

# College Entrance Examination Score Deficits in Ag-Intensive, Rural, Socioeconomically Distressed North Carolina Counties: An Inherent Risk to the Post-Secondary Degree Attainment for Rural High School Students

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## Abstract

The emphasis on college entrance examination scores for college admissions by land grant institutions can be detrimental to rural high school students interested in pursuing higher education in agricultural degree programs. Rural high school students from agriculturally intensive and socioeconomically distressed counties often demonstrate lower college entrance examination scores than their urban counterparts. Through looking at the North Carolina top ten farm cash receipt counties, students residing in these counties exhibit significant score deficits on the SAT and ACT when compared with the students in the urban counties comprising Research Triangle Park (RTP). The three variables observed in this study: agricultural intensity, rural designation and level of socioeconomic distress negatively impacted student scores on the SAT and ACT college entrance examinations.

## Introduction

Undergraduate college admissions committees consider a multitude of factors when determining the admissions status of prospective undergraduate applicants. One of the most highly considered factors for a student's admission status at a land-grant institution is his/her performance on SAT and/or ACT college entrance examinations. College entrance examinations, such as the SAT and ACT, are often used for standardization of students

and are also important for measuring the cognitive skills that will often lead to positive educational outcomes (Mattern, 2011). Specifically, either SAT or ACT scores are used by admissions committees as a tool to compare academic achievement of applicants and to draw inferences about the likelihood of a student's future success at the university level (Lane, 2009). Previous studies have found that low college entrance examination scores often disqualify students from admissions (Buchmann, 2012, p.438). Since many colleges and universities rely heavily upon ACT or SAT scores, many students interested in pursuing higher education in agricultural fields are denied admissions to agricultural degree programs within land grant universities. The denial is a direct result of poor performance on college entrance examinations.

A large majority of students applying to undergraduate agricultural degree programs reside in agriculturally intensive, rural, socioeconomically distressed counties. The histories of agricultural and rural communities have been "closely intertwined" (Smithers, 2005, p.281). Furthermore, the intimate relationship between agriculturally intensive and rural communities is clearly demonstrated when examining the top ten North Carolina counties 2009 farm cash receipts. The top ten North Carolina counties that lead the state in farm cash receipts for livestock and crop production are all classified as rural

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counties (Webb, 2011; N.C. Economic Development Center, Inc., 2012; North Carolina).

The rural/non-rural difference in college enrollment has largely been attributed to differences in socioeconomic and demographic backgrounds of students residing in these areas (Byun, 2011). Historically, rural areas have the highest poverty rates in America as persistently poor counties (Lichter, 2007) and their rural students typically have lower socioeconomic statuses. Socioeconomic status has been found to be highly influential in rural-urban differences, noted in educational outcomes (Fan, 1999). As a result, there are unequal deviations between rural and urban schools' availability of resources. The variations of resources include: books, computers, art and science supplies, course offerings and adequately heated and cooled buildings (Fan, 1999).

When compared with urban students, rural youth have lower educational and career aspirations (Griffin, 2011). Eighteen percent of U.S. students attend rural schools (Hardé, 2007) and often times these students are behind their non-rural counterparts when it comes to college enrollment and degree attainment, which many researchers have attributed to their lower socioeconomic background (Byun, 2011). Scores from the SAT college entrance examination are so highly correlated with family income and parents' education that the predictive power of the SAT actually reflects socioeconomic status (Atkinson, 2009). Similarly, students from metropolitan areas have exhibited higher performance than rural students in mathematics, reading and science on the ACT college entrance examination (Fan, 1999). Therefore, socioeconomic status is highly correlated with test scores; these youth from the top socioeconomic tiers are in a far better position to be accepted into these highly selective institutions (Alon, 2009).

