

Perceptions of Food Safety Careers among High School and Community College Students in Rural North Carolina¹

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Abstract

There is a significant need to recruit students into careers in the food industry, as it is experiencing a shortage of qualified food safety (FS) professionals. Despite the need for FS recruitment, there is scarce research on young people's perceptions of FS careers. This study investigated factors influencing students' choice of career fields and college majors among a convenience sample of 111 high school (HS) students and 24 community college (CC) students in rural Sampson County, North Carolina. When asked whether they had considered a career in FS, a greater percentage of CC students said yes than HS students (33% vs. 14%). Only 10% of minority students considered FS careers. Whereas 67% of all HS and CC students that there were either some or many careers in general, only 40% of them thought these careers were available in their hometown. "Salary and benefits" and "having an employer who believes in me and my ability to contribute" were consistently rated higher than the remaining factors in choosing a career by both HS and CC students, compared to factors such as performing work that is important to society. These findings provide valuable data to inform future recruitment efforts. Next steps for evaluating the effectiveness of FS recruitment campaigns are provided.

Introduction

The transformation of agriculture during the 20th century brought about a period of economic growth and increased efficiency in food production (Dimitri et al., 2005). During this time, there was a decline in the number of people residing and working on farms within the U.S. population. Less than 1% of the U.S. labor force currently works in agriculture, with less than a fourth of

the U.S. population residing in rural areas (USDA ERS, 2013). Academic institutions are faced with a declining interest among students in agriculture studies (National Research Council, 2009). The Report to the President on Agricultural Preparedness and the Agriculture Research Enterprise published by the President's Council of Advisors on Science and Technology (2012) recently highlighted the need to attract students to careers in agriculture, stating that many students within natural sciences do not have a positive viewpoint of agriculture-related careers and many of these students do not consider careers in agriculture. This affects the supply of educated, well-trained students entering the agricultural workforce.

Food safety is one of five priority areas that the National Institute of Food and Agriculture identified in 2012 as critical for solving tomorrow's societal problems due to heightened awareness of the economic and health consequences of foodborne illness. There are not enough college students choosing food safety as their field of study and career, as there is a looming shortage of qualified food safety professionals across the entire food industry (Freudenheim 2009; Scott-Thomas 2012). According to the National Research Council (2009), higher education institutions must actively recruit, develop and cultivate the next generation of food safety professionals as employers expect to be able to hire employment-ready graduates from colleges and universities. Effective recruiting from both community colleges and high schools into food safety academic programs is essential for maintaining a steady pipeline of employment-ready graduates.

Community colleges are ideal institutions for recruiting purposes as they represent the largest

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postsecondary education sector in the U.S. Currently there is an increasing rate of high school graduates enrolling in community colleges instead of four-year institutions. Nearly half of all U.S. undergraduates are enrolled in community colleges (National Student Clearinghouse, 2012). In North Carolina (NC), 39% of those who graduated with a bachelor's degree included community college as part of their educational path (North Carolina Community Colleges, 2012). It is important that community colleges and universities collaborate to increase transfer rates and validate the community college as an important path to a four-year degree (Kisker, 2007; National Research Council, 2009).

North Carolina is a major contributor to agricultural production, ranking within the top three in the nation for production of swine and turkeys and fifth in the production of broilers (NCDA, 2011). Sampson County is the ideal setting for food safety workforce development efforts because of its economic and demographic profiles and its proximity to several large food-processing companies. The North Carolina Rural Center (2012) provided statistics that highlight Sampson County as a prime place to focus on workforce development. Almost 20% of North Carolina's agricultural production comes from Sampson County and neighboring Duplin County and more than one fourth of all livestock receipts in North Carolina come from these two counties (North Carolina Rural Center, 2012).

Sampson Community College (SCC) is in close proximity to several large food-processing companies. For example, Butterball LLC, House of Raeford, Rose Hill, Prestage Foods and two Smithfield Foods processing facilities are all within 25 miles of the SCC campus. SCC's enrollment and achievement statistics are in line with state CC averages; however the number of professionals with a bachelor's degree or higher in Sampson County is significantly lower than all other counties combined. The SCC Animal Science and Industrial Systems Technology Departments work closely with the local food industry, with about 90 and 50% of their students, respectively, entering the food industry upon graduation. Currently SCC does not have a food safety program; however its administration has discussed establishing a collaborative program with North Carolina State University (NCSU). A collaborative food safety program could provide the food industry with a workforce of trained food safety professionals, bringing a positive impact to the surrounding communities. The success of a joint food safety program between SCC and NCSU would depend upon student enrollment.

