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**Transportation Infrastructure and Quality of Life for Disadvantage Populations:  
A Pilot Study of El Cenizo Colonia in Texas**

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## **ABSTRACT**

This research is a pilot study aimed to identify environmental characteristics in colonias that are related to infrastructure and safety, access to goods and services, and quality of life. A secondary objective consisted of evaluating a variety of tools that could be used to identify and assess these environmental characteristics. El Cenizo in Webb County, Texas, was selected as our study colonia after preliminary visits and investigations. A multi-disciplinary approach framed this study, considering the transportation, urban design and planning, public health, and socioeconomic dimensions as potential determinants of the residents' mobility behaviors, environmental perception, and quality of life. Three instruments were developed to collect data for this research: 1) a survey, 2) an activity diary or travel diary, and 3) environmental audit instruments. Additionally, this study also included a small sub-group study testing the usability of wearable Global Positioning Systems (GPS) units as a research tool to capture spatial-behavioral data, combined with travel diary. First, the study has generated valuable data on transportation and mobility behaviors where almost no-information is available. Second, the multidisciplinary approach has allowed a comprehensive approach towards a better understanding of the current needs of colonias, especially those related to pedestrians. Some of them could be easily addressed with direct short-term interventions while other require a more long-term plans. Third, the assessment of new research tools offers useful insights for future research in the context of similar low-income marginalized communities.

# EXECUTIVE SUMMARY

## INTRODUCTION AND STUDY OBJECTIVES

This research is a pilot study aimed at identifying environmental characteristics in colonias that are related to infrastructure and safety, access to goods and services, and quality of life. A secondary objective consists of evaluating the usefulness of different tools that could be used to identify these environmental characteristics. A multi-disciplinary approach frames this study, considering the transportation, urban design and planning, public health, and socioeconomic dimensions as potential determinants of the residents' mobility behaviors, environmental perception, and quality of life. This study focuses on colonias, with high concentrations of low-income Hispanic population, which present a unique opportunity to study the physical environment-transportation relationships within the context of poverty, public health and safety. Colonia residents are at high risks for many chronic and epidemic diseases, pedestrian injuries and fatalities, due to the challenging social, economic and living conditions

El Cenizo, from Webb County of Texas, was selected as our study colonia, after preliminary visits and investigations. Its physical and socio-demographic characteristics made El Cenizo an optimal site for this study. With a population of 3,545, this community voted to be incorporated as a city in August 29, 1989. The City of El Cenizo has an established record of infrastructure improvements, active involvement of the citizens, and various social and economic activities. Further, El Cenizo has strong collaborative relationships with Texas A&M University Center for Housing Urban Development (CHUD) from the College of Architecture, which was essential to successfully perform data collection efforts required for this research.

## METHODOLOGY

Three instruments were developed to collect data for this research: 1) a survey, 2) an activity diary or travel diary, and 3) environmental audit instruments. Issues of mobility and perception on the barriers for physical activity have become increasingly popular subjects of research and promotion efforts in recent years. However, this study is one of the first attempts targeting colonias, considering their particular environmental conditions and socio-cultural background. This study also included a small sub-group study testing the usability of wearable Global Positioning Systems (GPS) units as a research tool to capture spatial-behavioral data, combined with travel diary. All data collection instruments and instructional materials were developed both in English and Spanish. Promotoras were in charge of administering all data collection efforts. The environmental audit, collecting detailed attributes of the built environmental measures, was done by the research team, as a windshield audit.

## STUDY RESULTS

The study results showed very interesting and relevant findings:

- 1) As many other colonias along the border, El Cenizo was marketed to residents of Laredo unable to find affordable housing in Laredo. Low-income residents bought land trusting the developer's assurance that adequate infrastructure would be built in the future. This

was not the case, and a variety of problems were faced by this growing colonia since it started. In the middle of all these issues, the colonia voted to be incorporated as a general law city in August 29, 1989. Since then, El Cenizo has legal status as an incorporated city. The capacity of organizing to fulfill their basic needs and requests has been a positive characteristic of this colonia since its emergence.

- 2) It is not surprising to observe a positive perception of residents about their colonia, especially regarding the social environments, and high levels of residential satisfaction as a place to live and to raise children. The majority of the respondents stated that they intended to live in this colonia for a long time. The residents appeared to have a strong social support network, knowing many of the neighbors and interacting with them. Many walked within the colonia, often accompanied by family members and friends; and they made many socially-oriented trips within the community both during the day and at night. They also seemed to meet and speak with their neighbors frequently while walking. Safety concerns, unlike the common belief, were not serious among the residents, with slightly higher concerns about crime safety than about traffic safety.
- 3) Contrasting to the high level of social infrastructure, the built environmental conditions are observed to be very poor. Especially the objectively assessed (Environmental Audit) shows living conditions that present many challenges and unsafe conditions for the residents and the children. Due to lack or shortage of utilitarian destinations and recreational facilities, most physical activities within this colonia were conducted for social and recreational purposes. Compared to the objectively measured conditions, the residents' perceptions on their physical environments were much more positive or satisfactory even though they clearly reported lack of recreational facilities, such as parks, to be an issue in this colonia. Further, while overall residential satisfaction is fairly high, when asked specifically about infrastructure conditions and facilities in the colonia, there appeared to be high levels of dissatisfaction.
- 4) About two thirds of the respondents engaged in walking in colonia, while only less than 15% engaged in biking. While recreational walking was more popular than transportation walking, common walking destinations included many utilitarian destinations, such as grocery stores, community centers and bus stops. Walking appeared to be an important travel mode among the residents, serving both utilitarian and social/recreational purposes. Walking is fairly acceptable accommodated in this colonia, with its newly installed sidewalks and lighting, although many temporary and permanent blockages were found on or along the sidewalks, such as mailboxes, trashes, and abandoned cars. Walkers, compared to non-walkers, tended to be younger, have more children in their household, use transit more frequently, and have better health status. Further, walkers engaged in more moderate and vigorous physical activities. Non-walkers bought more meals away from home. Walkers perceived their environment similarly to non-walkers, with a few exceptions. Walkers were more satisfied with the noise level and the recreational facilities in the colonia, than non-walkers. Although it seems counter-intuitive, walkers perceived less supportive social environments and less likely agree to having many people walk or bike in their neighborhood. Walkers also rated lower about the lighting conditions and sidewalk maintenance conditions in the colonia. This is likely explained

due to the fact that they actually walk, and therefore more aware of these problems and higher expectations about these conditions, compared to those who do not walk.

- 5) Transit appears to be an important mobility option among the residents, especially those who do not have a driver's license or own a vehicle. The relative high rate of transit use is expected given the isolated location of the colonia, the limited services available within, and the lack of privately owned cars. While many residents used the transit, they also reported many barriers to transit uses, including insufficient and infrequent services, unreliable bus schedules, and confusing schedules among others. Improvements in transit service may target increasing number of services and expanding to serve more routine destinations, and clearly communicating and keeping the operation schedules. This suggests that potential for increasing transit usage if addressing these barriers.
- 6) Many barriers to walking, biking and transit use, both observed during the audit and reported in the survey by the residents, are modifiable environmental barriers. Modifiable conditions that may help the residents be more active in their colonia may include having more benches along the streets, better lightings, more trees and shades, better maintenance (no potholes, cracks in pavement, etc.), more sidewalks, traffic signs, and more bike lanes and bike racks. Also removing the blockages, both temporary (trashes, abandoned cars, etc.) and permanent (mailbox posts), along the sidewalks appears important.
- 7) During the audit, it was clear that many services and recreational amenities are lacking in this colonia. The majority of the respondents did their grocery shopping in a store outside their colonia. In the travel diary, several respondents reported going to Laredo, nearby community and even to Mexico for shopping and service needs, to buy groceries, pay bills, for gas, for medical services, etc. As gas prices continue to increase, and with limited household incomes, using private cars for supplying services not available in the colonia becomes very expensive. Currently 81.4 % consider driving too expensive. Public transit is an alternative that residents are likely to use if service is more frequent, and routes are more meaningful.
- 8) We did not observe an urgent concern about safety within the colonia based on the responses from the survey as well as from the audit observation. Further, the fact that many residents walk even during late evenings, shows that residents feel safe in the colonia. However, the fact that the elementary school (where children of El Cenizo attend) is on the edge of the colonia on the other side of a minor arterial road, may be the reason why 73 percent of respondents are concerned about traffic safety.

## LESSONS LEARNED

The study results also documented positive and negative attributes related to the tools used for collecting social and environmental characteristics in low-income areas. These attributes include the following:

- 1) An important lesson learned was that the commercially available GPS units were designed for a particular function, such as for individual fitness training, tracking the

routes for way finding purposes, etc. These units are provided with a software that is not compatible with standard GIS software, such as ArcGIS or ArcView. The data could be exported but only to a special file format that was not easily converted to a format that can be opened in the standard software. After extensive searching and testing, we were able to figure out a method to convert the data. However, this method requires multiple steps, involving (a) downloading the data from the GPS unit using the company's software – data comes as a [tcx] file that cannot be opened by the standard GIS software, (b) using the GPS Visualizer, available from the web, to convert the downloaded data to a plain [txt] file, (c) converting the text to [dbf] file in MS Access – converting the data in other software such as MS Excel will cause problems with the data, and (d) opening up the dbf file in ArcGIS and creating a shapefile. A trained researcher with good understanding of GIS data is required for performing these data conversion tasks and it is required to do a quality check for each step. Furthermore, the conversion process is also quite time consuming.

- 2) The quality of the data captured from this particular GPS unit was determined good enough for research purposes and for capturing slow-speed activities, such as walking. There were some glitches but most of them were easily identifiable, which could be manually cleaned up. For example, the unit sometimes captured the satellite signals even inside the building (which tend to suffer from high level of measurement errors), and those erroneous data showed visually distinctive patterns and could easily be identified and removed from the data. The length of battery power was something to consider but could be address by asking the participants to re-charge the battery in the event they decide to go out again in the evening or at night, after returning home from work. The training sessions and the small instruction manual that was included in the packet with the unit were found extremely useful. The unit appeared acceptable for the users to wear for multiple days.
- 3) Our GPS protocol was developed to minimize the user intervention, and therefore we did not ask them to push the lap button before making individual trips. This led to some additional difficulties in linking the trip data with the time and related data attribute. For the adult population, it may be advisable to ask them to push the lap button, which can save time and reduce confusions in the data transfer process and reduce the potential for additional coding errors. The data from the GPS units would be more useful when there are sufficient raw GIS layers, such as parcel layer with land use data, aerial photographs, streets, etc. These GIS data are now more commonly available, but rural areas especially where colonias are located suffer from lack/shortage of these GIS layers.
- 4) Also important to note is some of the unique characteristics of this population group's activity patterns. They appear to engage in more social activities and more trips to friends' and relatives' places. They commonly engage in walking and other outdoor activities in the neighborhood during the evening and night hours. This makes the issue of battery power/duration even more important. Capturing the social and built environmental audit data during the night time seems important, as a significant proportion of neighborhood activities appear to occur after dinner. Also, it is crucial to collect both the week day and the weekend activities. Lastly, monetary incentive,

especially for this type of data collection efforts, appears necessary to ensure a sufficient response rate and a good quality of data.

## POLICY RECOMMENDATIONS

Based on the study results, the research team proposed the following policy recommendations:

- 1) Walking barriers could be addressed by attending the current ones: cleaning debris, moving unused cars, more frequent garbage collection, and addressing the issue of unattended dogs. It may be promoted by the City of El Cenizo on a regular basis. As housing construction continues to happen, it is logical that waste accumulates. The City may promote campaigns to involve residents in the cleaning of the neighborhood.
- 2) This city has clearly invested in basic infrastructure in recent years. Current plans of building a park within the colonia is a move in the right direction. It will bring positive results in two ways: it will provide places to walk to, and will also enhance already existing social interactions. This would take advantage of social networks that are already evident in the colonia.
- 3) Promoting the establishment of more local stores and / or supporting current ones, may result on more utilitarian destinations within the colonia. Residents are likely to increase local consumption as they perceive how expensive it is to rely only on car usage.
- 4) Installing traffic signs (warning and regulatory) within the colonia may also improve the perception of safety. This could be done also in relation to the elementary school locate on the edge of the colonia; in fact, a safety study should be done for improving access to the school. As no data are available about accidents in the colonia, it may be a positive idea to start keeping record in the City, in order to support future funding requests to improve traffic safety. It is difficult to prove the need for improvements without data to support such requests.
- 5) Our study shows that residents are willing to use more public transportation. Better designed routes -that actually optimize times and provide reliable destinations- should result on higher usage. As gas prices continue to increase, it is more likely that low-income population – as is the case of colonia residents- rely on public transit services to move from the colonia to other destinations.

# TABLE OF CONTENTS

<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
<b>CHAPTER TWO: THEORETICAL BACKGROUND AND LITERATURE REVIEW</b>	<b>3</b>
SOCIAL, ECONOMIC AND DEMOGRAPHIC ISSUES IN COLONIAS	3
BUILT ENVIRONMENT, TRANSPORTATION AND HEALTH	8
HIGHWAY AND ROAD SAFETY IN COLONIAS	13
<b>CHAPTER THREE: METHODOLOGY</b>	<b>15</b>
<b>STUDY AREA</b>	<b>15</b>
<b>SURVEY</b>	<b>17</b>
Instrument Development	17
Sampling	18
Survey Administration	18
Response Rate	19
<b>ENVIRONMENTAL AUDIT</b>	<b>19</b>
Audit Tool Development	19
Audit Process	20
<b>GEOGRAPHIC INFORMATION SYSTEM</b>	<b>20</b>
<b>TRAVEL DIARY AND GPS FEASIBILITY TEST (SUB-SAMPLE only)</b>	<b>21</b>
Travel Diary	21
Global Positioning System (GIS)	21
<b>CHAPTER FOUR: FINDINGS</b>	<b>23</b>
<b>SURVEY</b>	<b>23</b>
Demographics Characteristics	23
Economic Characteristics	24
Walking	25
Characteristics of Walkers versus Non-walkers	27
Other Physical Activity	30
Diet Habits	31
Residential Satisfaction	31
Built Environmental Perceptions	33
Factor Analysis on Environmental Perception Variables	34
<b>ENVIRONMENTAL AUDIT</b>	<b>36</b>
Land Use and Building Conditions	36
Infrastructure Conditions	37
Individual Lot Conditions	39
<b>SUB-SAMPLE STUDY</b>	<b>40</b>
Travel Diary Use	40
GPS Use	41
<b>CHAPTER FIVE: CONCLUSIONS AND DISCUSSIONS</b>	<b>43</b>
<b>REFERENCES</b>	<b>47</b>
<b>APPENDICES</b>	<b>59</b>

## LIST OF FIGURES

Figure 1. Income levels for survey samples.....	5
Figure 2. Building Construction Stages in Colonias.....	6
Figure 6. Poor Quality of Pedestrian Facilities.....	11
Figure 9. Randomly selected parcels and completed surveys.....	18
Figure 10. GPS manual provided to participants sub-sample.....	22
Figure 11. Age of the respondent.....	23
Figure 12. Number of children in the household.....	23
Figure 13. Household Income level in El Cenizo.....	24
Figure 14. Number of walking a week.....	25
Figure 16 Recreation walking.....	25
Figure 17. Number of biking a week	30
Figure 18. Physical activity at work.....	30
Figure 19. Land Use Map.....	36
Figure 20. Public Facilities & Infrastructure.....	38
Figure 21. Transportation Infrastructure.....	38
Figure 22. Rating of gardens.....	39
Figure 23. Rating of Cleanliness & Maintenance.....	40

## LIST OF TABLES

Table 1. Basic Indicators.....	4
Table 2. Frequency and amount of walking, by purposes.....	25
Table 3. Destinations the respondents walked to.....	26
Table 4. Barriers to walking.....	27
Table 5. Health status between walkers and non-walkers.....	27
Table 6. Work activity type between walkers and non-walkers.....	28
Table 7. Environmental perceptions between walkers and non-walkers.....	29
Table 8. Environmental satisfaction among walkers and non-walkers.....	29
Table 9. Barriers to transit use.....	31
Table 10. Satisfaction with neighborhood environments in colonia.....	32
Table 11. Perception of safety and social environments in colonia.....	33
Table 12. Perception of built environments in the colonia.....	34
Table 13. Perceived presence of destinations in the colonia.....	34
Table 14. Factor analysis results for the environmental perception items.....	35

## **DISCLAIMER**

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## CHAPTER ONE: INTRODUCTION

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This research is a pilot study aimed to identify environmental characteristics in colonias that are related to infrastructure and safety, access to goods and services, and quality of life. A multi-disciplinary approach frames this study, considering the transportation, urban design and planning, public health, and socioeconomic dimensions as potential determinants of the residents' mobility behaviors, environmental perception, and quality of life. This study focuses on colonias, with high concentrations of low-income Hispanic population, which present a unique opportunity to study the physical environment-transportation relationships within the context of poverty, public health and safety. Colonia residents are at high risks for many chronic and epidemic diseases, pedestrian injuries and fatalities, due to the challenging social, economic and living conditions (e.g., Davidhizar and Bechtel 1999). Among many alarming facts are that up to 80 percent of Hispanic populations are overweight or obese, and they are twice more likely to have diabetes than non-Hispanic whites (Cowie et al. 2006, Hedley et al, 2004). In addition, the National Highway Traffic Safety Administration, reports that car-related accidents are the leading cause of death for Hispanics from 1-34 years of age, and are the sixth leading cause of death for Hispanics of all ages (NHTS 2003).

