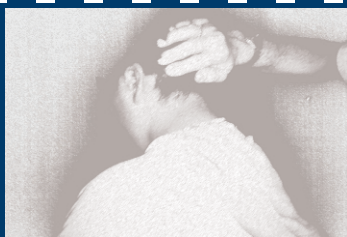


# ANTES

ACANTHOSIS NIGRICANS: THE EDUCATION AND SCREENING PROJECT

*A REPORT TO THE  
GOVERNOR AND 77TH LEGISLATURE  
OF THE STATE OF TEXAS*

*IN FULFILLMENT OF HOUSE BILL 1860  
OF THE 76TH LEGISLATURE*



Prepared by:  
The University of Texas System  
Texas-Mexico Border Health Coordination Office  
The University of Texas - Pan American

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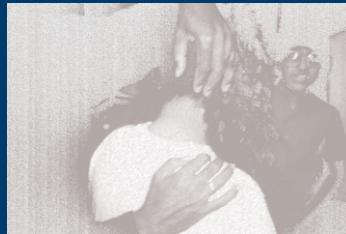
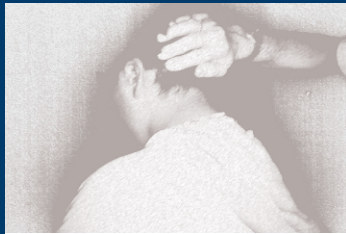
**TMBHCO Series Report 00-01: No. 2**

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## Executive Summary

This report is a descriptive presentation of the acanthosis nigricans screenings that were conducted in nine Texas-Mexico border counties as mandated by House Bill 1860 of the 76th Texas Legislature. Acanthosis nigricans, a hyperkeratinization of the skin, is a cutaneous marker associated with hyperinsulinemia and insulin resistance and indicates a risk factor for Type 2 diabetes and other chronic diseases. The undertaking was called Acanthosis Nigricans: The Education and Screening (ANTES) project. ANTES is the Spanish word for "before" which was appropriate since the project's purpose was to collect data on children that exhibited characteristics that could lead to the development of Type 2 diabetes and other chronic diseases.

School nurses screened for acanthosis nigricans during mandated vision/hearing and scoliosis screenings of school children during the 1999-2000 and the first half of the 2000-2001 school years. Data presented are from 102,733 screenings conducted by 537 school nurses from 48 school districts in 523 different schools. The nurses reported 14,792 (14.4%) children with acanthosis nigricans. In order to determine the percent of youth who were overweight, an evaluation on a sub-population of children aged 10-13 was conducted which revealed that 53.8% were at or above the 85th percentile and 37.6% were at or above the 95th percentile. Data on blood pressure readings that were collected at the time of the acanthosis nigricans screenings using age appropriate charts, heights/weights and blood pressure measurements are also presented. A random sample of children with acanthosis nigricans indicated that 35% had either elevated systolic and/or diastolic readings. The literature reports a close association between acanthosis nigricans and obesity as well as a relationship between abnormal levels of insulin and insulin resistance and high blood pressure. The children who were reported as overweight and having abnormal blood pressures indicates that they have a greater risk of future health problems than the general population. Obese children are at increased risk for diabetes, but the subset of children with acanthosis nigricans has a still higher risk. It could well be that there is no other condition that affects as many children in a chronic way as does insulin resistance.

The ANTES project revealed obstacles to implementing the desirable changes in order to guarantee children with acanthosis nigricans obtain the needed attention to alter nutritional habits, increase physical activity and obtain medical consideration. The lack of resources needed to provide long term nutritional care for families with children with acanthosis nigricans was evident. The current Medicaid system poorly compensates clinicians who are trying to employ a preventative solution. At the same time, more intensive clinical education describing the implications of acanthosis nigricans, insulin resistance, obesity and elevated blood pressure to a youthful population needs to be provided.

It is recommended that acanthosis nigricans screenings be made part of the state's public health policy. The screenings should be complemented with a concerted effort to prevent, reduce and eliminate obesity, insulin resistance and abnormal blood pressures through appropriate nutrition, weight loss and physical activity. Schools should provide at least 150 minutes of physical education and activity per week for the students and discourage organizations catering to children from selling soft drinks, candy, and other foods that offer little or no nutritional value on school campuses. Working water fountains should take the place of vending machines. Elimination of all sugar-sweetened snacks that do not contribute to the meal pattern served as part of the school meal program is highly encouraged.

