Texas Risk Assessment for Type 2 Diabetes in Children

A Report to the Governor and the 81st Legislature of the State of Texas
In Fulfillment of SB 415 of the 80th Legislature

The University of Texas-Pan American
Border Health Office
The University of Texas-Pan American Border Health Office

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Border Health Office
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ACKNOWLEDGEMENTS

The Texas Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administrated by The University of Texas Pan-American Border Health Office (BHO). We would like to extend a most grateful thanks to everyone who, through this program, have contributed to help families understand the importance of recognizing risk factors associated with Type 2 diabetes in children.

Foremost, the greatest gratitude is extended to the school nurses, nurse coordinators, and regional school health specialists involved with the risk assessments. Without the time, skills, and efforts of these special people, a child’s first line of defense for disease prevention and health promotion would erode. For many children, a school nurse is a child’s only form of medical attention.

The University of Texas-Pan American Border Health Office greatly appreciates the support and vision of State Senator Eddie Lucio Jr., D-District 27. Senator Lucio is to be congratulated for authoring SB 415 and for understanding the needs of the program to make the most significant impact possible on the health of children who are assessed through this program. We would also like to thank State Senator Judith Zaffarini, D-District 21 for co-authoring the bill and State Representative Jim McReynolds, D-District 12 for lending his sponsorship.

The Texas Risk Assessment for Type 2 Diabetes in Children is housed and supported by The University of Texas-Pan American and its President, Dr. Blandina Cárdenas and Provost Dr. Paul Sale. Thank you Dr. Cárdenas and Dr. Sale. In addition, the UTPA Border Health Office would like to extend its gratitude to Dr. Cynthia J. Brown, Vice-Provost for Graduate Programs and Academic Centers, for lending her expertise and support to the program and helping the Border Health Office strive for the highest performance standards possible.

The Texas Risk Assessment for Type 2 Diabetes in Children program is also very fortunate to have the advice and guidance of the Risk Assessment for Type 2 Diabetes Advisory Committee that advises the Border Health Office on the growth and direction of the program. This group of professionals and parents are well respected in their fields, understand the populations that are affected by the program, and understand the value of having such a program in place. For their help, we would like to thank:

Doreen D. Garza, MPH  
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Victor H. Gonzalez, MD  
Chair, Texas Diabetes Council

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Director of Discipline, Counseling and Pregnancy Programs  
Texas Education Agency

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Julia Soper, RN  
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Finally, we would like to thank the UTPA Border Health Office staff for believing in what they do.
EXECUTIVE SUMMARY

The Texas Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated and administrated by The University of Texas Pan-American Border Health Office (BHO). The program assesses children who may be at high risk to develop Type 2 diabetes in Education Service Center Regions 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20, impacting over 1.1 million children yearly. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, and 7th graders in public and private schools, certified individuals assess children for the acanthosis nigricans marker (AN), a skin condition that signals high insulin levels. Children who are positively identified with the marker undergo additional assessments of body mass index (BMI), BMI percentile, and blood pressure.

The Texas Risk Assessment for Type 2 Diabetes in Children is an important program because it can help identify children who have these risk factors, all of which can increase the propensity for children to develop Type 2 diabetes. Because of the risk assessment, referrals are issued to the parents of these children, alerting each parent of their child’s risk factors and encouraging further evaluation from a health professional. Becoming aware of and understanding what the risk factors suggest can stimulate the changes necessary to prevent or delay future health problems for children at risk of developing Type 2 Diabetes and other conditions.

The Texas Risk Factor Assessment for Type 2 Diabetes in Children program educates, trains and certifies school nurses or other individuals who are qualified to become proficient in conducting these assessments. Along with conducting the risk assessment, school nurses are also a valuable resource because they can provide parents with additional information about the health risks associated with Type 2 diabetes, develop an action plan for behavior change, and connect the family to medical care in their community.