El Cenizo, from Webb County of Texas, was selected as our study colonia, after preliminary visits and investigations. Its physical and socio-demographic characteristics made El Cenizo an optimal site for this study. With a population of 3,545, this community voted to be incorporated as a city in August 29, 1989. The City of El Cenizo has an established record of infrastructure improvements, active involvement of the citizens, and various social and economic activities. Further, El Cenizo has strong collaborative relationships with Texas A&M University Center for Housing Urban Development (CHUD) from the College of Architecture, which was essential to successfully perform data collection efforts required for this research.

Three instruments were developed to collect data for this research: 1) a survey, 2) an activity diary or travel diary, and 3) environmental audit instruments. Issues of mobility and perception on the barriers for physical activity have become increasingly popular subjects of research and promotion efforts in recent years (Craig, Brownson et al., 2002; Giles-Corti and Donovan, 2002; Handy, Boarnet et al., 2002; Giles-Corti and Donovan 2003; Hoehner, Brennan Ramirez et al., 2005). However, this study is one of the first attempts targeting colonias, considering their particular environmental conditions and socio-cultural background. This study also included a small sub-group study testing the usability of wearable Global Positioning Systems (GPS) units as a research tool to capture spatial-behavioral data, combined with travel diary. All data collection instruments and instructional materials were developed both in English and Spanish. Promotoras were in charge of administering all data collection efforts. The environmental audit, collecting detailed attributes of the built environmental measures, was done by the research team, as a windshield audit.

This report summarizes the results of this pilot study and includes four sections. The first section presents the background information about the social, economic, and community issues in colonias, and discusses previous literatures related to health, mobility and the built environment, and safety and transportation infrastructure. This first section highlights the main theoretical concerns and the related background information of this study. The second section presents a detailed explanation of the methodological approach used in this study. Advantages and limitations of each of the instruments are explained in the context of this study. A third section summarizes our main findings. As some of these instruments are applied in colonias for the first time, the focus of this pilot project is to test the feasibility and reliability

of these instruments, providing a basis for designing larger and more comprehensive studies in the future. Finally the report concludes with policy implications and future research recommendations.

As a general comment on the overall pilot project, the report presents several benefits. First, we have collected valuable data on transportation and mobility behaviors in colonias where little information is available. Second, the multidisciplinary approach of the research has allowed a more comprehensive approach towards a better understanding of the current needs of colonias. Finally, the assessment of new research tools offers useful insights for future research in the context of similar low-income marginalized communities.

## **CHAPTER TWO: THEORETICAL BACKGROUND AND LITERATURE REVIEW**

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This chapter presents the framework of this research including 1) social, economic, and community issues, 2) health, mobility and the built environment, 3) transportation infrastructure and public safety issues. The objective is to present the main theoretical advances and empirical knowledge from the different disciplines dealing with socio-demographic, economic, and environmental issues related to travel behavior, physical activity and quality of life. The discussion focuses on colonias and Hispanic populations where there is sufficient information available. However, when the evidence and prior knowledge is not sufficient the discussion expands to those involving larger populations.

### **SOCIAL, ECONOMIC AND DEMOGRAPHIC ISSUES IN COLONIAS**

Colonia is a Spanish term for neighborhood or community. In Texas, according to the Office of the Attorney General (OAG, 2006), a colonia is a residential area along the Texas-Mexico border that may lack basic water and wastewater systems, electricity, paved roads, and safe and sanitary housing. Colonias typically have substandard housing, inadequate plumbing and sewage disposal systems, and high concentrations of low-income residents. Colonias can also be found in many areas in the U.S. (Ward, 1999), but mainly in New Mexico, Arizona, and California and Texas. Texas has both the largest number of colonias and the largest colonia population. It is estimated that there are more than 2,294 colonias in Texas. For a detailed discussion on how colonias are established, see Doebele (1994), Larson (1995), Ward (1999), Ward et al. (2003), and Wilson and Menzies (1993).

Colonias are mainly populated by Hispanics, most of them of Mexican heritage, and the reasons for the emergence of colonias are not unlike the reasons for the emergence of slums in Latin America (Ward, 1999). Colonia-type developments are created by rapid urban and population growth in a context of little or no public housing and minimal state support for other low-income housing opportunities (Ward et al., 2004).

At the federal level, Colonias are defined as any identifiable community that (1) is in the state of Arizona, California, New Mexico, or Texas; (2) is within 150 miles of the border between the United States and Mexico (except for metropolitan areas with populations exceeding 1 million); (3) is designated as a colonia by the state or county in which it is located; (4) is determined to be a colonia on the basis of objective criteria such as a lack of a potable water supply, inadequate sewage systems, and a shortage of decent, safe and sanitary housing; and (5) was in existence and recognized as a colonia prior to Nov. 28, 1990 (USCA, 1479).

Some colonias are located in “extra-territorial jurisdictions,” while others have their own category and are considered “census places.” Very few (only the largest and oldest) have succeeded in attaining the status of a city. One of them is El Cenizo in Webb County of Texas, which is our study site. Though they have very limited resources, these emerging cities are starting to define their own policies and plans. Something that most colonias have in common is that they began as residential areas for the lower income sector of the workforce and are starting to become small markets. While zero to few job opportunities are available in colonias, some level of economic activity is evident. A growing number of small and micro businesses are emerging in colonias despite their isolated locations and high levels of poverty (Giusti, 2006).

Based on information from the Texas Human Resources, there are 30 border counties in Texas comprising a total population of 2,562,469. From this, 458,926 (18 percent) live in colonias. Webb County has a population of 193,117, from which 20,402, live in 60 identified colonias with only two of them having a population higher than 1,000, El Cenizo and Rio Bravo. Both have now risen to become cities and are working hard to improve living conditions for their habitants.

First of all, the predictable fact is that 98.95 percent of the El Cenizo’s population is Hispanic or Latino, compared to 32 percent in Texas and 13 percent nationwide. Education level is low with only 1 percent of persons older than 25 having a bachelor’s degree. This is much lower than the means of Texas (23 percent) and the country (24 percent). High school graduates are also low in El Cenizo (15 percent) compared to Webb County (53 percent), the state of Texas (76 percent) and the country as a whole (80 percent). Median age of the residents is 18.5 years, much lower than 32.3 years for Texas

As observed in Table 1, residents in El Cenizo have had a stable tenure in their current homes. In the U.S., only 50 percent of individuals have living in the same house for the last five years, whereas in the case of El Cenizo 67 percent have remained in the same home (US Census, 2000). Additionally, Webb County and the state of Texas only reach 53 percent and 46 percent, respectively, for housing stability of the last five years. This is important because it tells us that the population in colonias is steadier than in the rest of the country, contrary to the widely-held belief that colonias are “temporary” or “transitory” communities. Many people consider colonias as part of the “first stage” in a migration process from the south into the U.S., but it seems that the colonia population is more established than expected.

**Table 1. Basic Indicators**

	<b>El Cenizo</b>	<b>Webb County</b>	<b>Texas</b>	<b>United States</b>
Population	3,545	193,117	20,851,820	281,421,906
Percent Hispanic	98.9%	94%	32%	13%
higher	15%	53%	76%	80%
Percent (25 and older) with Bachelors degree or higher	1%	14%	23%	24%
Lived in same house since 1995	67%	53%	46%	50%
Born in the United States	58%	71%	86%	89%
Speaks spanish at home	79%	82%	25%	10%
Speaks English less than "very well"	47%	39%	11%	5%
Percent Unemployed	8%	4.9%	3.8%	3.7%
Median household income	\$13,333	\$28,100	\$39,927	\$41,994
Per capita income	\$3,610	\$10,759	\$19,617	\$21,587

Another misconception about colonias is the presumption that they are “Mexican communities.” According to the 2000 population census, 58 percent of the people of El Cenizo were American citizens by birth. In Webb County, 71 percent of the population claims the U.S. as their place of birth; in Texas, the figure is 86 percent, and nationally, the figure is 89 percent. We find, then, two “unexpected” characteristics: first a population that is more established than commonly accepted, and second, a population that is, for the most part, American.

Having said this, we also observed, from the same census, that 47 percent of the people of El Cenizo say they speak English “less than very well.” This is a very high figure compared with the 11 percent for the state of Texas. Webb County has 44 percent of its population not speaking English “very well,” while the U.S. as a whole shows only 5 percent. Additionally, 75 percent of the people in El Cenizo say they speak Spanish at home. This is interesting because if we relate it to the previous statistic on nativity, we find

that although 60 percent of the population in El Cenizo was born in the U.S., most of them keep Spanish as the home language. Indeed, for any service provided to residents in colonias to be successful, communication must be in Spanish.

There is a big gap in income between colonias and the national standard (USCB, 2006b). About 60 percent of colonia population is defined as living below the poverty level, even with optimistic estimates (USCB, 2006b). About 68 percent of the population of El Cenizo lives below the poverty level, much higher than the 31 percent in Webb County. Median annual household income in El Cenizo is \$13,333, which is about one-third of the median household income in the U.S. and about a quarter of that in Texas. Average family size is larger in colonias with 4.8 people (compared to 3.14 in the nation), resulting in even lower per-capita incomes. We observe that the national per capita income of \$21,587 is 6 times the per capita income in El Cenizo, which is \$3,610. The state of Texas shows 15.4 percent in this category, whereas 12 percent of the population is living in poverty in the country as a whole. We observe that our study samples mirror these income levels within El Cenizo (Figure 1).



**Figure 1. Income levels for survey samples**

### **Construction patterns in low-income communities**

Colonias are not governed by regulations defining minimum construction standards. As these are low-income communities, residents have no or limited access to mortgage/loans to buy a house or to make house improvements. Their limited resources will only let them buy small parts and pieces at a time and build their houses as time and resources become available. This practice, commonly known as incremental construction, characterizes the housing supply in these neighborhoods. While this is a common practice in developing countries (Ward, 1999), it does not represent widely accepted American construction patterns. Indeed many cities will impose strict regulations related to self-construction because of legal concerns as well as safety regulations. However, incremental construction is a policy

commonly applied in developing countries lacking financial systems that support major housing construction efforts. Some of the bills and regulations already passed by the Texas Legislature (Giusti, 2007) address this lack of minimum construction standards in colonias.

Planning departments in the U.S. are reluctant to accept, and most likely would bar, such practices. In colonias, however, construction in small steps is commonly observed. Colonia residents often work on their houses as work schedules and finances permit (Borderlines 1998). Houses are being improved constantly and, as families grow, houses expand accordingly. The result is a neighborhood with houses in all stages of construction (Figure 2). Figure 2 shows a few examples where house construction is at different levels of completion. In the first three pictures, families live in the property during the construction. In the last photo, the owner is building a separate structure while living in a mobile trailer.



House almost finished



House in construction



Building 2<sup>nd</sup> Floor



Building a separate structure

**Figure 2. Building Construction Stages in Colonias**

The implications of this construction practice in colonias are mixed. On the positive side, it allows low-income families to meet the basic need of sheltering. Besides, as residents build their home over a long period of time and with much personal involvement, there is a clear sense of ownership and self-

empowerment (Ward 1999, Giusti 2007). On the negative side, there are externalities related to the continuous construction. For example, dirt in the construction site (which in many cases is where the family continues to live), possible hazard materials are exposed on the streets and inside the units, and the evident noise and inconvenience related to construction. There is little research pointing their specific effects on human health and family life, as well as on the entire community.

### **Economic Activity in Colonias**

In his pioneering work, Birch (1987) demonstrated that most of the jobs created in the U.S. do not come from big corporations but from very small businesses. From that initial work to the present, much has been written about this topic (Balkin, 1989; Bartik, 2002; Musterd & Anderson, 2006; Papanikos, 2004; Schreiner, 2001b; Schreiner & Morduch, 2001; Servon, 1998; Servon & Bates, 1998) and many policies have been implemented based on these research findings (Bartik, 2002; Peters & Fisher, 2004). It is now widely accepted that small and microbusinesses are becoming the engines of growth in many communities.

Ethnic minorities are especially inclined to engage in self-employment or to create businesses serving their own markets, as documented in the U.S. (Borjas, 1986; Light, 2002; Masurel et al., 2004; Mora & Davila, 2005; Ram & Jones, 2002 ) as well as in other countries, both rich and poor (; Egbert, 2006; Kloosterman, 2003; Kontos, 2003; Musterd & Anderson, 2006; Ram & Smallbone, 2003). Border regions, in particular, have proven to be especially prolific of such activities because clusters of migrants involved in trade and business are more commonly found there. Specifically, Mexican-Americans in the Border States have higher self-employment rates than Mexican-Americans in interior cities (Flota and Mora 2001). Studies in other countries have found similar patterns among ethnic minorities in border regions compared to interior regions (Egbert, 2006; Schnell & Sofer, 2003;).

The potential of microbusinesses to contribute to local economic development could be viewed from several perspectives. In poor, isolated communities, these businesses are often the only available provider of local needs and services (Alwitt & Donley, 1997; Birch, 1987; O'Hara, 1999; Rowe et al., 1999; Williams, 2000). Shopping locally makes it possible for money to circulate within the community, providing that businesses serve local customers. This will not happen when shopping is done at large chains or retail outlets in nearby cities, out of the local economy (OECD, 2003). Because businesses and their customers pay some form of taxes and/or fees, local businesses also contribute to the local economic base. Further, although not in large numbers by definition, microbusinesses also generate some local employment (Birch, 1987; Musterd & Anderson, 2006; Papanikos, 2004); and, importantly, they tend to employ higher percentages of older (65 years and above), less-educated (high school or lower), and part-time workers (Headd, 2000). This is the type of employment most need in low-income communities as colonias.

Another benefit of small and microbusinesses is their capacity to create or consolidate social interactions and networks (Alwitt & Donley, 1997; Hund, 2003). They play the role of the locus where community members can interact, adding more value to the business in addition to simply providing goods and services. Most microbusinesses are located within neighborhoods, in peoples' homes, and on their front porches (Hund, 2003), so as people walk to these businesses, they are likely to encounter their neighbors on the streets and in the shops. The interaction facilitated by such proximity has the serendipitous impact of helping prevent crime. Moreover, in communities without parks, as most colonias are, local retail shops play a role in "neighboring," which Hund (2003) defines as the frequency with which one gives and/or receives assistance to and from neighbors. Similar results are found with working locally, which could be compared to shopping locally (Immergluck, 1998). Just as local businesses promote the development of networks, local work likewise leads to individual and community benefits.

## BUILT ENVIRONMENT, TRANSPORTATION & HEALTH

One of the main objectives of this research is to assess the built environment in colonias within the context of health and quality of life among their residents. This study assesses the built environment in colonias for its support for physical activity and access to goods and services. While there are studies examining the environmental influences on physical activity and health outcomes, relatively little is known for particular minority groups, such as Hispanics. Therefore, this section reviews the literature on the general population, and highlight findings relevant to Hispanic populations whenever available. The three themes of “built environment,” “lifestyle,” and “health” are the conceptual anchors of discussion in this section (Figure 3). A full review of literature on the relationships among these three themes is beyond the scope of this report. This review focuses on the built environment-physical activity relationships.

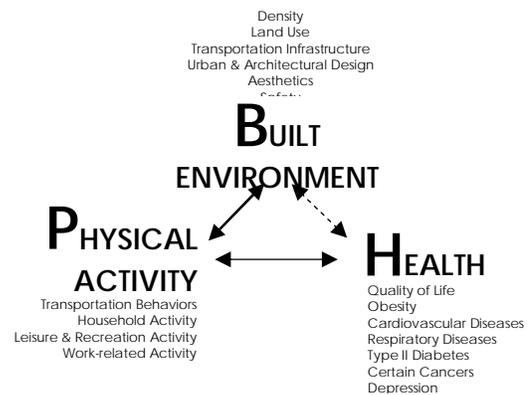


Figure 3. Conceptual Framework: The Triad

### Why Active Living through Walking and Bicycling?

Physical activity is a generic, natural part of human life, and has been appreciated throughout the human history. Sudden decrease in the need for physical labor in recent decades has brought upon many negative health consequences, posing a major burden to our healthcare system. Abundant evidence shows that physical activity is one of the most effective ways to prevent obesity and many other modern chronic diseases, such as cardiovascular diseases, diabetes, cancer, obesity, depression, anxiety, etc. (Pollock, 1978; Abbott et al., 1994; Hunt, 1995; Hakim et al., 1998). Despite the many well-known benefits of physical activity, more than 60 percent of U.S. adults are not regularly active and 25 percent are not active at all, according to the Center of Disease Control and Prevention (CDC) Behavioral Risk Factor Survey. About 400,000 deaths (16.6percent of all deaths in the U.S. in 2000) were associated with physical inactivity and poor diet, which was the second leading cause of death followed by tobacco with 435,000 deaths (Mokdad et al., 2004). Hispanic populations have significantly lower levels of physical activity and higher levels of obesity, compared to White. As much as 80% of Hispanics are considered overweight or obese, and rates of diabetes are twice of those among non-Hispanic whites (Cowie et al. 2006). Further, Hispanics, lower income groups, and those living in rural areas (most colonias are located in rural areas) are less likely to be engaged in regular physical activity (e.g., Gordon-Larsen et al. 1999; Kruger et al., 2007; Sjolie and Thuen, 2002; Giles-Corti and Donovan, 2002).