## Introduction

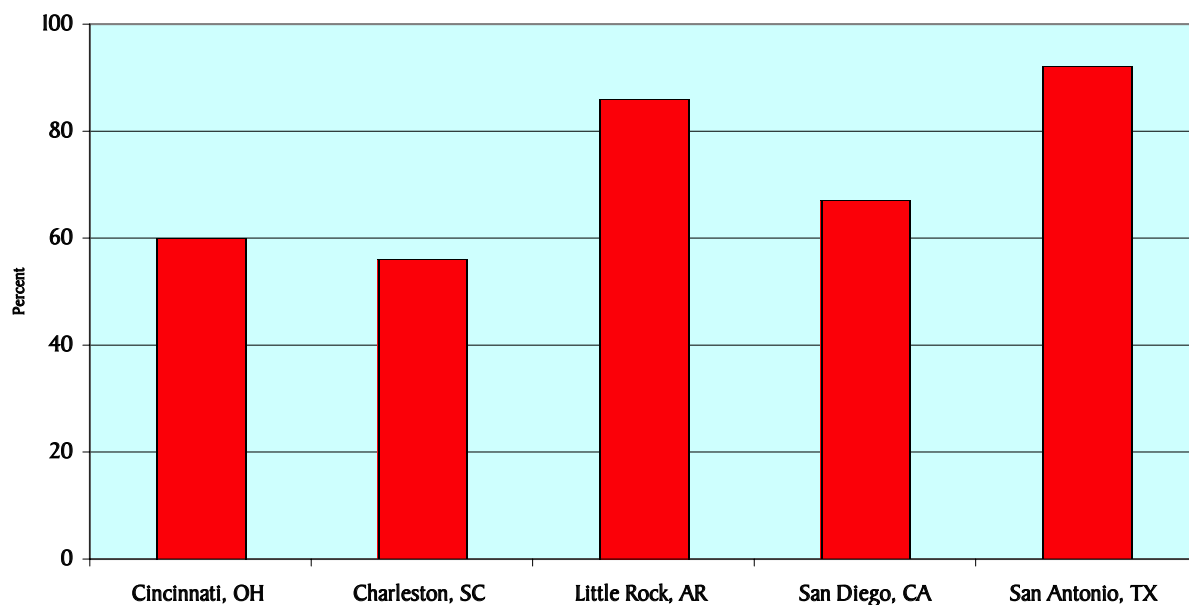
### ACANTHOSIS NIGRICANS

Acanthosis nigricans, a hyperkeratinization of the skin, is a cutaneous marker associated with hyperinsulinemia and insulin resistance and serves as a risk factor for Type 2 diabetes and other chronic diseases <sup>1-8</sup>. Because of the increasingly alarming rates of children developing Type 2 diabetes, acanthosis nigricans screenings are important and can help identify children with high insulin levels who may be at-risk for developing the disease. The increasing number of youth-onset Type 2 diabetes cases has heightened new interest in children's health, particularly in cases where acanthosis nigricans has been present at the time of diagnosis <sup>9-14</sup>.

Acanthosis nigricans was first described in 1889 by German dermatologist Paul Gerson Unna <sup>2</sup>. In the early 1970's, several studies made the association between acanthosis nigricans and insulin-resistance and hyperinsulinemia. Since then, other literature has reported on the relationship acanthosis nigricans has to insulin-resistance, hyperinsulinemia, and Type 2 diabetes. Recognizing acanthosis nigricans is important because of the increasingly alarming rates of children who are developing Type 2 diabetes<sup>16-21</sup>. Until recently, it was believed that children could not develop Type 2 diabetes. We now know that this is not true. Acanthosis nigricans screenings can help identify children who have high insulin levels and who may be at-risk for developing the disease.

Figure 1 presents the results of several population studies that describe the presence of acanthosis nigricans in North American children and adolescents at diagnosis of Type 2 diabetes. These data are significant because they illustrate the close association between acanthosis nigricans and Type 2 diabetes<sup>27</sup>.

**Figure 1 - Presence of acanthosis nigricans among North American children and adolescents at diagnosis of Type 2 diabetes**



The association between hyperinsulinism and obesity is well established <sup>9,12-20</sup>. As the child reaches adolescence, the stress of obesity and increased demand of insulin at the time explain the largely pubertal and postpubertal onset of Type 2 diabetes in children. Table I explains the classification of diabetes as seen in children:

Table I - Classification of diabetes as seen in children		
	Type 1 diabetes	Type 2 diabetes
Age	Throughout Childhood	Pubertal
Onset	Acute, Severe	Mild to severe, often insidious
Insulin Secretion	Very low	Variable
Insulin dependence	Permanent	No
Genetics	Polygenic	Polygenic
Race/ethnic distribution	All (low frequency in Asians)	African-Americans, Hispanic, Asian, Native American
Frequency (of all diabetes in children and youth)	~80%	10-20%
Association		
Obesity	No	Strong
Acanthosis nigricans	No	Yes
Autoimmunity	Yes	No

In 1989, Dr. Charles Stuart conducted one of the first studies to determine acanthosis nigricans prevalence rates in adolescents. Stuart and colleagues conducted acanthosis nigricans screenings on unselected populations in the public schools of Galveston, Texas. He reported a 13.3% prevalence rate in African Americans, Hispanics with 5.5% while non-Hispanic whites accounted for less than one percent. Dr. Stuart has since reported acanthosis nigricans rates have been increasing dramatically <sup>4</sup>.

## OBESITY

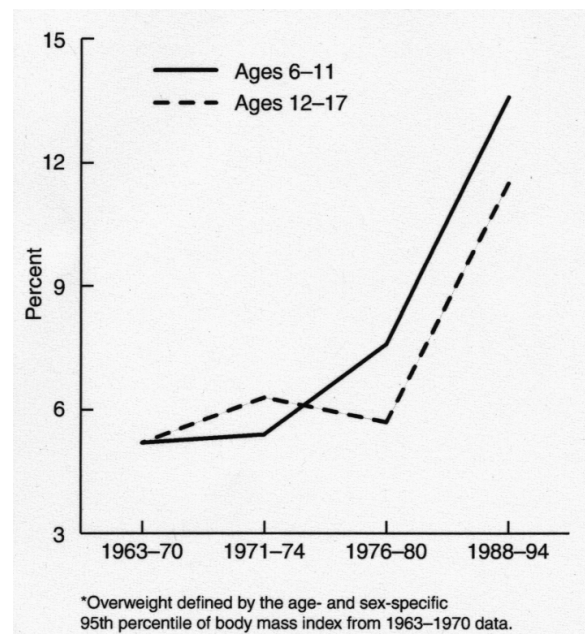
Since the ANTES project focused on acanthosis nigricans and children who are at high risk of developing Type 2 diabetes, understanding complications associated with obesity was also important. Obesity has rapidly become a major health concern since its prevalence has increased dramatically worldwide and it has been linked with an increase in the incidence of Type 2 diabetes, cardiovascular disease, hypertension, stroke and other physical, physiological and even psychological complications. Obesity is also a major cause of mortality in the United States, with substantial increases in morbidity and impairing quality of life. The estimated number of annual deaths attributed to obesity among U.S. adults is approximately 280,000 to 325,000. More than 80% of the estimated obesity-attributable deaths occurred among individuals with a body mass index (BMI) of more than 30 kg/m<sup>2</sup> <sup>22-27</sup>.

Data from the National Health and Nutrition Examination Surveys III (NHANES III) reported that the prevalence of obesity in the United States is presently higher than at any other time in recorded history. Other literature reported that approximately 63% of men and 55% of women aged 25 years and older in the United States population were overweight. The same report concluded that the most significant increases in obesity were found among Mexican Americans, non-Hispanic Blacks, and non-Hispanic Whites. Trend data from the NHANES series show that the percentage of obese persons has increased from 14.5% in the years 1976-1980 to 22.5% in 1988-1994 <sup>27-28</sup>.