During the 80th Texas Legislative session, the legislature passed Senate Bill 415 (SB 415). Senate Bill 415 (SB 415) called for the formation of the Risk Assessment for Type 2 Diabetes Advisory Committee (Advisory Committee) to advise the BHO on the growth and direction of the program. The Advisory Committee made recommendations regarding six matters impacting the program. Those recommendations are presented in this report.

The Texas Risk Factor Assessment for Type 2 Diabetes in Children program also contributes to the state plan for diabetes prevention and control developed by the Texas Diabetes Council by providing statistics and information of risk assessment activities and recommendations for assisting children in Texas at risk for developing Type 2 Diabetes. Important information will be presented on claims data for International Classification of Diseases-9 (ICD-9) Code 701.2 Acquired Acanthosis Nigricans. According to the claims data, the counts significantly increased as the risk assessments were introduced into Texas Public Health Regions where assessments had not been previously conducted. This indicates that parents of children who were identified as at-risk were seeking further health evaluation from their health care providers. As a result, the risk assessments may be effective in getting those children who are identified as at-risk to seek appropriate follow-up testing and may create the "stimulus" for opportunistic screenings conducted in primary health care practices.

Also, the Texas Risk Factor Assessment for Type 2 Diabetes in Children program now provides school administrators with an annual report of the school’s risk factor assessments. These reports include information on the total number of students assessed by school grades, the total number of students with the AN marker by school grade, and of those children with the AN marker - results of BMI and blood pressure assessments. Also included in these reports is the percent participation of the free and reduced school lunch as reported by the Texas Education Agency, the number of children who were issued a risk assessment referral form, and the number of those children that sought the care of a physician. These reports may help schools, in particular School Health Advisory Councils, initiate systems change, assist with other school health initiatives, and improve the school health environment. Risk assessment information is available to school administrators via website by Regional Education Service Center (ESC), school district, and individual school. Risk assessment information for Education Service Center Regions 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20 is included in this report.
Texas Risk Assessment for Type 2 Diabetes in Children

INTRODUCTION

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administrated by The University of Texas Pan-American Border Health Office (BHO). The program assesses children who may be at high risk of developing Type 2 Diabetes in Texas Education Agency Regional Education Service Centers 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20.

RISK ASSESSMENT MANDATE POPULATION
(1, 3, 5, & 7TH GRADES)

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGV</td>
<td>113,240</td>
</tr>
<tr>
<td>Corpus Christi</td>
<td>31,890</td>
</tr>
<tr>
<td>Victoria</td>
<td>15,698</td>
</tr>
<tr>
<td>Houston</td>
<td>307,669</td>
</tr>
<tr>
<td>Dallas</td>
<td>212,676</td>
</tr>
<tr>
<td>Ft. Worth</td>
<td>152,586</td>
</tr>
<tr>
<td>Austin</td>
<td>100,977</td>
</tr>
<tr>
<td>San Angelo</td>
<td>13,988</td>
</tr>
<tr>
<td>Midland/Odessa</td>
<td>22,083</td>
</tr>
<tr>
<td>El Paso</td>
<td>51,592</td>
</tr>
<tr>
<td>San Antonio</td>
<td>113,306</td>
</tr>
<tr>
<td>Total</td>
<td>1,135,705</td>
</tr>
</tbody>
</table>

Source: Texas Education Agency

During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, and 7th graders in public and private schools, certified individuals assess children for the acanthosis nigricans marker, a skin condition that signals high insulin levels.

Acanthosis Nigricans (AN) is considered a risk factor in the development of Type 2 Diabetes. Assessing for acanthosis nigricans can be useful to help identify children who may be at-risk for developing future health problems. Acanthosis nigricans identification is a simple, non-intrusive method that has been acceptable to children and those conducting the assessments.


Children who are positively identified with the marker undergo additional assessments of body mass index (BMI), BMI percentile, and blood pressure.

