

Texas Risk Assessment for Type 2 Diabetes in Children

A Report to the Governor
and the 82nd Legislature of the State of Texas



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

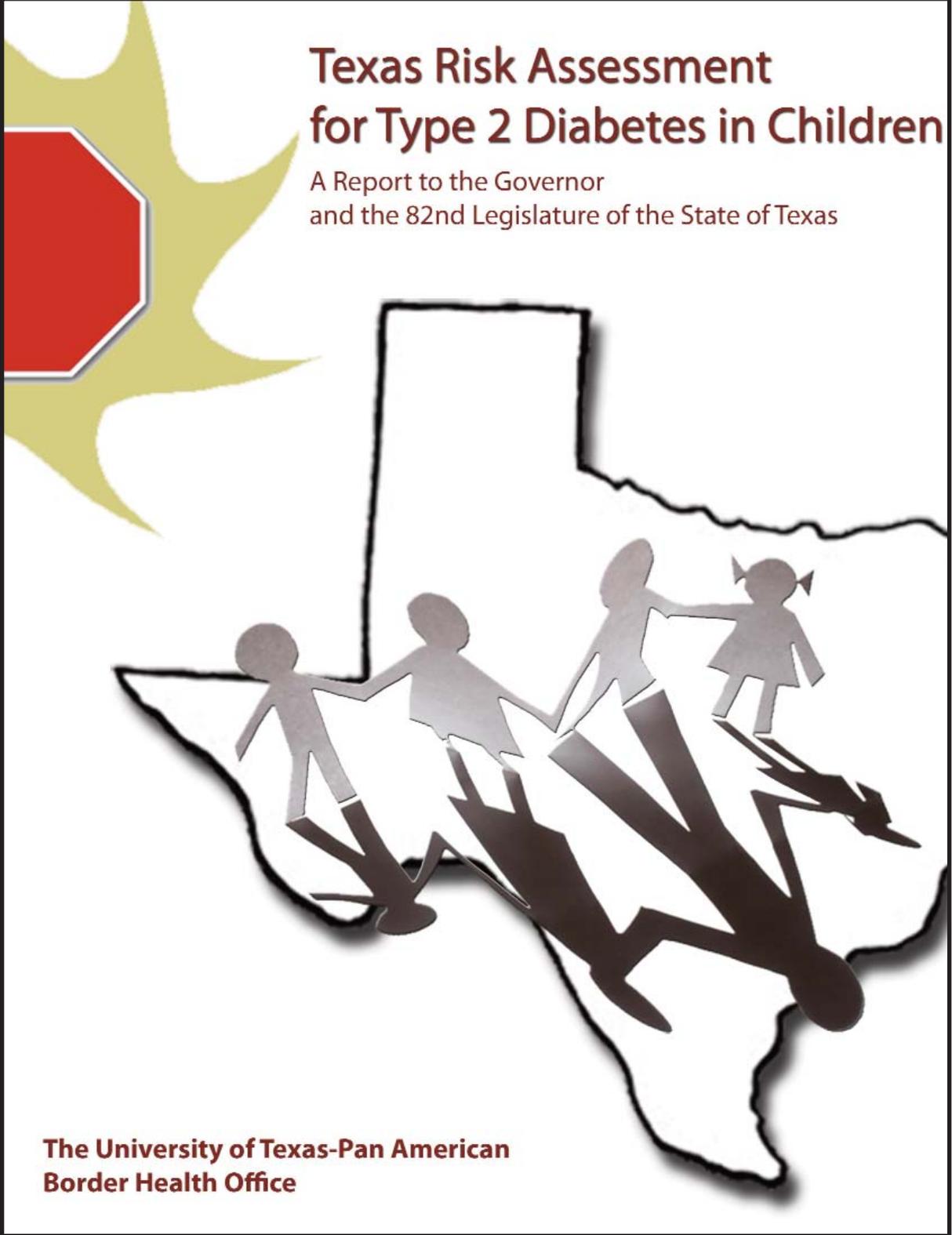


The University of Texas-Pan American Border Health Office

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ACKNOWLEDGMENTS

The University of Texas-Pan-American Border Health Office (BHO) would like to extend a warm and grateful thank you to everyone who supports the Texas Risk Assessment for Type 2 Diabetes in Children program. This important program would not be possible if not for their support and commitment.

As this program nears its 13th year in existence, we have not come across a more dedicated and committed group of professionals as school nurses. If there is any one common characteristic among this group is that they truly do care about the children in their communities.

The University of Texas-Pan American Border Health Office appreciates the continued support of State Senator Eddie Lucio Jr., D-District 27 and his staff. Without Senator Lucio's support, this program would end and so would risk assessments for over 1.2 million children throughout the State of Texas. We thank him for his commitment to reduce the burden of type 2 diabetes in children throughout this state.

The Texas Risk Assessment for Type 2 Diabetes in Children program is housed and supported by The University of Texas-Pan American. We would like to thank President Dr. Robert Nelsen for supporting the program through difficult economic times. We would also like to thank Dr. Cynthia J. Brown, Vice-Provost for Graduate Programs and Academic Centers, for her advocacy and mentorship.

The UTPA Border Health Office also appreciates the support and guidance of the Texas Risk Assessment for Type 2 Diabetes Advisory Committee. Their experience, ideas and recommendations have made a positive way forward for the program. Committee members include:

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

MESSAGE FROM THE EXECUTIVE DIRECTOR

The Texas Risk Assessment for Type 2 Diabetes in Children program assessed over 1.2 million public and private school children for their risk of type 2 diabetes in 2009-2010. Assessments took place in 4,459 schools in 517 school districts from 11 of the Texas Education Agency Service Center Regions. This program's large-scale and coordinated approach has given the state of Texas the best opportunity to reduce the burden of diabetes in the future and is a vanguard in the fight against type 2 diabetes in children.

Type 2 diabetes can be in many respects, a social epidemic – a disease that can come about as a result of one's life conditions. These life conditions have brought about lifestyle choices that have contributed dramatically to the rise of type 2 diabetes - and it is seriously affecting children throughout Texas. Children who develop type 2 diabetes may have an earlier risk for complications of the disease as adults. Diabetes can seriously impact a person's quality of life - whether it makes them lose a limb, a kidney, their sight, or suffer a heart attack. Public health efforts have concentrated on promoting healthy lifestyles for children, particularly in school settings, and prevention strategies that identify those with pre-diabetes or those who have a high risk to develop the disease. One bold strategy is the Texas Risk Assessment for Type 2 Diabetes in Children program.

For nearly 13 years, the Texas Risk Assessment for Type 2 Diabetes in Children has been helping identify children who may be at-risk to develop type 2 diabetes and help parents understand what the risk factors suggest to prevent or delay future health problems. The program has also played a role in supporting coordinated school health education programs and public health policy for the prevention of diabetes. A unique and important feature of the Texas Risk Assessment for Type 2 Diabetes in Children program allows school administrators to readily access risk assessment results in real time. This helps administrators know firsthand how many children were identified as at-risk for type 2 diabetes in their schools. The risk assessment results have helped schools initiate systems changes, assist with other school health initiatives, and improve the school health environment.

Of course, the most important aspect of the program is to help those children who are identified as at-risk to follow their assessment with a health care professional. Research shows that the origins of type 2 diabetes are firmly rooted in childhood and experts agree that the best chance to reduce the burden of diabetes is to identify those with pre-diabetes to prevent its onset. It is important then for children with these risk factors to be evaluated by a health care professional. During the 2009-2010 school year, a record 11,708 children followed up their risk assessment with a health professional. Beyond the numbers and figures of the Texas Risk Assessment for Type 2 Diabetes in Children program is the most significant contribution that the program can make - a change in a child's life. Winning the fight against diabetes can begin with a conversation, in these particular cases, a conversation with parents about their child's risk assessment. This contact between child, parent, and physician is a significant first step to reduce the burden of diabetes in the state of Texas. This optimism is the driving force behind the Texas Risk Assessment for Type 2 Diabetes in Children program.

The Texas Risk Factor Assessment for Type 2 Diabetes in Children program continues to support the Texas Diabetes Council's state plan for diabetes prevention and control. Risk assessment activities and information is made available to assist with this priority.

Risk assessment information for Texas Education Service Center Regions 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20 for the 2009-2010 school year is included in this report.

Proudly serving the state of Texas,

Doreen D. Garza, MPH
Executive Director

The University of Texas-Pan American Border Health Office

Texas Risk Assessment for Type 2 Diabetes in Children

The Texas Risk Assessment for Type 2 Diabetes in Children (TRAT2DC) is a state mandated program developed, coordinated, and administrated by The University of Texas Pan-American Border Health Office. This program helps assess children who may be at high risk to develop type 2 diabetes. This assessment is conducted by certified individuals in public and private schools during vision/hearing and scoliosis screenings.

During these vision/hearing and scoliosis screenings, children are assessed for the acanthosis nigricans marker - a skin marker that signals high insulin levels. Children who are identified with the marker are also assessed to determine body mass index (BMI) and blood pressure.

Risk assessments are issued to the parents of these children, alerting parents of the child's risk factors and encouraging further evaluation from a health professional. The risk assessments appear to be effective in getting at-risk children to seek appropriate follow-up evaluation/testing from a health care provider to prevent or delay future health problems.

The program assesses children who may be at-risk to develop type 2 diabetes in Texas Education Agency Education Service Center Regions 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20.

