

**2001 Survey of Child Restraint Use in
Fourteen Texas Cities**

by

Katie N. Womack

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Traffic Operations Division
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Chris Willrich, Project Manager

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Texas' first child passenger safety law went into effect without sanctions on October 1, 1984; enforcement with the imposition of \$25-\$50 fines began on January 1, 1985. Since that time, the Texas Transportation Institute (TTI) has collected data in selected cities throughout the state to monitor usage rates. This report presents the results of the 2001 survey conducted in 14 cities, and compares these findings to the results of the earlier surveys.

Survey Method

The 2001 observational survey of child restraint use was conducted in the Spring of 2001 (March and April) in the following 14 cities:

Amarillo	El Paso
Austin	Fort Worth
Beaumont	Houston
Brownsville	Lubbock
Bryan/College Station	San Antonio
Corpus Christi	Tyler
Dallas	Waco

Observations were conducted at two types of sites, child care centers and shopping centers. Every attempt was made to keep the observation sites consistent with prior waves of the survey. In some cases, however, a child care center may have closed, or refused to give permission for the observation. In some cases, child care centers were operating on a limited basis or were temporarily closed during the survey period. Alternate child care center sites of similar size were selected when possible within the same zip code. At child care center sites an attempt was made to observe restraint usage for the population of the center. That is, to the extent possible, every child arriving or departing from the center was observed. At each shopping center location, data was taken for 50 children. The sample size at shopping center locations in years prior to 1993 was 100. Therefore, the shopping center data since 1992 has been weighted by a factor of two, to maintain a comparable contribution to the overall data set as in prior years.

As in previous years, the 2001 survey utilized Texas A&M University students as observers. Observers were provided with two training sessions totaling approximately eight hours. The first training session was a classroom setting consisting of video presentations and a thorough discussion and demonstration of correct and incorrect child restraint use. The students then participated in practice observations at child care centers and shopping centers throughout the Bryan/College Station area. During the survey period, a TTI study staff member visited each observer at both a day care center and a shopping center site in each city to assure the accuracy of their observations.

Despite careful attention to observational technique in order to reduce errors in the data, several aspects of the survey method suggest the possibility of a bias that should be mentioned. First, observations conducted at child care centers during the morning drop-off time generally "catch" people unaware, so that upon arrival at the center their restraint behavior is not modified due to the presence of the observer. This assumes no prior notification to parents or guardians by the child care center. In most cases, participating child care centers cooperate in making the survey unannounced. Occasionally, however, parents and guardians are forewarned, and their restraint behavior may be modified, resulting in higher levels of restraint use than might occur without notification.

A more significant potential bias is introduced during the afternoon pick-up observation at child care centers because parents and guardians encounter the observer as they arrive at the center. This prompts questions inside the center. Once they are informed of the observer's purpose, their response may not exemplify their usual restraint behavior.

Other observational limitations concern varying degrees of detail that are site and situation dependent. Restraint misuse at shopping center sites are no doubt conservative estimates because observers collect data on vehicles entering or exiting the shopping center parking lot, and are not in a position to monitor the infant/child being placed in or taken out of the car. Additionally, the vantage point at child care centers does not always allow for close scrutiny of restraint misuse in all cases. Some child care centers are reluctant to allow observers to scrutinize vehicle interiors too closely. These situations are handled on an individual basis.

The child restraint use and misuse reported herein is based solely on observational data. Since permission to observe was not obtained from restraint users (only from site managers and directors), the specificity of the data is limited to what could be observed unobtrusively, and in the case of shopping centers, in moving vehicles.

Results of the 2001 Survey

13,517 observations were made in the 2001 survey. In this sample of 14 Texas cities, 40.6 percent of the children were riding correctly restrained in either an approved child safety seat or the vehicle safety belt. An additional 31.3 percent were observed to be restrained, but in an incorrect and unsafe manner (e.g., child safety seat incorrectly installed, infant or child not secured properly in child safety seat, incorrect use of safety belt system). The remainder of the children in the total sample, 28.1 percent, were found to be riding unrestrained (2.64 percent held on laps), despite the legal mandate (Table 1). In 124 cases where a child was riding unrestrained, or improperly restrained by a safety belt, an unused child safety seat was observed in the vehicle. Almost all of these vehicles with unused safety seats were cars rather than pickups (121 cars and 3 pickups).