Referrals are issued to the parents of these children, alerting each parent of their child’s risk factors and encouraging further evaluation from a health professional. Becoming aware of and understanding what the risk factors suggest can stimulate the changes necessary to prevent or delay future health problems for children at risk of developing Type 2 Diabetes and other conditions.
RISK ASSESSMENTS

ACANTHOSIS NIGRICANS

Acanthosis nigricans is a cutaneous marker associated with hyperinsulinemia and insulin resistance and is considered a risk factor for Type 2 Diabetes and other chronic diseases. Because of the increasingly alarming rates of children developing Type 2 Diabetes, acanthosis nigricans assessments are important and can help identify children with high insulin levels who may be at-risk for developing the disease. Children who are positively identified with the AN marker undergo additional assessments of body mass index (BMI), BMI percentile, and blood pressure.

BODY MASS INDEX

Body Mass Index (BMI) is a measurement that helps determine overweight status by using a mathematical formula that takes into account a child’s age, height, and weight. After BMI is calculated for children and teens with acanthosis nigricans, the BMI number is plotted on Center for Diseases Control and Prevention (CDC) BMI-for-age growth charts. 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. BMI categories are identified as obese, overweight, normal, and underweight.

BLOOD PRESSURE

Hypertension increases the risk for cardiovascular disease and is a complication of obesity. Hypertension has also been associated with insulin resistance and hyperinsulinemia. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to track blood pressure in children. Certified personnel perform two blood pressure measures on children who have the AN marker. Blood pressure is taken on the child’s right arm in a controlled environment, giving three to five minutes of rest in between each reading as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The blood pressure categories are identified as hypertensive, prehypertensive, or normal.

The Risk Factor Electronic System used by certified personnel conducting the risk assessments provides users with a printable CDC growth chart. BMI is plotted on the growth chart and includes BMI category.

Acanthosis nigricans reliably defines a subgroup of obese children with hyperinsulinemia and insulin resistance, the early abnormality of metabolic syndrome and Type 2 Diabetes.

During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, and 7th graders in public and private schools, certified individuals assess children for the acanthosis nigricans marker, a skin condition that signals high insulin levels. Children who are positively identified with the marker undergo additional assessments of body mass index (BMI), BMI percentile, and blood pressure.

Certified individuals make medical referrals for children with AN, which include BMI, BMI percentile, and blood pressure.

Risk assessment referrals are issued to the parents of these children, alerting each parent of their child’s risk factors and encouraging further evaluation from a health professional. Becoming aware of and understanding what the risk factors suggest can stimulate the changes necessary to prevent or delay future health problems for children at risk of developing Type 2 Diabetes and other conditions.
During the 80th Texas Legislative session, the legislature passed Senate Bill 415 (SB 415). This bill, which details the Risk Assessment for Type 2 Diabetes in Children program and its responsibilities, called for the formation of the Risk Assessment for Type 2 Diabetes Advisory Committee (Advisory Committee) to advise the BHO on the growth and direction of the program. In accordance with SB 415, and no later than September 1 of each even-numbered year, the Advisory Committee is required to make recommendations to the BHO regarding six matters impacting the program. The following report details the Advisory Committee's recommendations for each of the six items specified in SB 415:

1. **Recommend the person who should be responsible for conducting risk assessment activities under this chapter for schools that do not employ a school nurse;**

The Advisory Committee recommends that, in the absence of a school nurse, schools may subcontract for risk assessment services or assign a designated school employee to conduct the assessments, record and report the assessment information to the BHO, and refer and follow-up with children identified as being at risk. Individuals who conduct these assessments must receive training and certification from the BHO.

2. **Advise the office on the age groups that would benefit most from the risk assessment activities under this chapter;**

The Advisory Committee recommends that 9th grade students be included in the risk assessment program. Students in this grade may be experiencing puberty, which has been identified as important in the development of Type 2 diabetes in children.