Automobile dependency confirms this widespread trend of sedentary lifestyle. The predominant transportation mode in most parts of the U.S. is the automobile with over 86.4 percent of total commuting trips by automobiles in 2001 (Pucher and Renne, 2003). This trend has brought many serious side effects such as traffic accidents, noise, environmental degradation, and increased energy and land consumption. The adverse impacts of increase automobile use have fueled interests in non-motorized transportation. By promoting walking and biking as alternative transportation modes to driving for short trips, many additional benefits can come along, such as reduced vehicle-emitted air pollution, casualties and injuries related with traffic accident, and traffic- and driving-related daily stress and hassles. In the U.S., about half of all trips are less than 3 miles/4.8 km, considered by many to be within a bikeable (or possibly a walkable) distance, and 25 percent are less than 1 mile/1.6 km. If the built environment is supportive, bicycle and pedestrian travels can potentially replace a significant portion of automobile trips. However,

only 2.8 percent of commuting trips were done on foot in 2001 (Hu and Reuscher, 2004). Increasing opportunities to integrate physical activity as a benefit to health and the transportation system can promote lifestyle changes, increase social support, address health disparities in key populations, and potentially reduce time barriers for travel.

*Facilitate sustainable, lifestyle changes:* The challenge is that sedentary lifestyle and automobile dependency is now deeply rooted in American culture, including colonias. A long-term, sustainable solution is required to achieve any positive health outcomes. Lifestyle-based activities, such as walking to a store, or biking to work or school from time to time, are more likely to induce frequent, regular, and habitual physical activities that can be carried out throughout the entire lifespan (Hillsdon, 1995). Several studies showed that lifestyle interventions, compared to structured intervention (i.e., exercise program and health club activities) are more likely to induce long-term lifestyle changes and effective for currently sedentary people (Owen and Bauman, 1992; Dunn, 1999).

*Promote social support:* Walking and bicycling in neighborhoods provide opportunities for people to socialize with each other, and contribute to promote psychological health and heighten a sense of community. Unlike most vehicle-transportation infrastructure, which segregates communities and hinders social interactions (World Health Organization, 1999), pedestrian and bicycle facilities often provide places for community interactions which contribute to enhance social support. It is well documented that social support, such as friends to walk/bike with, family members who encourage you to exercise, and even simply seeing people walking/biking, constitute important incentives for an individual's behavior change (e.g. Bauman, Sallis et al. 2002; Eyster, Brownson et al. 2003).

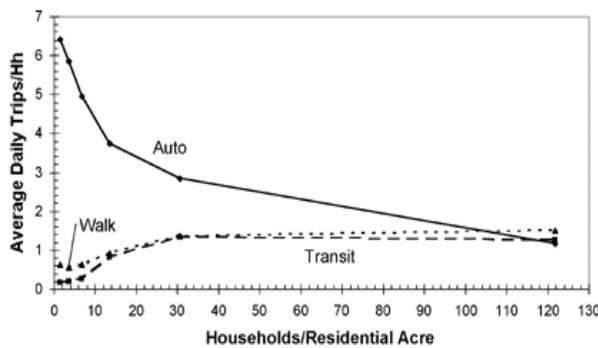
*Allow targeting a large segment of population with the most feasible and attractive types of physical activity:* Consideration of disparities in the levels of physical activities among different population groups is important. Transportation-purpose walking and bicycling are the most attractive types of physical activities, especially for the most vulnerable segments of populations, such as the elderly, the young, ethnic minorities, and the economically disadvantaged. These activities are cheap (Sevick, 2000) and available to almost everyone, while going to a gym or walking on a treadmill at home are options available only to those who can afford paying for these options. Morris and Hardman further emphasize the importance of walking by saying that unlike many other physical activities, walking does not decrease in middle age, and is a self-reinforcing, habit-forming, and readily repeatable physical activity (Morris, 1997). Therefore, it is likely that with proper environmental supports, walking can become a healthy habitual activity that everybody can engage in conveniently in everyday environments.

*Reduce time barriers:* Many people report lack of time to be a major barrier to physical activity (Zehnpfenning and Design Ventures Inc., 1993). Walking and bicycling fit into everyday life better than other recreational exercises that often require extra time and cost (Mason, 2000). Walking and bicycling can allow linking multiple trips of different purposes. However, these multi-functional, non-motorized trips are feasible only when the environment is designed to support them. Generally, people are willing to walk about a half of a mile (Lee, 2004), and it is important that common, daily destinations are located within a walkable distance from home. Further, availability and quality of sidewalks, bike lanes, lighting, and tree shades along the routes between origins and destination also influence people's decision to walk/bike. However, no empirical findings are available about the specific behavioral and environmental preferences related to physical activities including walking and biking among Hispanic populations. While those populations living in underserved conditions like colonias may rely more on walking and biking for their physical activity (compared to others who can afford to pay for the gym and sports activities), their environments may not be supportive. The streets in colonias often do not have adequate sidewalks, bike lanes or lighting; and colonia residents are often exposed to various hazardous materials and pollutants while walking or biking.

In short, increased non-motorized travel lends many benefits, such as increased safety, energy efficiency, reduced user cost, reduced municipal cost, improved air quality, and increased accessibility to more people. Policies connecting transportation, environment and public health goals must be better coordinated to create healthier and more sustainable communities.

### Built Environment and Lifestyle Physical Activity

Lifestyle physical activities, such as walking and bicycling, are heavily influenced by the settings and qualities of the physical environment in which people live, work and play. Literatures from multiple disciplines have addressed environment-walking/bicycling relationships. Public health literatures approach these activities as physical activity or leisure time activities, while those from urban and transportation planning consider as non-motorized transportation behaviors. The latter body of literature reports the following environmental factors to be significant correlates of walking and biking: land use mix, density, availability and quality of pedestrian facilities, transit services, and street layouts. A review of public health literature reports access to exercise facilities, trails and parks, plays a role in promoting physical activity (Lee and Moudon, 2004). It also found that streets were among the most frequently used places for physical activity. Other important facilities that are shown to encourage physical activity include public facilities such as footpaths, trails, parks, public open spaces, and bicycle paths, and private facilities such as gyms, health clubs, recreation centers and swimming pools. Conditions of the transportation infrastructure are also found to be important, including traffic volume, sidewalks, signage, streetlights, and traffic control measures. In addition, safety, terrain, home age, convenience, enjoyable scenery, and costal and urban residential locations are associated with physical activity in neighborhoods. The main constructs of variables shown to consistently and strongly influence physical activity are discussed as follows. The literature is insufficient to offer insights about Hispanic populations or colonia residents, so this review focuses on the general population in the U.S.



**Figure 4. Average Daily Trips/Household vs. Household Density (Source: Holtzclaw, no date)**

Commission survey of 10,000 households, and found that the increase in household density from 6 to 30 households/acre (4,047 square meters) increased walking trips from 0.6 to 1.4 trips/households (Holtzclaw, no date) (Figure 4). Dunphy and Fisher also observed a positive association between walking/biking trips per capita, and population density above 4,500 persons/square mile (2.59 square meters); however their data were aggregated at the zip code level (Dunphy and Fisher, 1996).

Considerations of land use for walkability and bikeability should be destination-specific and distance-specific. Not all destinations are attractive to walking. Shopping and daily routine destinations appear important for walking and physical activity (King et al., 2003; Lee and Moudon, 2006). Cervero and Kockelman observed that utilitarian walking trips are more likely to be made to personal services and

### Land Use, Destination, and Distance

Both the types and intensities of land uses are important for active living. People living in medium- to high-density neighborhoods produce more walk trips and transit trips due to shorter travel distances (Frank and Pivo, 1994; Holtzclaw, 1994). Frank and Pivo found that both employment and population densities are associated with walking trips (Frank and Pivo, 1994). Newman and Kenworthy observed that residential density was positively related with the residents' level of walking and bicycling (Newman and Kenworthy, 1989). Holtzclaw analyzed 1990 Metropolitan Transportation

convenience retail stores (Cervero and Kockelman, 1997). Steiner found that the respondents who lived within 1 mile from the shopping area – were more likely to make frequent trips, and they tended to walk more when the distance between their homes and shopping areas are shorter (Steiner, 1998). Lee et al. found that while grocery stores, restaurants, banks, post office, etc., were positively associated with walking, big box shopping centers and large office complexes were negatively associated (Lee and Moudon, 2006).

Distance is by far the most powerful factor influencing people’s decision to walk. It is typically considered that ¼ mile (0.4 km, a 5-minute walk) to ½ mile (0.8 km, a 10-minute walk) is within acceptable walking distance. A survey of residents from Seattle and its nearby urban areas reported about 8.4 to 13 minutes on average (translated to about 0.42 to 0.65 miles, 0.67 to 0.14 km) (Table 1). Important to note is that acceptable walking distances are influenced by (a) personal factors, such as demographic background and health status, (b) environmental factors, such as climate, the time of day, land use conditions, weather and topography, and (c) trip purposes, among other factors. In general, transportation-related walking trips tend to be shorter than recreational walking (OTAK, 1997; Lee and Moudon, 2006). Currently, knowledge is lacking about the distances considered or accepted as walkable by different populations and by those living in different environmental conditions.

### Transportation Infrastructure

Transportation infrastructure, such as streets, transit services, crosswalks, parking, and signals, and its related conditions, such as traffic volume and speed, are important for physical activities, especially for walking and biking. Small blocks with grid-like street patterns allow for direct and short routes to destinations (Snellen et al., 1998), while large blocks with loops and cul-de-sacs lengthen travel distances requiring detours (Figure 5). Cervero and Gorham (1995) reported that *transit* neighborhoods with a grid street layout and built before 1945 showed lower rates of driving alone and higher rates of walking and bicycling than did their *automobile* counterparts. Further, traffic and parking conditions have significant impacts on pedestrians and bicyclists, by influencing safety, convenience, and attractiveness of walking and biking.



**Figure 5. Examples of Grid-like and Cul-de-sac Streets (Adapted from Lee and Moudon 2005)**

### Pedestrian and Bicycle Facilities

In addition to the overall street patterns and vehicular roadway conditions, the availability and quality of pedestrian and bicyclist facilities are particularly important for walking and biking. A 1991 Harris Polls showed that 46 percent of the respondents would sometimes bike to work if safe bicycle lanes were available, and 59 percent would walk or walk more often if safe paths or walkways were available (Rodale Press, 1992). Lee and Moudon (in press) also reported that not having continuous sidewalks or bikeways were among the major barriers to walking



**Figure 6. Poor Quality of Pedestrian Facilities**

and biking. Not only is the mere availability of these facilities important, but they must be designed and maintained to provide safe, convenient, and pleasant walking experiences for pedestrians. Both functional and aesthetic aspects of the pedestrian facilities should be considered. Pedestrians respond to the surroundings more sensitively than drivers due to the slow speed that people experience their environment. Dimensions of pedestrian and bicyclist facilities must be adequate to accommodate various social activities as well as circulation. Further, proper location of amenities, such as benches, shelters, lighting fixtures, trash receptacles, shading trees, and public art, are also important in creating supportive environments for walking and bicycling (Federal Highway Administration, 1993; Eyster et al., 2002; Lee and Moudon, in press).

### **Recreational Facilities**

Availability and quality of recreation facilities such as parks, trails, sports facilities and gyms appear important (Table 8). However, previous empirical studies have reported some mixed results. Several studies showed no or limited associations between recreational facilities and physical activity (Jago et al., 2006; Moudon et al., 2007), while others reported significant associations (Giles-Corti and Donovan, 2003; Hoehner et al., 2005; Epstein et al., 2006). It appears that the quality of recreational facilities is important (e.g., facilities available within the parks, maintenance conditions, and attractiveness). Further, freely available public spaces, especially neighborhood streets, are among the most commonly used spaces for recreational activities (Giles-Corti and Donovan, 2002; Powell et al., 2003; Lee and Moudon, 2004).

### **Visual Quality**

Visual quality of the pedestrian environment plays an important role in providing psychological supports to physical activities outdoors. Visual quality is also shown to enhance a sense of place, which is shown to bring many physical and psychological health outcomes (Frumkin, 2003). It is largely determined by the forms, uses, and characteristics of the built and natural environments, and significantly affects people's psyche in making their behavior choices, including physical activity. Rapoport suggests that the number of noticeable differences is important, and slow speed of pedestrian travel requires a higher level of complexity, and allows for more subtle differences to be noticed. He also states that the complexity in the environment can reduce perceived travel time (Rapoport, 1987). Mota found that aesthetic quality of the neighborhood environment had a positive association with physical activity among adolescents (Ball et al., 2001; Saelens et al., 2003; Mota et al., 2005).

### **Safety**

Another perceptual issue that is detrimental to outdoor activities in neighborhoods is safety. Although the factual data on safety, such as crime and crash rates, have not increased, people's perception of safety and fear of crimes/crashes has increased. However, the number of casualties and the severity of injuries are much greater for pedestrians than for drivers. Ensuring pedestrian and bicyclist safety is the prerequisite to promoting walking and biking. Safety measures can target reducing the speed and volume of traffic and giving priorities to pedestrians at street interactions and crossings. Another safety issue relates to crime. Fear of crime is shown to be a significant barrier to physical activity especially among the poor, females, girls, minorities, and urban residents (Wilbur et al., 2002; Gielen et al., 2004; Gomez et al., 2004). Further discussions on the road safety issues are included in the following section.

## HIGHWAY AND ROAD SAFETY IN COLONIAS

Following an extensive review of the literature on crash characteristics and highway safety related to colonias, no document could be found that specifically covered these two topics. The few documents that were identified about colonias were related to provide solutions to help improve the transportation needs of residents living in this type agglomeration (Burke et al., 2005; Jasek and Khun, 2007).

Although no document specifically addressed safety issues in colonias, some characteristics observed elsewhere (i.e., typical residential streets) could also be applicable to colonias. Most colonias are composed of urban (or could sometimes be defined as rural) minor arterial and local residential streets. An important risk factor in residential streets can be caused by excessive speeding of vehicles. Elvik (2005) and Aarts and van Schagen (2006) documented three effects of speeding on crash risk and injuries. First, the probability of a crash is approximately equal to the square of the vehicle speed. Second, in the event of a crash, the risk of injury is approximately proportional to the impact forces on a person, which in turn are proportional to the square of the impact speed. Third, the probability of a crash increases as a vehicle's travel speed rises above the average travel speed of surrounding vehicles. The larger the difference, greater is the crash risk. It should be pointed out that according to NHTSA (2005), more than 50 percent of fatal crashes occurred on highways with a speed limit below 50 mph.

The design of minor arterials and local streets can influence safety and speeding, which in turn will influence crash risk as discussed above. For the first design component, it is a well-known fact that wider streets are associated with higher travel speeds (Walter and O'Brien, 1999). In terms of safety, the common belief dictates that wider streets or lane width is associated with a reduction in crash risk. However, not everyone agrees with this statement. For example, Hauer (2000) argued that the driver's adaptation may nullify the benefits linked to widening roads. According to this researcher, the common belief associated with the fact that a wider lane width can improve safety is based on two assumptions. The first assumption states that the average separation between vehicles will become larger when the lane is wider; thus, the wider separation can provide a buffer to avoid slightly random deviations of vehicles from the normal path inside the lane. However, drivers adapt to changes in roadway characteristics. High speed and careless driving may be induced by wider lane widths, so the net benefits may become null because of the negative effects associated with driver's adaptation. The second assumption is that a narrow lane may make a car run-off-the-road more easily, which may increase the risk for the driver to overturn or rollover (a characteristic associated in rural high speed arterials). Finally, Hauer (2000) indicated that when the lane width changes, other highway features tend to also be modified, so the isolation of the safety effect of lane width is actually difficult to measure.

The second design element is related to the length of the residential street (e.g., a tangent section without curves) (defined as block segment). Freeman (1985) examined the effects of driving environment upon the vehicle speeds in residential neighborhoods. This researcher developed regression models to estimate factors associated with vehicle speeds. He found that block length and street width were the most important factors in determining vehicle speeds. Using data collected in San Antonio, Texas, Ballard (2002) also found that block or segment length influenced vehicle speed. Longer block length was associated with higher vehicle speed (the 85<sup>th</sup> percentile value was collected). However, not everyone found this relationship. Based on data collected in Boise, Idaho, Szplett and Fuess (1999) reported that block length marginally affected vehicle speed.

The third design element is related to the structure of the roadway network. In many traditional neighborhoods located in the U.S., the highway network is usually designed in a grid pattern (Homburger et al., 1989). In this kind of layout, the residential streets are designed as long tangents that meet each

other at a perpendicular angle. It should be pointed out that the El Cenizo is characterized by this network layout (Figure 21). Similar to block length, simple grid layout street network can encourage excessive vehicle speeding. Because of this and other related safety problems, new developments in the U.S. no longer use this kind of layout without additional modifications to avoid long blocks where vehicles can achieve excessive speeds (Ewing, 1999).

The last topic is related to the application of traffic control devices in residential neighborhoods aimed at reducing excessive vehicle speeds. The first traffic control device is related to the installation of stop signs (all-way) at unsignalized intersections. Even though not recommended by the Manual for Uniform Traffic Control Devices or MUTCD (FHWA 2003), stop signs have been used frequently as an easy method to reduce excessive vehicle speed throughout the U.S. Several research studies have shown that stop signs are in fact ineffective to reduce vehicle speed in most circumstances and could potentially create problems by increasing the rate of drivers who disrespect this traffic control device as well as the potential unnecessary increase in air and noise pollution (see, e.g., Noyes, 1993; Bretherton Jr., 1999). The second traffic control device is the use of traffic signs to regulate vehicle speed on residential streets. Unfortunately, it has been shown that simply changing the posted speed limit without changing the physical characteristics of the residential street has very little effect on reducing excessive speeding (Homburger et al., 1989; Graham, 1997; Book and Smigielski, 1999).