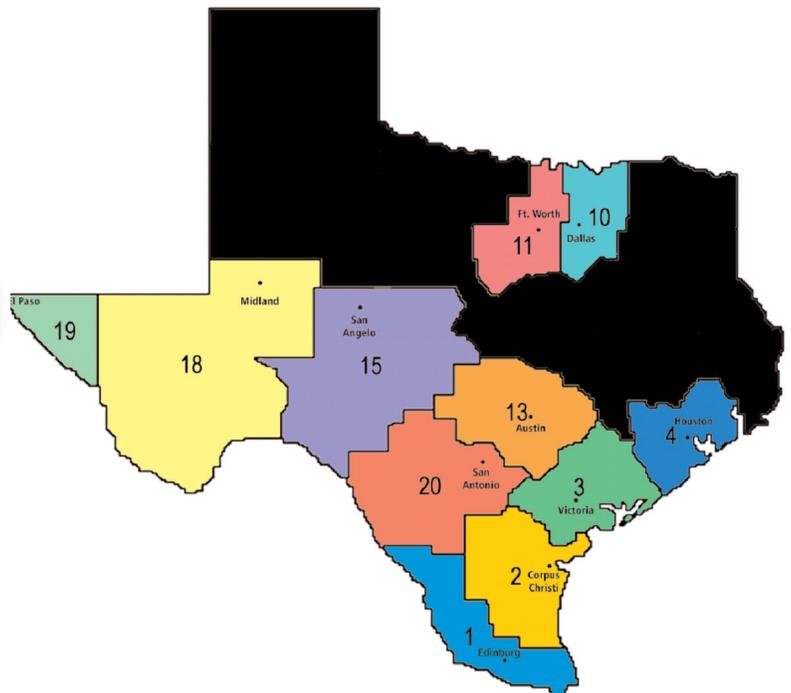
A TOTAL OF 517 SCHOOL DISTRICTS PARTICIPATED IN THE TEXAS RISK ASSESSMENT FOR TYPE 2 DIABETES IN CHILDREN PROGRAM. (2009-2010 TRAT2DC RISK ASSESMENT RESULTS)

A total of 4459 schools participated

- 398 high schools
- 826 junior high schools and middle schools
- 2810 elementary schools
- 425 other campuses

Total Number of Students Assessed

Region 1	148,594
Region 2	35,455
Region 3	16,693
Region 4	341,563
Region 10	203,386
Region 11	187,020
Region 13	119,382
Region 15	14,818
Region 18	23,021
Region 19	59,745
Region 20	113,779
Total	1,263,456

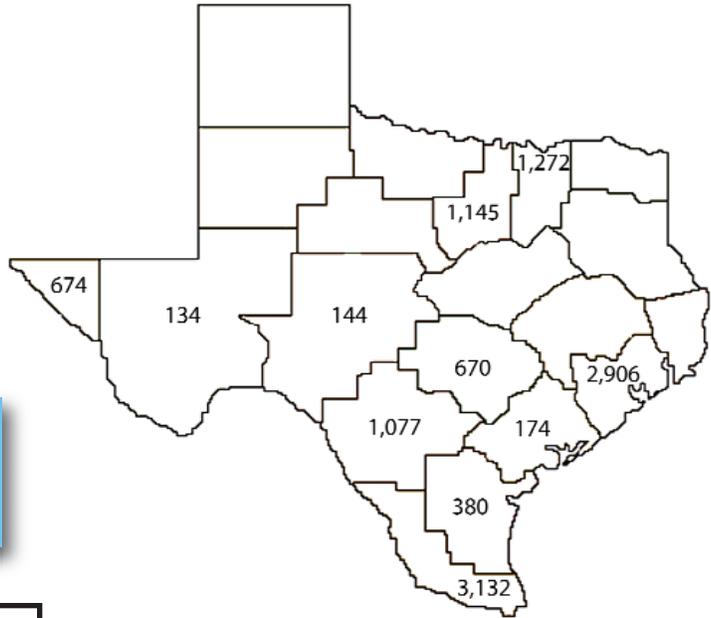


There are 11 Texas Education Agency Education Service Center Regions that participate in the Texas Risk Assessment for Type 2 Diabetes in Children program. (SB 415, 80th Texas Legislature)

Risk Assessment Referral

The Texas Risk Assessment for Type 2 Diabetes in Children program helps identify those children who may be at-risk to develop type 2 diabetes through simple, non-invasive assessments that have been identified as risk factors for the development of the disease and other complications. During vision/hearing and scoliosis screenings, certified individuals assess school children for these risk factors. If these risk factors are present, a referral is issued to the parents of the child explaining what was found and why it is of concern. The referral includes recommendations to seek further evaluation from a health professional.

Research shows that the origins of type 2 diabetes are firmly rooted in childhood and experts agree that the best chance to reduce the burden of diabetes is to identify those with pre-diabetes to prevent its onset. It is important then for children with these risk factors to be evaluated by a health care professional. This contact between child, parent, and physician is a significant first step to reduce the burden of diabetes in the State of Texas.



A total number of 11,708 students followed their risk assessment with a health care professional.

This map shows, by Texas Education Agency Regional Education Service Center Region, the number of children who saw a health care professional. (2009-2010 school year)

School: (SAMPLE SCHOOL) ORIGINAL SCHOOL	Date: 1/12/2011
Student's Name: _____	Grade: 3
RFES ID#: 14048	

Dear Parent(s):

The Texas Risk Assessment for Type 2 Diabetes in Children is a state mandated program that helps assess children who may be at risk to develop type 2 diabetes. This assessment is conducted by certified individuals 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 (AN) marker. Children who are identified with AN also are assessed for body mass index (BMI) and blood pressure.

These are the results of your child's assessments.

ACANTHOSIS NIGRICANS

Acanthosis nigricans (AN) is a skin marker associated with high insulin levels and insulin resistance. It is considered a risk factor for developing Type 2 Diabetes and other chronic diseases. AN appears most often in the skin fold areas on the neck, but can also be found in other areas of the body as well.

Is acanthosis nigricans present? Yes _____

BODY MASS INDEX

Body mass index (BMI) is calculated from a child's weight and height. After BMI is calculated, it is plotted on Centers for Disease Control and Prevention BMI-for-age growth charts to obtain a percentile ranking. The growth charts show the weight status categories used to determine weight status in children and teens.

There are four categories in which weight status can be determined: Underweight (less than 5th percentile), Healthy Weight (5th percentile to less than the 85th percentile), Overweight (85th percentile to less than the 95th percentile), and Obesity (equal to or greater than the 95th percentile).

Your child is 48.5 inches tall and weighs 84.75 lbs. He/she has a 25.35 BMI and is in the **OBESITY** category.

BLOOD PRESSURE

High blood pressure or hypertension increases the risk for cardiovascular disease and is a complication of obesity. Early detection of high blood pressure is important for children. High blood pressure is a major risk factor for heart disease and stroke in adulthood.

The blood pressure categories are identified as hypertensive, pre-hypertensive, and normal.

Your child has an average blood pressure of 77/63 and found to be in the **Normal** category for his/her age and height.

Please take this form with you when you take your child to your physician. School Nurse _____

The school system would appreciate comments from parents and doctors regarding Texas Risk Assessment for Type 2 Diabetes in Children. Information provided will be helpful for the nurse to better serve your child.

Doctor's diagnosis, treatment and/or recommendations: _____

Parent's comments: _____

Please sign and return this form to the school nurse.

Doctor's signature _____ Date: _____

Parent's signature _____ Date: _____

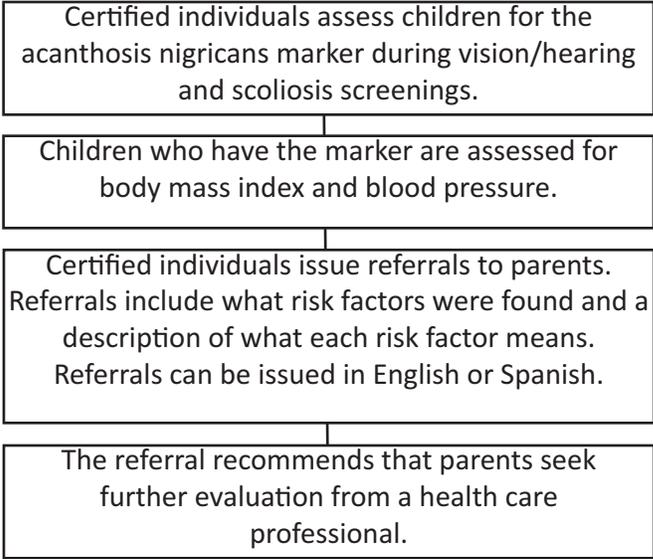
To apply for CHIP/Children's Medicaid:

*Apply online at <http://www.chipmedicaid.org/> *Apply by mail: Texas Health and Human Services Commission

*Pick up an application at H-E-B pharmacies P.O. Box 14200

*Call toll-free 1-877-543-7669 (that's 1-877-KIDS NOW) by phone Midland, TX 79711-9901