Many professional test preparation companies charge hundreds of dollars for their test preparation services; thus more privileged students are able to benefit from college entrance examination coaching which they can afford (Mattern, 2011). Students from these high socioeconomic statuses can also utilize expensive test preparation activities such as private classes or tutors which put them at a marked advantage over low socioeconomic students in their access to postsecondary education (Alon, 2009). College applicants living in urban areas were also more likely to retake the SAT a second, third, or fourth time, as compared with rural students (Vigdor, 2003). The expenses associated with taking college entrance examinations and test preparation can be more easily absorbed by socioeconomically advantaged families (Buchmann, 2012). Enrollment in private test preparation courses corresponds to a SAT score gain of around 30-40 points which, in turn,

increases a student's chances of "getting into the nation's most selective colleges and universities" (Buchmann, 2012, p. 455). Ultimately, high socioeconomic status (SES) leads to higher test scores through knowledge of test taking strategies (Sackett, 2009). In contrast, "students from disadvantaged backgrounds are unaware of preparation options, or are financially constrained from taking advantage of them and will be less likely to use test preparation" (Buchmann, 2012, p. 440). Today, education is a primary means for success as an adult; therefore, the challenges that rural youth face when trying to enroll in postsecondary education corresponds to an apparent obstacle to social mobility (Crosnoe, 2002).

## Study Area

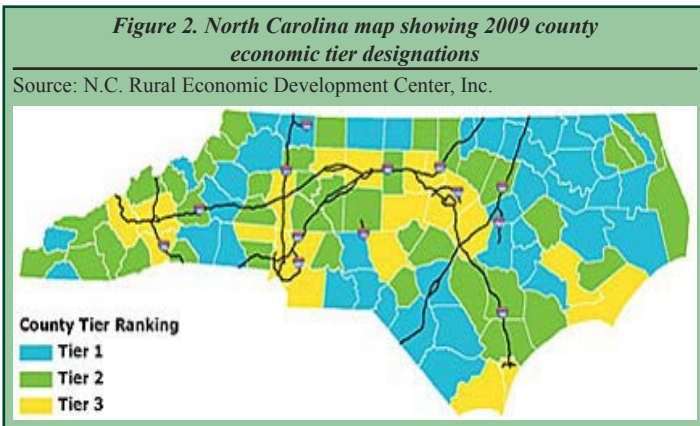
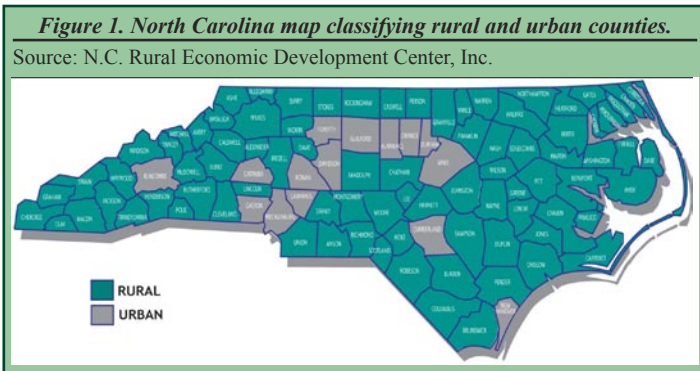
The focus of this study is on the top ten farm cash receipt counties within North Carolina (Table 1) which is based upon the 2009 Agricultural Statistics Book by the North Carolina Department of Agriculture and Consumer Services (Webb, 2011). The top ten counties upon which this study has been conducted are the following: Duplin, Sampson, Union, Wayne, Robeson, Bladen, Wilkes, Johnston, Nash and Randolph (Webb, 2011).

Next, the top farm cash receipt counties in North Carolina (n=10) were classified as rural vs. urban (Figure 1). According to the North Carolina Economic Development Center's classification of rural and urban, a county is classified as rural if it has a "population density of no more than 250 people per square mile at the time of the 2000 U.S. Census" ("NC Economic Development Center, Inc.", 2012). It can be noted that out of the ten top agriculture producing counties in North Carolina, all are classified as rural. From the aforementioned counties (n=10), the N.C. Economic Development Center Inc. has deemed Duplin, Sampson, Union, Wayne, Robeson, Bladen, Wilkes, Johnston, Nash and Randolph counties as rural ("N.C. Rural Economic Development Center, Inc.", 2012).

