

Gender Differences in Consumption and Perception of Local Produce among High School Students¹

Kyle Colton Flynn²
University of Arkansas
Fort Smith, AR

Jennie Popp³
University of Arkansas
Fayetteville, AR

Sonja Hausmann⁴
Drexel University
Philadelphia, PA

Jeremy Whisenhunt⁵
Northwest Arkansas Community College
Bentonville, AR



Abstract

As farming practices have moved towards large-scale production methods, the average individual has become further removed from the practice of agriculture. As a result, many high school students gain the majority of their knowledge of farming in a classroom setting. This case study was conducted to better understand if gender plays a role in differing experiences, knowledge and perceptions of agricultural practices, local produce and produce consumption among high school students in Northwest Arkansas. Eleventh-grade students ($n=50$) from three school districts were asked to answer questions about their agricultural and local produce experiences, knowledge and perceptions. Young men were ($p=.01$) more likely to have taken an agriculture class in high school and were ($p=.02$) more likely to be able to identify the average farm-to-plate distance of produce. Furthermore, we found that female students were more likely to have positive perceptions of locally grown foods, whereas male students were ($p=.04$) more likely to believe that there are disadvantages to local foods. However, neither young men nor young women were meeting Center for Disease Control and Prevention (CDC) recommendations for fruit and vegetable consumption. Further study is warranted to explore the gender differences and the impact that education may

have in the formation of knowledge, perceptions and healthy food choices among high school students.

Introduction

Studies have found that a relationship exists between gender and the intake of fruits and vegetables (Blanck et al., 2008; Emanuel et al., 2012; Serdula et al., 2004). The Center for Disease Control and Prevention (CDC) suggests that adolescents and children are failing to consume the recommended daily amounts of fruit and vegetables (Harris et al., 2012; Kim et al., 2011; Upton et al., 2012). Other studies have shown that consumption of produce increases with increased exposure to and availability of fruits and vegetables (Cullen et al., 2009; Evans et al., 2012). Related studies support that with opportunities for agricultural and local food education, students are more likely to make healthier eating decisions (Cullen et al., 2009; Desmond, 2004; Graham et al., 2005; Heneman et al., 2008).

The National Research Council (NRC, 1988) recommended that schools offer systematic instruction in agriculture to grades K-12 (Emanuel et al., 2012; NRC, 1988). Because most students participate in public school education, the classroom's educational environment is an effective means to transfer agriculture

¹The University Institutional Review Board approved the study protocol. Study participants were under the age of 18 and in accordance with University regulations, guardians of participants provided written informed consent prior to participation in the study.

²Department of History, Geography, Political Science, Philosophy and Religious Studies, (479) 409-0725, kcflynn44@gmail.com

³Department of Agricultural Economics and Agribusiness, (479) 575-2279, jhpop@uark.edu

⁴Academy of Natural Sciences, (479) 684-7516, Sonja.Hausmann@drexel.edu

⁵Department of Life Sciences, (479) 466-5343, jwhisen@gmail.com

Gender Differences in Consumption

and nutrition knowledge to America's youth (Nolan, 2005). The establishment of food preferences and dietary habits are formed during childhood (Kirby et al., 1995) and by targeting the students at an early age, long-term healthier eating choices can be increased (Carter, 2002; Nolan, 2005). Similarly, studies suggest that integrating agricultural education in the classroom may influence students to make healthier food choices over time (Anupama et al., 2008; Graham et al., 2005).

When it comes to making food choices, studies have suggested that women when compared to men: 1) are more likely to consume fruits and vegetables (Emanuel et al., 2012; Blanck et al., 2008); 2) tend to have more positive attitudes towards local food purchasing (Gallons et al., 1997; Jekanowski et al., 2000; Kezis et al., 1998; Gracia et al., 2012); and 3) are more sensitive to the social dimensions of local products (Gracia et al., 2012). These results raise the question of gender differences among high school students with regard to the consumption, experiences, knowledge and perceptions of local produce and agriculture production.

The CDC (2010) daily consumption recommendations for active adolescent women (men) are 1.5 (2) servings of fruit and 2.5 (3) servings of vegetables. Produce intake by adolescents often falls short of these recommendations (Casagrande et al., 2007; CDC 2007; Emanuel et al., 2012; Guenther et al., 2006; Serdula et al., 2004). While no data were found for Arkansas adolescents' consumption of fruit and vegetables, the CDC (2010) reports that only 24.5% of Arkansas adults meet the fruit recommendation (compared to 32.5% nationally), but slightly exceed the national average in meeting vegetable consumption recommendations at 26.9% (compared to 26.3% nationally) (CDC, 2010). Furthermore, the gender gap between male and female fruit and vegetable consumption appears to be widening. In a study by Serdula et al. (2004), between 1994 and 2000 women increased their consumption of vegetables, while men exhibited no change in vegetable consumption.