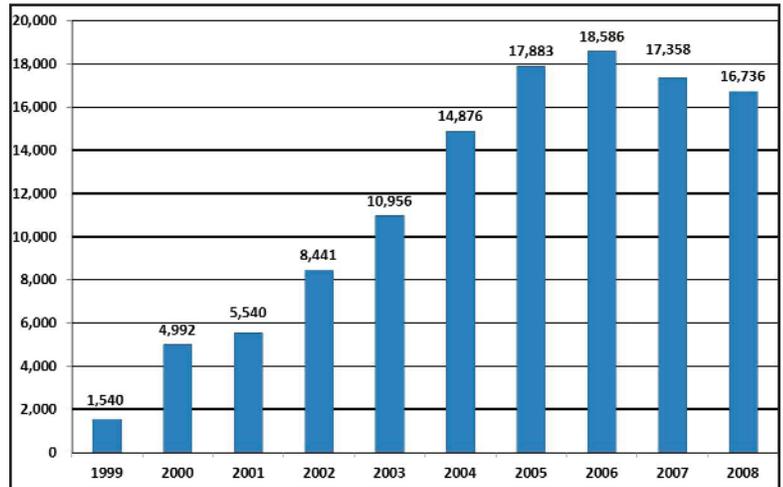
TRAT2DC Assessment Process



International Classification of Diseases-9 Member Count Data

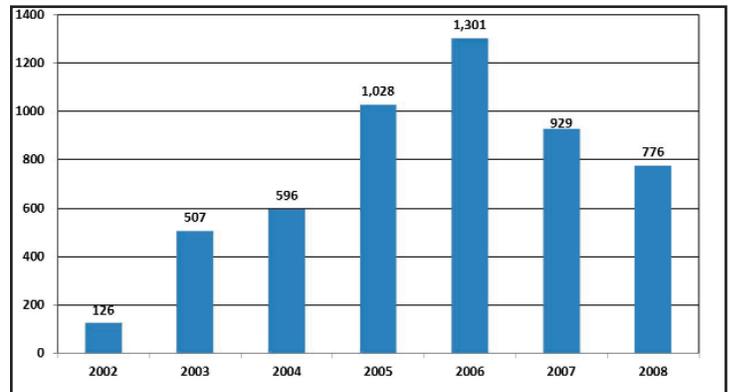
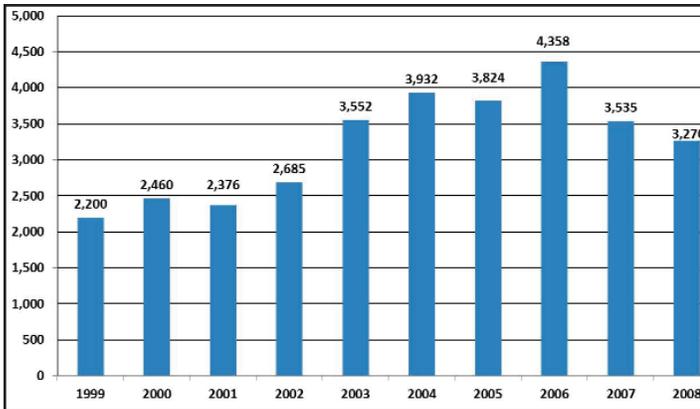
Texas Department of State Health Services Medicaid/CHIP member count data has been obtained to help understand the medical community's response to the Texas Risk Assessment for Type 2 Diabetes in Children program. Information obtained on International Classification of Diseases (ICD-9) Code 701.2 Acquired Acanthosis Nigricans member count data among children 0-17 years of age has increased since the program began in 1999. This increase may reflect the awareness and education that has been promoted through the TRATDC2 program as well as physician response to the risk assessment referral. Other member count information for conditions related to the risk assessment are presented as well.

**Acquired Acanthosis Nigricans ICD-9 code 701.2
Member Count Children 0-17 years old
Texas Medicaid 1999-2008**



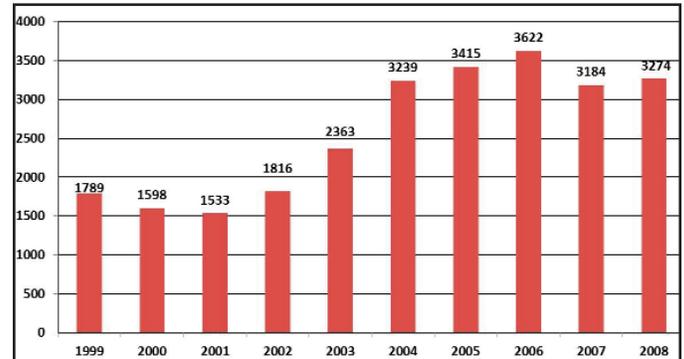
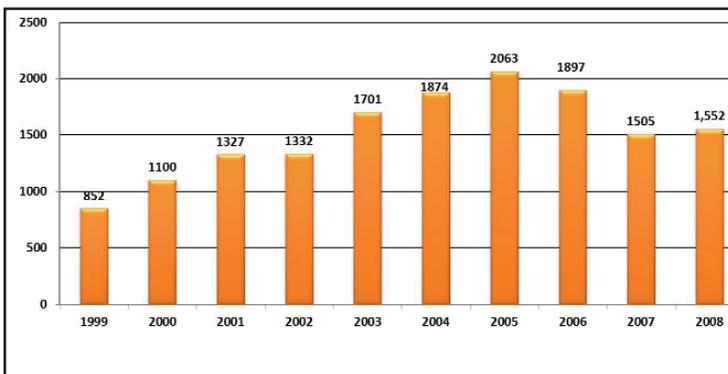
**Type 2 Diabetes ICD-9 code 250.*0 or 250.*2
Member Count Children 0-17 years old
Texas Medicaid 1999-2008**

**Metabolic Syndrome ICD-9 code 277.7
Claims Member Count Children 0-17 years old
Texas Medicaid 2002-2008**



**Obesity ICD-9 code 278
Member Count Children 0-17 years old
Texas Medicaid 1999-2008**

**Hypertension ICD-9code 401.1 or 401.9
Member Count Children 0-17 years old
Texas Medicaid 1999-2008**



Risk Assessments

ACANTHOSIS NIGRICANS

Acanthosis nigricans (AN) 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.



Acanthosis Nigricans(AN)

The relationship with AN and diabetes and between AN and a condition that is a precursor to diabetes (hyperinsulinemia and insulin resistance) establish the opportunity to use this visible marker of diabetes risk in diabetes case identification and preventive counseling. Earlier publications suggest that both of these actions (case identification and preventive counseling) are enhanced by the diagnosis of AN.

Source: Kong, AS, Williams, RL, Smith, M, Sussman, AL, Skipper, B, Hsi, AC, Rhyne, RL. Acanthosis Nigricans and Diabetes Risk Factors: Prevalence in Young Persons Seen in Southwestern US Primary Care Practices. *Ann Fam Med* 2007;5(3):202-208

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

Source: Guran, T, Turan, S, Akcay, T, Bereket, A. Significance of acanthosis nigricans in childhood obesity. *Journal of Paediatrics and Child Health*. 2008. 44 (338-341).

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, noninvasive method that has been acceptable to children and those conducting the assessments.

Source: Smith, WG, Gowanlock, W, Babcock, K, Collings, A, McCarthy, A. Prevalence of Acanthosis Nigricans in First Nations Children in Central Ontario, Canada. *Can J Diabetes* 2004;28(1):410-14.

Youth with the AN+ group had severe insulin resistance, and more than 1 in 4 already had abnormal glucose homeostasis. AN identified a high-risk population, for whom appropriate interventions have the potential to attenuate or prevent the development of diabetes and further metabolic abnormalities.

Source: Brickman, W, Huang, J, Silverman, B, Metzger, B. Acanthosis Nigricans Identifies Youth at High Risk for Metabolic Abnormalities. *J Pediatr* 2010;156:87-92

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. BMI categories are identified as obese, overweight, normal, and underweight. A child with a BMI greater or equal to the 95th percentile is considered obese and 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. A child whose BMI falls between the 85th and 94th percentile is considered overweight and should be evaluated carefully and should be given particular attention to secondary complications of obesity.

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.

Success Stories

Beyond the numbers and figures of the Texas Risk Assessment for Type 2 Diabetes in Children program, the most significant contribution that the program can make is a change in a child's life. Success stories like the ones below show us that winning the fight against diabetes can begin with a conversation, in these particular cases, a conversation with parents about their child's risk assessment. This optimism is the driving force behind the Texas Risk Assessment for Type 2 Diabetes in Children program - For a Healthy Texas!

Letter from a school nurse in Texas Education Agency Region 20

This is to relate the information concerning my student who has gone from very positive to totally negative for AN markers in 2 school years. The student was negative for her AN check in 3rd and 5th grades. I checked her for AN in 7th grade and found her to be positive. She weighed 158 lbs. and was 62.25 inches tall on 09/22/08. I sent a referral letter to her parents on 10/23/08. Mom never sent back paperwork but did call me recently to tell me that her daughter was seen by a doctor several times and that she is watching her diet and getting a lot of exercise. The mother further stated that she does not want her daughter to get diabetes as an adult so is monitoring her daughter's eating and exercising habits.

I checked this child for AN on 01/22/10, as an 8th grader, as we check for spinal abnormalities in the 5th and 8th grades in our school district. I had not seen her for over a year and was amazed at her transformation! She stated that she was eating better and exercising and had lost about 25 pounds! All of her AN markers had disappeared.

She has gone from positive to negative AN markers in 18 months and as of today, 03/26/10, weighs 134 and is 62.25 inches tall. She is trim and healthy looking, states that she is eating more vegetables and fruits and less fats, sweets and meats. Therefore, she has lost 24 pounds since the beginning of the seventh grade and is now towards the end of 8th grade.

I have several students who have lost weight and are not yet AN negative after being positive. When we used to measure AN on a scale of 0-4, I have several students who have been 4's or 3's and are now 1 or 2's.

Sincerely,

*Toni L. Serene, RN
Bandera Middle School*

Letter from a school nurse in Texas Education Agency Region 1

I did the AN screening at IDEA San Juan and I had about 3 ninth grade students that it benefited. One was put on a strict diet and she was so excited when she realized she was losing weight and feeling better. Another student went to see the Dr. and found out she had high cholesterol, she too was put on a diet and started to feel better. Her legs had been swelling up and she never said anything. I felt some satisfaction that I helped improve their health as a result of the screenings.

*Sandra Delgado
Clinic Staff Member, IDEA Public Schools
Rio Grande Valley, Texas*

Success Stories - cont.

