareness: Wildlife & Fisheries Sciences			.774
Level of Awareness: Agriculture Business Management	.607		
Level of Awareness: Agricultural Law	.669		
Level of Awareness: Food Processing	.876		
Level of Awareness: Animal Breeder	.668		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 interactions.

Table C5 Barriers to Enrollment in Agricultural Programs

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Square Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.475	37.295	37.295	4.475	37.295	37.295	3.909	32.571	32.571
2	2.164	18.036	55.331	2.164	18.036	55.331	2.670	22.250	54.821
3	1.028	8.563	63.894	1.028	8.563	63.894	1.089	9.074	63.894
4	.886	7.385	71.280						
5	.746	6.219	77.499						
6	.663	5.521	83.020						
7	.610	5.083	88.103						
8	.363	3.025	91.128						
9	.334	2.782	93.910						
10	.260	2.162	96.077						
11	.245	2.043	98.120						
12	.226	1.880	100.00						

Extraction Method: Principal Component Analysis.

Table C6 Barriers to Enrollment in Agricultural Programs

Related Component Matrix

	Component		
	1	2	3
Barriers: Lack of mentors/role models in agriculture.	.790		
Barriers: Lack of relatives/significant others in agriculture.	.744		
Barriers: Lack of opportunity to work on a farm growing up.	.733		
Barriers: Lack of contact with recruiters in agriculture.	.817		
Barriers: Lack of career opportunities available in agriculture.	.674		
Barriers: Lack of parental support.		.685	
Barriers: Lack of people of color in agriculture.		.831	
Barriers: Society's negative image of agriculture.		.830	
Barriers: Ridicule by peers regarding agriculture.		.771	
Barriers: Lack of discussion from guidance counselors	.629		
Barriers: Lack of promotional materials about agriculture.	.762		
Barriers: Interest in agriculture.			.913

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 interactions.