3. **Recommend a method to record and report the number of children who are identified in the risk assessment process as being at risk for having or developing Type 2 diabetes and who qualify for the national free or reduced-price lunch program established under 42 U.S.C. Section 1751 et seq.;**

The Risk Assessment for Type 2 Diabetes in Children Advisory Committee recommends that information on the total percentage of students enrolled who qualify for national free or reduced-price lunch program for school districts be included by the BHO in the school district risk assessment activity reports. Currently, information on individual student national free or reduced-price lunch program participation is not readily accessible to those individuals conducting risk assessments. In the future, the Advisory Committee will investigate other methods of recording and reporting the number of children that are identified at-risk for having or developing Type 2 diabetes and who qualify for the national free or reduced-price lunch program.

4. **Recommend a deadline, which may not be later than the first anniversary of the date the advisory committee submits a recommendation to the office under this section, by which the office shall implement the advisory committee's recommended risk assessment activities, surveillance methods, reports, and quality improvements;**

In order to allow sufficient time for implementation and training, the Advisory Committee recommends the BHO implement the Advisory Committee's recommendations no later than September 1, 2009.
RISK ASSESSMENT ADVISORY COUNCIL RECOMMENDATIONS

5. Contribute to the state plan for diabetes treatment developed by the council under Section 103.013 by providing statistics and information on the risk assessment activities conducted under this chapter and recommendations for assisting children in this state at risk for developing Type 2 diabetes:

The Advisory Committee recommends that the BHO contribute to the state plan by providing the Texas Diabetes Council with statistical information obtained through the risk assessment program.

6. Recommend any additional information to be included in the report required by Section 95.004.

The Advisory Committee recommends no additional information to be included in the individual risk assessment reports required by Section 95.004 of the Texas Health and Safety Code.

This report is submitted to the UTPA Border Health Office pursuant to Section 95.006 (i) of the Texas Health and Safety Code.

Texas Risk Assessment for Type 2 Diabetes in Children Advisory Committee

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Executive Director
UTPA Border Health Office

Victor H. Gonzalez, MD
Chair, Texas Diabetes Council

Lauralea Bauer
Director of Discipline, Counseling and Pregnancy Programs
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Mary Lou Lujan, RN
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Children’s Diabetes and Endocrine Center of South Texas
Driscoll Children's Hospital
Texas Pediatric Society

Julia Soper, RN
School nurse, Pharr-San Juan-Alamo ISD
Texas Risk Assessment for Type 2 Diabetes in Children

ICD-9 701.2 Acquired Acanthosis Nigricans Claims Count

To understand the impact of the Texas Risk Assessment for Type 2 Diabetes in Children program, Texas Department of State Health Services Medicaid/CHIP claims data was obtained for years 1999 to 2003, sourcing International Classification of Diseases (ICD-9) Code 701.2 Acquired Acanthosis Nigricans claims count. This data would help address whether school nurse referrals were being followed up by parents with health care providers.

During the inception years of the Texas Risk Assessment for Type 2 Diabetes in Children program, 1999-2001, the assessments were mainly conducted in Texas Public Health Regions 10 and 11. For years 1999 and 2000, Acquired Acanthosis Nigricans ICD-9 code 701.2 increased from 2,848 to 10,090 claims (p<.001). This marked a 254% increase between those years. Claims count between years 2000 and 2001 increased by only 7%, increasing from 10,090 to 10,810 (p<.001).

In 2001, the Texas Risk Assessment for Type 2 Diabetes in Children program expanded the assessments to include Texas Public Health Regions 8 and 9, including partial areas of Regions 6 and 7. For years 2001 and 2002, the claims count increased from 10,810 to 15,524 (p<.001). A 44% increase in claims count was seen between those years. Claims count between years 2002 and 2003 increased from 15,524 to 19,605 (p<.001), yielding a 26% increase.