The N.C. Department of Commerce annually ranks the state's 100 counties based upon their economic well-being and then assigns each county a tier designation (Figure 2). The 40 most socioeconomically distressed counties in the state of North Carolina are classified as being Tier One, the next 40 as Tier Two and the 20

Table 1. The 2009 top ten NC counties in total farm cash receipts.

| County   | Thousand Dollars worth of farm cash receipts |
|----------|--|
| Duplin   | 876,984                                      |
| Sampson  | 841,595                                      |
| Union    | 419,882                                      |
| Wayne    | 336,947                                      |
| Robeson  | 333,624                                      |
| Bladen   | 295,088                                      |
| Wilkes   | 259,885                                      |
| Johnston | 237,316                                      |
| Nash     | 198,926                                      |
| Randolph | 196,837                                      |



Statistics – 2009 Annual Statistics Book” (Webb, 2011). The North Carolina Rural Economic Development Center Inc.’s list of urban and rural counties in North Carolina was also used to designate whether these ten counties were classified as urban or rural (Figure 1). Counties analyzed in this study were considered rural if they had a population density at the 2000 U.S Census of no more than 250 people per square mile (“N.C. Rural economic Development Center, Inc.”, 2012). Finally, the North Carolina Department of Commerce’s Economic Development 2009 Tier Rankings (“North Carolina Department of Commerce,” 2009) were utilized to denote the socioeconomic status of each of the counties examined in this study (Figure 2). The Department of Commerce classifies the state’s 100 counties based on their economic well-being and then annually assigns each county a Tier designation. The state’s 40 most distressed counties are labeled as Tier One, the next 40 most distressed counties as Tier Two and the least 20 distressed counties are designated as Tier Three (“North Carolina Department of Commerce”, 2011).

**Results**

The mean score for the top ten North Carolina counties in total farm cash receipts was 952.8 on the SAT and 19.9 on the ACT (Table 2). North Carolina’s urban counties had a higher mean score, with an SAT score of 1007.9 and an ACT score of 21.4 (Table 2). Within Research Triangle Park (RTP), the college entrance examination scores increased even more. The RTP’s mean SAT score was a 1056.7 and 22.7 on the ACT (Table 2). When statistically analyzing the top ten counties against the RTP counties and NC urban counties, it can be noted that a significant statistical difference\* ( $p < 0.05$ ) in scores on the SAT and ACT is observed.

When looking at socioeconomic status it was noted that increased economic distress and college entrance examination scores were inversely correlated. The NC Rural Tier 1 counties had a mean score of 923.23 on the SAT and 19.23 on the ACT (Table 2). As we improve socioeconomic status and observe the Tier 2 NC Rural counties, the scores increase on the SAT and ACT, with respective scores of 980.97 and 20.57 (Table 2). The least economically distressed, Tier 3 counties had the highest overall mean scores, with 1022.45 on the SAT and 21.9 on the ACT (Table 2). After analyzing the scores between the tiers, it can be noted that there are statistical significant differences\* ( $p < 0.05$ ) between the scores for the three different tiers.

The data clearly shows that students from rural counties exhibited significant score deficits on their SAT and ACT college entrance examinations in comparison to urban students from RTP and that the

least socioeconomically distressed counties are then designated as Tier Three.

The levels of socioeconomic distress of the top farm cash receipt counties ( $n=10$ ) in North Carolina were then examined. The most socioeconomically distressed counties were identified as Tier One (Wayne, Robeson, Bladen and Wilkes); an additional four counties were designated as Tier Two (Duplin, Sampson, Nash and Randolph); leaving only two (Union and Johnston) as Tier Three (“N.C. Rural Economic Development Center, Inc.”, 2009).

**Methods**

We analyzed the 2009 scores on the SAT and ACT for North Carolina high school students to compare students from agriculturally-intensive, rural and socioeconomically distressed demographics against Research Triangle Park urban high school students (North Carolina State Board of Education, 2009). We then compared these two distinct student populations’ scores with the fall 2009 freshman incoming class at North Carolina State University (NCSU). The fall 2009 NCSU freshman class data was accessed from North Carolina State University’s 2009 Freshman Profile (North Carolina State University, 2012).

The agriculturally-intensive counties examined in this study (Table 1) were selected based on their status as being in the top ten North Carolina counties for farm cash receipts according to the North Carolina Department of Agriculture and Consumer Services’ “Agricultural

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lower socioeconomic statuses found within these rural counties is associated with students' performance on SAT and ACT college entrance examinations.