Letter from a school nurse in Texas Education Agency Region 18

I had a student in the school year 2000-2001 who was in a grade level that we did not check for ANTES as it was called at that time. I noticed the marker on his neck and he was overweight. I called his mother and she came to the school to discuss my findings. I explained to mom what I knew and had learned about the callous on his neck. I told her that he was at risk for Type 2 diabetes and she needed to take her child to the doctor for further evaluation. I gave her the paperwork with his ht, wt, and 2 blood pressure readings to take with her to the doctor. She was very cooperative and took her child to the doctor for a complete checkup. Within a week she came back to discuss the findings from his doctor. She brought me the referral form I had given her with the doctor's finding. It stated that her child's insulin levels were high and the doctor said he was indeed at risk for Type 2 diabetes. He recommended a diet and exercise program for the child. Mom carried out the diet instructions and her child began to lose weight. His personality changed and he seemed to be a very happy child. I praised him continuously as I saw him in the clinic or in the hallway. By the time he entered the 3rd grade he had lost weight and of course had gained some height. The callous on the back of his neck had begun to disappear. During that school year he moved away, and I have no idea where he is now. What I do know is that this parent took the information very seriously and carried out the doctor's orders regarding his diet and exercise. At the time he moved away he was well on his way to better health.

*Glenda Low, LVN
Big Spring ISD*

Letter from a school nurse in Texas Education Agency Region 2

I spoke to you briefly last week regarding a case of positive AN I had last year. This child was overweight with slight positive markers for AN. I spoke to the parent and also sent referral forms. She immediately saw her MD and the child was given a diet to follow as well as exercise. Before the year was up she had lost some weight and was becoming more active. Mom decided that the whole family would participate. I believe everyone lost weight. She mentioned that the whole family made it a habit of walking in the late afternoons. I just saw the mom this past week and she looks great. She mentioned that everyone is still exercising and their eating much healthier. Her daughter's asthma symptoms have also improved.

Sincerely

*Araceli R. Sanchez, L.V.N.
Brooks County ISD*

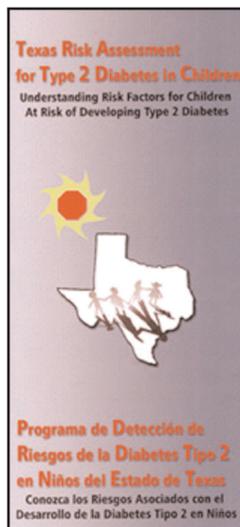
Texas Risk Assessment for Type 2 Diabetes in Children Support Services

The Texas Risk Assessment for Type 2 Diabetes in Children program provides training and certification to school nurses or other certified individuals in conducting risk assessments. This service is provided by health education coordinators that are assigned, but not restricted to, certain Texas Education Agency Regional Education Service Centers. Requests for materials and training and technical support for the Risk Factor Electronic System is also provided by these coordinators.

Providing these services is pertinent to the success of the program. The value gained from face-to-face trainings provides opportunities to develop transparency and trust between school nurses/certified individuals and the Border Health Office. Face-to-face trainings allow for school nurses to evaluate and judge the integrity, competency, and commitment that the Border Health Office provides to the program.

Risk Assessment Trainings 2009-2010 School Year

TEA Region	Number of Trainings	Number of Certified Individuals
Region 1	22	513
Region 2	5	36
Region 3	6	63
Region 4	38	1042
Region 10	18	452
Region 11	23	522
Region 13	9	230
Region 15	2	33
Region 18	3	76
Region 19	3	87
Region 20	8	127
Other Regions	1	139
Total	138	3320



The Texas Risk Assessment for Type 2 Diabetes in Children program provides educational materials to school nurses/certified individuals. These materials are an excellent resource for parents. They are bilingual and explain the importance of the risk factors associated with the risk assessment.

**TEXAS RISK ASSESSMENT FOR TYPE 2 DIABETES IN CHILDREN PROGRAM
TEXAS EDUCATION AGENCY REGIONAL EDUCATION SERVICE CENTER
FACT SHEETS**

Region 1

2009-2010

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

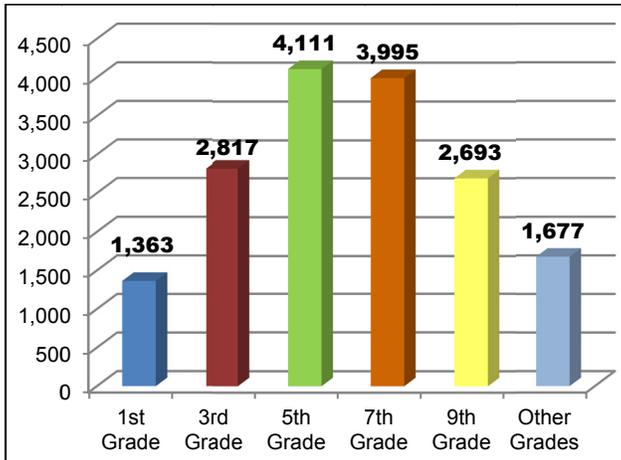
Demography

Total Number of Students Assessed: **148,594** Number of Students Referred: **14,529** % of Students on Free and Reduced Lunch: **85%**
 Total Number of Students with AN: **16,656** Number of Students Seen Physician: **3,132**

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.

Number of Students with AN by Grade

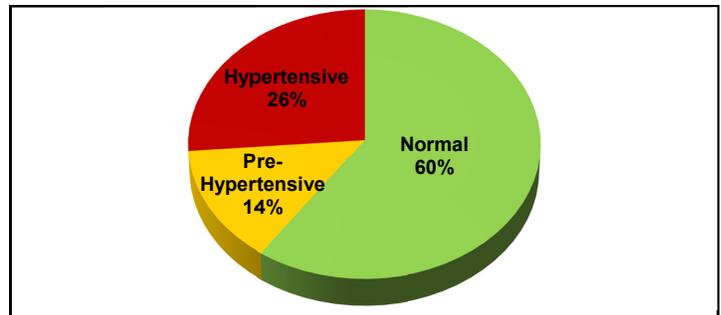


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	926	1,799	2,506	2,355	1,329	894	5,350	4,459
Pre-Hypertensive	149	328	598	548	459	230	1,169	1,143
Hypertensive	255	629	957	1,077	892	510	2,082	2,238

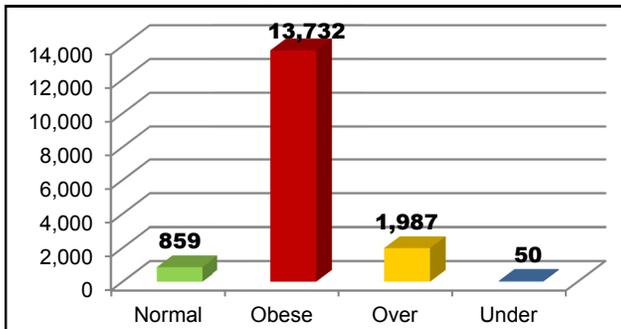
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	78	111	177	197	216	80
Obesity	1,199	2,467	3,380	3,191	2,099	1,396
Overweight	73	226	539	591	367	191
Underweight	5	10	9	12	9	5

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

Region 2
2009-2010

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

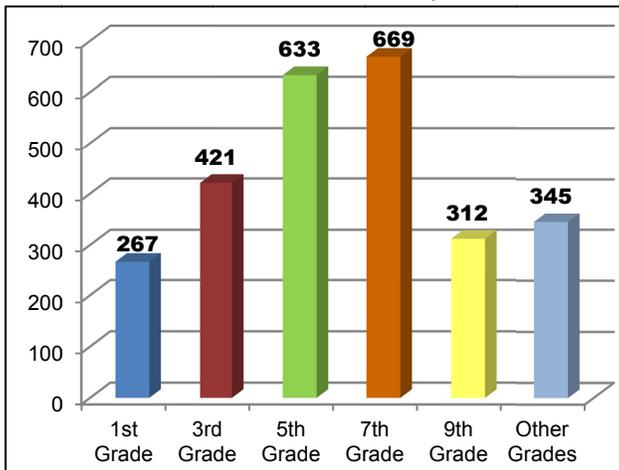
Demography

Total Number of Students Assessed: **35,455** Number of Students Referred: **2,348** % of Students on Free and Reduced Lunch: **62%**
 Total Number of Students with AN: **2,647** Number of Students Seen Physician: **380**

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.