According to the claims data, the counts significantly increased as the risk assessments were introduced into Texas Public Health Regions where assessments had not been previously conducted. This may indicate that parents of children who were identified as at-risk were seeking further health evaluation from their health care providers. As a result, the risk assessments may be effective in getting those children who are identified as at-risk to seek appropriate follow-up testing and may create the "stimulus" for opportunistic screenings conducted in primary health care practices.
The Texas Risk Assessment for Type 2 Diabetes in Children program is supported by funds from the Texas State Legislature provided to The University of Texas-Pan American Border Health Office. The following is a detailed expense account of fiscal year 2007-2008.

The Texas Risk Assessment for Type 2 Diabetes in Children program budget is $292,605.

A total of $155,088 is allocated to pay the salaries of 4 FTE Health Education Coordinators, 1 FTE secretary, partial support for an Risk Factor Electronic System (RFES) programmer, and two part-time direct wage employees. The coordinators are responsible for training approximately 5,000 school nurses and providing them with technical assistance with the Risk Factor Electronic System. These coordinators also participate in health fairs, participate as members of School Health Advisory Councils, and assist in other risk assessment-related requests. The secretary assists the coordinators with directing phone calls and making all travel and meeting arrangements. The part-time RFES programmer assists in with configuration of the RFES, updating the program, implementing any changes as necessary. The part-time employees are students who assist the coordinators with preparing all the training packets, copies, mail-outs, and data entry.

A total of $83,165 is allocated for operating and maintenance. This includes the professional printing of educational material for school nurses (bilingual brochures, posters, videos). It also supports the purchase of computers and software, maintenance for office vehicles, consumable office supplies, postage, and telephone.

A total of $54,352 is allocated for travel. This includes both ground and air travel, lodging and meal per diem for coordinators to carry out responsibilities in the risk assessment mandated regions. These funds are also used for travel expenses related to continuing education for staff regarding relevant children’s health related issues.
SUGGESTED READINGS


Bonet, B, Viana, M, Sánchez-Vera, I, Quintanar, A, Martínez, J, Espino, M. Adipose tissue and liver lipid metabolism in obese children: role of the body mass index and the presence of acanthosis nigricans. Diabetic Medicine 2007;24:1192-1198


Dabelea, D, Pettitt, DJ, Jones, KL, Arslanian, SA. Type 2 Diabetes Mellitus in Minority Children and Adolescents: An Emerging Problem. Pediatric Endocrinology 1999;28:709-729


Gahagan, S, Silverstein, J, Committee on Native American Child Health and Section on Endocrinology. Prevention and Treatment of Type 2 Diabetes Mellitus in Children, With Special Emphasis on American Indian and Alaska Native Children. Pediatrics 2003;112(4):e328-e346


Hardin, DS. Screening for Type 2 Diabetes in Children with Acanthosis Nigricans. Diabetes Educator 2006;32(4):547-552


Jones, LH, Ficca, M. Is Acanthosis Nigricans a Reliable Indicator for Risk of Type 2 Diabetes? J Sch Nursing 2007;23(5):247-251


Maitra, SK, Rowland Payne, CME. The obesity syndrome and acanthosis nigricans. Acanthosis nigricans is a common cosmetic problem providing epidemiological clues to the obesity syndrome, the insulin-resistance syndrome, the thrifty metabolism, dyslipidaemia, hypertension and diabetes mellitus type II. Journal of Cosmetic Dermatology 2004;3:202-210

**SUGGESTED READINGS**


National Association of State Boards of Education. Policy Update. 2000;8(10)


Neufeld, ND, Raffel, LJ, Landon, C, Chen, YDI, Vadheim, CM. Early Presentation of Type 2 Diabetes in Mexican-American Youth. Diabetes Care 1998;21:80-86


Rosenbloom, AL, Joe, JR, Young RS, Winter, WE. Emerging Epidemic of Type 2 Diabetes in Youth. Diabetes Care 1999;22:345-354


Suggested Readings

Strauss, RS. Childhood Obesity and Self-Esteem. Pediatrics 2000;105:1


Zwillich, CW. Is Untreated Sleep Apnea a Contributing Factor for Chronic Hypertension? JAMA 2000;283:1880-1881
Texas Regional Education Service Center
Risk Assessment Fact Sheets
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The following results are for the assessments conducted in your region:

### Demography

<table>
<thead>
<tr>
<th>Total Number of Students Assessed: 129,644</th>
<th>Number of Students Referred: 12,941</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Students with AN: 15,142</td>
<td>Number of Students Seen Physician: 2,654</td>
</tr>
</tbody>
</table>

### Acanthosis Nigricans

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

### Blood Pressure

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

### Body Mass Index

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student's height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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*Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency
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The following results are for the assessments conducted in your region:

**Demography**

<table>
<thead>
<tr>
<th>Total Number of Students Assessed: 30,243</th>
<th>Number of Students Referred: 1,983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Students with AN: 2,565</td>
<td>Number of Students Seen Physician: 392</td>
</tr>
</tbody>
</table>

**Acanthosis Nigricans**

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

**Blood Pressure**

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<table>
<thead>
<tr>
<th>Grade</th>
<th>1st</th>
<th>3rd</th>
<th>5th</th>
<th>7th</th>
<th>Other Grades</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>152</td>
<td>282</td>
<td>360</td>
<td>359</td>
<td>108</td>
<td>693</td>
<td>568</td>
</tr>
<tr>
<td>Pre-Hypertensive</td>
<td>40</td>
<td>67</td>
<td>123</td>
<td>114</td>
<td>38</td>
<td>199</td>
<td>183</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>84</td>
<td>132</td>
<td>206</td>
<td>218</td>
<td>103</td>
<td>360</td>
<td>383</td>
</tr>
</tbody>
</table>

**Body Mass Index**

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: **Underweight**, **Normal**, **Overweight**, and **Obese**. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

<table>
<thead>
<tr>
<th>Grade</th>
<th>1st</th>
<th>3rd</th>
<th>5th</th>
<th>7th</th>
<th>Other Grades</th>
<th>Underweight</th>
<th>Obesity</th>
<th>Overweight</th>
<th>Underweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>11</td>
<td>13</td>
<td>14</td>
<td>18</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Obese</td>
<td>253</td>
<td>443</td>
<td>624</td>
<td>595</td>
<td>225</td>
<td>3</td>
<td>201</td>
<td>65</td>
<td>0</td>
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<tr>
<td>Overweight</td>
<td>12</td>
<td>29</td>
<td>64</td>
<td>79</td>
<td>17</td>
<td>0</td>
<td>3</td>
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</tr>
<tr>
<td>Underweight</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*% of Students on Free and Reduced Lunch: 61.9%

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency
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The following results are for the assessments conducted in your region:

### Demography

| Total Number of Students Assessed: 13,346 | Number of Students Referred: 776 |
| Total Number of Students with AN: 1,062 | Number of Students Seen Physician: 151 |

### Acanthosis Nigricans

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

### Blood Pressure

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

<table>
<thead>
<tr>
<th>Normal</th>
<th>Pre-Hypertensive</th>
<th>Hypertensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>96</td>
<td>31</td>
<td>55</td>
</tr>
<tr>
<td>153</td>
<td>48</td>
<td>85</td>
</tr>
<tr>
<td>215</td>
<td>39</td>
<td>79</td>
</tr>
<tr>
<td>55</td>
<td>6</td>
<td>41</td>
</tr>
<tr>
<td>319</td>
<td>88</td>
<td>152</td>
</tr>
<tr>
<td>261</td>
<td>54</td>
<td>139</td>
</tr>
</tbody>
</table>

### Body Mass Index

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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The following results are for the assessments conducted in your region:

**Demography**

Total Number of Students Assessed: **274,962**

Number of Students Referred: **14,781**

Total Number of Students with AN: **18,047**

Number of Students Seen Physician: **2,158**

% of Students on Free and Reduced Lunch: **54.1%**

**Acanthosis Nigricans**

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**Blood Pressure**

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

**Body Mass Index**

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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The following results are for the assessments conducted in your region:

**Demography**

<table>
<thead>
<tr>
<th>Total Number of Students Assessed: 158,410</th>
<th>Number of Students Referred: 7,385</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Students with AN: 9,293</td>
<td>Number of Students Seen Physician: 867</td>
</tr>
</tbody>
</table>

**Acanthosis Nigricans**

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**Blood Pressure**

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<table>
<thead>
<tr>
<th>Normal</th>
<th>Pre-Hypertensive</th>
<th>Hypertensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>456</td>
<td>95</td>
<td>174</td>
</tr>
<tr>
<td>1,078</td>
<td>242</td>
<td>443</td>
</tr>
<tr>
<td>1,837</td>
<td>509</td>
<td>905</td>
</tr>
<tr>
<td>968</td>
<td>279</td>
<td>717</td>
</tr>
<tr>
<td>621</td>
<td>145</td>
<td>475</td>
</tr>
<tr>
<td>2,754</td>
<td>663</td>
<td>1,489</td>
</tr>
<tr>
<td>2,206</td>
<td>607</td>
<td>1,225</td>
</tr>
</tbody>
</table>

**Body Mass Index**

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

*Includes high schools, charter schools, and private schools and excludes incomplete data sources. Source: Texas Education Agency*
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The following results are for the assessments conducted in your region:

**Demography**

<table>
<thead>
<tr>
<th>Total Number of Students Assessed: 125,481</th>
<th>Number of Students Referred: 5,088</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Students with AN: 6,340</td>
<td>Number of Students Seen Physician: 742</td>
</tr>
</tbody>
</table>

**Acanthosis Nigricans**

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

**Blood Pressure**

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>423</td>
<td>777</td>
</tr>
<tr>
<td>3rd</td>
<td>88</td>
<td>172</td>
</tr>
<tr>
<td>5th</td>
<td>139</td>
<td>401</td>
</tr>
<tr>
<td>7th</td>
<td>1,068</td>
<td>1,382</td>
</tr>
<tr>
<td>Other</td>
<td>1,086</td>
<td>339</td>
</tr>
</tbody>
</table>

**Body Mass Index**

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student's height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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The following results are for the assessments conducted in your region:

### Demography

- **Total Number of Students Assessed:** 78,329
- **Number of Students Referred:** 3,431
- **Total Number of Students with AN:** 4,076
- **Number of Students Seen Physician:** 520
- **% of Students on Free and Reduced Lunch:** 43.7%

### Acanthosis Nigricans

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

<table>
<thead>
<tr>
<th>Grade</th>
<th>1st</th>
<th>3rd</th>
<th>5th</th>
<th>7th</th>
<th>Other Grades</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal</strong></td>
<td>274</td>
<td>543</td>
<td>689</td>
<td>540</td>
<td>171</td>
<td>1,208</td>
<td>1,009</td>
</tr>
<tr>
<td><strong>Pre-Hypertensive</strong></td>
<td>84</td>
<td>124</td>
<td>192</td>
<td>139</td>
<td>34</td>
<td>293</td>
<td>280</td>
</tr>
<tr>
<td><strong>Hypertensive</strong></td>
<td>113</td>
<td>229</td>
<td>330</td>
<td>349</td>
<td>76</td>
<td>537</td>
<td>560</td>
</tr>
</tbody>
</table>

### Blood Pressure

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

| Normal | 17 | 58 | 55 | 56 | 21 |
| Obese  | 422| 775| 1,001| 873| 233|
| Overweight | 32 | 67 | 155 | 106 | 27 |
| Underweight | 1  | 4  | 4  | 1  | 2  |

* Includes high schools, charter schools, and private schools and excludes incomplete data sources.