*"It is estimated that 10 to 15% of children are overweight and that the prevalence of obesity in children and adolescents has more than doubled between 1980 and 1994. In addition, 60% of obese children aged 5-10 have at least one risk factor for cardiovascular disease, while 25% of these children have two or more"*

Figure 2 - Percentage of young people who are overweight



*"Because obese children are likely to become obese adults, efforts must be concentrated on preventing obesity in children"*

Childhood obesity is now occurring in epidemic proportions as suggested by the recent increase in the incidence of Type 2 diabetes cases. It is estimated that 10 to 15% of children are overweight and that the prevalence of obesity in children and adolescents has more than doubled between 1980 and 1994. In addition, 60% of obese children aged 5-10 have at least one risk factor for cardiovascular disease, while 25% of these children have two or more. Because obese children are likely to become obese adults, efforts must be concentrated on preventing obesity in children. Figure 2 presents percentage data on young people who are overweight <sup>22-29</sup>.

Childhood obesity has also been associated with decreased levels of self-esteem, higher rates of sadness, loneliness, and nervousness and an inclination to engage in high-risk behaviors. Significantly lower levels of self-esteem have been observed in obese Hispanic and white females as they enter early adolescence <sup>30</sup>.

Obstructive sleep apnea, an intermittent interruption of airflow through the nose and mouth that occurs during sleep as a result of excess adipose tissue close to the airway, may also be common in overweight children and adolescents. The fact that obstructive sleep apnea can have a profound effect on learning potential should be an important issue to both the medical and educational communities. Children with sleep apnea have been found to experience neurocognitive abnormalities in learning, memory and vocabulary. Obstructive sleep apnea could very well be a major cause of school failure and learning disabilities in the United States <sup>31-33</sup>.

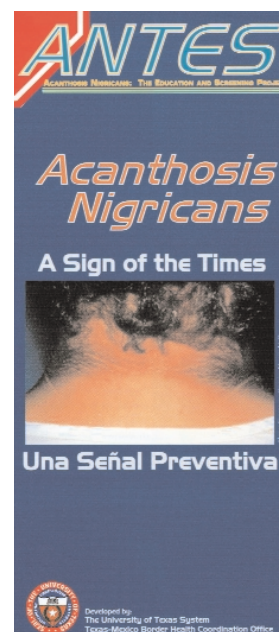
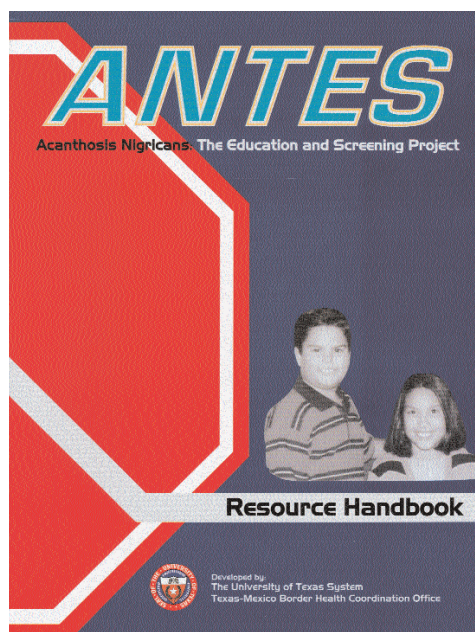
## METHODS

During June, July and August 1999, the TMBHCO trained over 500 school nurses from 48 school districts throughout the pilot nine border counties. School nurses learned about H.B. 1860 and the requirements of the legislative mandate. A brief history, detailed description and the significance of acanthosis nigricans screenings were explained. Nurses were trained to determine the presence of acanthosis nigricans and to collect, record and report data on specially prepared instruments and forms. They were also instructed to collect height/weight data and blood pressure measurements.

### ANTES Resource Handbook and Brochure

The TMBHCO developed the Acanthosis Nigricans: The Education and Screening (ANTES) Project resource handbook, an educational tool to assist in the successful implementation of the ANTES project. The ANTES handbook was targeted for use by school nurses and other health care professionals. The handbook provided a description of what acanthosis nigricans is and its significance; procedures for screening for acanthosis nigricans; a definition and evaluation of obesity in children; guidelines and screening protocols for overweight/obese youth; therapeutic actions for obesity; CPT codes to facilitate the classification of acanthosis nigricans and to assist physicians and/or dietitians in billing; and a pictorial pullout poster of the four grades or severity of acanthosis nigricans. The handbook was distributed to over 550 school nurses as well as over 1000 family physicians, general practitioners, pediatricians, endocrinologists, dermatologists and other health care professionals in the nine border county area. A colorful foldout easy-to-read bilingual brochure was also produced. The brochure was developed for comprehensible use by school nurses to assist in educating parents and the community-at-large about acanthosis nigricans and the ANTES project. Figure 3 provides a cover portrayal of the documents described.

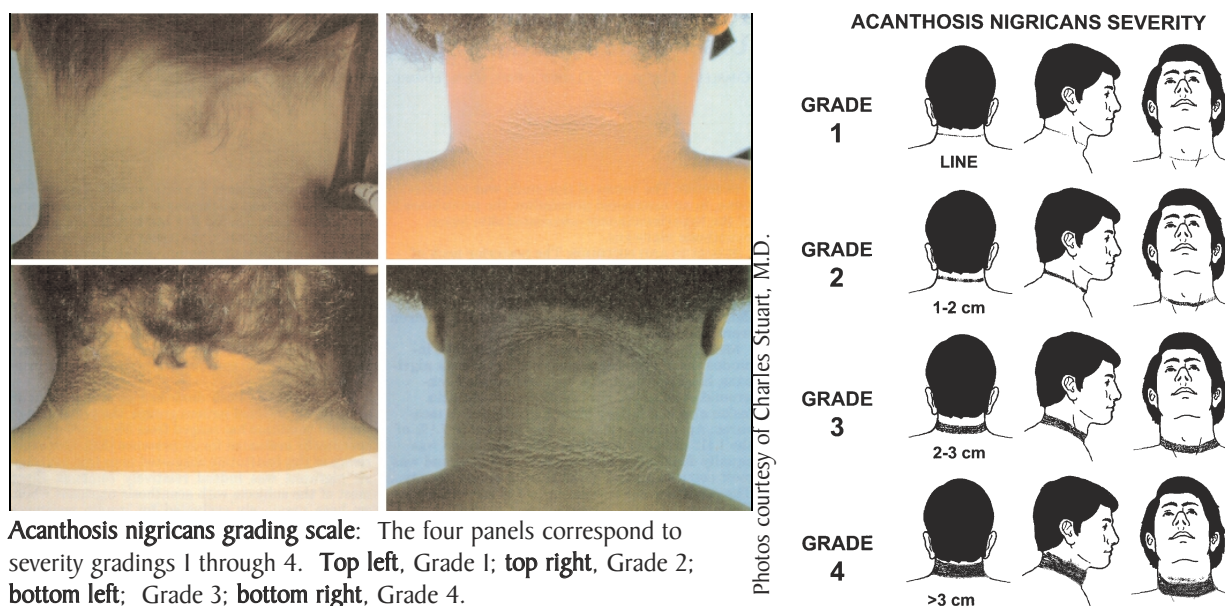
Figure 3 - ANTES Resource Handbook and Brochure