Similar to the dietary practices of men and women, many studies have suggested gender differences with regard to social issues and the actions of selflessness (Andreaoni and Vesterlund, 2001); generosity (Cox and Deck, 2006); preferences (Croson and Gneezy, 2009); and the willingness to purchase local foods (Gracia et al., 2012). Furthermore, studies have suggested the willingness to pay for local food can have significant differences by gender (Gracia et al., 2012; Jekanowski et al., 2000; Kezis et al., 1998). Gracia et al., (2012) found that social influence factors play a role in the willingness to pay for locally produced lamb meat. In this study, women were found to be more willing to pay a premium for the locally grown product, but men did not show this same tendency. Jekanowski et al. (2000) surveyed 320 consumers and found that females had a greater tendency than males to purchase local products. This tendency was correlated with the amount of time females had lived within the state in which they were

purchasing. Kezis et al. (1998) surveyed 239 shoppers at a small farmers' market in Maine and found that shoppers at farmers' markets are most likely (70%) to be women who are employed outside of the home.

Behaviors exhibited and attitudes held by men and women are shaped by their knowledge and experiences. Today, with the urbanization of the US and the loss of 95% of US farmers since 1900 (Ikerd, 2008), students have fewer opportunities to directly experience agricultural processes (Bagdonis, 2009; Berlin, 2002; Terry and Lawyer, 1995; Williams, 2000). One way to gain that knowledge is to include experiences such as gardening, farmers' visits, farm-to-school programs and agriculture courses in educational settings. Through a combination of agricultural and nutritional lessons, studies have shown that an increase in students' preferences of more vegetables becomes apparent (Morris et al., 2002; Nolan, 2005); positively affecting the amount of fruit and vegetable intake of students (Evans et al., 2012; CDC, 2011).

Research on gender differences is frequently conducted in a case study context (Gallons et al., 1997; Kezis et al., 1998). Case studies may be used to emphasize contextual analysis and to strengthen an area of knowledge that is already known (Soy, 1997). Therefore, in order to strengthen this area of knowledge, the research presented is offered in the form of a case study.

Purpose and Objectives

The purpose of this case study was to develop information regarding the relationship among Northwest Arkansas eleventh-grade students and their experiences, knowledge and perceptions of local produce and agriculture. The specific objectives of this case study were to determine for the study group whether:

- Fruit and vegetable intake differs significantly by gender.
- Experiences with agriculture production and local foods differ significantly by gender.
- Knowledge of agriculture production and local foods differ significantly by gender.
- Perceptions of agriculture production and local foods differ significantly by gender.

Materials and Methods

This study targeted eleventh-grade students from three school districts in two counties in Northwest Arkansas. Eleventh-grade students were chosen for three reasons. First, as only 18.9% of Arkansans receive a degree beyond a high school diploma (U.S. Census Bureau, 2012), high school may be the student participants' final chance to learn about local produce and agriculture in an educational setting. Second, eleventh-grade students are close to the age of moving out and making their own food choices, if they have not already. Third, at the time of the study, all students in Arkansas were required to enroll in 11th grade English, thus

improving the opportunity for the research to focus on a specific age group. Three school districts were chosen in order to capture the diversity in student populations in rural and urban communities.

A case study was conducted via a student survey. Following well established survey methodology (Dillman, 2000; Dillman et al., 2009; Rea and Parker, 1992; James and Bolstein, 1992), a questionnaire was constructed to examine students' consumption, experience, knowledge and perception of local food and agriculture production. The survey instrument consisted of 26 questions in five sections. The drafted instrument was pre-tested on a group of 80 college undergraduates and revised based on student comments. The revised version was approved by the University of Arkansas Institutional Review Board. Parents of participants under age 18 provided written informed consent prior to participation in the study.

Data from the participants' completed surveys were entered into an Excel database. The final data set was comprised of 74 different variables representing information collected from each question. The data were analyzed using the following methods. First, summary statistics were generated for each of the 74 variables. Next, additional statistical approaches were employed that included Chi-square tests (SAS Institute Inc., 2013) and Fisher exact tests (SAS Institute Inc., 2013). Significant differences were evaluated at the $p=.05$ level.