Number of Students with AN by Grade

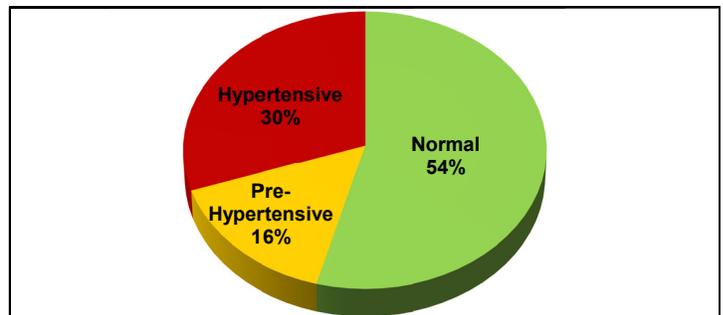


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	160	259	369	328	123	151	757	633
Pre-Hypertensive	43	44	77	125	48	62	200	199
Hypertensive	63	109	172	216	95	122	376	401

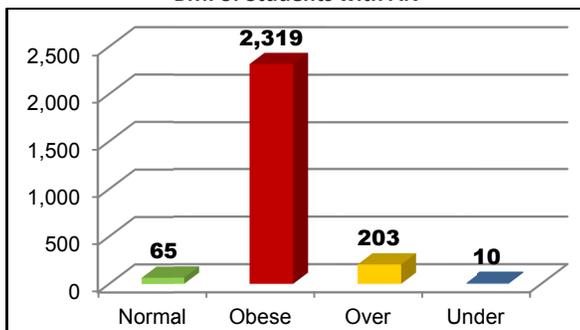
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	7	4	6	23	216	14
Obesity	248	389	576	569	237	300
Overweight	11	24	49	75	16	28
Underweight	1	2	1	2	2	2

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

Region 3
2009-2010

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

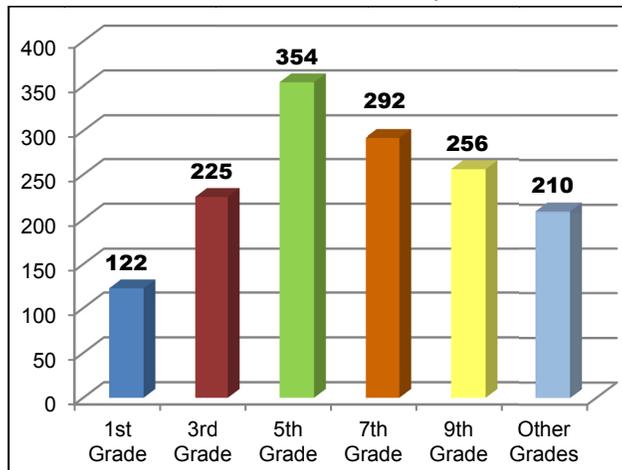
Demography

Total Number of Students Assessed: **16,693** Number of Students Referred: **1,157** *% of Students on Free and Reduced Lunch: **57%**
 Total Number of Students with AN: **1,459** Number of Students Seen Physician: **174**

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.

Number of Students with AN by Grade

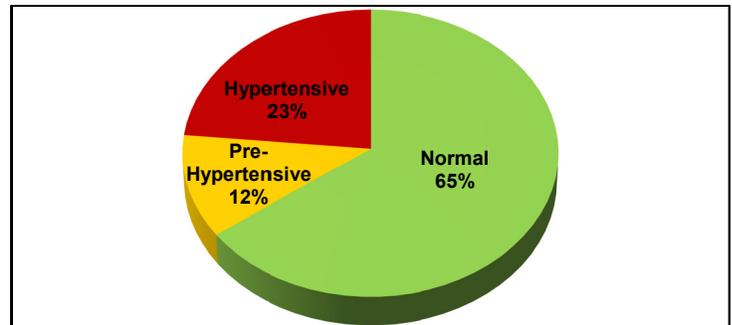


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	86	149	218	168	189	133	525	418
Pre-Hypertensive	10	29	46	44	21	19	96	73
Hypertensive	26	47	88	79	45	56	168	173

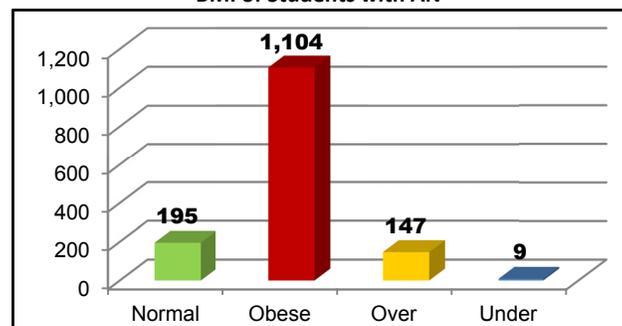
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	24	24	29	20	216	69
Obesity	93	179	285	235	195	117
Overweight	5	20	36	35	31	20
Underweight	0	2	4	1	0	2

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

Region 4
2009-2010

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

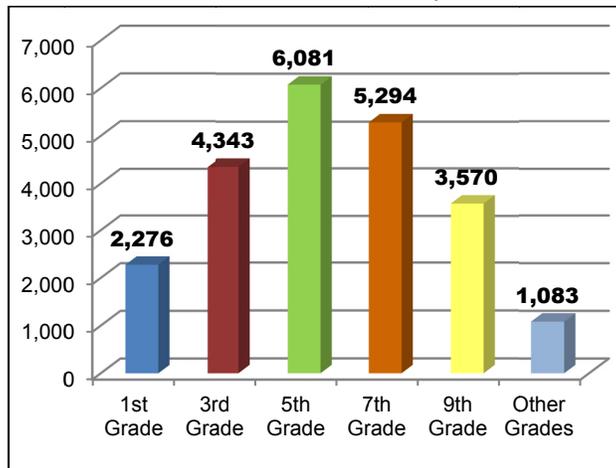
Demography

Total Number of Students Assessed: **341,563** Number of Students Referred: **21,564** *% of Students on Free and Reduced Lunch: **54%**
 Total Number of Students with AN: **22,647** Number of Students Seen Physician: **2,906**

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.

Number of Students with AN by Grade

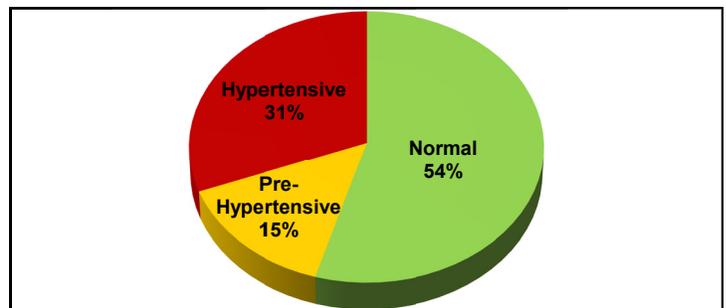


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	1,342	2,573	3,331	2,658	1,759	503	6,993	5,173
Pre-Hypertensive	287	574	884	854	487	176	1,742	1,520
Hypertensive	622	1,142	1,806	1,744	1,212	360	3,628	3,258

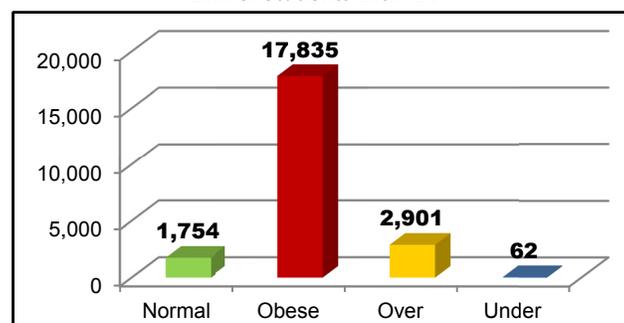
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	177	262	395	424	216	61
Obesity	1,884	3,664	4,797	4,058	2,519	913
Overweight	189	402	851	778	580	101
Underweight	17	11	16	9	5	4

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

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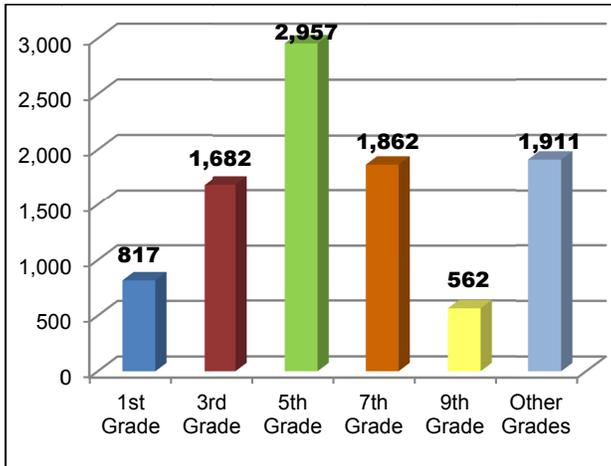
Demography

Total Number of Students Assessed: **203,386** Number of Students Referred: **8,016** % of Students on Free and Reduced Lunch: **51%**
 Total Number of Students with AN: **9,791** Number of Students Seen Physician: **1,272**

Acanthosis Nigricans

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Number of Students with AN by Grade

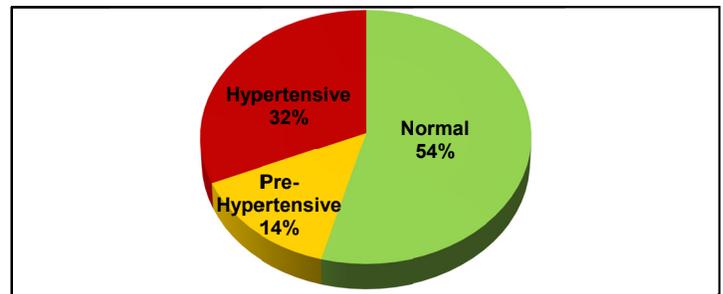


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	531	956	1,667	875	241	954	3,048	2,176
Pre-Hypertensive	96	222	416	292	102	250	750	628
Hypertensive	178	471	827	689	210	658	1,663	1,370

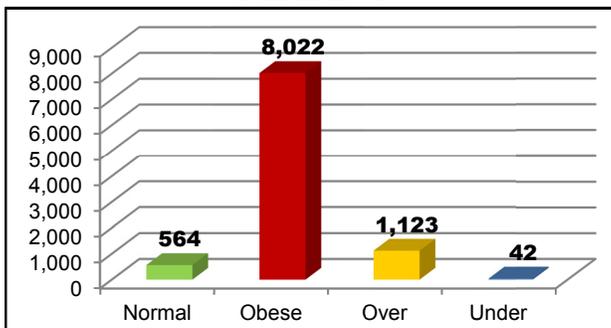
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	51	64	176	108	216	100
Obesity	713	1,443	2,412	1,493	402	1,559
Overweight	45	156	353	248	88	233
Underweight	6	11	9	8	2	6