## CHAPTER THREE: METHODOLOGY

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This research involved five distinctive phases. The first phase was to select the area of research; the second phase was to develop data collection instruments and to gather the required information from colonias residents and the built environment; the third phase was to select a sub-sample and perform feasibility study on the use of GPS and travel diaries; the fourth phase involved data analysis; and finally the fifth phase was to document the methods and findings of this research. In this chapter we present the first three phases and in the next chapter the analysis and findings will be reported.

### STUDY AREA

The first step in this research was to select the colonia(s) to be studied. After an initial investigation, two colonias in Webb County were tentatively selected for consideration: El Cenizo and Highway 59 colonias. They were identified as being different in terms of their layout, location related to the city, and level of income and development. The initial assessments of these two colonias were based on the available secondary data and the site visits. The research team met with the Center for Housing and Urban Development (CHUD) staff in Webb County, who was instrumental in providing tours, history and vital information about both potential colonias for the study. The results from the initial assessments are summarized as follows.

#### El Cenizo

El Cenizo is a fairly established colonia located about 10 miles south of the city of Laredo. In 1989, residents of El Cenizo voted to be incorporated as a general law city. It currently has a City Hall and City Council, though with severe financial limitations. Despite such difficulties, the City has managed to fund basic infrastructure, and today it has mostly paved roads, some sidewalks, street lighting, water and waste water facilities. The City agreed to assist us in our data collection efforts, and allow us to use the city hall for meetings and training sessions necessary for our research.



Figure 7. El Cenizo City Hall and Fire Station

## Highway 59

Highway 59 colonia is located approximately 20-30 minutes east from Laredo city's boundary. It is divided in half by the highway. The northern section appears to have rural housing, many seemingly abandoned homes, with little infrastructure in terms of electricity, water or transportation. The total population and population density in this section seemed extremely low. It was also pointed out during the visit, the frequent flooding that this colonia experiences. The southern half of the colonia had more residents at higher density, but still very low compared to El Cenizo. In general, little opportunities for walking existed in this colonia. There was almost no infrastructure; most roads were still dirt roads, and often muddy and treacherous to drive and walk on.



**Figure 8. Road Conditions and Scattered Housing in Highway 59 colonia (north side of highway)**

After the initial visit, and a systematic analysis of both colonias, the research team made two decisions: first, Colonia Highway 59 was deemed inappropriate for our research study because there were very few identifiable business and limited transportation options were available due to lack of sufficient infrastructure. This lack of sufficient variability in land uses, travel options, and infrastructure support levels led us to determine this colonia to be inappropriate for our study. Second, selecting a single colonia for our study was a necessary decision to ensure feasibility. Due to shortage of secondary data available for these colonias, this research required extensive primary data collection efforts, which involved time and labor intensive fieldwork.

Therefore, El Cenizo was selected because it represents a better setting for our study. It showed a variety of land uses, had basic infrastructure for transit and walking, and seemed to have enough social and institutional support that enabled the study to take place in a timely and feasible manner. The population of El Cenizo was concentrated within a manageable study area with resources for recruitment in the study such as the mayor's support and El Cenizo City Hall staff as well as promotoras living in the area who were also available. Additionally, this colonia is fairly developed, with a history of political will and a sense of community. As such, it appeared to serve as an ideal location for an in-depth pilot study.

As many other colonias along the border, El Cenizo was marketed to residents of Laredo unable to find affordable housing in Laredo. Low-income residents bought land trusting the developer's assurance that adequate infrastructure would be built in the future. Failure to provide a wastewater facility on a timely basis led to lawsuits brought by local residents, with assistance from Texas Rural Legal Aid (TRLA), a non-profit legal organization serving colonias. As a result, D&A Realty was ordered to establish a trust fund that would finance the construction of a sewer plant. Several problems were faced by this growing colonia, and in the middle of this, the community voted to incorporate as a general law city in August 29,

1989. Since then El Cenizo has legal status as an incorporated city. Another important characteristic of the City of El Cenizo is its proximity to the border with Mexico, which is to be considered when analyzing the data later. Since the first visit, it was always required not to go close to the border area per the instructions of border patrol and other advisors in the area. There are no bi-national roads or bridges connecting the two countries near El Cenizo. The Rio Grande River, on the edge of the city, borders the two countries.

## **SURVEY**

### **Instrument Development**

The survey covered the following topics: 1) physical activity; 2) access to daily needs; 3) access to products or services for health promotion; 4) transportation and transit services perception; 5) perception about the levels of satisfaction about the colonia; 6) health concerns; and 7) safety. The team analyzed previous studies on the built environment and mobility, and identified important items to include in the survey. The Behavioral Risk Factor Surveillance System (BFRSS) survey by the Centers for Disease Control and Prevention (CDC) and the Neighborhood Environment Walkability Survey (NEWS) tool developed by Sealens et al. were used as a basis for the survey. However, questions were modified and new questions were added to ensure the questions are relevant to and covered all potentially important issues for our study populations. For example, questions about destinations were modified to ensure that the questions only ask about those business or land uses available within El Cenizo. Land use types and local businesses were identified during the site visits, from the Webb County Appraisal District, and the population and economic census. Once the survey format was defined, the research team obtained and Institutional Review Board (IRB) approval from Texas A&M University. The survey was originally developed in English and was translated into Spanish by a research team member. A third person translated the Spanish version back to English to ensure that the translation process did not introduce unexpected biases or problems. The sections of the final survey are explained below (see Appendix A for a complete survey instrument in English and Spanish).

Section 1: Physical Activity included twenty eight questions where respondents report on how much physical activity they did in a week period. It included locations where walking, biking, or any other physical activity took place; if participant were accompanied while doing physical activity; barriers to walking or biking in the colonia; and how much time was spent in sedentary activities such as watching TV and using computers.

Section 2: Built Environment included three questions about respondent's perception on the availability of and access to stores, shopping, and recreational places in the colonia. Objective measures of the built environment were taken using an environmental audit tool and conducted by the research team, which will be discussed later.

Section 3: Transportation and Safety included three questions regarding perceptions of traffic congestion, speed, and general safety within the colonia; and access and usage of transit services.

Section 4: Social, economic and demographic and health data included thirty one questions about individual habits that may be associated with healthy living, including diet habits. Basic socio-demographic, employment, income, height, weight, and perceived health status data were also collected.

The Built Environment section included questions about how the participants perceived a variety of elements within their colonia. Questions included presence of routine destinations, such as grocery stores,

convenience stores, restaurants, schools, religious institutions, bus/transit stops, etc. It also included items that asked the participants to rate their opinion about the shopping conveniences and street connectivity and sidewalk conditions. The next set of items included their satisfaction about the colonia as a place to live and raise children, about access to and quality of various service, shopping, and recreation facilities, and about the school quality. The last series of questions were related to their perception of transportation, safety and the social environments of their colonia. Safety related questions included respondents' concerns about traffic speed, congestion, and crimes.

## Sampling

The survey samples were selected from the total of 929 residential properties identified in El Cenizo. Properties that were public institutions, churches or known businesses were excluded. We estimated that 200 respondents was an optimal number for the survey. A random sampling of 476 properties was performed in SPSS to ensure that about 200 completed surveys can be yielded and a map of the selected properties is included (Figure 9). Sampling parcels, instead of sampling addresses or telephones, was much easier because it did not require to have a complete listing of all address/telephone numbers from all residents (Lee et al., 2006). In addition, we could visually examine where those sampled residences were and to ensure samples were not clustered in certain areas, before the survey was carried out.



Figure 9. Randomly selected parcels and completed surveys

## Survey Administration

The options considered for the survey administration were by mail, by telephone, or in person. Based on the literature and our previous experience with low-income ethnic communities, the team decided to hire promotoras to be in charge of the entire survey process, including the delivery and the collection of the completed surveys in person. The connection with CHUD and its regional staff with the local institutions

allowed us an easy access to promotoras in El Cenizo. CHUD and the mayor of the city assisted in the selection of promotoras, who live in El Cenizo and are trained as outreach workers by CHUD.

One of our research team members traveled to El Cenizo and personally trained the two promotoras about the content of the survey, the objectives of the study, and the IRB requirements in terms of confidentiality, respect for privacy and voluntary participation by the respondents. Practice surveys were performed until both promotoras felt comfortable with the survey. The training was well received by the promotoras, and when one of them had to drop from the study (which caused unexpected delays in our research), it was decided that it was better to continue with just one promotora who was already trained than involving a new one.

With this list of sampled properties and hardcopies of the survey, primarily in Spanish, promotoras were asked to deliver the surveys to the selected households. Where there are multiple adults in the household, one adult (older than 18 years of age) with the closest birthday to the day of the survey was selected to complete the survey. The promotora explained the overall objectives of survey, gave an information sheet in lieu of a signed consent form, and asked to fill out the survey if the selected adult agreed to participate. The promotora would return in a few days to answer any questions they had or to help the individual fill out any missing items in the survey if needed. In the event that the selected participant did not want to fill in the base survey, an exit survey with a few questions on demographics and physical activity was given to help address response bias. In compliance with IRB protocols, individuals were not required to fill out the full survey or the exit survey, if they did not wish to do so. As the survey included sixty seven questions, the promotora often needed to spend over an hour with a participant, both assisting with the survey and providing a social context for the study to increase the comfort level of participants in the study, which turned out to be another essential part of the promotora's job.

## **Response Rate**

The survey began in early June of 2007 and continued through September of 2007. The promotora was able to collect 89 complete surveys and approximately 11 exit surveys. The response rate for the survey was 45 percent (based on the 200 surveys). This is a successful result given the length of the survey, the restricted randomization protocol, and the amount of time required from the respondent and the promotora who needed to assist each respondent in filling out the survey as complete as possible. Figure 9 shows the locations of the completed surveys in relation to the initial samples. While the number of completed surveys was smaller than the original target of 200, it was determined appropriate given the pilot nature of our research, the limited time and resources available for this research, the relatively small number of study population, and limited range of variations in the key study variables.

## **ENVIRONMENTAL AUDIT**

The built environment was measured both subjectively through the survey, and objectively using the Geographic Information System (GIS) and field audits. To measure the built environment of our study area, an extensive environmental audit was necessary due to limited availability of existing GIS data.

### **Audit Tool Development**

An audit tool was developed to objectively and systematically assess the built environment. Audit items were identified based on having some role in influencing people's behaviors or perception of their neighborhood environment. Several previously developed and tested/validated tools were used to guide

the development of our audit tool, which included the Systematic Pedestrian and Cycling Environment Scan (SPACES) instrument developed and validated by Pikora (Pikora, 2002), the Pedestrian Environment Data Scan (PEDS) instrument developed by Clifton (Clifton et al., 2004), the Environmental Audit Tool developed by the Healthy Aging Network, and a few additional tools developed by Xuemei Zhu and Chanam Lee (Xuemei and Lee, 2008, Lee et al., 2008). Items from these existing tools were assessed for their relevance to our study site and preliminary audit tools were developed which were then refined during and after the site visits. Due to lack of similar studies related to communities as colonias, the audit included a larger than expected pool of potentially important items to be tested. The results from this study can help develop a shorter/simpler audit tool that includes only the significant items, which can be used for future research on underserved communities like the colonias.

The final Audit Tool consisted of four 1-page audits; audit items consisted of checklists, ratings and fill-in boxes. The four tools were (a) Lot Audit, (b) Segment Audit, (c) Segment Perception Audit, and (d) Point Audit, based on the type and unit of the data collected (Appendix B).

The Lot Audit was conducted for each of the 969 lots in the study site. Items included land use, building (housing type, construction status, cleanness and maintenance of the building, and presence of porch-like area), garden (presence and condition of the garden, potted plants), and fence (setback from sidewalks and fence type). The Segment Audit was performed for linear items such as sidewalks, roadways, linear buffer areas between the roadways and lots, and presence of people along the streets. Sidewalks were audited in greater detail, including its completeness, widths, number of curb cuts, surface materials and conditions, and obstructions. The Segment Perception Audit was to understand the overall environment and was conducted at or near the center point of a street segment (block) by two researchers; they independently but simultaneously rated noise levels, convenience, visual quality, cleanness/maintenance, safety, and attractiveness of each street segment. The Point Audit identified specific facilities or detailed elements, such as bus stops, basketball hoops, lightings, crosswalks, stop signs, and other signs (e.g., security warning signs, commercial advertisement, neighborhood event advertisement, etc.).

## **Audit Process**

The audit was conducted for two days in June of 2007. One team of three researchers conducted the Lot Audit and part of the Segment Audit. Another team of two researchers conducted the remaining part of the Segment Audit, Segment Perception Audit and Point Audit. We used a windshield audit for all but the Segment Perception Audit which was conducted as a walking audit. For most of the lot and the segment audit items, we developed a coding system for each audit item, and used it to record directly on to a hard-copy parcel map. As a backup, we also videotaped the entire study site, by driving all streets twice to capture the roadside environments on both sides.

We originally planned to use a PDA with GIS software that will facilitate the data entry process, but we did not have proper resources to do so in a timely manner. Audit data were rich and informative but entering these extensive data into GIS turned out to be time-consuming and a labor-intensive process. It was fortunate that some existing GIS layers were available for El Cenizo. Further, having the parcel addresses data on the base map, which we did not have for our colonia, would have improved the accuracy and ease of the audit process.

## **GEOGRAPHIC INFORMATION SYSTEM**

The Geographic Information System (GIS) was used for various visual and descriptive analyses of the environmental attributes, as well as a measurement tool to quantify environmental variables. The base

layers and data were obtained from the Webb County Appraisal District and from the Webb County Planning & Physical Development Department. The Webb County Appraisal District data was provided in spreadsheet form and included property owner information, property values, some land use information, and legal description of the property. The Planning Department provided GIS layers including parcels, centerlines for streets, street names, driveways, additional land use information, topography, and floodplain zones. This data served as the base map information and was used in fieldwork to confirm land uses, perform the built environment audit, and link with survey data for analysis of spatial characteristics and participant responses.

In order to allow for the GIS layers to link with the Appraisal District data and layers received from the Planning Department, each property or parcel was selected on the map within the GIS, and attribute data was added including a field with the block number and lot number (legal description in the Appraisal District data). Later, a paper map with the site addresses was obtained from El Cenizo City Hall and this field was added for each parcel to assist further in linking to the survey data to the map layers. Within the appendices is a description of the fields obtained from the Appraisal District, Planning Dept, and created fields that capture the field work for the built environment audit and link with the survey data (Appendix C).

## **TRAVEL DIARY AND GPS FEASIBILITY TEST (SUB-SAMPLE only)**

The third phase of this study involved gathering objective data on travel behaviors, from a travel diary and Global Positioning System (GPS) units. This phase was conducted with a smaller sub-sample of participants who were recruited from the initial full survey. It was a qualitative study assessing the feasibility of using GPS and Travel Diary as tools to capture physical activity data in an objective and precise manner, especially among minority populations living in small communities. In addition to the previous methods that relied on self-reported information on the amounts, frequency, mode, and purposes of activities/trips, the use of GPS can provide objective and spatial data that can be mapped in GIS and analyzed. It can offer valuable insights into some of the important questions that could not be addressed using the traditional methods. Questions such as which routes the participant took, at what speed they traveled, where they stopped, and for how long they stayed at each destination, are the examples inquires that can be answered using the GPS data. The participants were asked to wear the GPS unit and record the travel diary for four consecutive days from Wednesday to Saturday. Participants who completed both tasks were offered a gift certificate.

### **Travel Diary**

Participants were given copies of activity log sheets where they were requested to record the trips that they took over the four days (Appendix D). They were instructed to fill in the log every day or throughout the day as they move about. A trip was defined as any movement from one to another location, excluding movements within buildings. A trip could be done by different transportation means as walking, or biking or by automobile or bus. An example of a travel diary is presented in Appendix D. For each trip, the diary included spaces to write information about a) when and where they start the trip, b) when and where they arrived, and c) why they made the trip.

### **Global Positioning System (GIS)**

GPS units record spatial data on movements in outdoors, including locations/route, speed, and time, which can be downloaded to a standard GIS software for further spatial analyses. The main purpose of this data was to identify the routes people use for all travel, including for recreational and transportation purposes, and to explore how the characteristics of the built environment affect people's route choices. There were several GPS units available in the market that could be used for this purpose. In order to

identify an appropriate GPS model for our study, the team consulted with researchers who have used GPS units for similar research projects and the GPS manufacturers/providers. The criteria used to select the GPS model included data accuracy, output data available, wearability, ease of operation, and price. The final model selected was the GARMIN Forerunner 205 model.

A training session was held on October of 2007 in El Cenizo City Hall to demonstrate and train the participants about how to fill out the travel diary and how to wear the GPS and charge its battery. Each participant was given a packet including the unit, battery charger, and an instruction manual (Figure 10); and a package including copies of travel diary sheets with instructions. In addition, a large poster with more information about the study and about how to use the GPS was posted in the City Hall. The GPS-diary data collection was done in batches of ten participants, as there were ten GPS units available. A promotora was in charge of delivering and picking up the GPS units and travel diary packets, and finally returning GPS units and all completed surveys to the research team at Texas A&M University.

**T**ransportation  
Infrastructure and  
Quality of Life:  
El Cenizo, Texas

Texas A&M University  
Texas Transportation  
Institute  
College Station, TX

By Cecilia Giusti, Chanam Lee,  
Dominique Lord, and Meghan Wieters

In collaboration with the Center for  
Housing and Urban Development  
Regional Office in Webb County

Funded by the Southwest Region  
University Transportation Center  
(2006-2008)

**THANK YOU**  
for your help on this important  
research project!

**MUCHAS GRACIAS**  
Por su valiosa ayuda en este  
project de investigacion

**Buttons**



- 1** power
- Presione y mantenga apretado el boton de power para prender o apagar la unidad  
Presione para dar vuelta al contraluz apagado
- 2** mode
- Presione para ver el timer o el menú principal  
Presione para salir de un menú o de una página  
Presione y sostenga para cambiar deportes
- 4** start/stop
- Presione para iniciar o parar el timer

**Como recargar la bateria del GPS?**

Por favor recargue su GPS todas las noches. Para evitar la corrosion asegurese de que el GPS este totalmente seco antes de ponerlo a recargarse.