Source: Texas Education Agency
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The following results are for the assessments conducted in your region:

### Demography

<table>
<thead>
<tr>
<th>Total Number of Students Assessed: 12,260</th>
<th>Number of Students with AN: 838</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students Referred: 791</td>
<td>Number of Students Seen Physician: 148</td>
</tr>
</tbody>
</table>

### Acanthosis Nigricans

Acanthosis nigricans (AN) is a skin condition that is frequently seen on the nape of the neck. It appears as a dark/black, rough, or velvety area on the surface of the skin. The AN marker is important because it most often signals high insulin levels circulating within the body. The AN marker is considered a risk factor in the development of Type 2 Diabetes.

### Blood Pressure

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### Body Mass Index

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: **Underweight**, **Normal**, **Overweight**, and **Obese**. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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The following results are for the assessments conducted in your region:

### Demography

| Total Number of Students Assessed: 16,448 | Number of Students Referred: 803 |
| Total Number of Students with AN: 1,028 | Number of Students Seen Physician: 145 |

### Body Mass Index

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

### Acanthosis Nigricans

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### Blood Pressure

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<table>
<thead>
<tr>
<th>Gender</th>
<th>1st Grade</th>
<th>3rd Grade</th>
<th>5th Grade</th>
<th>7th Grade</th>
<th>Other Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>166</td>
<td>159</td>
<td></td>
<td></td>
<td>222</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>274</td>
</tr>
</tbody>
</table>

Blood Pressure of Students With AN

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency
Risk Assessment for Type 2 Diabetes in Children Fact Sheet
REGION 19
2007-2008

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The following results are for the assessments conducted in your region:

Demography

| Total Number of Students Assessed: 47,445 | Number of Students Referred: 3,712 |
| Total Number of Students with AN: 4,379 | Number of Students Seen Physician: 511 |

Acanthosis Nigricans

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Blood Pressure

Hypertension has also been associated with insulin resistance and hyperinsulinemia, which is important for children with the AN marker. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to measure blood pressure in children.

<table>
<thead>
<tr>
<th>1st</th>
<th>3rd</th>
<th>5th</th>
<th>7th</th>
<th>Other Grades</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>313</td>
<td>632</td>
<td>951</td>
<td>690</td>
<td>141</td>
<td>1,361</td>
</tr>
<tr>
<td>Pre-Hypertensive</td>
<td>37</td>
<td>112</td>
<td>212</td>
<td>174</td>
<td>33</td>
<td>281</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>82</td>
<td>165</td>
<td>268</td>
<td>365</td>
<td>85</td>
<td>462</td>
</tr>
</tbody>
</table>

Body Mass Index

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student's height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

<table>
<thead>
<tr>
<th>BMI of Students with AN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
</tr>
<tr>
<td>Normal</td>
</tr>
<tr>
<td>Obese</td>
</tr>
<tr>
<td>Overweight</td>
</tr>
<tr>
<td>Underweight</td>
</tr>
</tbody>
</table>

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The following results are for the assessments conducted in your region:

**Demography**

- Total Number of Students Assessed: **92,674**
- Total Number of Students with AN: **6,689**
- Number of Students Referred: **5,247**
- Number of Students Seen Physician: **832**

**Acanthosis Nigricans**

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**Blood Pressure**

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<table>
<thead>
<tr>
<th>Grade</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>456</td>
<td>932</td>
<td>1,388</td>
</tr>
<tr>
<td>Pre-Hypertensive</td>
<td>88</td>
<td>240</td>
<td>328</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>165</td>
<td>435</td>
<td>600</td>
</tr>
</tbody>
</table>

**Body Mass Index**

A high Body Mass Index (BMI) for age percentile is also considered a risk factor for the development of Type 2 Diabetes. BMI is calculated using the student’s height and weight. The BMI percentiles are determined by the Center for Disease Control BMI for age percentile growth charts. The percentiles are separated into four categories: Underweight, Normal, Overweight, and Obese. In the development of Type 2 Diabetes, special emphasis is placed on the At-Risk of Overweight and Overweight categories.

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