During the 1999-2000 academic school year, school nurses from throughout Cameron, Hidalgo, Jim Hogg, Webb, Willacy, Starr, Zapata, El Paso and Hudspeth Counties screened children during state-mandated vision, hearing, and scoliosis screenings. Screenings were conducted on school campuses during school hours. The nurses reported screening 102,733 children ages five through nineteen for acanthosis nigricans. Screening for acanthosis nigricans was performed by visually examining and palpating the neck for the thickened, darker skin characteristic of the marker.

Figure 4 provides a depiction of the graded severity of acanthosis nigricans. Grade 1 typically shows as a line. Grade 2 was measured as 1-2 cm in width. Grade 3 had a width of 2-3 cm, while Grade 4 measured a width greater than 3 cm. Grading acanthosis nigricans was important since higher grades indicate higher levels of insulin circulating within the body.

**Figure 4 - Graded severity of acanthosis nigricans**



**Acanthosis nigricans grading scale:** The four panels correspond to severity gradings 1 through 4. **Top left**, Grade 1; **top right**, Grade 2; **bottom left**, Grade 3; **bottom right**, Grade 4.

The children who were positively identified with the acanthosis nigricans marker were further assessed for blood pressure, heights, and weights. Demographic data were also collected.

Using an appropriate size cuff, blood pressure was measured in a controlled environment on two occasions (3 to 5 minutes apart) on the child's right arm and with the cubital fossa supported at heart level and the child in a seated position. Blood pressure was recorded twice on each occasion and the average of each of the systolic and diastolic blood pressure measurement was taken to obtain the reported blood pressure reading.

Blood pressure readings were plotted against the appropriate blood pressure tables adjusting for height and weight in boys and girls. The height percentile was determined from the standard growth charts. The child's systolic and diastolic blood pressure was compared with the numbers provided in the table (boys or girls) for age and height percentiles. The child was normotensive if blood pressure was below the 90th percentile. If the child's blood pressure, systolic or diastolic, was at or above the 95th percentile, the child could be hypertensive. Blood pressure measurements between the 90th and 95th percentiles were considered high-normal and warrant further observation and consideration of other risk factors <sup>34</sup>.

The school nurses reported heights and weights for the children with acanthosis nigricans and standard measurements of obesity across age groups was calculated using Body Mass Index (BMI). BMI is expressed as body weight in kilograms divided by the square of height in meters or:

$$\text{BMI} = \frac{\text{Weight in Kilograms}}{(\text{Height in Meters})^2}$$

**Metric conversion:** Multiply pounds by .45; inches by 2.5.  
Height example: 5'7" = 67 inches; 67 x 2.5 = 167.5 cm/100 = **1.68 meters**

Once BMI was determined, the BMI was plotted on the revised National Center for Health Statistics growth charts to determine the degree of the child's overweight <sup>35</sup>.

*A child with a BMI greater or equal to the 95th percentile identifies children who will have a greater chance of maintaining obesity into adulthood. This is also significant as studies have shown that BMI above the 95th percentile is associated with elevated blood pressure, hyperlipidemia, and obesity-related disease and mortality.*

*A child whose BMI falls between the 85th and 94th percentile should be evaluated carefully and should be given particular attention to secondary complications of obesity.*

The ANTES Individual Screening Form was used to record the data. The form was completed by the school nurse and kept on file once the child identified with acanthosis nigricans was referred to a clinician and received a diagnosis and treatment recommendations. The ANTES Consolidated Data Form was completed by the school nurse or appropriate school personnel and sent to the TMBHCO. The TMBHCO used the form to develop a database containing all the relevant information (i.e. age, weight, height, blood pressure readings, degree of acanthosis nigricans) about the children identified with acanthosis nigricans. With the age, height, and weight information provided, the TMBHCO was then able to calculate the child's body mass index and report this measurement back to the school nurse. Once children were screened at school, a referral was made for the child to see a physician. Physicians, in order to document the diagnosis, recommendation(s), and/or treatment, used the ANTES referral form. The referral form was then returned to the school nurse.

A major component of the ANTES project was to prepare health care provider education. The TMBHCO conducted several workshops and seminars for physicians and other health care professionals. Through the Texas Board of Medical Examiners, the TMBHCO collected the names and addresses of physicians operating in the nine border county target area. The ANTES resource handbook was distributed to these physicians. Also, in cooperation with the Texas Medical Association, a one-page document describing the pilot screening project and the screening protocol appeared in the August, September and October 2000 issues of Texas Medicine.

One specific aim of the ANTES project was to provide education to school parents and the community about acanthosis nigricans and its associated complications. Promotoras (community health workers) conducted presentations (on school campuses and in the community) to various parental involvement, PTA/PTO and community groups.