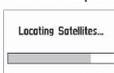
- 1. Ajuste el GPS en el cargador (cradle).
- 2. Conecte (enchufe) la parte pequeña del AC adapter en la entrada mini-USB port del cargador (cradle).
- 3. Enchufe (conecte) el otro extremo en el enchufe de electricidad standard en la pared.
- 4. Deje el GPS asi conectado (recargandose) hasta la mañana siguiente.

**Como Usar el GPS?**

**Antes de salir - En la mañana**

1. Por favor presione y mantenga presionado el boton de 'Power **1**' para prender el GPS. La siguiente imagen aparecera en la pantalla:

Locating Satellites...



2. Presione 'Start **4**' para inicializar el timer, y usted vera que la pantalla del GPS cambia a "timer" tal como se muestra en la pantalla de abajo. Si usted ve esta pantalla, usted esta ya listo para empezar.



Si por cualquier motivo usted no ve la pantalla de "Timer" arriba indicada, por favor apague el GPS y vuelva a empezar desde el paso 1 otra vez.

**Cuando vuelve a casa - En la noche**

1. Por favor presione y mantenga presionado el boton de 'Power **1**' para apagar el GPS. (No se preocupe si ya esta apagado. Esto sucede porque la bateria solo dura 12 horas. Quizá lo ha usado mas de 12 horas y en ese caso se apaga automaticamente.)
2. Re-cargue la bateria poniendo el GPS en el cargador (Vea el reverso para mas informacion sobre como recargar la bateria).

**Si usted sale otra vez** despues de la comida, o si sale en la noche por cualquier razon, por favor vuelva a usar el GPS. Con la re-carga durante la cena el GPS esta parcialmente cargado y puede volver a registrar informacion. Por favor, asegurese de volver a poner a cargar el GPS antes de ir a dormir.

**Si usted no vuelve a salir**, deje el GPS cargandose hasta la mañana siguiente.

**DETALLES IMPORTANTES**

- Algunas veces, usted puede ver mensajes en su pantalla (por ejemplo lost satellite reception, low battery, etc.), pero usted no necesita hacer nada. Simplemente ignore estos mensajes..
- Si usted presiona el boton 'Start **4**' por accidente (y el timer se para), por favor presione el boton de 'Start **4**' inmediatamente.
- Si usted pierde la pantalla del 'Timer' (por ejemplo, porque presiono los botones equivocados), presione el boton de 'Mode **2**' varias veces hasta que la pantalla de 'Timer' reaparezca.

Figure 10. GPS manual provided to participants sub-sample

## CHAPTER FOUR: FINDINGS

This chapter presents findings from this pilot study. Note that the findings are descriptive and exploratory given the nature of this research as pilot and feasibility studies. First, descriptive findings from the survey are summarized. Next, the physical environmental characteristics of the study area, collected from the GIS-generated maps and field audits, are described. Last, results from the sub-sample feasibility study on the use of GPS and travel diary are briefly discussed. Note that the final sample sizes for individual variables vary depending on the number of missing responses for the individual survey items, with the maximum of 89 respondents.

### SURVEY

#### Demographics Characteristics

The respondents included 29 males (33 %), and 59 females (67 %), a distribution expected for this type of community. The age distribution of the respondents is approximately normal with a slightly higher representation of younger age cohorts (Figure 11). About one third belonged to the 35-44 years old category. The respondents were primarily Hispanic (87.5 %), with only 10.2% identifying themselves as whites. The majority of the households, 44.9 %, had two adults, but many had three or more adults (23.6 % with three and 12.4 % with four adults) and slightly over 10 % had only one adult in the household. Regarding the marital status, 70.5 % were married, followed by 14.8 % being divorced, separated or never married, and 4.5% being a member of an unmarried couple. On average, there were 2.37 children in the household, and 21 respondents had no child less than 18 years of age in the household (

Figure 12). Many families had two (14 respondents) or three children (24 respondents). One out of five respondents reported having four or more children in their household.

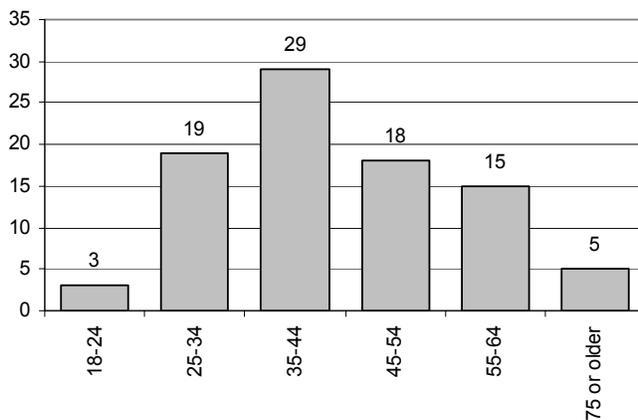


Figure 11. Age of the respondent

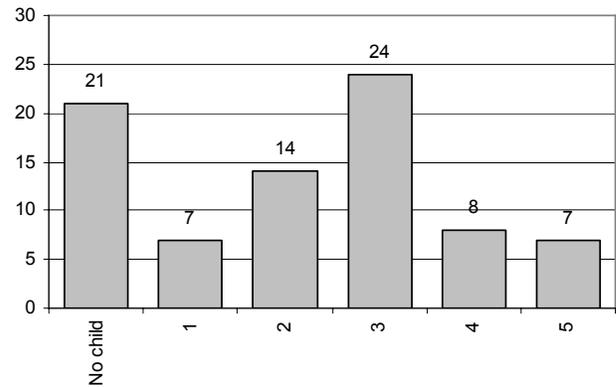


Figure 12. Number of children in the household

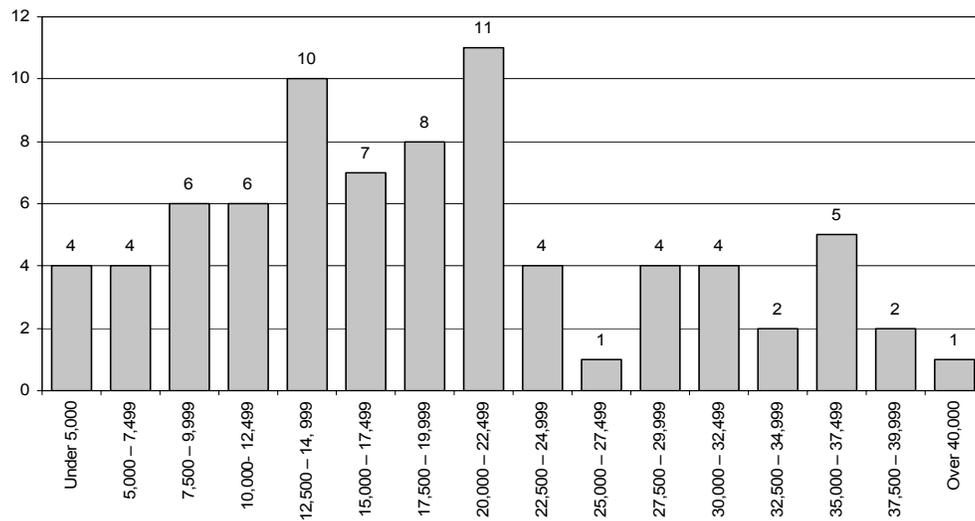
On average, the respondents lived in the colonia for about 14.5 years ( $SD = 7.032$ ), with a range from 0 to 36 years. The majority (51 respondents) was born in Mexico and 32 respondents were born in Texas. Of those who were not born in the US, 13 respondents lived less than 1 year in the US, one lived for five years, three for ten years, and the rest lived in the US for 15 years or longer. Regarding the intention to stay in the current colonia, most responses indicated “for the rest of my life” with 36 responses, and “don’t know/not sure” with 30 responses. Only one said 1-5 years. Regarding the perceived health status,

about 68.5% stated good or fair. Another 20.2% said very good and only 9% said excellent. Over 88% of the respondents owned one or more dogs in their household, with an average of 1.74 dogs and a range of zero to six dogs per household. The latter may be important to note when addressing barriers to walking where many respondents indicated ‘unattended dogs’ being a significant barrier.

### Economic Characteristics

The average household’s income was \$19,209, with a standard deviation of \$9,726 (Figure 13). About 57 % of the respondents declared a household income of less than \$20,000, while only one respondent reporting a household income of more than \$40,000. A little over one third of the respondents (35.2 %) were employed (26 employed for wages and 5 self-employed); 37 respondents were homemakers and 11 were retired. From the employed, 29 % worked in El Cenizo; 6.5 % in other colonias located nearby; and 33.9 % in Laredo. Twenty three respondents reported working 40 or more hours per week, of which 13 respondents worked for 50 hours or more. About 91% owned a house and the rest lived in a rental home. This is important as El Cenizo shows a very high percentage of homeowners. We can characterize this colonia as a “community of homeowners” and not as a “community of renters” as low-income communities are usually characterized.

On average, there were about 1.76 functioning cars per household. Ten out of 88 respondents (11.2%) who answered this question did not own a car. Twenty households owned three or more cars. This high rate of car ownership is expected due to the need to rely on automobiles for commuting and shopping, because El Cenizo does not have those destinations/services. About 63% of the respondents had a driver’s license, which accentuates the need for public transportation options.



**Figure 13. Household Income level in El Cenizo**

## Walking

**Amounts of Total Walking:** About 65.5% or 57 of 87 respondents reported walking at least once in a usual week. Most of them (50 out of 57 respondents) walked between 2 and 5 times a week. On average, respondents declared walking 2.29 times per week, with a standard deviation of 2.22. Slightly over one third of the respondents (30 out of 87) did not walk at all in a usual week (Figure 14). For those who walked, they walked for a long duration at a time when they walked, with an average of 43 minutes each time (a range from 10 to 240 minutes). This is significantly more than the recommended daily minimum of 30 minutes of physical activity for health purposes.

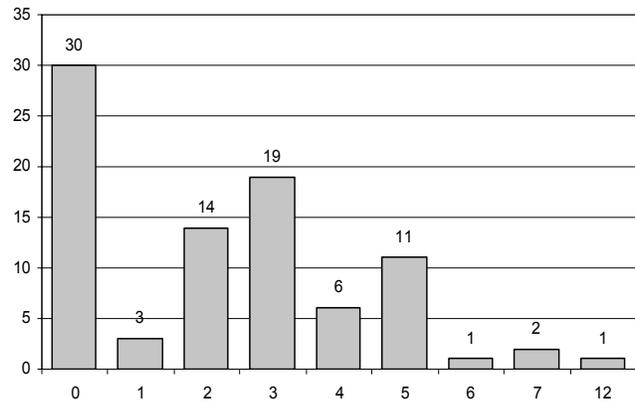


Figure 14. Number of walking a week

**Walking by Purposes:** The respondents walked more frequently and longer for recreational purposes than for transportation purposes (Table 2). Respondents declared walking 4.02 times per week for recreational/exercise purposes, and only 2.47 times per week for transportation walking. Note that the figures for total walking in Table 2 are less than the sum of transportation and recreation walking, likely due to the fact that the respondents recalled more accurately to these purpose-specific walking questions than those general walking questions. And therefore, the total walking minutes are likely underestimated. Figures 15 and 16 show the spatial distribution of the respondents based on the amounts of recreation versus transportation walking.

Table 2. Frequency and amount of walking, by purposes

Total Walking: All Respondents (n=87)		Total Walking: Walker Only (n=57)		Transportation Walking (n=55)		Recreation Walking (n=55)	
Trips/week	Min/week	Trips/week	Min/week	Trips/week	Min/week	Trips/week	Min/week
2.29	27.78	3.49	43.16	2.47	30	4.02	43.45



Figure 15 Recreation walking

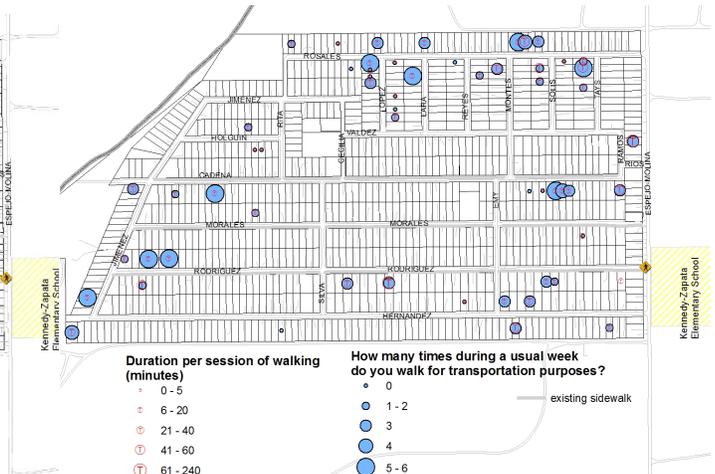


Figure 16 Transportation walking

*Walking Company:* For those who walked, the majority engaged in walking with others, most of whom were children or other family members/relatives. Still many respondents walked alone (30.3%). They also walked with friends or with pets. When asked where they walked, the most frequently mentioned places were streets (43 out of 89 respondents, 48.3%), followed by parks (10.1%) and trails (9.0%). It should be noted that there are no parks within the colonia, which means that residents walk also on the edge of the colonia (where the only park is located).

*Walking Destinations:* Destinations that the respondents walked to included stores (food and others), service destinations, and restaurants (Table 3). Popular destinations were grocery stores (41 respondents walked to at least once a week), followed by post office/mailbox/postal service (40), community center/recreation center (38), bus/transit stop (30), elementary school (28), and religious institutions (16). Other destinations were much less frequently visited with less than 5 respondents reported walking to. In this colonia, service-related destinations and grocery store were found to be most common destinations that people walked to.

**Table 3. Destinations the respondents walked to**

	Destinations	N	Percent (n=89)
Food Stores & Restaurants	Grocery store	41	46.1%
	Convenience Store	3	3.4%
	Fast Food restaurant	2	2.2%
	Non Fast Food restaurant	1	1.1%
Other Stores	Hardware Store	4	4.5%
	Salon/ Barber Shop	3	3.4%
	Bingo / Party Supply	2	2.2%
	Garage Sale	4	4.5%
Services	Post Office/Mailbox / Postal services	40	44.9%
	Community Center/ Recreation Center	38	42.7%
	Bus / Transit Stop	30	33.7%
	Elementary School	28	31.5%
	Religious Institution	16	18.0%
	Day Care	1	1.1%

*Barriers to Walking:* Although walking was not a rare activity in this colonia, many barriers to walking appeared to exist, especially those related to the built environment. Leading barriers included unattended dogs (33 responses), no parks or recreation places (31), no benches and other places to rest (27), no interesting places to walk (25), and no trees or shade (24). Table 4 lists the most common barriers mentioned by the respondents and we divided them in “built” environmental and “social/personal” barriers. As seen in Table 4, many more “built” environmental barriers were reported by respondents than “personal” barriers. Key personal barriers were lack of time and safety concerns. A couple of physical, but non-built, environmental barriers were also reported, which included bad weather and too many hills. Importantly, many of the built environmental barriers were something that can be easily modified, such as benches and places to rest, trees or shade, sidewalks, signalized crosswalks, and lighting. These easy fixes hold great potential as feasible and effective interventions to target for promoting walking in colonias.

**Table 4. Barriers to walking**

Social & Personal Barriers				Environmental Barriers			
Rank		Respondents		Rank		Respondents	
		N	%			N	%
1	Unattended dogs	33	37.1%	2	No parks or recreations places	31	34.8%
13	Lack of time	13	14.6%	3	No benches or places to rest	27	30.3%
15	Fear of being robbed/ attack/ assaulted	11	12.4%	4	No interesting places to walk	25	28.1%
17	Childcare responsibility	8	9.0%	5	No trees or shade	24	27.0%
19	Too many hills	7	7.9%	6	Distances to places are too great	19	21.4%
20	Bad weather	6	6.7%	6	No sidewalks or no continuous sidewalks	19	21.4%
21	Drug-related activity	5	5.6%	6	No safe places to walk nearby	19	21.4%
21	No one to walk with me	5	5.6%	9	No interesting architecture	17	19.1%
				10	No crosswalks or pedestrian signals	15	16.9%
				10	No shopping locations nearby	15	16.9%
				12	Not enough lighting at night	14	15.7%
				14	No walking paths or trails nearby	12	13.5%
				16	Traffic is traveling too fast on roads I need to walk along	10	11.2%
				17	Dangerous street-crossing conditions	8	9.0%
				21	Too many obstructions in sidewalk area	5	5.6%

### Characteristics of Walkers versus Non-walkers

Characteristics between the walker (walked at least once a week) and non-walker groups were compared for the variables that had sufficient samples for the bivariate statistical test, such as ANOVA, t-test, or Fisher’s Exact Test.

*Socio-demographic Characteristics:* Levels of walking did not differ by gender or by the place where the respondent was born. Perceived health status had a marginally significant (Chi-Square = 0.104) positive association with walking. Walkers, compared to non-walkers, were more likely to rate their health status to be good, very good or excellent, and less likely to rate fair (Table 5). Further, walkers tended to be younger than non-walkers ( $t = 1.994, p = 0.029$ ), and they had significantly more children in their household (2.59 children/household among walkers, compared to only 1.89 among non-walkers,  $t = -0.694, p = 0.094$ ). Other personal variables tested but shown insignificant included the number of cars and dogs in the household, income, hours spent in paid work, using exercise equipment at home, and hours spent in sedentary activities.