The purpose of this study was to gather data relevant to recruitment efforts for college programs and careers in food safety. Specific objectives included gathering information from both Sampson County HS students and CC students to assess (1) the awareness of safety careers; (2) perceptions of the availability of careers in food safety; and (3) the factors that influence the targeted students' career choices.

Methods

The research approach in this study targeted a defined population using a cross-sectional survey to produce descriptive results. The North Carolina State University Institutional Review Board approved the study protocol and all participants provided written informed consent prior to participation in the study.

High school students (n=111) from five schools in Sampson County were surveyed while visiting SCC for a campus-wide career day. The HS students completed a pencil and paper version of the survey as part of a tour of SCC. Additionally, CC students enrolled in the Animal Science Curriculum at SCC (n=24) completed an online version of the same survey as an activity in a 200-level animal science class. Survey respondents' demographics are provided in Table 1.

Table 1. Demographics of survey respondents in the present study.

	High School (n=111)	Community College (n=24)
Gender		
Male	79%	67%
Female	21%	33%
Ethnicity		
Caucasian	67%	79%
African American	9%	13%
Hispanic	19%	4%
Asian	0%	4%
Native American	2%	0%
Pacific Islander	1%	0%
Other	2%	0%
Average Age	18	23

Researchers at NCSU and SCC developed questions about careers in food safety factors that may affect students' career choices. These were composed online using Qualtrics (Provo, UT) and included the following:

1. "Have you considered a career within the food industry?"
2. "Have you ever worked in the food industry?"
3. "How available do you think careers in food safety are in general?"
4. "How available do you think careers in food safety are specifically in your hometown?"
5. "How important are the following factors in your selection of a career?"

Each question provided participants with a five-point Likert scale to indicate their responses, with exception to the first and second questions, which simply asked for a yes or no. Likert scales ranged from "many available" to "none" in questions three and four and from "very important" to "not important at all" in the fifth question. These Likert scales were converted to quantitative scores, ranging from 0 for "none" and "not at all important" up to 5 for "many available" and "very important." Survey participants were asked about eight factors in the fifth question: salary and benefits, my employer pays for my benefits, my workplace is close to home, opportunity for career promotion, performing work that is important to society, having an employer that believes in me, flexible work hours and travel opportunities. Statistical analyses

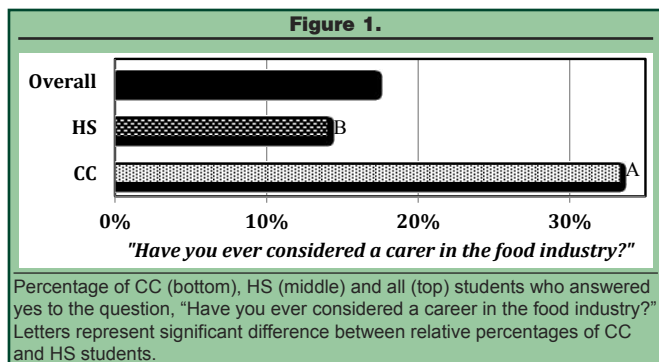
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were performed using a software package (SAS, SAS Institute, Cary, NC). Pearson correlations were evaluated and a 95% confidence interval was evaluated using t-test and one-way ANOVA hypothesis testing.

Results and Discussion

Have You Considered a Career within the Industry?

Participants were asked whether they had considered a career in the food industry. Approximately 33% and 14% of CC and HS students, respectively, said they had considered careers in the food industry (Figure 1). In a related study Wachenheim and Beauchamp (2013) measured interests in food safety careers among undergraduate students in an introductory microeconomics course. Half of their students expressed no interest, and the remaining students were evenly split between expressing interest and being neutral. There is opportunity to increase these numbers through well-designed recruitment efforts. In this regard, Wachenheim and Beauchamp (2013) stated there is a need to inform students about what food safety professions entail, as many students' perceptions of food safety professions are flawed. It was unclear what specific food safety professions the students in the present study have considered.