## Results

Table 2 presents a breakdown, by border region, of the number of children screened during the ANTES pilot project and also depicts the prevalence rate of acanthosis nigricans for each area including total prevalence. Most of the 102,733 children who were screened were from the 3rd to 8th grades. This total represented 48 school districts and 523 different schools. The Laredo area reported 17% of students with acanthosis nigricans, the Rio Grande Valley 16.4% and the El Paso area reported 11%. The total number of children with acanthosis nigricans was 14,794, which is 14.40% of the total screened.

**Table 2 - Number of children screened for acanthosis nigricans (ANTES project)**

	Total Screened	Number of children with AN	AN percent
Rio Grande Valley	53606	8765	16.4%
Catholic Schools	1196	131	11%
Laredo	11675	1989	17%
<b>Region I Total</b>	<b>66,477</b>	<b>10,885</b>	<b>16.4%</b>
El Paso	14752	1874	13%
Surrounding ISD's	21351	1995	9.3%
Catholic Schools	153	40	26.1%
<b>Region I9 Total</b>	<b>36,256</b>	<b>3,909</b>	<b>11%</b>
<b>Project Total</b>	<b>102,733</b>	<b>14,794</b>	<b>14.4%</b>

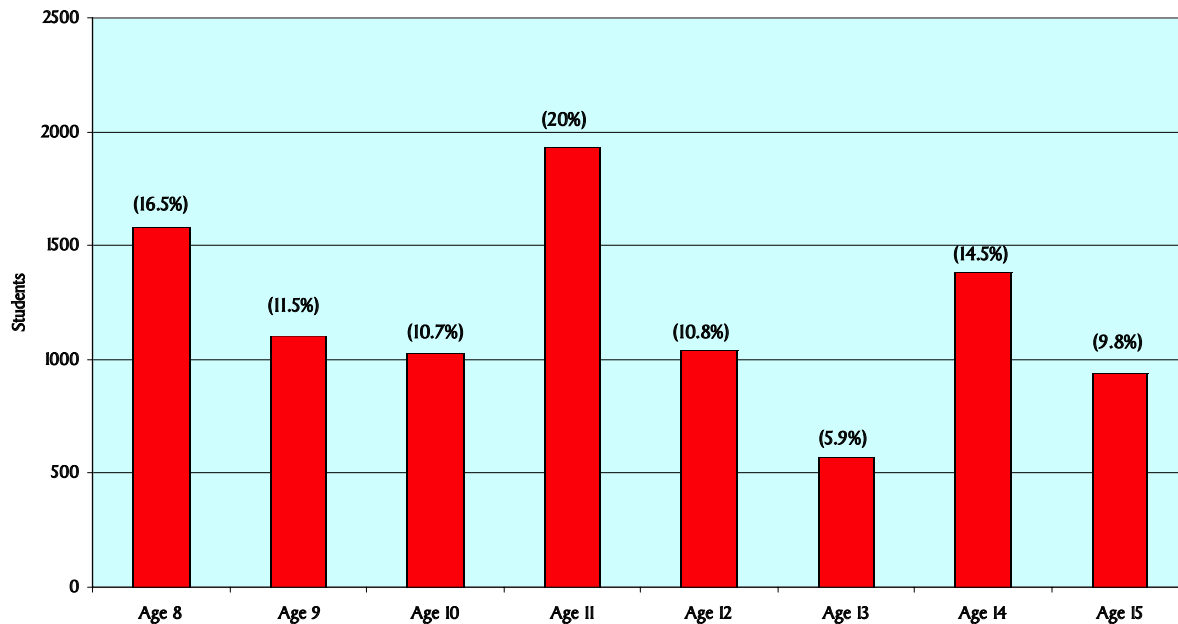
The ratio of acanthosis nigricans by gender was evenly distributed. The Rio Grande Valley reported a 51% male:47% female ratio; Laredo reported a 51% male: 49% female; and El Paso reported a 53% male:47% female. Table 3 presents other demographic data.

**Table 3 - Demographic characteristics of ANTES project participants**

	RGV	Laredo Area	El Paso Area	Total
Gender				
Male	4753	1019	2116	7888
Female	4046	961	1899	6906
Race/Ethnicity				
Hispanic	8447	1900	3614	13961
Black	72	10	120	202
White	176	50	201	427
Other	104	20	80	204

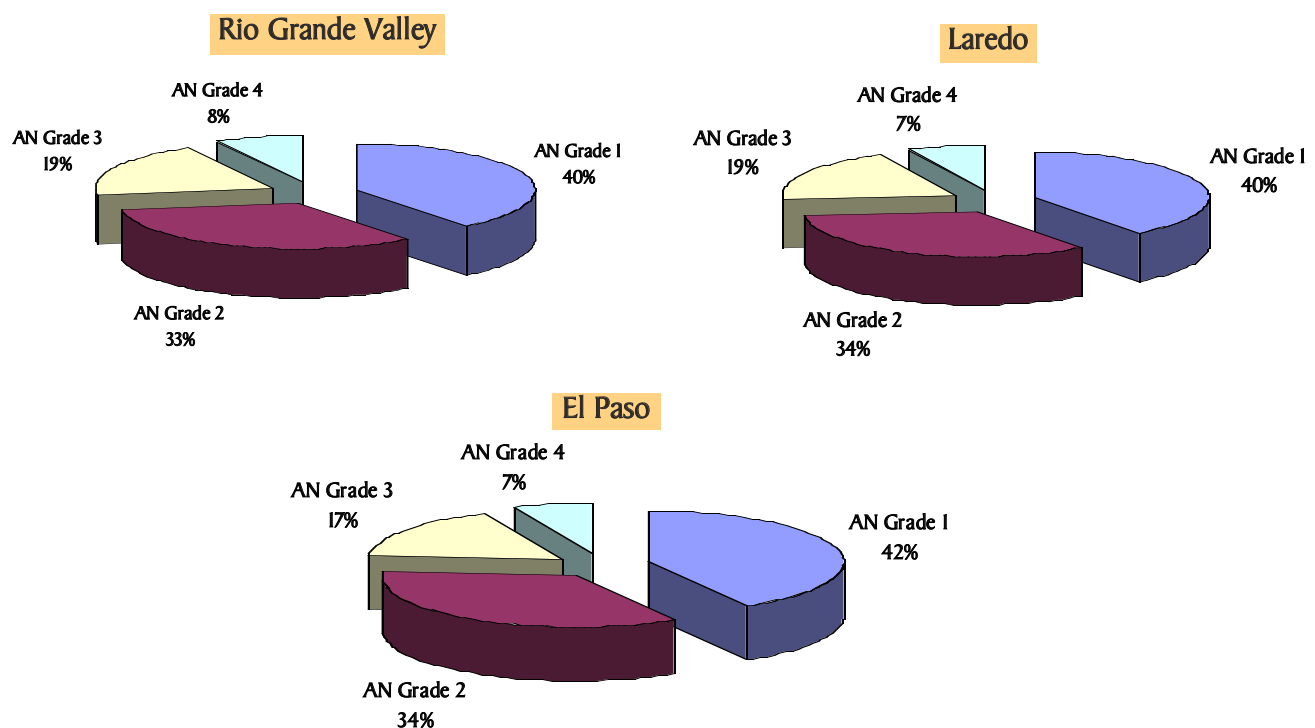
Figure 5 presents the number of children in eight different age categories who were reported with acanthosis nigricans. Children who were eight years old who had acanthosis nigricans totaled 1580, nine years old 1102, 10 years old 1025, 11 years old 1935, 12 years old 1041, 13 years old 572, 14 years old 1387, and 15 years old 939. Six additional age-groups were also reported with acanthosis nigricans but are not included in this figure.