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

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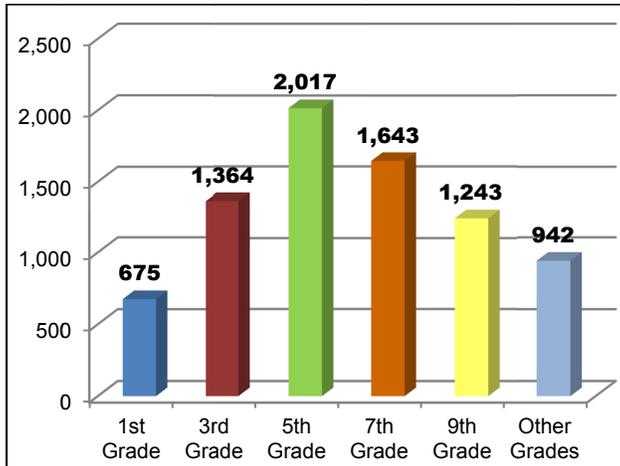
Demography

Total Number of Students Assessed: **187,020** Number of Students Referred: **7,301** % of Students on Free and Reduced Lunch: **41%**
 Total Number of Students with AN: **7,884** Number of Students Seen Physician: **1,145**

Acanthosis Nigricans

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Number of Students with AN by Grade

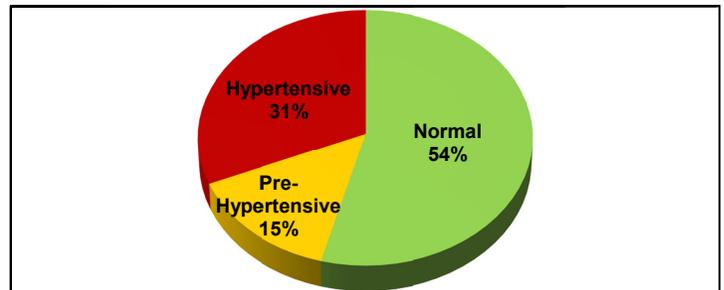


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	390	803	1,068	827	678	452	2,489	1,729
Pre-Hypertensive	90	195	313	239	163	127	628	499
Hypertensive	182	351	597	564	395	356	1,342	1,103

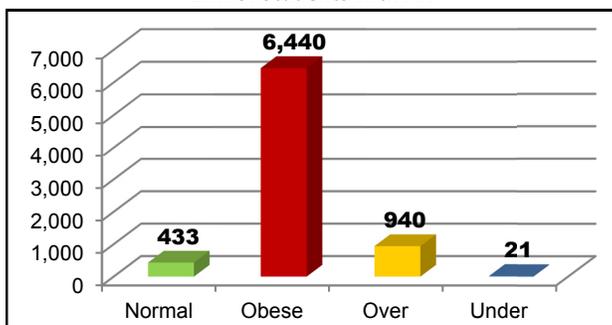
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	51	50	94	86	216	48
Obesity	568	1,170	1,630	1,337	950	785
Overweight	46	137	258	214	180	105
Underweight	3	2	5	6	2	3

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

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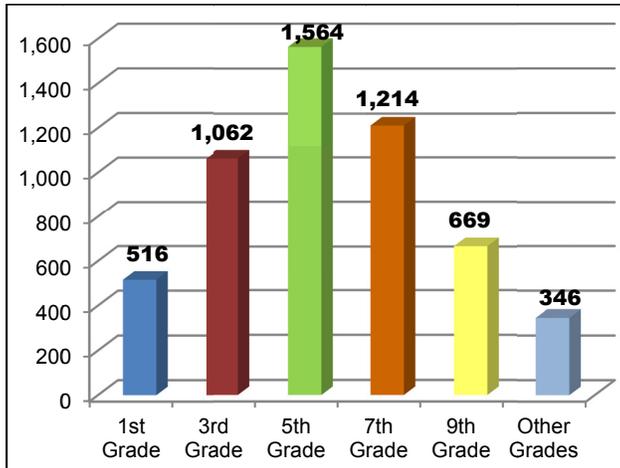
Demography

Total Number of Students Assessed: **119,382** Number of Students Referred: **4,829** % of Students on Free and Reduced Lunch: **44%**
 Total Number of Students with AN: **5,371** Number of Students Seen Physician: **670**

Acanthosis Nigricans

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Number of Students with AN by Grade

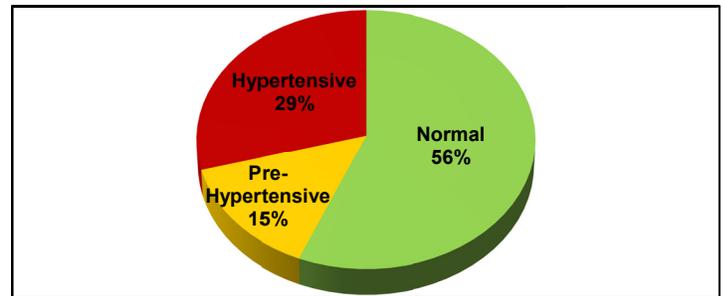


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	349	690	899	627	298	202	1,712	1,253
Pre-Hypertensive	54	127	261	189	102	54	412	375
Hypertensive	109	244	399	392	365	87	870	726

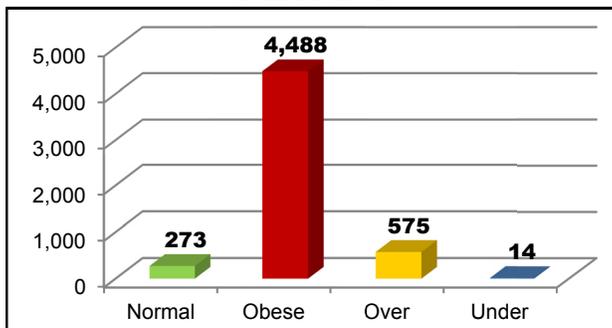
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	33	42	66	59	216	15
Obesity	432	924	1,322	996	519	295
Overweight	43	91	170	153	84	34
Underweight	5	3	1	1	3	1

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

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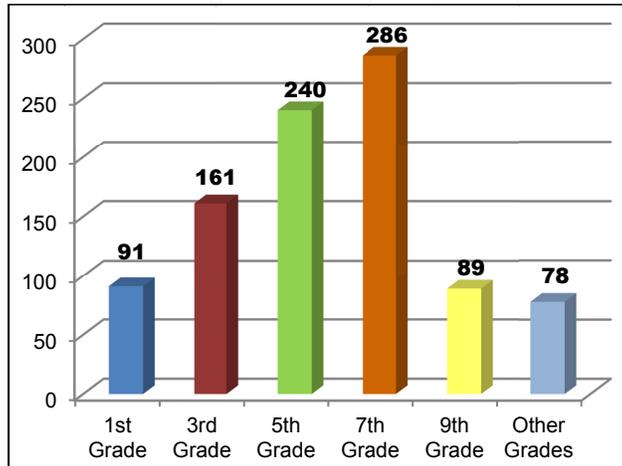
Demography

Total Number of Students Assessed: **14,818** Number of Students Referred: **938** % of Students on Free and Reduced Lunch: **59%**
 Total Number of Students with AN: **945** Number of Students Seen Physician: **144**

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.

Number of Students with AN by Grade

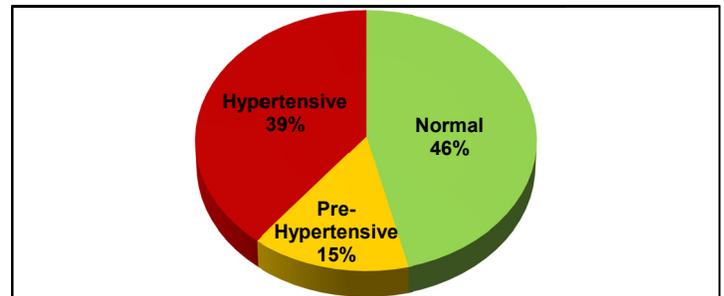


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	60	80	115	136	15	30	244	192
Pre-Hypertensive	7	23	39	42	17	9	81	56
Hypertensive	23	58	86	108	57	39	196	175

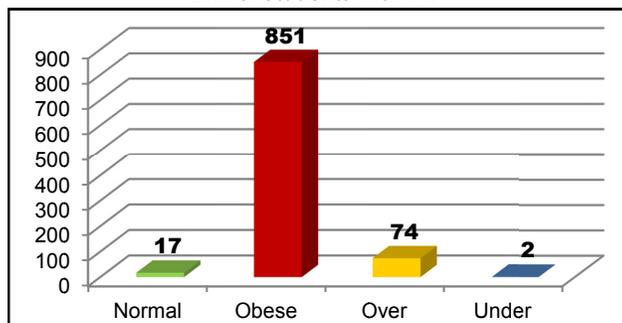
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	3	2	3	6	216	1
Obesity	81	148	220	248	84	70
Overweight	5	10	17	32	3	7
Underweight	1	1	0	0	0	0

* 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:

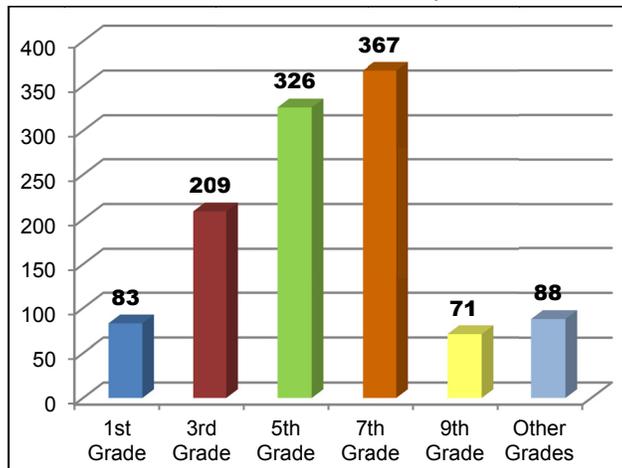
Demography

Total Number of Students Assessed: **23,021** Number of Students Referred: **939** % of Students on Free and Reduced Lunch: **55%**
 Total Number of Students with AN: **1,144** Number of Students Seen Physician: **134**

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.