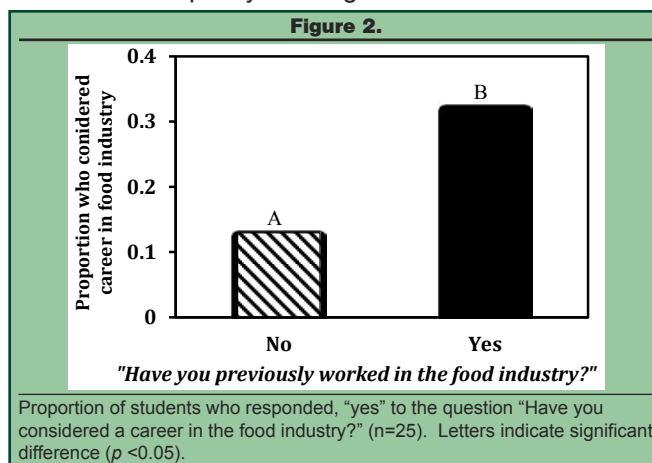
Relatively more CC students have considered careers in the food industry than HS students ($p < 0.05$; Fig. 1). This result could be explained by the age difference between HS and CC students. The average ages of HS and CC students were 18 and 23, respectively. Esters (2007) reported that freshmen in an agricultural and life science college had higher levels of indecision while choosing careers than college seniors. It is probable that CC students devoted more consideration to their career choices than HS students because of their higher levels of maturity and/or they felt more pressure to establish a career path. This explanation remains to be corroborated by other studies of young peoples' career choices however.

Approximately 9% of minorities indicated they have considered careers in the industry, compared to 19% of non-minority students (data not shown). Thus, a significantly lower proportion of minorities considered careers in the food industry than non-minority students ($p < 0.05$). Approximately 12-13% of male HS, female HS

and female CC students indicated they have considered careers in the food industry, which was significantly less than male CC students ($p < 0.05$), in which case 44% of these students have considered these careers. Recruitment efforts should focus on underrepresented minority and female populations. Previous studies have suggested minorities have negative feelings associated with agricultural careers (Scanlon et al., 1989; Wiley et al., 1995). Wiley et al. (1995) suggested this is partly explained by minorities not realizing agricultural majors encompasses more than only farming. This problem is especially significant in Sampson County, where the Hispanic and African American population proportion is twice as high as all NC rural counties and all NC counties combined (North Carolina Rural Center, 2012). Ma (2011) suggested promotional materials used to describe a career field should involve representation of diverse groups of professionals currently employed in that job sector.

Have You Ever Worked in the Food Industry?

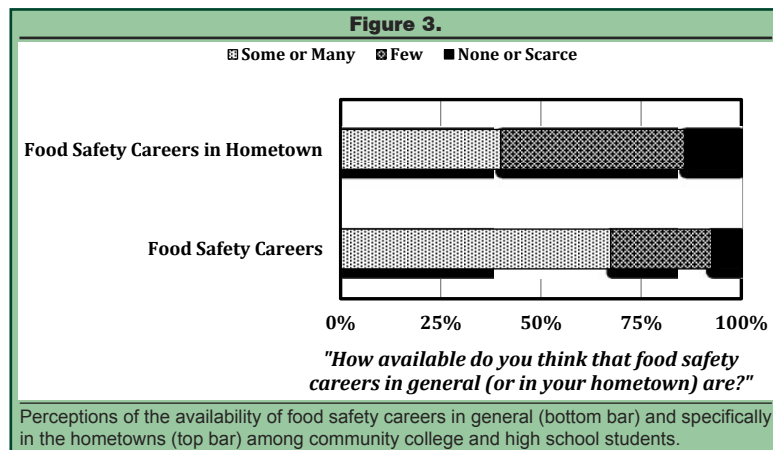
In the present study, 19% of HS students and 46% of CC students said they had worked in the food industry before (data not shown). Overall, these students were 2.2 times more likely to consider a career in food safety than students who have not worked in the food industry before (Figure 2). These results suggest recruitment efforts specifically targeted at students with food industry work experience could be more effective than those aimed at students in general. Workers who have relevant previous training need less training and have greater productivity than workers with no experience in the industry (Bishop, 1994). Therefore, specialized recruitment efforts aimed at students with previous work experience would reach a significant audience (approximately 20% and 50% of students in the present study) and improve the efficiency of workforce capacity building.