Figure 5 - Number of students with acanthosis nigricans (ANTES project)



Grading of acanthosis nigricans was important since higher grades indicate higher levels of insulin circulating within the body. Figure 6 presents the percent grade of acanthosis nigricans in each region.

Figure 6 - Percent grade of acanthosis nigricans (ANTES Project)



The ANTES project analyzed height and weight data on a random sample of children with and without acanthosis nigricans (n=3025) ages 10-13 to determine the prevalence of obesity among children living along the Texas-Mexico border. Obesity was determined using BMI and plotted on the revised National Center for Health Statistics growth charts to determine the degree of the child's overweight. A child with a BMI greater or equal to the 95th percentile has a greater chance of maintaining obesity into adulthood. This is also significant since studies have shown that BMI above the 95th percentile is associated with elevated blood pressure, hyperlipidemia, and obesity-related disease and mortality. Children whose BMI falls between the 85th and 94th percentile should be evaluated carefully and should be given particular attention to secondary complications of obesity<sup>14, 24-26, 35</sup>. Figure 7 presents BMI percentiles. The school nurses reported 37.6% of the children sampled fell above the 95th percentile. This number was more than twice that reported by the NHANES III in 1988-1994. Sixteen and two tenth percent of the children were at the 85th percentile, indicating they are at-risk of becoming overweight. The combined prevalence of children above the 85th percentile was 53.8%.

**Figure 7 - Percent growth percentiles for body mass index of children ages 10-13 (ANTES Project)**

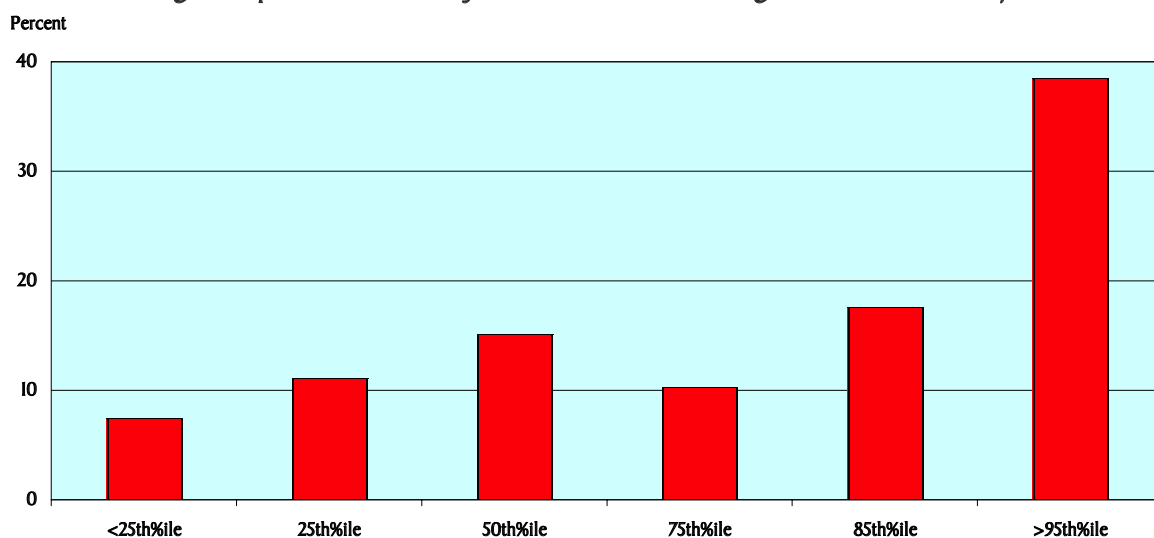


Figure 8 presents a descriptive comparison of overweight children from previous national studies to ANTES data.