Child restraint use by location in the vehicle is shown in Table 2. The majority of children observed were riding in the back seat (80.8 percent). Observers noted 35 children riding unrestrained in the cargo area of vehicles. Analysis of restraint use by location indicates a significant difference in front seat versus back seat use. The percentage of infants and children riding unrestrained was significantly higher for those in the front seat ($z=7.82, p<.01$). Passengers in the back seat were more

often restrained. This relationship held true when either one child occupant was observed or multiple child occupants were observed in vehicles. Single child occupants were restrained 66.5 percent of the time in the front seat compared to 78.4 percent of the time in the back seat. One factor that contributed to the lower usage observed in front seats was the higher proportion of children being held in laps observed in front seats compared to back seats. Seventy percent of the children observed being held in someone's lap were observed in the front seat. In addition, all (21) of the integrated child safety seats were by definition in the back seat.

When the observations were examined by type of observation site, restraint use was found to be higher at child care centers than at shopping centers. While 76.9 percent of the children observed at child care centers were observed to be riding restrained in some manner, (correctly or incorrectly) 68.9 percent of the children observed at shopping centers were restrained (Table 3).

Analysis by vehicle type (car versus pickup truck) showed that children were more likely to be riding restrained in cars than in pickups. While 72.4 percent of the children in cars were restrained in a child safety seat or safety belt, 66.7 percent of the child passengers of pickups were similarly restrained (Table 4).

An analysis by individual city revealed that the percentage of child restraint use in the 14 cities varied from a high of 86.0 percent in Ft. Worth to a low of 48.4 percent in Brownsville (Table 5). A breakdown of observed usage rates at day care centers and shopping centers for individual cities revealed that usage observed at day care centers was higher for the most part than that observed at shopping centers (Tables 6 and 7). In two cities (Amarillo and Fort Worth), use at the shopping center sites was higher than at the day care center sites. Incorrect restraint use was observed more frequently at day care centers than at shopping center sites. As mentioned previously, this is very likely to be a result of the observation technique, which allowed for greater scrutiny at the day care center sites during drop-off and pick-up times.

It is important to note that the variation in restraint use within cities by site can be very large. While these combined data are presented as a city total, the results should not be interpreted as uniform restraint usage for the reported cities.

Trend Analyses

This section of the analysis compares child restraint use over the 18 years for which data has been collected. Percentages restrained at child care centers and shopping centers were contrasted and changes across time were examined. An assumption was made that the use of restraints for each child, when two or more were riding in the same vehicle, was not independent. In other words, restraint use for one child would influence whether or not a restraint was used for any or all of the other child passengers. Due to this assumed dependency of restraint use among multiple child passengers, the major statistical analyses were carried out using observations on vehicles with a single child occupant.

In this analysis, the reported percentages for restrained children include both correctly and incorrectly restrained. Combining correctly and incorrectly restrained proportions helps to eliminate

any bias that may have been introduced due to problems associated with accurately assessing examples of misuse. As was explained previously, instances of misuse included in this data set were limited to those that were obvious to the observers without prolonged inspection and thus represent a conservative estimate of actual misuse. This was particularly true at shopping centers where vehicles did not always stop at the observation points. By combining correct and incorrect proportions into a broader category of overall restraint use, the effect of observer bias is reduced.

Prior editions of this report have indicated estimates of misuse at significantly lower rates, particularly prior to 1998. There are several factors related to the higher percentage of misuse reported in Table 1. First, as noted in a previous edition of this report, in earlier years the practice of placing the shoulder belt behind the back of a belted child was considered an acceptable technique to keep the shoulder belt from touching the face. This practice, which in the past had been considered correct belt use, is now considered incorrect belt use. Second, in recent years, greater attention and emphasis has been given to importance of correct use of child safety seats, and the dangers of misuse have been widely publicized. The study staff has been trained to more effectively recognize misuse, and has transferred as much of this training as feasible to the field observers. An additional factor that may explain some of the increase in child safety seat misuse is the gradual increase in child restraint use overall. In other words, the more often seats are used, the greater the opportunity for incorrect use to occur.