How Available do You Think Careers in Food Safety are in General? How about the Availability of these Careers in Your Hometown?

Approximately 67% of all students thought there were either many or some FS careers available in general, and this result was similar for CC and HS students (Figure

3). This result was promising, as students' perceptions appeared to be accurate. Indeed many FS careers are available, for example, in 2010 there were 33,500 agriculture and food scientist jobs, 13,900 of which were specifically food scientist/technologist jobs on the market (Bureau of Labor Statistics, 2010). There were also 46,360 first-line production supervisor/manager jobs available. The agriculture and food scientists jobs market is expected to increase by 10% throughout the next 10 years (Bureau of Labor Statistics, 2010). Both HS and CC students' perceptions of the availability of FS careers specifically in their hometown was significantly lower than that of these careers in general. Only 40% of all students thought there were either many or some FS careers available (Figure 3), which was significantly less than their perceptions of these careers when location was not specified to their hometown ($p < 0.05$). These data suggest students think there are fewer careers in their hometown than there are nationally. The accuracy of students' perceptions of local food career availability question is arguable. Sampson County is home to several large food-processing companies and it is well known that most of these have been recruiting FS professionals for many years. However, compared to areas outside of Sampson County, of course there are more careers available worldwide.



It was hypothesized that students' perceptions of the availability of FS careers would positively influence their interests in these careers. However, there was no significant correlation between students responses to these two questions ($p > 0.05$; data not shown). Thus, recruitment efforts aimed at students of this target audience should communicate more than the availability of jobs, as it appeared that other factors influenced students' interests in these careers.

How Important are the Following Factors in Your Selection of a Career?

"Salary and benefits" and "having an employer who believes in me" were ranked as the top two important factors for both HS and CC students' selections of career fields (Table 2). While "Opportunities for career promotion" ranked as the third most important factor for both groups, it was of equal importance to CC students

as the top two factors but less important than these factors to the HS students ($p < 0.05$). Nonetheless, CC and HS students held similar views of what factors are most important in their choices of careers.

It has been reported that the majority of students choose a major based on whether that field of study matches their interests and abilities, as opposed to several other factors, such as importance to societal problems, potential for career advancement and financial reasons (Malgwi et al., 2005; Beggs et al., 2008). However, the present study suggested the contrary. For example "salary and benefits" was significantly more important than "performing work that is important to society" ($p < 0.05$). This discrepancy could be due to demographic differences (e.g. location or socioeconomic status) between the students of Sampson County and students those studied in previous research. It is also likely that factors such as "salary and benefits" and "opportunity for career promotion" have become more important to today's students in college, since the U.S. economy's Financial Crisis of 2007-2008 has significantly impacted students' perceived economic stress levels (Guo et al., 2011).

Social and economic factors probably had a significant effect on the results in the present study. A study by Ferry (2006) utilized focus groups to examine factors influencing career choices among three groups, which included graduating high school seniors, college seniors and employed young adults. Results indicated that communities of more affluence appeared to offer youth more school and family support in career exploration, which resulted in understanding and consideration of a broader range of career options than those youth in limited socio-economic communities. Furthermore, the study showed a wide range of "career choice maturity." Students from the lower-income schools indicated they were more likely to have not decided on a career, whereas students from affluent schools were more likely to attend college or alternative advanced training.

SCC serves a county that exceeds most measures of poverty (e.g. poverty rate, child poverty rate and elderly poverty rate) when compared to state and rural county averages. The average household in Sampson County is approximately \$6,000-9,000 less than the state average and approximately \$3,000-6,000 less than all rural NC counties combined. Thus, this study underscores a crucial opportunity in not only educating our future workforce of the many food safety careers, but a critical prospect in breaking an economically challenged cycle among young adults.

Limitations

While the use of survey research offers a timely and straightforward approach to understanding real world observations at a low cost, the authors acknowledge the results of this study may not be generalizable to all HS and CC students. The authors chose to utilize

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convenience sampling, however convenience sampling does not result in representative results and may be difficult to replicate among other populations. In spite of these limitations, this study serves as a catalyst for future studies regarding the current needs of recruiting students in food safety academic programs and careers, especially those specifically in Sampson County, NC.