**Figure 8 - Comparison of young people who are overweight -- NHANES vs. ANTES**

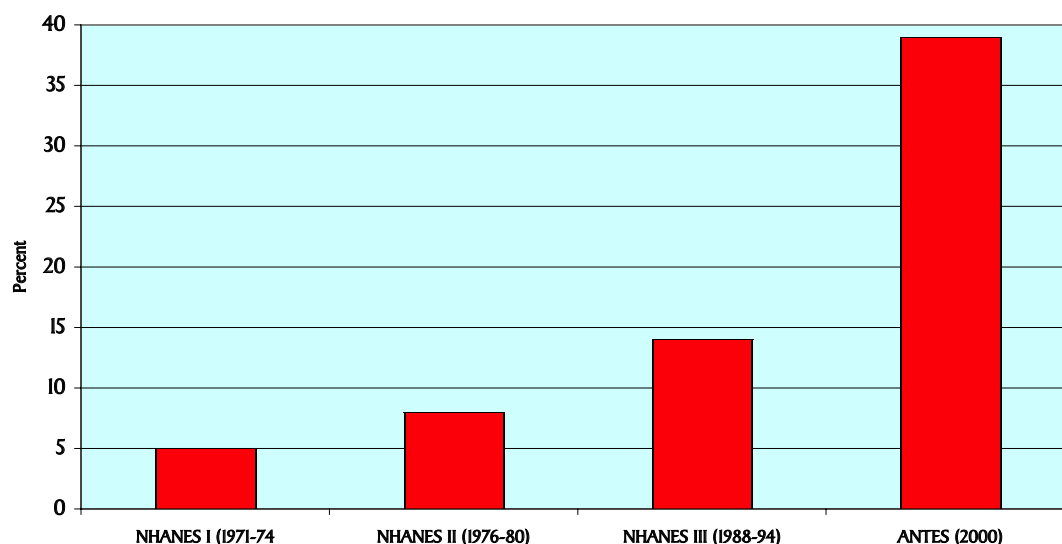
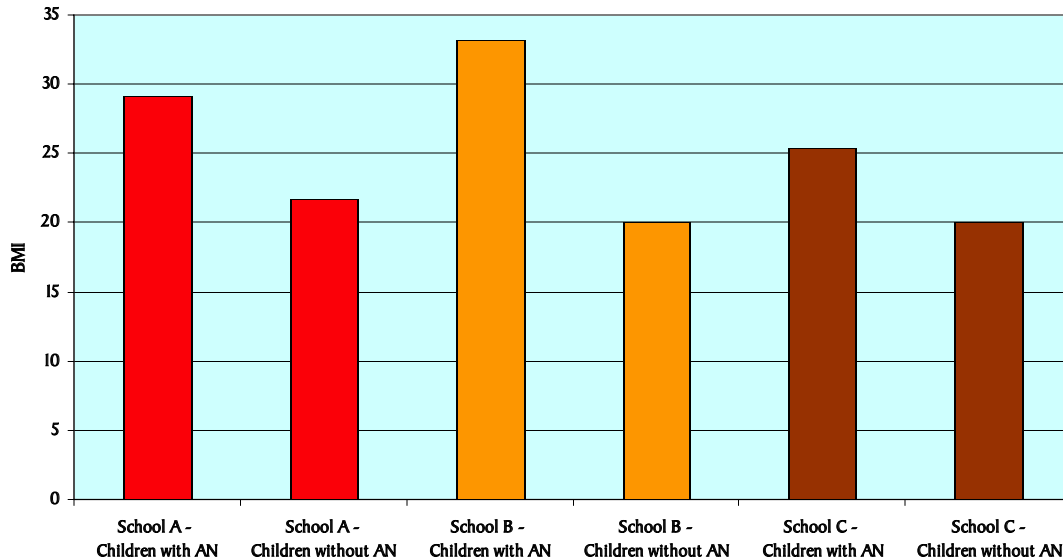


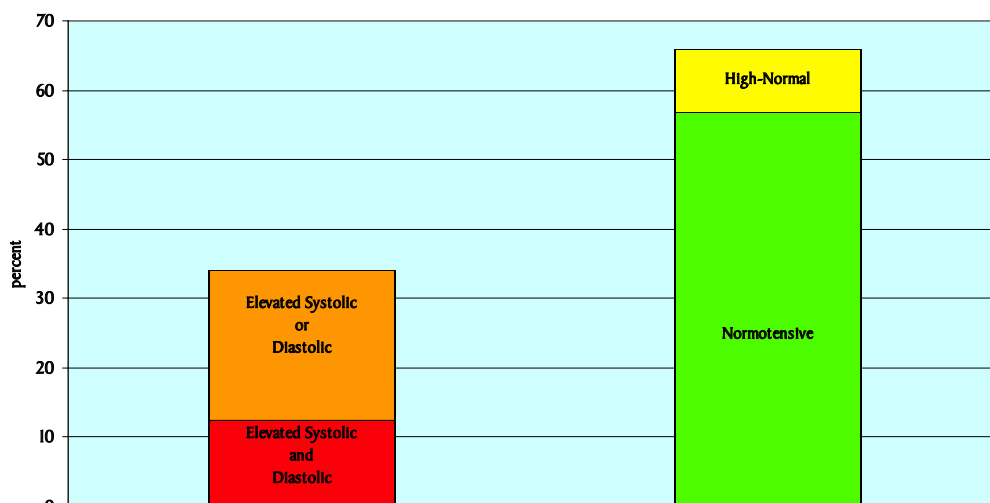
Figure 9 presents a BMI comparison of children with acanthosis nigricans to those without the marker. A total of 740 students from three different elementary schools (schools A, B and C) were used for comparison purposes. Students from school A with acanthosis nigricans had a 29.1 BMI while those without had a 21.7 BMI, a 25% difference; students from school B with acanthosis nigricans had a 33.2 BMI while those without had a 20.1 BMI, a 60% difference; students from school C with acanthosis nigricans had a 25.4 BMI while those without had a 20.1 BMI a 21% difference.

**Figure 9 - Body mass index comparison in three different settings - AN children vs. Non-AN children**



Hypertension increases the risk for cardiovascular disease and is a complication of obesity. Hypertension has also been associated with insulin resistance and hyperinsulinemia, which results in acanthosis nigricans. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to track blood pressure in children. Figure 10 presents data on blood pressure measurements in four categories: elevated systolic and diastolic measures, elevated systolic or diastolic measures, high-normal measures and normotensive measures. Thirteen percent of children examined had elevated systolic and diastolic measures above the 95th percentile for blood pressure in children, while 22% of the children had either an elevated systolic or diastolic measure, resulting in 35% of children with elevated blood pressure. Fifty-seven percent of the children examined had normal blood pressures, and 9% had high-normal measurements, which carry an increased risk of developing elevated blood pressure.

**Figure 10 - Blood pressure measurements - children with acanthosis nigricans**





## DISCUSSION/RECOMMENDATIONS

Results of the ANTES project suggest that the population of Mexican American children along the border has an even higher rate of obesity and high blood pressure than nationally reported rates. Applying this concept to the reported 14.4% of children with the marker vastly increases the number and potential numbers of children from the border area who either may have or are on the threshold of getting Type 2 diabetes and other chronic conditions.