Table 8 shows restraint use (for vehicles with one child only) for each of the study cities over time. During the first year of the child restraint law, child restraint use increased by at least 50 percent in all study cities except Austin. (Austin's baseline usage rate was the highest of the original 11 cities.) In four of the study areas, child restraint use more than doubled in that same time period. These changes, which occurred coincident with the implementation of the child passenger safety law in Texas, were consistent with the experiences noted in other States at the time legislation was put into effect. What occurred between 1985 and 1986, however, represented more than just the transition from the first year to the second year of enforcement. The mandatory safety belt use law (MUL) in Texas went into effect on September 1, 1985; thus, observed child restraint usage rates in 1986 were probably affected by the new legislation requiring the use of safety belts by adults in this State. In 1987 child restraint use dropped in every survey city except Corpus Christi. By 1987 the safety belt use law was in its second year of effect and restraint use in general had declined somewhat (Womack, et al., 1987). Other studies have documented a strong relationship between drivers' use of safety belts and their use of child restraints for their children (Kernish, et al., 1986). The combined average driver belt use in January of 1987 for the same 12 cities of the child restraint survey was 59.5 percent, compared to the average for child restraint use of 54.2 percent in March of 1987.

While child restraint use in 1987 decreased in all the survey cities except Corpus Christi, more fluctuation across cities has been evidenced from 1988 to the present. In 1988, only one city showed an increase in use, four cities showed decreases, and nine remained constant. Increased child restraint use was observed in eight of 12 study cities in the 1989 survey. This trend in increased usage was evidenced in 1990 for six cities, in 1991 for eight cities, and in 1992 for nine cities. In 1993, only three cities showed increases in child restraint use. In 1994, increased child restraint use was observed in seven cities. In 1995 and again in 1996, four cities showed increases in levels of

use. Increases in child restraint use were observed in 1997 for only three cities, in 1998 for six cities, in 1999 for four cities, and for six cities again in 2000.

The 2001 survey showed an overall increase in child restraint use for the 14 cities combined. This overall increase was statistically significant. Two cities (Tyler and Waco) showed statistically significant decreases over the prior year. Five of the 14 cities showed significant increases in child restraint use from 2000. These five cities were: Amarillo, El Paso, Fort Worth, Houston, and Lubbock. The remaining seven cities did not show a statistically significant change from 2000 to 2001, although several showed numerical increases.

Table 9 shows percentages of child restraint use for each city over time, without controlling for the effect of multiple child passenger dependence. In other words, the percentages provided in Table 9 are for every child observed in each survey. Figure 1 illustrates the trend for the average of the 18 cities over time. When all observations are considered, the results indicate that the total average across all cities increased significantly during the two years in which restraint legislation was being implemented ($z=-29.05$, $p<.01$ from 1984 to 1985; and $z=-35.04$, $p<.01$ from 1985 to 1986). However, a significant decline in total child restraint use was evidenced in 1987 ($z=14.74$, $p<.01$). During the two-year period following (1988 and 1989), child restraint use for the 14 cities combined did not change to a statistically significant degree. The 1990 survey revealed the first significant increase in child restraint use since 1986 ($z=-5.43$, $p<.01$ from 1989 to 1990). Significantly greater use continued in 1991 ($z=-8.73$, $p<.01$). A small, statistically non-significant decrease in overall child restraint use was observed in 1992. The 1993 and 1994 surveys revealed statistically significant increases in overall child restraint use ($z=-2.85$, $p<.01$ in 1993 and $z=-3.58$, $p<.01$ in 1994). The average usage rate across the 14 cities significantly decreased in 1995 ($z=4.42$, $p<.01$). The 1995 decrease was reversed in 1996 ($z=-5.17$, $p<.01$) and continued upward in 1997. This trend continued in 1998 as the total proportion of restrained children observed in 1998 was significantly greater than the total proportion of restrained children in 1997 ($z=-7.86$, $p<.01$). The slight decline from 67.2 percent child restraint use in 1998 to 66.5 percent restrained in 1999 was not a statistically significant decrease. However, the 1 ½ percentage point increase from 66.5 percent in 1999 to 68.0 percent in 2000 was a statistically significant increase. Likewise, the increase observed in 2001 is also a statistically significant change from the year 2000 estimate.