**Table 5. Health status between walkers and non-walkers**

Walk		Very Good or Excellent	Good	Fair	Total
Non walker	Count	7	7	14	28
	% within walk	25.0%	25.0%	50.0%	100.0%
Walker	Count	19	24	16	59
	% within walk	32.2%	40.7%	27.1%	100.0%
Total	Count	26	31	30	87
	% within walk	29.9%	35.6%	34.5%	100.0%

*Transit Use, Diet and Physical Activity Habits:* As expected, walkers were much more likely to use transit, than non-walkers. Over 68% of the walkers used transit, while only 31% of the non-walkers used

transit at least once a week (Chi-square = 11.048, Fisher’s Exact Test  $p = 0.001$ , one-sided). Of the four diet-related items, only one showed a statistical significance at the 0.05 level. Non-walkers were almost twice more likely to buy meals away from home, with a weekly average of 2.07 meals compared to only 1.19 meals among walkers. Frequency of grocery shopping and consumption of fruits and vegetables were not associated with walking.

Regarding work-related physical activities, walkers were more likely to have jobs that involve “mostly heavy labor” or “mostly walking,” while non-walkers were more likely to be sitting at work (Table 6). This difference was statistically significant at the 0.05 level (Chi-square = 6.808). In addition, walkers were significantly more likely to engage in moderate physical activity. Almost 88% of walkers, compared to only 58.6% of non-walkers, engaged in some moderate physical activity during the past week (Chi-square = 9.456, Fisher’s Exact Text  $p = 0.003$ ). The difference was not as significant for the vigorous physical activity (Chi-square = 2.379, Fisher’s Exact Text  $p = 0.107$ ). Over 83% of walkers and 68% of non-walkers engaged in vigorous physical activities.

**Table 6. Work activity type between walkers and non-walkers**

Walk		mostly sitting	mostly walking	mostly heavy labor	Total
Non-walker	Count	8	7	0	15
	% within Walk	53.3%	46.7%	.0%	100.0%
Walker	Count	8	27	5	40
	% within Walk	20.0%	67.5%	12.5%	100.0%
Total	Count	16	34	5	55
	% within Walk	29.1%	61.8%	9.1%	100.0%

*Perception of Destinations:* Perceptions of destinations within the colonia did not differ significantly between walkers and non-walkers. Only one destination, hardware store, was significant (Fisher’s Exact Test  $p = 0.013$ ). Perceived presence of hardware store was negatively associated with walking, as more non-walkers (41.4%) perceived the presence of hardware store than the walkers (16.7%) did. This is expected as hardware stores usually do not have the conditions that are attractive or safe for walking.

The perceptions of environmental conditions between walkers and non-walkers were similar, with only four items showing statistically significant differences at the 0.1 level (Table 7). Non-walkers were more likely to agree on having good lighting, having people walk and bike in the colonia (2 separate items), and having well-maintained sidewalks. There may be considered counter-intuitive as non-walkers perceive more supportive environmental conditions; however, these perception variables are highly dependent on people’s perception, instead of the factual reality, and walkers are more aware of and have high expectations for these environmental conditions. And therefore, it is not surprising to see lower ratings among the walkers for these assessment items. Satisfaction variables showed the opposite direction of association, with walkers having higher satisfaction ratings for the number and quality of recreational facilities and the noise level in the colonia, than non-walkers. Only three out of the 12 satisfaction items showed statistically significant differences between walkers and non-walkers (Table 8).

**Table 7. Environmental perceptions between walkers and non-walkers**

			N	Mean*	t	Sig.
Safety	Traffic congestion is a problem in our area	Non-walker	27	2.9259	-0.598	0.552
		Walker	55	3.0909		
	People drive too fast within my colonia	Non-walker	28	3.8929	0.258	0.797
		Walker	56	3.8393		
	My colonia streets are well lit at night	Non-walker	28	4.4286	4.940	<b>0.000<sup>†</sup></b>
		Walker	57	3.2982		
	There is a high crime rate in my colonia	Non-walker	28	2.4286	-0.386	0.700
		Walker	54	2.5370		
The crime rate in my colonia makes it unsafe to go on walks during the day	Non-walker	28	2.3929	0.015	0.988	
	Walker	54	2.3889			
The crime rate in my colonia makes it unsafe to go on walks at night	Non-walker	27	2.5185	-0.851	0.397	
	Walker	56	2.7679			
Social Environment	People in my colonia know each other	Non-walker	28	3.9643	0.622	0.536
		Walker	58	3.8448		
	I see and speak to other people when I am walking in my colonia	Non-walker	27	3.7037	0.821	0.414
		Walker	57	3.4737		
	Many people bike in my colonia	Non-walker	28	3.6429	2.451	<b>0.016</b>
		Walker	57	3.1754		
Many people walk in my coloina	Non-walker	28	4.0714	2.060	<b>0.043</b>	
	Walker	58	3.7241			
Built Environment	I can do most of my shopping at local stores	Non-walker	29	2.9310	0.000	1.000
		Walker	58	2.9310		
	The streets in my colonia do not have many dead-ends	Non-walker	29	3.2759	1.109	0.271
		Walker	58	2.9828		
	There are many four-way intersections in my colonia	Non-walker	29	2.8966	-0.506	0.614
		Walker	60	3.0167		
The sidewalks in my colonia are well maintained.	Non-walker	28	3.0000	1.791	<b>0.077</b>	
	Walker	60	2.4500			

\*Note: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree <sup>†</sup>bold characters indicate significant variables at the 5% level

**Table 8. Environmental satisfaction among walkers and non-walkers**

	Satisfied with:		N	Mean*	t	Sig.
Shopping & Services	the access to shopping in your colonia	Non-walker	28	2.8929	-0.639	0.525
		Walker	57	3.0526		
	the quality of elementary school in your colonia	Non-walker	29	3.7586	-0.770	0.443
		Walker	58	3.8966		
	the number of food stores in your colonia	Non-walker	28	2.6071	-0.345	0.731
		Walker	56	2.6964		
	the quality of food stores in your colonia	Non-walker	29	2.6897	-0.421	0.675
		Walker	55	2.8000		
the number of restaurants in your colonia	Non-walker	21	2.3333	-0.097	0.923	
	Walker	47	2.3617			
the quality of restaurants in your colonia	Non-walker	21	2.1905	-0.480	0.633	
	Walker	45	2.3333			
Recreational Facilities	the number of recreational facilities (parks, playgrounds, etc) in your colonia	Non-walker	27	0.4444	-4.541	<b>0.000</b>
		Walker	57	1.4737		
	the quality of recreational facilities (parks, playgrounds, etc) in your colonia	Non-walker	27	0.5185	-3.960	<b>0.000</b>
		Walker	57	1.5088		
Livability	your colonia as a good place to raise children	Non-walker	29	3.5172	0.261	0.795
		Walker	56	3.4643		
	your colonia as a good place to live	Non-walker	29	4.0000	1.350	0.181
		Walker	58	3.7586		
	Satisfied with - the cleanliness of the colonias streets	Non-walker	29	2.5172	-0.029	0.977
		Walker	57	2.5263		
Satisfied with the level of noise within my colonia	Non-walker	29	3.0345	-1.869	<b>0.066</b>	
	Walker	56	3.3036			

\*Note: 1=very dissatisfied, 2=dissatisfied, 3=neutral, 4= satisfied, 5=very satisfied

## Other Physical Activity

Biking was not a common type of physical activity among the respondents. Only 13 biked once or more a week. Twenty seven respondents owned a bike. Biking was predominantly for recreation or exercise purposes. Only two biked for shopping; one biked to go to work; and one biked to visit friends. Reasons for not biking included (a) not owning a bike, 46 respondents, (b) unattended dogs, 29, (c) no bike lanes or trails, 19, (d) lack of time, 19, (e) fear of injury from cars, 16, (f) no safe places to bike nearby, 15, (g) fear of falling, 14, (h) lack of interest in biking, 14, (i) no interesting places to bike to, 13, (j) childcare responsibility, 13, (k) no bike racks at destinations, 12, (l) fear of bicycle being stolen, 11, (m) potholes in street or riding path area, 11 respondents. Notable environmental barriers were unattended dogs, lack of safe and interesting places to bike in and to, and lack of bike racks, which seemed to be related to some of the personal barriers, such as fear of falling and fear of bicycle being stolen.

A low but a significant percentage (18.2 %) reported exercising at home using exercise equipment. Levels of physical activity at work were generally moderate to low: the majority reported mostly walking (53 %), followed by mostly sitting (25 %) and heavy labors (7.8%). Regarding total weekly physical activity, 67 respondents reported engaging in some moderate activity, such as brisk walking, biking, vacuuming, gardening, or anything else that causes small increase in breathing or heart rate. Twenty nine respondents engaged in such activities five or more days a week. Sixty two respondents reported engaging in at least some vigorous activities, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate. Twenty four were active in five or more days a week.

The survey also asked a few questions to assess the respondents' perceptions about physical activity. When asked if walking is for recreation rather than transportation purpose, the answers varied with 54.9 % of disagreement and 31.7 % of agreement. Over half of the respondents disagreed that biking is for recreation rather than transportation purpose. When asked if they think driving is expensive, 81.4 % agreed (37 % agreed and 44.4 % strongly agreed); 11 % disagreed; and 2.5 % strongly disagreed. Responding to the statements related to the respondents' awareness of physical activity, almost everyone agreed or strongly agreed that physical activity is important to stay healthy, and that walking or biking is a good way of getting physical activity.

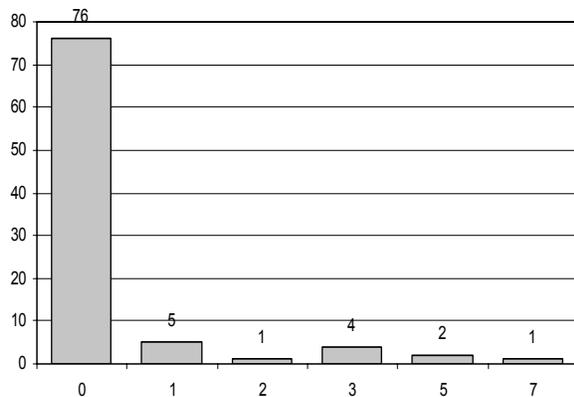


Figure 17. Number of biking a week

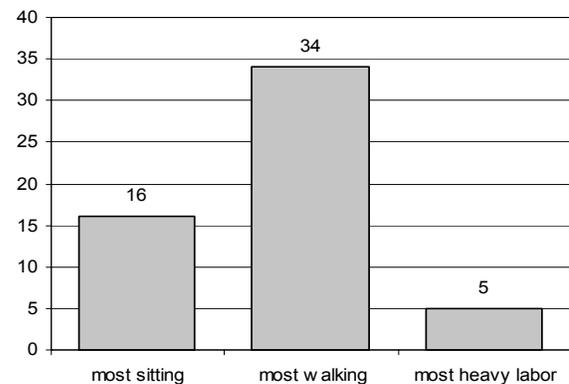


Figure 18. Physical activity at work

## Transit Use

Transit (bus) was popularly used by the respondents, with 56.2 % declared using it at least once a week. From those who used the transit, 20 % used it twice a week, 11 % three times a week, and 5 % used it four times a week. Main purposes of using the transit were for shopping (mentioned by 13 respondents

for grocery shopping and 17 for other shopping), and to get health/medical services (mentioned by 16 respondents). Other purposes included visiting friends (12 respondents), going to service facilities (10), and going to work (9).

Many barriers for transit use were reported. The top barrier to transit use was owning a car (64.0%). Table 9 shows all deterrents that were mentioned by the respondents. In addition to the personal barriers, availability and schedule of transit services were also commonly mentioned. Almost one third of the respondents reported not having the transit services available at destinations where they needed to go (30.3%). Many barriers were related to the quality of transit services, including taking too much time (21.3%), too infrequent (20.2%), and no transit service available when they need to leave or return (19.1%), issues related to scheduling. Further, respondents felt strongly about the need for transit services in the colonia. Only 1.2% reported transit was not necessary. Also, the majority (52.3%) thought transit was for those who did not own a car, suggesting their perception about transit as an inferior alternative to a private automobile.

**Table 9. Barriers to transit use**

	Barriers	N	Percent (n=89)
Transit service	No transit service available to the destination I need to go to	27	30.3%
	Cannot go to multiple places using transit	26	29.2%
Transit schedule	Take too much time to use transit	19	21.3%
	No transit service available when I need to leave or return	17	19.1%
	Too confusing to figure out the transit schedules	12	13.5%
	Too infrequent	18	20.2%
	Unreliable bus schedules	11	12.4%
	Unknown schedule	14	15.7%
Personal	Owning a car	57	64.0%
	Need a car at or after work	11	12.4%
	Having to carry heavy items	17	19.1%
Weather	Weather	11	12.4%

## Diet Habits

Many respondents mentioned that they buy vegetables (60 respondents) and groceries (62 respondents) from a grocery store outside their colonia, likely those in the City of Laredo, which is the closest major city. The next most frequently used store was the grocery stores within their colonia. The majority of the respondents reported going for grocery shopping one to three times per week (35 shopping once, 33 shopping twice, and 19 shopping three times a week). Our respondents did not eat out frequently, with 33 reporting no eating out at all. Thirty seven respondents reported eating out once or twice a week, and only eight reported eating out five or more times a week. The majority (59 respondents) consumed 1-2 servings of fruits a day, and only seven respondents reported eating five or more servings a day which is the recommended amount for keeping good health. They consumed more vegetables than the recommended minimum, with 18 respondents eating five or more servings a day and 38 respondents eating 2-3 servings a day.

## Residential Satisfaction

A series of likert-scale questions were asked about the respondents' levels of perceived satisfaction of their built environment (asked how much they agreed or satisfied with a statement/condition). Although there were some services, stores and facilities available in El Cenizo, the responses were mixed in terms

of their satisfaction with the quality and variety of these services/stores/facilities (Table 10). Especially low levels of satisfactions were found for recreational facilities in this colonia. Most respondents were dissatisfied (30.3 % very dissatisfied and 47.9 % dissatisfied) with the number of recreational facilities within the colonia with only 6.2 % saying satisfied and 2.1 % saying very satisfied. Almost three quarters of the respondents were not satisfied with the quality of recreation facilities. However, when asked if their colonia was a good place to raise children, 58.8 % felt satisfactory (52.8 % were satisfied and 5.9 % were very satisfied) and only 9.4 % were dissatisfied and 3.5 % were very dissatisfied. The majority (71.3%) reported that the colonia was a good place to live in general (50.6 % were satisfied and 20.7 % were very satisfied). Only 5.7 % of the respondents were dissatisfied and 1.1 % were very dissatisfied. The overall noise level in the colonia appeared acceptable. They were less satisfied with the cleanness of the streets in their colonia.

The majority (55.1%) stated that they could not do most of the shopping in the colonia, but almost half of the respondents still said that they were satisfied with the access to shopping in their colonia. Close to half of the respondents were not satisfied with the number (48.7%) and the quality (47.6%) of food stores in the colonia. Further, many were not satisfied with the number (55.8%) and the quality (60%) of the restaurants in the colonia.

There is one elementary school located on the edge of El Cenizo. When asked about the level of satisfaction with this school's quality, 73 % said they were satisfied (16.9 % very satisfied and 56.2 % satisfied). Only 9 % were not satisfied with this school, from which only 2.2 % were very unsatisfied.

In sum, while the respondents were generally satisfied with the overall residential conditions in the colonia, they were less likely to be satisfied with the specific conditions related to recreation, shopping or services. They were most dissatisfied with recreational facilities in the colonia, as demonstrated by the lowest mean satisfaction ratings among all items.

**Table 10. Satisfaction with neighborhood environments in colonia**

<i>How satisfied are you with:</i>		N	Mean	SD	Min	Max	Chi-square
Shopping & Services	the access to shopping in your colonia	85	<b>3.00</b>	1.08	1	4	40.22**
	the quality of elementary school in your colonia	87	<b>3.85</b>	0.79	2	5	51.71**
	the number of food stores in your colonia	84	<b>2.67</b>	1.11	1	5	25.52**
	the quality of food stores in your colonia	84	<b>2.76</b>	1.14	1	5	22.90**
	the number of restaurants in your colonia	68	<b>2.35</b>	1.10	1	5	17.88**
	the quality of restaurants in your colonia	66	<b>2.29</b>	1.12	1	5	18.70**
Recreational Facilities	the number of recreational facilities (parks, playgrounds, etc) in your colonia	48	<b>2.00</b>	0.95	1	5	35.33**
	the quality of recreational facilities (parks, playgrounds, etc) in your colonia	47	<b>2.13</b>	0.97	1	5	31.62**
Livability	your colonia as a good place to raise children	85	<b>3.48</b>	0.88	1	5	73.76**
	your colonia as a good place to live	87	<b>3.84</b>	0.86	1	5	65.13**
	the cleanliness of the colonias streets	86	<b>2.52</b>	1.35	1	5	18.07**
	the level of noise within my colonia	85	<b>3.21</b>	0.69	1	5	109.65**

Note: 1=strongly disagree or very dissatisfied, 2=disagree or dissatisfied, 3=neutral, 4=agree or satisfied, 5=strongly agree or very satisfied; \*\* chi-square significant at the 0.01 level.