There were not significant differences noted on which gender had the most acanthosis nigricans. When dividing the study area by three sections (Rio Grande Valley, Webb region and El Paso region), the proportion of acanthosis nigricans by the age of the children and the severity of the marker were similar.

The number of children who were reported as overweight, obese and having abnormal blood pressures indicate that the study population has greater risk for future health problems than the general population. The case can be made that utilizing acanthosis nigricans screenings as a starting point for health promotion and disease prevention in a young population has merit. Although potential chronic health conditions were noted in children without acanthosis nigricans, those with acanthosis nigricans had increased obesity and abnormal blood pressure. It could well be that there is no other condition that affects as many children in a chronic way as does insulin resistance.

The 14,794 (14.4%) children reported with the acanthosis nigricans marker out of 102,733 screened was a significant proportion. Another aspect of the project that provided important data was a randomized body mass index comparison of 5th and 6th grade children with and without acanthosis nigricans. The children, from three different settings, with acanthosis nigricans had 21%, 25% and 60% higher body mass index than classmates without the marker. When comparing children with acanthosis nigricans to those without acanthosis nigricans in a body composition test, the acanthosis nigricans positive children were determined to have a lower basal metabolic rate and a higher percentage of body fat. Thirty-eight percent of the children screened had a BMI over the 95th percentile compared with national data (NHANES) III that totaled 14%. Children with acanthosis nigricans had blood pressure measurements 15% higher than age appropriate standards. This is significant since elevated blood pressure correlates with hypertension in early adulthood, which leads to other health problems. In a previous study analyzing blood profiles of 6th grade children with acanthosis nigricans in the Rio Grande Valley, it was reported that 24% had elevated blood pressure, 59% had high cholesterol and 28% had elevated triglycerides <sup>6</sup>.

This project provides an encouraging foundation for future and expanded acanthosis nigricans screenings. The ANTES project revealed obstacles to implementing the needed changes that assure children with acanthosis nigricans obtain the needed attention to alter nutritional habits, increase physical activity and obtain medical consideration. The lack of resources needed to provide long term nutritional care for families with children with acanthosis nigricans was evident. The current Medicaid system poorly compensates clinicians who are trying to employ a preventative solution. At the same time, more intensive clinical education describing the implications of acanthosis nigricans, insulin resistance, obesity and elevated blood pressure to a youthful population needs to be

conducted. This is a serious issue that should be recognized by the medical community, school policy makers and parents.

It is recommended that acanthosis nigricans screenings be expanded to include a much larger population of the state and said screenings be part of the state's public health policy. Acanthosis nigricans screenings in some predominantly minority communities has focused attention on childhood obesity and diabetes risk. This has helped to set the stage for community-based nutrition and fitness interventions. School nurses and other school personnel involved in the education of children believe that it is in the best interest of Texas if a specific focus is placed on students' health to complement the already mandated vision/hearing and scoliosis screenings. The acanthosis nigricans screenings should be complemented with a concerted effort on preventing, reducing and eliminating obesity and abnormal blood pressures through weight loss and physical activity. This requires the entire school community be involved in promoting a healthy environment for the children.

In consultation with school nurses, these other recommendations are also offered:

**1. Increase the number of school nurses in the Texas Public School districts. The TMBHCO supports the position of the National Association of School Nurses that the maximum ratio of nurse to student should be one school health nurse to no more than 750 students in the general school population.**

All children and youth have a right to have their health needs met while in school. According to the National Association of School Nurses, the delivery of quality school nursing services is affected by the nurse/student ratio<sup>36</sup>

**2. School districts should be discouraged from agreeing to "Pouring Rights" contracts, in which a school district grants a beverage company sole rights to all drink sales in its schools.**

Soft drinks are the "quintessential junk" food. A 12-ounce can contains about 1.5 ounces of sugar and 160 calories, but not much else worth mentioning. Pouring Rights" contracts are increasingly common throughout the country, particularly in states of Texas, Colorado, and Michigan. In exchange for the exclusive rights to sell and promote their product in a school district, the companies pay districts sums of money that often exceed several million dollars. As previously mentioned in this report, rates of childhood obesity have doubled in the past 30 years. Young people's consumption of milk dropped by a third between the 1970s and 1990s, while their consumption of soda has risen more than 50 percent. The TMBHCO offers this recommendation because of its concern with the poor nutritional value of soft drinks <sup>37</sup>.

**3. Physical education should be a requirement for students in grades K-12. At least 150 minutes should be allocated each week to the subject.**

The number of quality Physical Education programs in our nation's schools continues to dwindle and more of our youth suffer from a lack of fitness. Physical education is an integral part of the education process. Researchers have shown that students who participate in regular physical education will enjoy enhanced memory and learning, better concentration and increased problem-solving abilities. Regular physical education encourages a positive attitude toward self and others, which is an important factor in creating a healthy learning environment <sup>27</sup>.

#### 4. Obese children must be checked for obstructive sleep apnea.

Obstructive sleep apnea with daytime somnolence is a common problem in adults, but recent studies show that it may also be common in overweight children and adolescents. Obstructive sleep apnea could have a profound effect on learning potential. Children with obstructive sleep apnea have been found to have neurocognitive abnormalities in learning, memory and vocabulary. Findings suggest that obstructive sleep apnea could very well be a major cause of school failure and learning disabilities in the United States <sup>32</sup>.

#### 5. School districts along with local, state and federal governments should be aggressive in providing water fountains in public buildings and playgrounds.

#### 6. Improve the nutritional content of school breakfast and lunch programs.

Most of the children will get sugar-sweetened foods and snacks away from school, so the school can be an area where there is a sugar respite. Children aged 7 to 12 spend more than \$2 billion a year of their own money on snacks and beverages, and teenagers have \$58 billion to spend on candy, soft drinks, ice cream, and fast food. Also, kids are said to influence one-third of total sales of candy and gum, and 20-30% of cold cereals, pizza, salty snacks, and soft drinks <sup>37-38</sup>. Studies also indicate protein consumption during breakfast stabilizes blood sugar.

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**“THAT WHICH CAN BE FORESEEN CAN BE PREVENTED”**

**DR. CHARLES MAYO  
CIRCA 1928**

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