Summary

The 2001 survey of child restraint use, conducted in 14 Texas cities, revealed that 71.9 percent of the 13,517 children observed were restrained in a child safety seat or vehicle safety belt in some manner. Observers noted that 31.3 percent of the children they saw were riding in a child safety seat that was installed incorrectly or being used incorrectly, or were using a safety belt that did not fit correctly. The remaining 28.1 percent of the child passengers observed were not restrained at all. Children in the back seat were more likely to be restrained than those in the front seat. Overall, children were more likely to be riding in child safety seats or in vehicle safety belts when they were observed at day care centers in the survey sample and when they were in passenger cars rather than pickup trucks.

The percentage of child restraint use varied from 48.4 to 86.0 percent across cities. Five cities showed significant increases in child restraint use from 2000 (Amarillo, El Paso, Fort Worth, Houston and Lubbock). Significant decreases over 2000 were observed in Tyler and Waco. The remaining seven cities did not show a significant change from the previous year. The 2001 survey showed a statistically significant increase in child restraint use when all child passengers in all cities observed were compared with those observed in 2000.

REFERENCES

Kernish, R., and L. London, Strategies to Increase the Use of Child Safety Seats: An Assessment of Current Knowledge, National Analysts, Booz, Allen and Hamilton, Inc., December 1986.

Womack, K. N., and J. Fesenmaier, 1987 Survey of Front Seat Occupant Restraint Use in Fourteen Texas Cities, Texas Transportation Institute, Texas A&M University System, September 1987.

**Table 1. Observed Child Restraint Use For 14 Cities in
Texas (2001) (N = 13,517)**

<u>Restraint Use</u>	<u>Frequency</u>	<u>Percent</u>
Correctly Restrained:		
Correct use of child safety seat	3890	28.8
Correct use of vehicle safety belt	<u>1600</u>	<u>11.8</u>
Total	5490	40.6
Incorrectly Restrained:		
Incorrect use of child safety seat	2341	17.3
Incorrect use of vehicle safety belt	1890	14.0
Total	4231	31.3
Unrestrained:		
No restraint	3439	25.5
Child held on lap	<u>357</u>	<u>2.6</u>
Total	3796	28.1

Table 2. Child Restraint Use by Seat Position

POSITION	Restrained		Unrestrained		TOTAL	
	N	(%)	N	(%)	N	%
Front Seat	1146	66.1	588	33.9	1734	100.0
Back Seat	5643	75.8	1806	24.2	7449	100.0
Cargo Area	0	0.0	35	100.0	35	100.0

Table 3. Total Observations of Child Restraint Use by Type of Site

Restraint Usage	SITE TYPE			
	Day Care Center		Shopping Center	
	N	(%)	N	(%)
Correctly Restrained	1846	36.2	1822	43.3
Incorrectly Restrained	2073	40.7	1079	25.6
Unrestrained	1174	23.1	1311	31.1
TOTAL	5093	100.0	4212	100.0

Table 4. Child Restraint Use by Type of Vehicle

Restraint Usage	VEHICLE TYPE			
	Car		Pickup	
	N	(%)	N	(%)
Correctly Restrained	5118	41.2	370	34.2
Incorrectly Restrained	3881	31.2	352	32.5
Unrestrained	3435	27.6	361	33.3
TOTAL	12434	100.0	1083	100.0

Table 5. Observed Child Restraint Use in 14 Texas Cities

City (# Observed)	Percent Restraint Use			
	Correct	Incorrect	Restrained	Unrestrained
Amarillo (881)	47.1	23.7	70.8	29.2
Austin (895)	43.9	39.8	83.7	16.3
Beaumont (753)	49.0	31.1	80.1	19.9
Brownsville (897)	22.2	26.2	48.4	51.6
Bryan/College St. (897)	42.5	38.1	80.6	19.4
Corpus Christi (1060)	49.3	25.9	75.2	24.8
Dallas (1003)	43.8	25.1	68.9	31.1
El Paso (919)	41.5	28.0	69.5	30.6
Fort Worth (914)	39.5	46.5	86.0	14.0
Houston (1305)	36.5	28.4	64.9	35.1
Lubbock (1053)	31.4	47.3	78.7	21.3
San Antonio (813)	29.3	25.6	54.9	45.1
Tyler (902)	54.4	20.4	74.8	25.2
Waco (1223)	40.2	31.6	71.8	28.2