The following null hypotheses were developed regarding the relationships between gender and local foods:

- Ho1: There is no significant difference in the amount of vegetable and fruit intake between male and female 11th grade students.
- Ho2: There is no significant difference among male and female 11th grade students in experiences with local foods and agriculture production.
- Ho3: There is no significant difference among male and female 11th grade students in knowledge of local foods and agriculture production.
- Ho4: There is no significant difference among male and female 11th grade students in perceptions of local produce and agriculture production.

Results and Discussion

Respondent Characteristics

The fifty students who participated in the case study were enrolled in the 11th grade English classes of Bentonville (6 students), Farmington (16 students) and Lincoln (28 students) High Schools. Study participants were ages 16-17 with 20 young men and 30 young women.

Fruit and Vegetable Intake

Most participants said they liked fruits (96%) and vegetables (94%) and 80% (64%) of them ate at least three servings of vegetables (fruits) each week. Among the students, corn [*Zea mays*] (17%) and strawberries

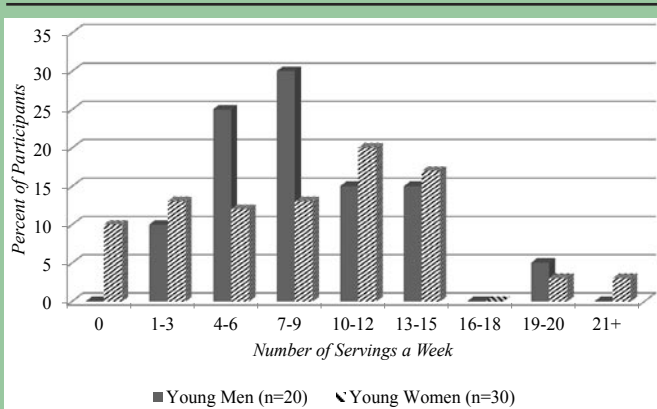
[*Fragaria ananassa*] (26%) were the most preferred vegetable and fruit. Other vegetables and fruit that were preferred by students included carrots [*Daucus carota*] (15%), broccoli [*Brassica oleracea*] (11%), apples [*Malus domestica*] (15%) and grapes [*Vitis*] (9%). No significant differences in the consumption of fruit ($p=.48$) and vegetables ($p=.14$) between the young men and women. This result was unexpected given other studies (Blanch et al., 2008; and Serdula et al., 2004) found that approximately 9-10% more adult women were consuming five servings of vegetables and fruit on a daily basis, compared to adult men. The difference in results might be explained by changing perceptions and values as these case study students mature to adult age. However, public school classrooms are still an excellent forum to offer this education since the vast majority of American children attend public schools (Nolan, 2005).

Additional analyses showed that fruit and vegetable consumption rates of these young men and women fell well short of the CDC's recommended weekly intake. As mentioned earlier, the CDC (2010) daily consumption recommendations for active adolescent women (men) are 1.5 (2) servings of fruit and 2.5 (3) servings of vegetables or 10 (14) servings of fruit and 17.5 (21) servings of vegetables in a week. Participants were asked how many times per week they ate fruits at each meal and, separately, how often they ate vegetables at each meal. Each reported instance of fruit or vegetable consumption was counted as a serving and these numbers were compared to the recommended number of servings for fruits and vegetables according to CDC guidelines. Only 10% of men and 14% of women ate the recommended amount of servings of vegetables each week, while none of the men and only 7% of women ate the recommended amount of fruit servings each week (see Figures 1 and 2). Vegetable consumption per week peaks at 7-9 for young men and 10-12 for young women. This represents on average less than two servings a day. There was no significant difference ($p=.98$) between young men and women in weekly consumption of vegetables.

For fruit, young men's consumption again peaked in the 7-9 serving range. However, surprisingly among young women, consumption peaked only in the 1-3 range. This is surprising because young women met the CDC's fruit consumption requirements more often than male students and according to research (Serdula et al., 2004) women tend to consume more fruit than men. Statistical analyses again found no significant difference ($p=.37$) in the consumption of fruit. Research suggests that consumption rates could be improved by targeting students with agricultural education at an early age possibly leading to long-term healthier eating choices since these habits and preferences are developed early in life (Anupama et al., 2008; Carter, 2002; Graham et al., 2005; Kirby et al., 1995).