## Social Environment and Safety

Safety questions included those related to traffic and crime. There appeared to be some concerns related to cars driving too fast, as 65 respondents agreed or strongly agreed to have this problem. A high number of respondents (46) disagreed having crime problems in the neighborhood. Safety while walking in the colonia appeared to be a concern but only among some respondents; 19 and 29 respondents did not agree to the statements that the crime rate makes it unsafe to go on walks during the day and night, respectively. The majority reported walking in the colonia was safe both during the day and at night. However, the mean values for all three crime safety items are at about the neutral level, ranging from 2.39 to 2.69, which are much lower than the traffic-related safety ratings (Table 11). The respondents' perceptions of social environments appeared strong and positive (means ranging from 3.33 to 3.88). In general, the respondents reported more positively on the social environmental and traffic safety items, than the crime safety items.

**Table 11. Perception of safety and social environments in colonia**

<i>Do you agree with the following:</i>		N	Mean	SD	Min	Max	Chi-square
Safety	Traffic congestion is a problem in our area	82	<b>3.04</b>	1.17	1	5	40.56**
	People drive too fast within my colonia	84	<b>3.86</b>	0.89	1	5	80.17**
	My colonia streets are well lit at night	85	<b>3.67</b>	1.28	1	5	21.06**
	There is a high crime rate in my colonia	82	<b>2.50</b>	1.20	1	5	18.12**
	The crime rate in my colonia makes it unsafe to go on walks during the day	82	<b>2.39</b>	1.14	1	5	27.63**
	The crime rate in my colonia makes it unsafe to go on walks at night	83	<b>2.69</b>	1.25	1	5	17.18**
Social Environment	People in my colonia know each other	86	<b>3.88</b>	0.83	1	5	66.33**
	I see and speak to other people when I am walking in my colonia	84	<b>3.55</b>	1.20	1	5	25.76**
	Many people bike in my colonia	85	<b>3.33</b>	0.85	1	5	59.41**
	Many people walk in my colonia	86	<b>3.84</b>	0.91	2	5	26.47**

Note: 1=strongly disagree or very dissatisfied, 2=disagree or dissatisfied, 3=neutral, 4=agree or satisfied, 5=strongly agree or very satisfied; \*\* chi-square significant at the 0.01 level.

## Built Environmental Perceptions

For this section we also included likert-scale questions, that were asked about the respondents' perceptions of their built environment. Perceptions about the street network, whether there are many dead-end streets and four-way intersections, were divided without any strong pattern of consensus. More people disagreed than agreed to the statement that the sidewalks are well maintained, and that the streets are clean. Only 28% were satisfied with how clean the streets are, compared to 55.8% who were dissatisfied. Over 55% disagreed that they could do their shopping at local stores. Noise did not appear to be a concern among the respondents, with mostly neutral responses (Table 12).

Regarding the perceived presence of utilitarian destinations within the colonia, almost everyone (over 90%) reported having a grocery store, community/recreation center, bus/transit stop, elementary school, and religious institution. Other common destinations included post office/mailbox/postal services (88.8%), salon/barber shops (83.1%) and hardware stores (75.3%). The full list of destinations that at least 10% of the respondents perceived to have in their colonia is presented in Table 13.

**Table 12. Perception of built environments in the colonia**

<i>Do you agree with the following:</i>	N	Mean*	SD	Min	Max	Chi-square
I can do most of my shopping at local stores	87	2.93	1.29	1	5	53.06**
The sidewalks in my colonia are well maintained	88	2.63	1.36	1	5	6.43
The streets in my colonia do not have many dead-ends	87	3.08	1.16	1	5	26.74**
There are many four-way intersections in my colonia	89	<b>2.98</b>	1.04	1	5	28.13**

\*Note: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree; \*\* chi-square significant at the 0.01 level.

**Table 13. Perceived presence of destinations in the colonia**

Destination	Number of Respondents	Percent of Respondents (n=89)
Grocery Store	88	98.90%
Community Center / Recreation Center	87	97.80%
Bus / transit stop	87	97.80%
Elementary school	86	96.60%
Religious institution	84	94.40%
Post Office / Mailbox / Postal services	79	88.80%
Salon / barber shop	74	83.10%
Hardware store	67	75.30%
Day care	38	42.70%
Bingo / Party supply store	32	36.00%
Non-fast food restaurant	28	31.50%
Convenience store	21	23.60%
Fast food restaurant	19	21.30%
Video store	15	16.90%
Fruit/vegetable market	15	16.90%
Library	12	13.50%
Farmers market	9	10.10%

## Factor Analysis on Environmental Perception Variables

Variables from the three previous sections, including residential satisfaction, social environment and safety, and built environmental perception, measure the respondents' perceptions of environmental conditions/attributes. These psychological perceptions can be better characterized by examining their underlying structure using factor analyses. These variables' measurement scale, a 5-point likert type scale, is appropriate for the factor analysis. Table 14 shows the results from the factor analysis that extracted seven latent factors from the 25 individual items. The remaining one item, sidewalk maintenance, was excluded as it created its own factor. The factor analysis used a Varimax rotation method and is based on a correlation matrix.

Six satisfaction items related to shopping, restaurants and food stores loaded to the same factor as the residential satisfaction item on their perception of colonia as a good place to raise children (factor 1). All three crime-related safety items loaded to the same latent factor (factor 2). The two satisfaction items on recreational facilities and one item on access to shopping were related to the same factor (factor 3). The 4<sup>th</sup> factor included the three social environmental items and street lighting items. The 5<sup>th</sup> latent factor captured safety conditions and the street layout in the colonia. The next two factors included less cohesive

sets of items; factor 6 included noise, school quality and seeing/speaking to other people when walking, and factor 7 captured two satisfaction items related to the overall livability and cleanness of the streets, and one item on the street layout.

**Table 14. Factor analysis results for the environmental perception items**

Factor		1	2	3	4	5	6	7
1. Satisfaction with stores and as a place to raise children	Satisfied with the number of restaurants in your colonia	<b>0.877</b>	-0.188	0.201	-0.069	0.135	0.110	-0.059
	Satisfied with the number of food stores in your colonia	<b>0.855</b>	-0.137	0.176	0.050	-0.175	0.069	0.163
	Satisfied with the quality of food stores in your colonia	<b>0.833</b>	-0.094	0.088	-0.033	-0.168	0.055	0.296
	Satisfied with the quality of restaurants in your colonia	<b>0.806</b>	-0.210	0.234	-0.106	0.105	0.245	-0.046
	Satisfied with the access to shopping in your colonia	<b>0.691</b>	-0.018	0.340	0.297	-0.001	-0.157	0.059
	Satisfied with your colonia as a good place to raise children	<b>0.580</b>	-0.356	0.249	0.067	0.176	0.163	0.323
2. Safety from crime	There is a high crime rate in my colonia	-0.272	<b>0.894</b>	-0.067	-0.069	-0.050	0.124	-0.010
	The crime rate in my colonia makes it unsafe to go on walks at night	-0.103	<b>0.878</b>	0.091	-0.058	0.023	-0.020	-0.059
	The crime rate in my colonia makes it unsafe to go on walks during the day	-0.135	<b>0.828</b>	-0.053	-0.106	0.050	-0.238	-0.136
3. Satisfaction with recreational facility and with access to local stores	Satisfied with the quality of recreational facilities in your colonia	0.224	-0.011	<b>0.921</b>	-0.073	0.088	0.065	0.092
	Satisfied with the number of recreational facilities in your colonia	0.304	-0.074	<b>0.838</b>	-0.161	0.163	0.086	0.150
	I can do most of my shopping at local stores	0.312	0.136	<b>0.680</b>	0.097	-0.046	-0.270	-0.063
4. Social environments and lighting	Many people walk in my colonia	0.151	0.077	-0.130	<b>0.805</b>	-0.364	0.147	-0.045
	People in my colonia know each other	0.226	-0.341	-0.033	<b>0.747</b>	0.291	0.107	0.023
	Many people bike in my colonia	-0.127	-0.036	0.003	<b>0.739</b>	0.136	-0.192	0.208
	My colonia streets are well lit at night	-0.183	-0.109	-0.055	<b>0.621</b>	-0.179	0.053	-0.068
5. Safety from traffic	Traffic congestion is a problem in our area	0.005	0.031	0.119	-0.099	<b>0.885</b>	-0.033	0.186
	There are many four-way intersections in my colonia	0.027	-0.218	0.349	0.146	<b>0.594</b>	0.225	-0.438
	People drive too fast within my colonia	-0.202	0.370	-0.039	0.196	<b>0.477</b>	-0.441	0.227
6. Satisfaction with noise, school and contact with other people	Satisfied with the level of noise within my colonia	0.363	0.097	-0.123	-0.195	0.115	<b>0.786</b>	0.125
	I see and speak to other people when I am walking in my colonia	-0.073	-0.159	0.034	0.371	-0.147	<b>0.656</b>	-0.145
	Satisfied with the quality of elementary school in your colonia	0.158	-0.325	0.258	0.127	0.005	<b>0.441</b>	0.272
7. Satisfaction with livability, cleanness, and street layouts	Satisfied with your colonia as a good place to live	0.225	-0.206	0.140	0.071	0.093	-0.034	<b>0.756</b>
	The streets in my colonia do not have many dead-ends	-0.093	-0.072	-0.025	-0.211	-0.126	-0.077	<b>-0.579</b>
	Satisfied with - the cleanliness of the colonias streets	0.309	-0.206	0.428	-0.129	0.180	0.074	<b>0.437</b>

## ENVIRONMENTAL AUDIT

This section describes the built environmental characteristics of El Cenizo based on the environmental audit and GIS mapping. While the resident’s perceptions of the built environment were included in the previous section, this section provides only the objectively measured assessments of the built environment.

### Land Use and Building Conditions

*Land Uses:* The predominant land use in the colonia is small single family homes (Figure 19). There are some businesses, such as two identifiable grocery store/markets/convenience stores, several beauty salons, small kiosk style food vendors, sales of electronics and other small items, and a few auto repair sites. There are several churches in the colonia which also seem to provide facilities for small children such as playgrounds and day care. There is also a city hall, a community center, and a fire station. Both the city hall and the fire station are located close to each other on Cadena street (Figure 20), which may be considered as the “main street” in El Cenizo. During our observations, we identified more commercial land uses than the official land use data provided by the governmental agencies. It is not uncommon practice to have residential lots combined with a small commercial activity, such as stands selling food or party balloons. These “informal” businesses are not necessarily officially recorded by the authorities.



Figure 19. Land Use Map

*Building Conditions:* Building conditions also were assessed based on externally observable characteristics. We classified building conditions as abandoned, unfinished, under construction, and vacant. When there are broken windows, lack of roof, and/or no signs of daily activity (e.g., clothing, vehicles, worn paths to doorways; when clearly no one appeared to be living a property), it was designated as “abandoned.” As explained in the previous chapter, it is a common practice that residents may be working on building their permanent home while living in a more temporary structure. In fact, an abandoned building on one lot may eventually be ‘replaced’ by the living quarters on an adjacent lot. It is likely that the owner of both lots is the same person and will be transitioning to a newer building over a period of time. These construction patterns are prevalent in El Cenizo, with 548 structures identified as finished (64 % of all properties), 131 as unfinished, 18 under construction, 32 abandoned, and 133 vacant or unoccupied. This means that about 40 % of the buildings in El Cenizo are not finished.

## **Infrastructure Conditions**

*Sidewalks and Lighting:* Concrete sidewalks are installed by the City of El Cenizo on the following streets: Rodriguez, Morales and Cadena, which run east-west and are the main corridors within the colonia (dotted lines in Figure 20). Sidewalks are available on one side of the street. Further, there are many new street lights located on almost all streets within the colonia, though the researchers were unable to determine how many were functional. Both concrete sidewalks and street lights were built or installed over the last two years. (data provided by the City of El Cenizo staff).

*Streets, Transit Service, and Public Facilities:* The transportation infrastructure in the colonia consists of paved road, some sidewalks on east-west corridors, curb and gutter, some street signs, and one painted crosswalk. There are no stop signs within the colonia or traffic signals on the minor arterial connected to the colonia, Espejo Molina. There are bus stops (Figure 21), some with shelters and benches. About half have a shelter and benches, and a few of them are almost not visible. During our field observations, buses were seen but not very frequently and did not carry many passengers. Bus service is provided by *El Aguila* Rural Transportation which has a service area population of 180,000 and encompasses 3,360 square miles (Turnball, Dresser and Higgins, 1999).

*Blocking Items in Pedestrian/Public Areas:* In the fieldwork, researchers noted items that were in the public right-of-way. Two types of blocking objects were identified: permanent and temporary. The key permanent objects that blocked passage, particularly for those in wheelchairs or strollers, were mailboxes. Often both cluster mailboxes (as often used in apartment complexes but in the colonia were also used for single family houses) and individual mailboxes were in the middle of the sidewalk or the pedestrian path, leaving less than 3 feet on either side for passing. Other items such as cars, debris, and trashcans were common temporary blockages observed in the right-of-way.



Figure 20. Public Facilities & Infrastructure



Figure 21. Transportation Infrastructure

## Individual Lot Conditions

On a more subjective scale, the researchers evaluated the cleanliness and general state of maintenance within the colonia. Generally, most properties were fairly well maintained, though the closer to the border area on Jimenez street, more issues related to debris and homes needing repair work seemed to increase. More gardens were observed in the southern part of the colonia which also had more trees along the roadway, although in general the colonia did not have a lot of trees. In general, many homes have gardens and/or potted plants and flowers that were well cared by the residents. (Figure 22).

Many homes had a fence. Most of the observed fences are permeable, in the sense that it is possible to see through them. Some argue that the presence of fences could be explained by the fact that El Cenizo is right by the border with Mexico. However, other colonias further away from border also show relatively high number of fences. It was also observed many *no trespassing* signs. In general, chain link or different types of visually permeable fencing were used and very few people had dense or visually impermeable ones. Given the fact that there are several not finished units, houses (under construction), fences are one way to easily define the limits of the property. Besides, fences are also used to keep construction materials within the property while houses are being built. While having fencing may provide protection or security (probably more a perception sense of security than true protection), visual connection to the street allows social interaction with neighbors.

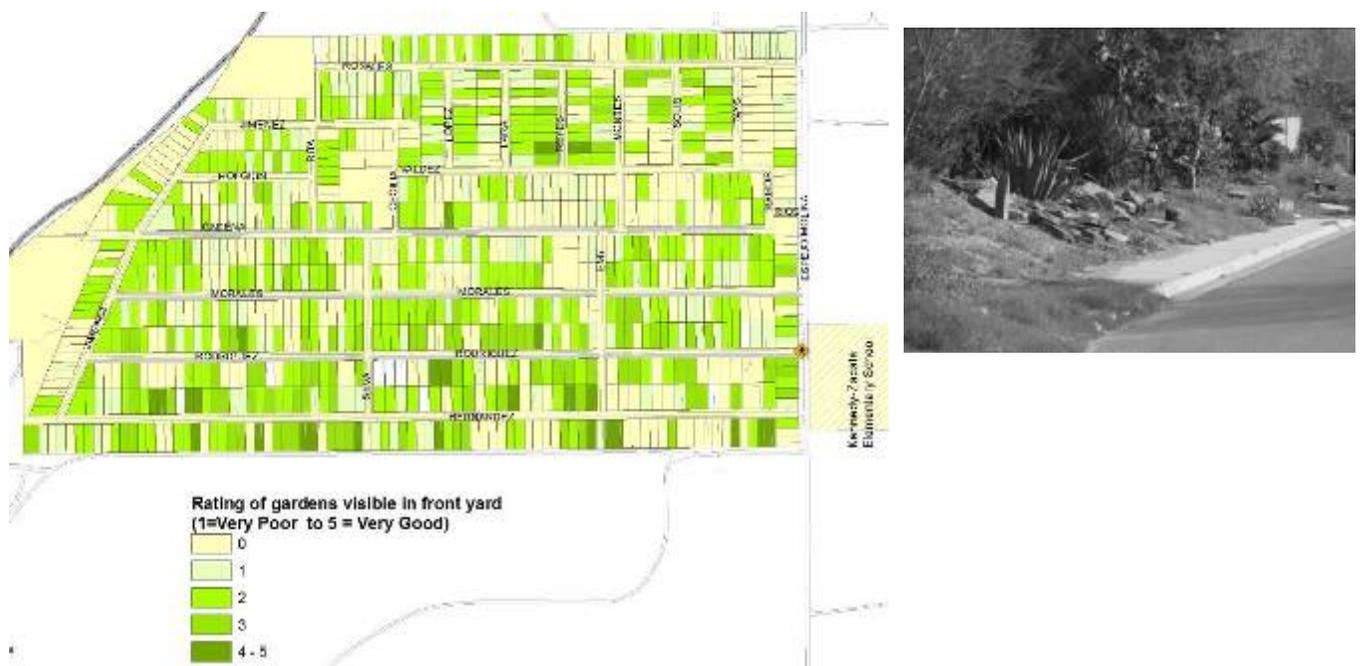


Figure 22. Rating of gardens



**Figure 23. Rating of Cleanliness & Maintenance**

## SUB-SAMPLE STUDY

### Travel Diary Use

As stated earlier, the purpose of this sub-sample study was not to analyze the data, but to assess the feasibility of using the GPS and travel diary as data collection instruments. So, findings from the travel diary are only very briefly discussed here. A total of 35 residents volunteered to participate in the sub-study, including 8 males and 27 females. Each day, about 2 to 13 trips were recorded in the travel diary. It was confirmed that automobiles were the predominant mode used for the utilitarian trips, such as commuting and shopping. No bicycling trips were recorded for the four days that we collected the data for. Many reported walking at least once during the four days; it was more common on weekend days and for social and recreational trips.