Table 6. Observed Child Restraint Use at Day Care Centers in 14 Texas Cities

City (# Observed)	Percent Restraint Use			
	Correct	Incorrect	Restrained	Unrestrained
Amarillo (283)	37.8	23.7	61.5	38.5
Austin (293)	39.9	47.1	87.0	13.0
Beaumont (249)	47.0	42.6	89.6	10.4
Brownsville (295)	22.7	42.4	65.1	34.9
Bryan/College St. (493)	33.1	51.5	84.6	15.4
Corpus Christi (460)	52.0	31.3	83.3	16.7
Dallas (301)	39.9	35.9	75.8	24.2
El Paso (319)	29.2	44.2	73.4	26.6
Fort Worth (314)	31.5	53.2	84.7	15.3
Houston (495)	32.7	38.6	71.3	28.7
Lubbock (355)	35.2	49.6	84.8	15.2
San Antonio (315)	20.3	37.5	57.8	42.2
Tyler (302)	50.0	34.4	84.4	15.6
Waco (619)	35.9	37.8	73.7	26.3

**Table 7. Observed Child Restraint Use at Shopping Centers
in 14 Texas Cities**

City (# Observed, weighted by a factor of 2)	Percent Restraint Use			
	Correct	Incorrect	Restrained	Unrestrained
Amarillo (598)	51.5	23.7	75.2	24.8
Austin (602)	45.8	36.2	82.0	18.0
Beaumont (504)	50.0	25.4	75.4	24.6
Brownsville (602)	21.9	18.3	40.2	59.8
Bryan/College Station (404)	54.0	21.8	75.7	24.3
Corpus Christi (600)	47.3	21.7	69.0	31.0
Dallas (704)	45.5	20.4	65.9	34.1
El Paso (600)	48.0	19.3	67.3	32.7
Fort Worth (600)	43.7	43.0	86.7	13.3
Houston (810)	38.8	22.2	61.0	39.0
Lubbock (698)	29.5	46.1	75.6	24.4
San Antonio (498)	34.9	18.1	53.0	47.0
Tyler (600)	56.7	13.3	70.0	30.0
Waco (604)	44.7	25.2	69.9	30.1

Table 8. Observed Percentage of Restraint In Vehicles With One Child Occupant by City Over Time^a

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Amarillo	18.1	38.9	64.0	49.3	56.3	37.3	45.9	53.2	52.5	65.7	57.2	49.1	54.5	58.0	75.0	65.8	71.7	80.4
Austin	45.0	60.9	75.7	73.9	70.6	76.5	74.4	80.2	73.8	68.6	77.5	76.0	90.7	77.9	79.3	74.5	86.0	86.8
Beaumont	NA	NA	NA	NA	60.6	50.8	67.8	68.6	64.0	63.6	74.0	65.5	75.7	70.3	71.5	73.2	76.5	81.7
Brownsville	8.3	15.6	50.9	17.2	13.9	19.3	27.2	35.1	34.1	22.9	33.3	39.2	32.5	38.4	37.7	40.9	53.9	54.7
Bryan/CS	33.6	51.3	73.8	62.2	63.1	62.9	69.8	79.6	77.7	76.1	74.1	80.4	83.4	79.1	83.1	84.5	83.1	83.0
Corpus Ch.	18.3	33.6	51.8	61.3	53.3	62.5	58.2	59.7	61.6	63.5	74.2	59.5	61.4	66.9	61.2	74.7	73.8	79.5
Dallas	28.2	49.8	65.5	52.9	55.7	62.7	53.1	71.5	66.2	62.9	62.3	60.6	69.2	65.0	70.6	64.0	73.2	73.5
El Paso	NA	35.6	60.0	54.3	57.2	52.8	59.9	47.1	55.1	42.6	56.6	50.7	52.6	58.0	61.8	68.2	54.1	72.0
Ft. Worth	NA	NA	NA	NA	63.3	63.8	68.5	71.9	71.2	63.2	66.2	77.7	75.0	75.7	77.4	77.7	77.8	81.3
Houston	24.3	44.4	60.3	56.7	52.1	48.5	45.5	53.5	51.4	55.7	60.4	58.4	56.1	59.5	54.5	61.0	62.3	71.6
Lubbock	20.2	47.4	65.4	59.7	53.6	54.4	53.2	70.7	64.4	62.7	74.3	77.3	68.0	68.7	73.8	82.9	78.0	84.1
San Antonio	20.4	53.0	61.9	58.7	43.5	42.5	47.6	50.2	59.6	61.4	56.1	62.6	65.6	63.7	57.7	55.5	59.5	62.6
Tyler	20.0	49.7	68.1	55.5	58.0	65.0	66.5	68.0	71.5	73.4	71.1	70.7	77.1	76.2	79.8	71.6	79.5	75.0
Waco	23.1	42.1	59.8	48.2	52.8	48.4	50.4	64.4	58.9	70.2	66.6	57.8	61.6	65.9	72.5	72.1	78.0	72.4