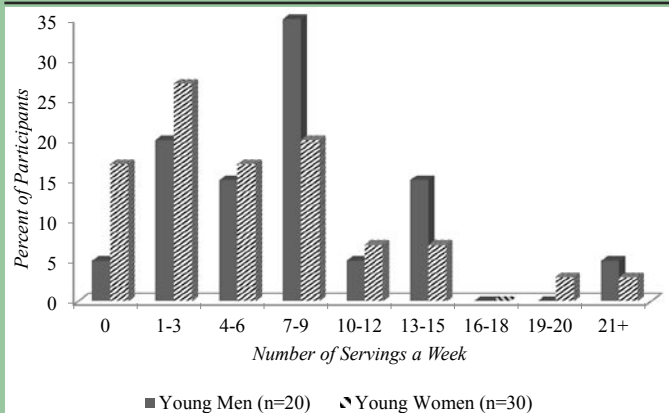
Gender Differences in Consumption

Figure 1. Weekly Vegetable Consumption Among Participants by Gender



Note: The Center for Disease Control and Prevention recommends 21 servings of vegetables per week for men and 17.5 for women. The results of the study were obtained in 2011 in the region of Northwest Arkansas.

Figure 2. Weekly Fruit Consumption Among Participants by Gender



Note: The Center for Disease Control and Prevention recommends 14 servings of fruit per week for men and 10 for women. The results of the study were obtained in 2011 in the region of Northwest Arkansas.

Local Foods and Agricultural Production Experiences

Survey participants were asked about a variety of experiences they may have had involving local produce and/or agricultural production. Questions gauged whether students had 1) lived on a farm, 2) grown a garden, 3) been to a farmers' market, 4) taken an agricultural course in junior high and 5) taken an agricultural course in high school (Table 1). While only a few students stated that they had lived on a farm (10% young men; 20% young women) a much larger portion of the survey participants had grown a garden (70% young men; 67% young women). The majority of young men (85%) and young women (80%) had been to a farmers' market. Only a small percentage of young adults (25% young men; 13% young women) had taken an agricultural class in junior high, but by high school, more of the students (75% young men; 40% young women) had done so.

Chi-square analysis was used to test for significant differences in the experiences among young men and women (Table 1). Significant gender differences ($p=.01$) existed for only one experience variable which was taking an agricultural class at the high school level.

Local Foods and Agricultural Production Knowledge

Survey participants were asked several questions that were intended to gauge their knowledge of agricultural production. Questions included whether they knew

Table 1. Affirmative Answer to Questions About Agriculturally Related Experiences by Gender

Experience	Young Men (%) (n=20)	Young Women (%) (n=30)	p ^a
Lived on a farm	10	20	.21
Grew a garden	70	67	.24
Been to a farmer's market	85	80	.27
Took an agricultural class in junior high	25	13	.17
Took an agricultural class in high school*	75	40	.01*

* $p<.05$, ^aFisher's Exact Test

Note: The results of the study were obtained in 2011 in the region of Northwest Arkansas.

1) the crop for which Arkansas has consistently ranked number one in production, 2) the average distance that produce travels from farm to table, 3) the name of the Arkansas state program (Arkansas Grown) that promotes the sale of meat and produce grown within the state and 4) the ability to identify produce readily grown in the state of Arkansas (Table 2). More than half of both young men (70%) and young women (53%) knew that Arkansas ranked first in the production of rice [*Oryza sativa*] in the nation. In 2012 Arkansas produced 48% of all the rice grown in the United States, harvesting 1,300,000 acres (530,000 hectares) of rice (NASS, 2013). Alternatively, less than a third of total students (young men 45%; young women 30%) knew how far produce travels, on average, from farm to plate (1500-2500 miles) (Pirog et al., 2001). No respondents knew the name of state program that promotes the sale of meats and produce grown in Arkansas (Arkansas Grown). Lastly, student participants were able to identify six different types of produce at least 60% of the time, as shown in Table 2. It is important to mention that corn and strawberries were correctly identified 100% of the time which was not surprising given student fruit and vegetable preferences. Furthermore, the produce that was incorrectly identified could be linked to the students' lack of awareness

Table 2. Percentage of Correct Answers to Questions Relating to Agricultural Knowledge by Gender

Knowledge	Young Men (%) (n=20)	Young Women (%) (n=30)	p ^b
The crop that Arkansas grows more of than any other state	70	53	.15
How far produce travels from farm to plate*	45	30	.02*
State program that promotes the sale of meats and produce grown in Arkansas	0	0	N/A
<i>Identification of fruits and vegetables:</i>			
Blueberries [<i>Vaccinium corymbosum</i>]	90	100	.16
Cucumber [<i>Cucumis sativus</i>]	80	90	.20
Blackberries [<i>Rubus fruticosus</i>]	65	67	.24
Sweet Potatoes [<i>Ipomoea batatas</i>]	60	67	.21
Corn [<i>Zea mays</i>]	100	100	N/A
Strawberries [<i>Fragaria ananassa</i>]	100	100	N/A

* $p<.05$, ^bFisher's Exact Test

Note: The results of the study were obtained in 2011 in the region of Northwest Arkansas.

of what these fruits and vegetables look like in raw form, when compared to their prepared form.