Number of Students with AN by Grade

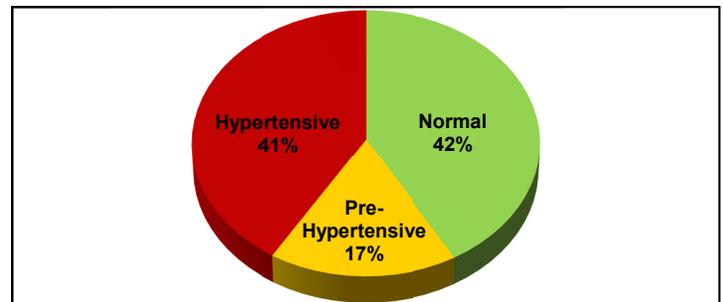


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	43	78	123	179	23	27	274	199
Pre-Hypertensive	14	36	63	55	10	15	115	78
Hypertensive	24	92	140	131	38	43	257	211

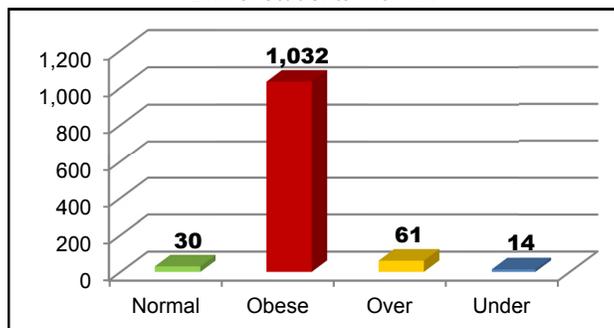
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	1	2	7	14	216	2
Obesity	76	191	297	324	64	80
Overweight	3	11	18	23	2	4
Underweight	2	3	4	4	1	0

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. Source: Texas Education Agency

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

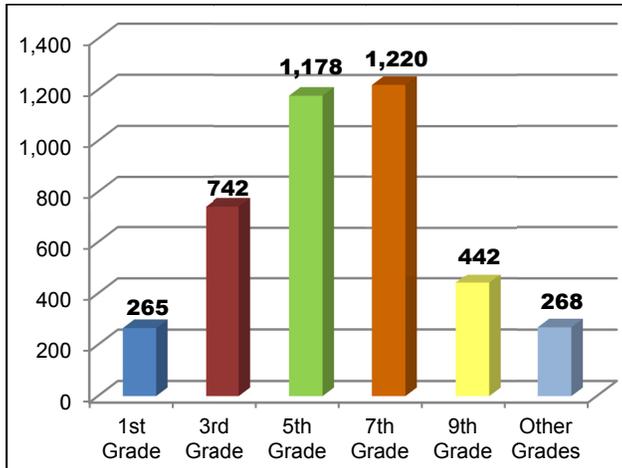
Demography

Total Number of Students Assessed: **59,745** Number of Students Referred: **3,765** % of Students on Free and Reduced Lunch: **76%**
 Total Number of Students with AN: **4,115** Number of Students Seen Physician: **674**

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.

Number of Students with AN by Grade

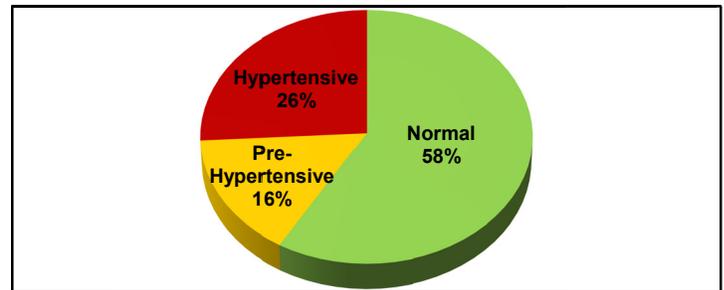


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	181	445	714	662	212	156	1,255	1,115
Pre-Hypertensive	34	117	177	171	91	43	337	296
Hypertensive	50	178	280	338	138	66	553	497

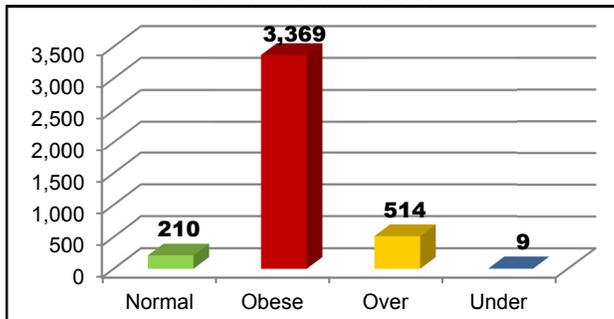
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	16	37	52	66	216	13
Obesity	224	635	966	979	343	222
Overweight	24	67	155	168	71	29
Underweight	1	1	1	4	1	1

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

The Risk Assessment for Type 2 Diabetes in Children is a legislatively mandated program developed, coordinated, and administered 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. During vision/hearing and scoliosis screenings of 1st, 3rd, 5th, 7th, and 9th graders in public and private schools, certified individuals assess children for the acanthosis nigricans (AN) marker, a skin condition that signals high insulin levels. Children who are 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. They help alert each parent of what the risk factors are and what changes will be necessary to prevent or delay future health problems for children at risk of developing type 2 diabetes and other health conditions.

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

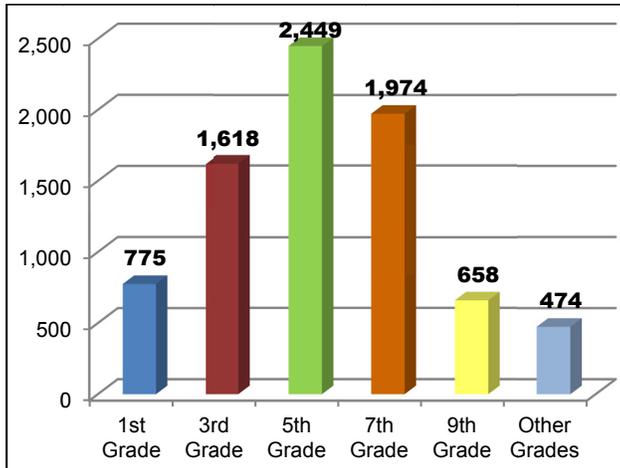
Demography

Total Number of Students Assessed: **113,779** Number of Students Referred: **6,616** % of Students on Free and Reduced Lunch: **63%**
 Total Number of Students with AN: **7,948** Number of Students Seen Physician: **1,077**

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.

Number of Students with AN by Grade

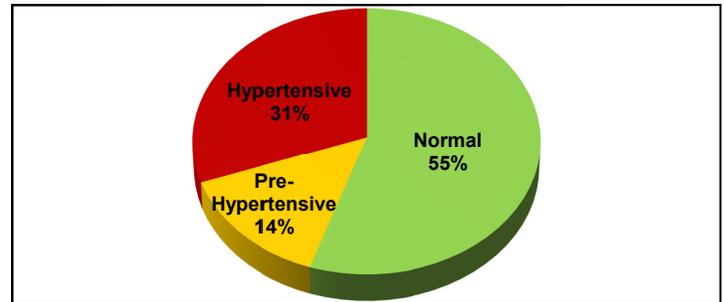


Blood Pressure

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.

	1st	3rd	5th	7th	9th	Other Grades	Female	Male
Normal	470	977	1,321	985	341	268	2,435	1,927
Pre-Hypertensive	99	216	381	280	104	56	605	531
Hypertensive	202	412	738	703	212	149	1,230	1,186

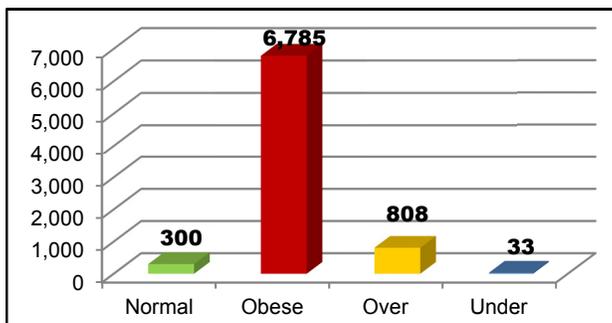
Blood Pressure of Students with AN



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 age, sex, 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 **Obesity**. In the development of type 2 diabetes, special emphasis is placed on the Overweight and Obesity categories.