A comparison of the 2009 NCSU fall freshmen averages on the SAT and ACT with students from the top ten NC farm cash receipt counties shows these students have significant lower scores. Due to the limitation of only one observation for the 2009 NCSU fall freshmen's college entrance examinations, a statistical analysis could not be performed. However, you can numerically compare the 2009 NCSU freshmen averages against the aforementioned counties (n=10) and see the educational

hindrance that these rural and socioeconomically distressed students must face. The 2009 NCSU freshmen had a mean score of 1184 on the SAT and 26 on the ACT in comparison with the top ten NC farm cash receipt counties' scores of 952.8 on the SAT and 19.9 on the ACT. This reveals that the NC farm cash receipt top ten counties were facing a score deficit of 231.2 points on the SAT and 6.1 points on the ACT (Table 2).

## Discussion and Conclusions

Due to the aforementioned educational challenges that many students from agriculturally-intensive, rural and socioeconomically distressed counties face, we hypothesized that students residing in counties with these designations would exhibit significant score deficits on the SAT and ACT when compared with the averages of the urban counties comprising Research Triangle Park (RTP). Statistical analysis of the data collected in this study confirmed that the three variables examined: agricultural intensity, rural designation and level of socioeconomic distress negatively impacted student performance on both the SAT and ACT college entrance examinations.

An analysis of the data indicated that the NC top ten farm cash receipt counties had lower scores on the SAT and ACT when compared with the 2009 NCSU freshman average. These students also scored lower than their urban counterparts' average from the Research Triangle Park. It was further noted that regardless of which variable was examined, rural designation or agricultural intensity, as socioeconomic distress levels increased (moving from Tier Three to Tier One) the average scores on the SAT and ACT continued to drop.

The significant deficits in college entrance examination scores of agriculturally intensive counties raises a severe challenge for land grant universities to carry out their original mission to "teach agriculture, military tactics and the mechanic arts, as well as classical studies, so that members of the working classes could obtain a liberal, practical education" (Cornell University, 2010). If land-grant institutions are to remain true to their original undertaking, they must make themselves accessible to the students within the states they serve.

Currently, a large majority of students from agriculturally-intensive counties in North Carolina who wish to pursue higher education in agricultural fields of study are not competitive for admissions to land grant institutions offering such degree programs

**Table 2. Comparison of 2009 SAT and ACT scores between NCSU Fall 2009 Freshman Class, State Average of North Carolina students, Research Triangle Park Urban students, students from the Top Ten Farm Cash Receipts, and Tier 1, 2, & 3 in NC.**

| Counties                         | SAT (CR + M) | NCSU Average SAT Score Differential | ACT   | NCSU Average ACT Score Differential |
|----------------------------------|--------------|-------------------------------------|-------|-------------------------------------|
| NCSU Fall 2009 Freshman Averages | 1184         | 0                                   | 26    | 0                                   |
| North Carolina                   | 1006         | -178                                | 21    | -5                                  |
| Rural North Carolina             | 948          | -236                                | 20    | -6                                  |
| Urban North Carolina             | 1007.93      | -176.07                             | 21.4  | -4.6                                |
| Research Triangle Park in NC     | 1056.67      | 127.33                              | 22.6  | -3.4                                |
| Top 10 Farm Cash Receipts        | 952.8        | -231.2                              | 19.9  | -6.1                                |
| Tier 1 Top 10 Farm Cash Receipts | 939          | -245                                | 19    | -7                                  |
| Tier 2 Top 10 Farm Cash Receipts | 932          | -251                                | 19    | -7                                  |
| Tier 3 Top 10 Farm Cash Receipts | 1022         | -162                                | 22    | -4                                  |
| Tier 1 Rural North Carolina      | 923.23       | -260.77                             | 19.23 | -7.77                               |
| Tier 2 Rural North Carolina      | 980.97       | -203.03                             | 20.57 | -5.43                               |
| Tier 3 Rural North Carolina      | 1022.45      | -161.55                             | 21.91 | -4.09                               |

\*Note: The combined SAT critical reading (CR) and math (M) sections are scored on a 1,600 point scale and the ACT is scored on a 36 point scale