Recommendations for Future Work

To build upon this empirical study, future studies should be constructed within a social science framework. For example, Social Cognitive Career Theory (SCCT) was developed to explain processes of developing career interests, making career choices and achieving career success (Greenhaus and Callanan, 2007). These events are theoretically dependent on three interdependent variables: self-efficacy, outcome expectations and goals. According to SCCT, the messages in recruitment communications should emphasize tasks and abilities required in FS careers so students have an opportunity to consider their self-efficacy in these activities. For example, management careers in food processing plants demand leadership skills and the majority of food safety science careers require scientific skills and knowledge in microbiology. Recruitment messages should also emphasize outcomes of FS careers so students may determine whether these satisfy their expectations and interests, e.g. salary and benefits seemed to be a key motivator in the present study. Other outcomes that could be communicated include developing technology solutions for reducing food safety risks, educating or training audiences on food safety, or minimizing the spread of foodborne illness through surveillance methods. In theory, students formulate personal goals for career achievement in food safety if they connect with these self-efficacy and outcome messages.

Future studies should also consider adopting formalized instruments for assessing students' career decision-making process. The Career Decision Scale (CDS) was developed to identify individuals' barriers in making

career decisions (Osipow, 1987) and this instrument has stimulated significant research activity since it was first introduced. Similarly, the Career Factors Inventory (CFI) measures four components related to problems individuals face as they experience career indecision (Chartrand et al., 1990), the Career Decision-Making Difficulties Questionnaire measures levels of career indecision and identify contributing factors (Gati et al., 1996) and the Career Decision-Making Self Efficacy assesses self-efficacy expectations in career decision-making (Taylor and Betz, 1983). Applications of these instruments, within the confines of a framework such as SCCT, would improve the insights gained in future studies.

Summary

This study provided data relevant to developing collaborative recruitment programs between SCC and NCSU in improving the food safety workforce capacity. This partnership opportunity requires special attention to both underrepresented minorities and students from communities in poverty. Overall, students seemed aware of the many careers available in this field; however underrepresented minorities indicated the lowest interest levels in food safety careers. Students with previous work experiences in the food industry had higher interest levels, thus targeting these students could enhance effectiveness of recruitment campaigns. Top factors influencing all students' career choices were identified as salary, benefits, having a caring employer and opportunity for career promotion. Future research should employ social science frameworks and employ standardized instruments aimed at determining best practices for recruiting specific populations. These include underrepresented minorities and women, as these groups were least interested in FS careers, and also students with previous work experiences in the food industry because they appeared to be the most likely to choose careers in food safety.

Table 2. Top factors affecting HS and CC students' choice of careers, ranked in order of importance. Superscript letters indicate significant differences within each grouping.

High School		Community College		Overall (Both)	
Factor	Mean	Factor	Mean	Factor	Mean
1. "Salary and benefits"	4.26 ^A	1. "Having an employer who believes in me"	4.26 ^A	1. "Salary and benefits"	4.24 ^A
2. "Having an employer who believes in me"	3.99 ^{AB}	2. "Salary and benefits"	4.16 ^A	2. "Having an employer who believes in me"	4.07 ^{AB}
3. "Opportunities for career promotion"	3.97 ^B	3. "Opportunities for career promotion"	4.13 ^{AB}	3. "Opportunities for career promotion"	4.01 ^B
4. "Flexible work hours"	3.86 ^{BC}	4. "Flexible work hours"	4.13 ^{AB}	4. "Flexible work hours"	3.94 ^B
5. "Performing work that is important to society"	3.64 ^{CD}	5. "Performing work that is important to society"	3.96 ^{ABC}	5. "Performing work that is important to society"	3.73 ^C
6. "Travel Opportunities"	3.59 ^{DE}	6. "My workplace is close to home"	3.91 ^{ABC}	6. "My workplace is close to home"	3.59 ^{CD}
7. "My workplace is close to home"	3.47 ^{DE}	7. "My employer pays for my education"	3.61 ^{BC}	7. "Travel Opportunities"	3.57 ^{CD}
8. "My employer pays for my education"	3.31 ^E	8. "Travel Opportunities"	3.50 ^C	8. "My employer pays for my education"	3.40 ^D

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