^a Percentages reflect correct and incorrect restraint

Note: 1984 represents the period before the Texas child restraint law was passed. 1985 and 1986 data includes only day care centers and shopping centers matched with pre-law survey. 1987 through 2001 data includes all day care and shopping centers surveyed.

Table 9. Observed Child Restraint Use by City Over Time^a

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Amarillo	16.5	35.9	60.3	38.8	49.6	32.1	43.8	51.2	46.7	62.4	52.9	42.9	45.5	47.4	72.6	49.2	67.3	70.8
Austin	40.6	55.7	73.5	68.3	67.7	71.4	72.3	76.6	71.2	70.7	74.3	72.6	85.3	78.1	77.4	72.0	83.3	83.7
Beaumont	NA	NA	NA	NA	56.2	49.5	60.2	63.6	63.8	63.7	66.6	56.6	72.0	66.9	70.1	70.0	76.6	80.1
Brownsville	7.3	10.9	44.5	15.3	14.5	21.2	25.3	31.5	33.0	22.0	31.4	36.8	26.1	35.3	37.4	39.3	51.9	48.4
Bryan/CS	30.1	47.7	69.8	60.8	61.8	62.1	67.6	78.1	74.8	74.8	70.5	78.4	80.0	79.5	82.2	84.2	77.3	80.6
Corpus Ch	18.8	37.2	52.1	53.7	50.9	58.4	56.1	59.0	59.5	64.3	75.0	55.6	56.0	67.3	60.2	74.9	72.9	75.2
Dallas	26.4	44.7	59.7	48.7	54.3	59.2	49.4	69.7	60.8	65.5	63.7	55.4	65.7	61.3	71.8	62.5	68.3	68.9
El Paso	NA	32.1	55.5	48.6	54.5	47.9	57.3	45.0	50.9	44.4	50.6	48.2	51.5	54.8	60.0	67.1	45.3	69.5
Ft. Worth	NA	NA	NA	NA	63.2	59.1	65.4	71.7	65.3	64.0	63.1	72.6	72.4	73.4	78.0	77.1	75.1	86.0
Houston	19.6	37.1	52.7	54.0	50.9	44.3	44.2	48.0	46.9	50.3	56.8	55.3	51.5	51.7	51.6	57.7	56.6	64.9
Lubbock	17.8	37.0	60.1	54.0	46.4	52.3	50.6	64.7	61.0	61.7	70.6	72.8	65.7	65.8	77.5	82.2	71.8	78.7
San Antonio	18.7	42.8	53.0	57.5	42.0	40.1	46.1	45.6	51.4	54.9	50.6	57.3	56.7	60.0	56.2	50.7	49.0	54.9
Tyler	19.8	42.5	66.6	55.1	56.3	62.0	64.0	61.2	65.8	70.0	66.9	68.3	74.4	75.6	79.6	70.8	78.2	74.8
Waco	20.6	36.0	52.7	42.0	48.8	46.5	46.0	59.6	56.0	59.5	63.0	45.9	55.5	65.2	73.4	72.1	74.5	75.2

^aPercentages reflect correct and incorrect restraint use for all children observed.

Figure 1. Observed Child Restraint Use in Texas Over Time