**Table 3. Comparison of 2009 SAT scores between Rural North Carolina students, Urban North Carolina students, students from the Top Ten Farm Cash Receipt Counties, Tier 1, 2, & 3 in NC, and Research Triangle Park Urban students.**

| Group                                      | SAT     | Standard Error |
|--|---------|----------------|
| NC Urban                                   | 1007.93 | 13.99          |
| Research Triangle Park                     | 1056.67 | 31.30          |
| Rural Tier 1 North Carolina                | 932.23  | 8.68           |
| Rural Tier 2 North Carolina                | 980.97  | 9.16           |
| Rural Tier 3 North Carolina                | 1022.45 | 16.35          |
| Top Ten NC Counties for Farm Cash Receipts | 952.8   | 17.15          |

\*Note: The combined SAT critical reading (CR) and math (M) sections are scored on a 1,600 point scale.

**Table 4. Comparison of 2009 ACT scores between Rural North Carolina students, Urban North Carolina students, students from the Top Ten Farm Cash Receipt Counties, Tier 1, 2, & 3 in NC, and Research Triangle Park Urban students.**

| Group                                      | ACT   | Standard Error |
|--|-------|----------------|
| NC Urban                                   | 21.4  | .38            |
| Research Triangle Park                     | 22.67 | .85            |
| Rural Tier 1 North Carolina                | 19.23 | .24            |
| Rural Tier 2 North Carolina                | 20.57 | .25            |
| Rural Tier 3 North Carolina                | 21.9  | .44            |
| Top Ten NC Counties for Farm Cash Receipts | 19.9  | .47            |

\*Note: The ACT is scored on a 36 point scale.

because of score deficits on the ACT and SAT. As a result, many traditional agricultural degree programs are downsizing or even closing due to limited undergraduate student populations. This poses a direct threat to the future development of agriculture across the U.S.A.

Within each land-grant institution (Cornell, 2010) a Cooperative Extension System provides educational programming in five key areas: sustaining agriculture and forestry, protecting the environment, maintaining viable communities, developing responsible youth and developing strong, healthy and safe families (NC Cooperative Extension, 2012). If the Cooperative Extension System is going to achieve the goals of each of these five key areas, it is imperative that the next generation of Cooperative Extension leaders help to bridge the deficit in SAT and ACT test scores in rural and socioeconomically distressed counties. The Cooperative Extension System can help develop future agricultural students in these communities by removing the current college entrance examination score roadblock that prevents many students from such areas from gaining admissions to land-grant universities. This goal can be accomplished through supplemental education from these institutions.

North Carolina State University and the North Carolina Cooperative Extension Service are partnering to provide an opportunity for students who are interested in pursuing a Bachelors Degree in agricultural and/or life science degree programs who live in agriculturally intensive counties. To help these students increase their ACT College Entrance Examination Scores and improve their chances of being accepted into college, a special program, ACT Supplemental Preparation in Rural Education (A.S.P.I.R.E.) has recently been launched through the College of Agriculture and Life Sciences at North Carolina State University and the North Carolina Cooperative Extension System. The purpose of A.S.P.I.R.E. is to raise scores on the ACT College Entrance Examination in order to increase the number of rural high school students pursuing higher education in agriculture. The North Carolina Extension agents, who will teach this program, will be trained through a Master Trainer Course offered through the Princeton Review. These agents will be instructed on how to teach the skills, strategies and tactics for tackling the ACT. After the A.S.P.I.R.E. agents are trained, they will teach the ACT test preparation skills to rural high school students across the state of North Carolina. The A.S.P.I.R.E. program is a new approach and after completion of the program, the results will be analyzed to determine the efficacy of implementing ACT preparation to rural high school students through the use of North Carolina Extension agents.

## Summary

The importance of college entrance examination scores for admissions by land grant institutions are often the leading factor for students not being accepted into college. Rural high school students from agriculturally intensive counties are more likely to have a lower socioeconomic status which further impedes their access to resources that could improve their SAT or ACT scores. With increased scores these students, from the aforementioned counties, could achieve a potential higher acceptance rate to colleges and universities. Land grant institutions must assist students from rural, socioeconomically distressed and agriculturally intensive counties in bridging deficits on college entrance examination scores in order to improve their chances of gaining admissions to post-secondary education in agricultural fields.

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