BMI of Students with AN



	1 st	3 rd	5 th	7 th	9 th	Other Grades
Normal	30	48	99	54	216	11
Obesity	694	1,446	2,049	1,683	499	414
Overweight	40	115	273	231	100	49
Underweight	8	3	22	0	0	0

* Includes high schools, charter schools, and private schools and excludes incomplete data sources. **Source:** Texas Education Agency

Suggested Readings

- Agazzi, H, Armstrong, K, Bradley-Klug, K. BMI and Physical Activity Among at-Risk Sixth - and Ninth - Grade Students, Hillsborough County, Florida, 2005-2006. *Prev Chronic Dis* 2010;7(3):A48 1-9
- Allison, DB, Fontaine, KR, Manson, JE, Stevens, J, VanItallie, TB. Annual Deaths Attributable to Obesity in the United States. *JAMA* 2000;282:1530-1538
- American Diabetes Association. Type 2 Diabetes in Children and Adolescents. *Pediatrics* 2000;105(3):671-680
- Barlow, SE, Dietz, WH. Obesity Evaluation and Treatment: Expert Committee Recommendations. *Pediatrics* 1998;10(3):e29
- Bent, KN, Shuster, GF, Hurley, JS, Frye, D, Loflin, P, Brubaker, C. Acanthosis Nigricans as an Early Clinical Proxy Marker of Increased Risk of Type II Diabetes. *Public Health Nursing* 1998;15:415-421
- 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
- Brickman, WJ, Binns, HJ, Jovanovic, BD, Kolesky, S, Mancini, AJ, Metzger, BE. Acanthosis Nigricans: A Common Finding in Overweight Youth. *Pediatric Dermatology* 2007;24(6):601-606
- Brickman, W, Huang, J, Silverman, B, Metzger, B. Acanthosis Nigricans Identifies Youth at High Risk for Metabolic Abnormalities. *J Pediatr* 2010;156:87-92
- Campagna, AF, Pettitt, DJ, Engelgau, MM, Burrows, NR, Geiss, LS, Valdez, R, Beckles, GLA, Saaddine, J, Gregg, EW, Williamson, DF, Narayan, KMV. Type 2 diabetes among North American children and adolescents: An epidemiologic review and a public health perspective. *The Journal of Pediatrics* 2000;136:664-672
- Cook, VV, Hurley, and JS. Prevention of Type 2 Diabetes in Childhood. *Clinical Pediatrics* 1998;37:123-130
- 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
- Drobac, S, Brickman, W, Smith, T, Binns, HJ. Evaluation of a Type 2 Diabetes Screening Protocol in an Urban Pediatric Clinic. *Pediatrics* 2004;114(1):141-148
- 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
- Gilkison, C, Stuart, CA. Assessment of patients with acanthosis nigricans skin lesion for hyperinsulinemia, insulin resistance, and diabetes risk. *Nurse Practitioner* 1992;17(2):26-43
- Hamiel, OP, Standiford, D, Hamiel, D, Dolan, LM, Cohen, R, Zeitler, S. The Type 2 Family: A Setting for Development and Treatment of Adolescent Type 2 Diabetes Mellitus. *Arch Pediatric Adolescence Med* 1999;153:1063-1067
- Hardin, DS. Screening for Type 2 Diabetes in Children with Acanthosis Nigricans. *Diabetes Educator* 2006;32(4):547-552
- Hermanns-Le, T, Francois Hermanns, J, Pierard, GE. Juvenile Acanthosis Nigricans and Insulin Resistance. *Pediatric Dermatology* 2002;19(1):12-14
- Jones, LH, Ficca, M. Is Acanthosis Nigricans a Reliable Indicator for Risk of Type 2 Diabetes? *J Sch Nursing* 2007;23(5):247-251
- Kiernan, M, Winkleby, MA. Identifying Patients for Weight-Loss Treatment. An Empirical Evaluation of the NHLBI Obesity Education Initiative Expert Panel Treatment Recommendations. *Arch Intern Med* 2000;160:2169-2176
- Kong, AS, Williams, RL, Rhyne, R, Urias-Sandoval, V, Cardinali, G, & Weller, NF. Acanthosis Nigricans: High Prevalence and Association with Diabetes in a Practice-Based Research Network Consortium - A Primary Care Multi-Ethnic Network (PRIME Net) Study. *J Am Board Fam Med* 2010;23(4): 476-485
- Kong, AS, Williams, RL, Smith, M, Sussman, AL, Skipper, B, Hsi, AC, Rhyne, RL. Acanthosis Nigricans and Diabetes Risk Factors: Prevalence in Young Persons Seen in Southwestern US Primary Care Practices. *Ann Fam Med* 2007;5(3):202-208
- Kuczmarski, RJ, Flegal, KM, Campbell, SM, Johnson, CL. Increasing prevalence of overweight among U.S. adults: the National Health and Nutrition Examination Surveys. *JAMA* 1994;272:205-211
- Ludwig, DS, Majzoub, JA, Al-Zahrani, A, Dallal, GE, Blanco, I, Roberts, SB. High Glycemic Index Foods, Overeating, and Obesity. *Pediatrics* 1999;103:3
- 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
- Mokdad, AH, Serdula, MK, Dietz, WH, Bowman, BA, Marks, JS, Koplan, JP. The Spread of the Obesity Epidemic in the United States, 1991-1998. *JAMA* 1999;282:1519-1522
- Mukhtar, Q, Cleverley, G, Voorhees, R, McGrath, J. Prevalence of Acanthosis Nigricans and Its Association With Hyperinsulinemia in New Mexico Adolescents. *J Adolesc Health* 2001;28: 372-376

Suggested Readings

- Must, A, Spadano, J, Coakley, EH, Field, AE, Colditz, G, Dietz, WH. The Disease Burden Associated with Overweight and Obesity. *JAMA* 1999;282:1523-1529
- National Task Force on the Prevention and Treatment of Obesity. Overweight, Obesity, and Health Risk. *Arch Intern Med* 2000;160:898-904
- 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
- Otto, D, Wang, X, Sandra, T, Reyna M, Farooqui, M, Shelton, M. A Comparison of Blood Pressure, Body Mass Index, and Acanthosis Nigricans in School-Age Children. *JOSN* 2010;26(3):223-229
- Pediatrics. The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents: National High Blood Pressure Education on Children and Adolescents 2004;114; 555-576
- Pediatrics. Update on the 1987 Task Force Report on High Blood Pressure in Children and Adolescents: A Working Group Report for the National High Blood Pressure Education Program 1996;98(4):649-657
- Nationwide Children's Hospital. Pediatric Obesity: Nationwide Children's Hospital Helping Children Live Healthier Lifestyles. *Pediatric Directions* 2007;31
- Perez Gomez, G, Huffman, FG. Risk Factors for Type 2 Diabetes and Cardiovascular Diseases in Hispanic Adolescents. *J Adolesc Health* 2008;43:444-450
- Peterson, K, Silverstein, J, Kaufman, F, Warren-Boulton, E. Management of Type 2 Diabetes in Youth: An Update. *American Family Physician* 2007;76(5):658-664
- Pettitt, DJ, Moll, PP, Knowler, WC, Mott, DM, Nelson, RG, Saad, MF, Bennett, PH, Kottke, BA. Insulinemia in Children at Low and High Risk of NIDDM. *Diabetes Care* 1993;16:608-615
- Pihoker, C, Scott, CR, Lensing, SY, Cradock, MM, Smith, J. Non-Insulin Dependent Diabetes Mellitus in African-American Youths of Arkansas. *Clinical Pediatrics* 1998;37:97-102
- Pinhas-Hamiel, O, Dolan, LM, Daniels, SR, Standford, D, Khoury, PR, Zeitler, P. Increased incidence of non-insulin-dependent diabetes mellitus among adolescents. *Journal of Pediatrics* 1996;128:608-615
- Reaven, GM. Role of insulin resistance in human diseases. *Diabetes* 1988;37:1595-1607
- Rosenbloom, AL, House, DV, Winter, WE. Non-Insulin Dependent Diabetes Mellitus (NIDDM) in Minority Youth: Research Priorities and Needs. *Clinical Pediatrics* 1998;37:143-152
- Rosenbloom, AL, Joe, JR, Young RS, Winter, WE. Emerging Epidemic of Type 2 Diabetes in Youth. *Diabetes Care* 1999;22:345-354
- Rosenbloom AL, Silverstein JH. Type 2 Diabetes in Children & Adolescents: A Guide to Diagnosis, Epidemiology, Pathogenesis, Prevention, and Treatment. Alexandria, Virginia: American Diabetes Association, Inc 2003
- Scott, CR, Smith, JM, Cradock, MM, Pihoker, C. Characteristics of youth-onset noninsulin-dependent diabetes mellitus and insulin-dependent diabetes mellitus at diagnosis. *Pediatrics* 1997;100:84-91
- Shwartz, RA. Acanthosis Nigricans. *Journal of the American Academy Dermatology* 1994;31:1-19
- Slyper, AH. Childhood obesity, adipose tissue distribution, and the pediatric practitioner. *Pediatrics* 1998;102(1):e4
- Strauss, RS. Childhood Obesity and Self-Esteem. *Pediatrics* 2000;105:1
- Stuart, CA, Driscoll, MS, Kurt, LF, Gilkison, CR, Sudah, S, Smith, MM. Acanthosis Nigricans. *Journal of Basic and Clinical Physiology and Pharmacology* 1998;9(2-4):407-418
- Stuart, CA, Gilkison, CR, Smith, MM, Bosma, A, Keenan, BS, Nagamani, M. Acanthosis nigricans as a risk factor for non-insulin dependent diabetes mellitus. *Clinical Pediatrics* 1998;73-79
- Stuart, CA, Pate, CJ, Peters, EJ. Prevalence of acanthosis nigricans in an unselected population. *American Journal of Medicine* 1989;87:269-272
- Stuart, CA, Smith, MM, Gilkison, CR, Shaheb, S, Stahn, RM. Acanthosis nigricans among Native Americans: an indicator of high diabetes risk. *American Journal of Public Health* 1994;84(11):1839-1842
- Villas, P, Chen, Z, Garza, D, Salazar, D. An electronic system to assist schools in determining the health risk of students. *Am J Health Studies* 2006;2(1):57-61
- Villas, P, Salazar, D, Garza, D, Villagomez, N, Lightner, T. Acanthosis Nigricans in Youth: A Type 2 Diabetes Marker. *Texas Journal of Rural Health* 2000;18(1):52-58



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