Chi-square tests revealed no significant differences between young men and young women for the knowledge questions with the exception of the average distance that produce travels from farm to plate ($p=.02$).

Perceptions of Local Agriculture

In order to capture the perceptions of local agriculture, questions were used to gauge students' belief of whether there are 1) benefits to buying local produce and 2) disadvantages to buying local produce. The percentage of young men (95%) and young women (93%) that believed that there are benefits to local foods was high. The local foods benefits that the young men most frequently suggested included 1) benefits the local economy and farmers (37%), 2) freshness (32%) and 3) knowing where the food was grown (26%). Among young women the most frequently suggested benefits included 1) less travel (18%), 2) knowing where the food was grown (14%) and 3) benefits the local economy and farmers (11%). The percentage of young men (55%) and young women (27%) that believed that there are disadvantages to local foods varied. Among those young men that suggested that there were disadvantages the most frequent reasons were 1) poor quality and lack of freshness (45%), 2) lack of knowledge of growing process (27%) and 3) lack of availability (18%). Young women suggested the following disadvantages most frequently: 1) poor quality and lack of freshness (38%), 2) more expensive (25%) and lack of availability (25%).

Chi-square tests were used to compare the perceptions of the young men and women. The results as well as the p -values can be found in Table 3. A significantly higher ($p=.04$) percentage of men surveyed (55%) were apt to believe that local foods had disadvantages, such as in areas of cost and year-round availability when compared to their young women counterparts (27%). Multiple studies have found concurring results, with women generally having a more positive attitude towards the purchasing of local foods (Gallons et al., 1997; Gracia et al., 2012; Jekanowski et al., 2000; Kezis et al., 1998). These studies show that women are also more likely to be willing to pay a premium for locally produced food. Other studies suggest that this may be due to a greater sensitivity to social issues, selflessness and generosity on the part of women, relative to men (Andreaoni and Vesterlund, 2001; Cox and Deck, 2006).

Summary

The purpose of this case study was to examine consumption, experiences, knowledge and perceptions of young adults with agricultural production, local foods and fruit and vegetable intake. Four hypotheses were tested to determine whether significant differences existed between these young men and women in 1) weekly intake of fruits and vegetables, 2) experience with local foods and agricultural production, 3) knowledge of local foods and agricultural production and 4) perceptions of local produce and agricultural production.

Study results showed that most students are not meeting the daily fruit and/or vegetable consumption recommended by the CDC. However, no significant difference was found in fruit and vegetable consumption between the men and women, thus we fail to reject the first null hypothesis. Our second hypotheses stated that no significant differences in experiences existed between these men and women with respect to having: 1) lived on a farm, 2) grown a garden, 3) been to a farmer's market, 4) taken an agricultural course in junior high and 5) taken an agricultural course in high school. We fail to reject that hypothesis for four of the five types of experience. Significant differences were only found for having taken an agricultural course at the high school level. No significant differences existed in knowledge between men and women related to 1) Arkansas' number one crop, 2) the Arkansas Grown program and 3) the ability to identify produce readily grown in the state of Arkansas. We reject only the null hypothesis that no difference existed between men and women's knowledge of food miles. Our final hypothesis focused on men and women's perceptions of advantages and disadvantages of local produce. While no significant differences existed in what they felt were advantages to local produce, a significantly higher percentage of young men listed disadvantages to local produce when compared to young women. So again, we could only reject part of the hypothesis.

Our case study provides some insights on the experiences, knowledge and perceptions of agriculture, local foods and produce consumption of eleventh grade students in Northwest Arkansas. Our results not only show that few differences existed between the young men and women studied but that many of these students lack experiences and knowledge of agriculture, in which the literature (e.g., Morris et al., 2002; Nolan, 2005) suggests can influence healthy food choices. While further study of larger groups of students is needed, our case study provides some justification for increased agricultural educational opportunities in the classroom if society's goal is to encourage healthy food choices for young men and women.

Table 3. Percentage of Male and Female Students Affirming the Benefits and Disadvantages of Local Produce

Perceptions	Young Men (%) (n=20)	Young Women (%) (n=30)	p^c
Benefits of local foods	95	93	.44
Disadvantages of local foods*	55	27	.04*

* $p<.05$, c Fisher's Exact Test

Note: The results of the study were obtained in 2011 in the region of Northwest Arkansas

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