Many respondents engaged in activities during the evening and night hours; it was not rare to see trips recorded as late as 10 pm or later. Social trips, such as visiting friends and relatives in the neighborhood, were quite frequent, which appeared to involve many walking trips.

A significant proportion of the participants reported going to Mexico for visiting family members or relatives/friends, and/or for shopping and medical purposes. The problem of longer initialization time for acquiring the satellite signals in Mexico, compared to the time required in the US side, is something that one of the respondents noticed. He suggested that it could be helpful to let the participants know in advance so that they may wait a little longer before starting their outdoor activities in Mexico. The majority of the trips were done for commuting, shopping (many related to grocery shopping), and giving someone a ride. Commonly reported destinations included work/job, school (taking children to/from school), friends' or relatives' houses, gas stations, banks, supermarkets/Walmart, restaurants, and city hall or other places to pay bills. Further, many reported taking a long walk (1+ hour) in the neighborhood in

the evening. A number of participants appeared to have multiple jobs at different locations, often making a stop at home during the lunch time before going to another job in the afternoon.

The expected differences between the weekday and the weekend days were easily noticed from the travel diary. Further, it is advisable to collect both Saturday and Sunday activities in future studies, as differences in activity patterns appeared to exist between these two days. Similar trips patterns were found for the three weekdays that we collected the data for.

The participants reported that the format and the instructions for the travel diary were clear and easy to follow. They did not think that recording daily activities was too much of a burden and they did not have any problems remembering the activities/trips taken that day. It only took about one minute for most of them to fill in the travel diary every day. One respondent reported filling in the diary throughout the day as he/she moved around. All participants reported that it was easier to wear the GPS unit, compared to filling out the travel diary. Several of the sub-sample study participants missed reporting one or more trips in the travel diary, but most of them appeared to have recorded most, if not all, trips in the travel diary.

## **GPS Use**

As discussed in the Method section above, a focus group discussion was conducted via a telephone conference call a few weeks after the sub-sample study was completed. The discussion was facilitated by 40 questions that covered the wearability, battery issues, and effectiveness of the training/instruction related to the GPS use; ease of recording activities in travel diary; and other comments and suggestions. The question list was sent to the participants about a week before the focus group. There were 4 people who participated in the focus group with 1 male and 3 female.

*Wearability:* Regarding the wearability of the GPS unit, the users reported the weight, feel of the materials, and the overall comfort of the unit to be good or acceptable. For those who wear a wristwatch, they felt wearing the GPS unit was similar to wearing a regular wristwatch. However, one female participant noted that the size of the unit was a slightly too big for her. All participants reported no problem remembering to wear the unit in the morning, and therefore did not believe a reminder call was necessary. They did not feel that wearing the unit for four days was too long. Especially with the monetary incentive, they felt responsible for following the instructions. One of the users mentioned that he/she accidentally pushed one of the buttons located on the face of the unit. This problem was also noted during the initial testing by the research team members; those buttons were sometimes pushed against the body or other objects when leaning. Mostly, it did not cause serious problems so we configured it to turn off the alarm sound when these buttons are pushed. However, it should be avoided if possible at all to push these buttons, especially the start button as it will stop recording the activities. They mentioned seeing the unit several times a day just to see if it was working. Several respondents said that they took off the unit once or more a day when washing the dishes, etc., but did not forget to wear it back.

*Battery:* The major burden for the users was to recharge the battery every night. The users reported that it was easy to charge and easy to remember to charge the battery every night. They could easily tell if and when the battery ran out. Most of them recharged the battery when it was out. Some inconsistency was found in the battery power capacity across the units. One particular unit appeared to have a shorter battery power than the others. One unit consistently, for all four days, ran out of battery before 5pm even if it was fully charged every night. Most units appeared to have sufficient memory to capture all daytime activities (but likely not sufficient with extended evening or night-time activities; the exact length of battery power varies depending on multiple factors, such as how much time they spend inside vs. outside, how fast and how far they traveled, etc.). It was recommended to recharge the battery when he/she decided to go out again in the evening or at night, after returning home after work. All but one participant looked at the

instruction manual enclosed in the packet for figuring out how to charge the battery. And he/she found the instruction to be easy to understand and useful. The one who did not refer to the instruction could still figure out how to charge the battery with no difficulty.

*Training and Instruction:* All of them strongly agreed that the training session was useful and informative (much more useful than other form of instructions). They also reported the instruction manual included in the packet was useful and they referred to the manual multiple times. We also put a poster at the city hall/community center, which they did not have to refer to because all the questions they had were answered from the training and the instruction manual included in the packet. One of the respondents suggested adding a note regarding the possibility of extended signal acquisition times required especially in Mexico. In addition, one mentioned that an additional training session and/or a closing/debriefing session would have been beneficial.

## CHAPTER FIVE: CONCLUSIONS AND DISCUSSIONS

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This chapter briefly summarizes the findings, lessons learned, policy recommendations, and a discussion on remaining challenges for improving the lives of residents of colonias in Texas.

### Findings

As many other colonias along the border, El Cenizo was marketed to residents of Laredo unable to find affordable housing in Laredo. Low-income residents bought land trusting the developer's assurance that adequate infrastructure would be built in the future. This was not the case, and a variety of problems were faced by this growing colonia since it started. In the middle of all these issues, the colonia voted to be incorporated as a general law city in August 29, 1989. Since then, El Cenizo has legal status as an incorporated city. The capacity of organizing to fulfill their basic needs and requests has been a positive characteristic of this colonia since its emergence.

It is not surprising to observe a positive perception of residents about their colonia, especially regarding the social environments, and high levels of residential satisfaction as a place to live and to raise children. The majority of the respondents stated that they intended to live in this colonia for a long time. The residents appeared to have a strong social support network, knowing many of the neighbors and interacting with them. Many walked within the colonia, often accompanied by family members and friends; and they made many socially-oriented trips within the community both during the day and at night. They also seemed to meet and speak with their neighbors frequently while walking. Safety concerns, unlike the common belief, were not serious among the residents, with slightly higher concerns about crime safety than about traffic safety.

Contrasting to the high level of social infrastructure, the built environmental conditions are observed to be very poor. Especially the objectively assessed (Environmental Audit) shows living conditions that present many challenges and unsafe conditions for the residents and the children. Due to lack or shortage of utilitarian destinations and recreational facilities, most physical activities within this colonia were conducted for social and recreational purposes. Compared to the objectively measured conditions, the residents' perceptions on their physical environments were much more positive or satisfactory even though they clearly reported lack of recreational facilities, such as parks, to be an issue in this colonia. Further, while overall residential satisfaction is fairly high, when asked specifically about infrastructure conditions and facilities in the colonia, there appeared to be high levels of dissatisfaction.

About two thirds of the respondents engaged in walking in colonia, while only less than 15% engaged in biking. While recreational walking was more popular than transportation walking, common walking destinations included many utilitarian destinations, such as grocery stores, community centers and bus stops. Walking appeared to be an important travel mode among the residents, serving both utilitarian and social/recreational purposes. Walking is fairly acceptable accommodated in this colonia, with its newly installed sidewalks and lighting, although many temporary and permanent blockages were found on or along the sidewalks, such as mailboxes, trashes, and abandoned cars. Walkers, compared to non-walkers, tended to be younger, have more children in their household, use transit more frequently, and have better health status. Further, walkers engaged in more moderate and vigorous physical activities. Non-walkers bought more meals away from home. Walkers perceived their environment similarly to non-walkers, with a few exceptions. Walkers were more satisfied with the noise level and the recreational facilities in the colonia, than non-walkers. Although it seems counter-intuitive, walkers perceived less supportive social environments and less likely agree to having many people walk or bike in their neighborhood. Walkers

also rated lower about the lighting conditions and sidewalk maintenance conditions in the colonia. This is likely explained due to the fact that they actually walk, and therefore more aware of these problems and higher expectations about these conditions, compared to those who do not walk.

Transit appears to be an important mobility option among the residents, especially those who do not have a driver's license or own a vehicle. The relative high rate of transit use is expected given the isolated location of the colonia, the limited services available within, and the lack of privately owned cars. While many residents used the transit, they also reported many barriers to transit uses, including insufficient and infrequent services, unreliable bus schedules, and confusing schedules among others. Improvements in transit service may target increasing number of services and expanding to serve more routine destinations, and clearly communicating and keeping the operation schedules. This suggests that potential for increasing transit usage if addressing these barriers.

Another important finding to note is that many barriers to walking, biking and transit use, both observed during the audit and reported in the survey by the residents, are modifiable environmental barriers. Modifiable conditions that may help the residents be more active in their colonia may include having more benches along the streets, better lightings, more trees and shades, better maintenance (no potholes, cracks in pavement, etc.), more sidewalks, traffic signs, and more bike lanes and bike racks. Also removing the blockages, both temporary (trashes, abandoned cars, etc.) and permanent (mailbox posts), along the sidewalks appears important.

During the audit, it was clear that many services and recreational amenities are lacking in this colonia. The majority of the respondents did their grocery shopping in a store outside their colonia. In the travel diary, several respondents reported going to Laredo, nearby community and even to Mexico for shopping and service needs, to buy groceries, pay bills, for gas, for medical services, etc. As gas prices continue to increase, and with limited household incomes, using private cars for supplying services not available in the colonia becomes very expensive. Currently 81.4 % consider driving too expensive. Public transit is an alternative that residents are likely to use if service is more frequent, and routes are more meaningful.

We did not observe an urgent concern about safety within the colonia based on the responses from the survey as well as from the audit observation. Further, the fact that many residents walk even during late evenings, shows that residents feel safe in the colonia. However, the fact that the elementary school (where children of El Cenizo attend) is on the edge of the colonia on the other side of a minor arterial road, may be the reason why 73 percent of respondents are concerned about traffic safety.

## **Lessons Learned**

As surveys and environmental audits have been used before, there is no need to present now their positive and negative attributes. Rather, the innovative aspect of the methodology proposed was the use of GPS for capturing objective raw data on travel behavior, and this section provides a discussion about their use for such purpose.

An important lesson learned was that the commercially available GPS units were designed for a particular function, such as for individual fitness training, tracking the routes for way finding purposes, etc. These units are provided with a software that is not compatible with standard GIS software, such as ArcGIS or ArcView. The data could be exported but only to a special file format that was not easily converted to a format that can be opened in the standard software. After extensive searching and testing, we were able to figure out a method to convert the data. However, this method requires multiple steps, involving (a) downloading the data from the GPS unit using the company's software – data comes as a [tex] file that cannot be opened by the standard GIS software, (b) using the GPS Visualizer, available from the web, to convert the downloaded data to a plain [txt] file, (c) converting the text to [dbf] file in MS Access –

converting the data in other software such as MS Excel will cause problems with the data, and (d) opening up the dbf file in ArcGIS and creating a shapefile. A trained researcher with good understanding of GIS data is required for performing these data conversion tasks and it is required to do a quality check for each step. Furthermore, the conversion process is also quite time consuming.

The quality of the data captured from this particular GPS unit was determined good enough for research purposes and for capturing slow-speed activities, such as walking. There were some glitches but most of them were easily identifiable, which could be manually cleaned up. For example, the unit sometimes captured the satellite signals even inside the building (which tend to suffer from high level of measurement errors), and those erroneous data showed visually distinctive patterns and could easily be identified and removed from the data. The length of battery power was something to consider but could be address by asking the participants to re-charge the battery in the event they decide to go out again in the evening or at night, after returning home from work. The training sessions and the small instruction manual that was included in the packet with the unit were found extremely useful. The unit appeared acceptable for the users to wear for multiple days.

Our GPS protocol was developed to minimize the user intervention, and therefore we did not ask them to push the lap button before making individual trips. This led to some additional difficulties in linking the trip data with the time and related data attribute. For the adult population, it may be advisable to ask them to push the lap button, which can save time and reduce confusions in the data transfer process and reduce the potential for additional coding errors. The data from the GPS units would be more useful when there are sufficient raw GIS layers, such as parcel layer with land use data, aerial photographs, streets, etc. These GIS data are now more commonly available, but rural areas especially where colonias are located suffer from lack/shortage of these GIS layers.

Also important to note is some of the unique characteristics of this population group's activity patterns. They appear to engage in more social activities and more trips to friends' and relatives' places. They commonly engage in walking and other outdoor activities in the neighborhood during the evening and night hours. This makes the issue of battery power/duration even more important. Capturing the social and built environmental audit data during the night time seems important, as a significant proportion of neighborhood activities appear to occur after dinner. Also, it is crucial to collect both the week day and the weekend activities. Lastly, monetary incentive, especially for this type of data collection efforts, appears necessary to ensure a sufficient response rate and a good quality of data.

## **Policy Recommendations**

El Cenizo shows signs of being a lively city. Residents show relatively high levels of walking despite the poor infrastructure in the colonia. However, regardless of the high level of activities, there are several policy recommendations that could help minimize even more current barriers to enhance mobility within and outside the colonia. The policy recommendations we propose are as follows:

- 6) Walking barriers could be addressed by attending the current ones: cleaning debris, moving unused cars, more frequent garbage collection, and addressing the issue of unattended dogs. It may be promoted by the City of El Cenizo on a regular basis. As housing construction continues to happen, it is logical that waste accumulates. The City may promote campaigns to involve residents in the cleaning of the neighborhood.
- 7) This city has clearly invested in basic infrastructure in recent years. Current plans of building a park within the colonia is a move in the right direction. It will bring positive results in two ways: it will provide places to walk to, and will also enhance already existing social interactions. This would take advantage of social networks that are already evident in the colonia.

- 8) Promoting the establishment of more local stores and / or supporting current ones, may result on more utilitarian destinations within the colonia. Residents are likely to increase local consumption as they perceive how expensive it is to rely only on car usage.
- 9) Installing traffic signs (warning and regulatory) within the colonia may also improve the perception of safety. This could be done also in relation to the elementary school locate on the edge of the colonia; in fact, a safety study should be done for improving access to the school. As no data are available about accidents in the colonia, it may be a positive idea to start keeping record in the City, in order to support future funding requests to improve traffic safety. It is difficult to prove the need for improvements without data to support such requests.
- 10) Our study shows that residents are willing to use more public transportation. Better designed routes -that actually optimize times and provide reliable destinations- should result on higher usage. As gas prices continue to increase, it is more likely that low-income population –as is the case of colonia residents- rely on public transit services to move from the colonia to other destinations.

## **Remaining Challenges**

This study showed the current characteristics of a relatively large and established colonia. The fact that it has a city council and an active population are positive elements on creating communities. However, this is not necessarily a “typical” example of a colonia in Texas. Perhaps it shows what a more cohesive community is capable of achieving despite poverty and isolation.

This research was exploratory in nature and the methods and techniques described above should be expanded to include colonias that have different infrastructure and social networks. It is possible that isolation and residents’ needs may result in higher levels of social support. Examining other colonias may tell us whether what we observed in El Cenizo is unique or is a common trait among different colonias.

Issues of health, as reported by survey participants, does not seem to be a key concern in El Cenizo, which is not what our original research suggested. We may need to include more objective health data (as we did in terms of the built environment) in order to complement our current research.

Another issue that should be examined more closely is related to traffic safety. The lack of data on accidents is a major weakness that limits any research that aims at improving the lives of people. We should look for creative ways to collect information on motor vehicle crashes (including pedestrians and bicyclists) both within and outside the colonia. Different levels of governmental agencies should provide resources to the City council for such purpose. As noted above, a large portion of respondents had more concerns about traffic safety than their personal sense of security. If the City of El Cenizo starts collecting accidents within the city limits, it may create a baseline from which data can be analyzed.

In terms of survey instruments, we need to improve the type of GPS units used to collect information on travel behavior. The units we used were originally designed for physical fitness activities rather than for finding routes to be translated in GIS format. It would be ideal to have GPS units that will help researchers to more accurately record travel behavior of pedestrians and cyclists, as well as improve the data transferability process.

Finally, the findings documented in this study should be compared with other studies conducted in higher-income communities. This may help answer what portion of the mobility patterns is explained by a “poor” built environment, or if this is better explained by a “rich” social network.

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## **APPENDICES**

**Appendix A: Survey Instrument – English and Spanish versions**

**Appendix B: Environmental Audit Tool**

**Appendix C: Codebook for GIS and survey data**

**Appendix D: Travel Diary**



**Appendix A: Survey Instrument – English and Spanish versions**

**Physical Activity in Colonias in Texas**

Thank you for agreeing to fill out our survey. We are conducting this survey on behalf of Texas A&M University. You should have received a postcard/letter from Texas A&M University stating that your family has been selected to participate in this survey. The purpose of this survey is to understand daily activities for people living in South Texas colonias. All information obtained from this survey will be confidential and taking part in this survey is voluntary. If you are uncomfortable with a particular question we can skip that question and move on. If at any point you are uncomfortable we can stop the questions. If you don't understand question, please feel free to ask for more information.

You may contact the survey director, Cecilia Giusti or Meghan Wieters at: \_\_\_\_\_, if you have questions after the interview.

**Participant Name (code name):** \_\_\_\_\_  
Include address

**Section 1. Physical Activity**

1. How many times during a usual week do you walk for recreation, exercise, to get to and from places, or for any other reason in your colonia?

\_\_\_\_\_ (number of times per week)

Don't walk [Skip to # 15]

2. When you walk, about how many minutes do you spend walking each time you walk?

\_\_\_\_\_ (number of minutes)

3. Where do you generally walk when you are walking not for transportation purposes ( recreation, exercise, relaxing) in your colonia?

Check all that apply:

- Streets
- Walking or jogging trails
- Parks
- Other, Please specify: \_\_\_\_\_
- Don't Know / Not sure

4. When you walk in your colonia, do you usually walk: Check all that apply

- Alone
- with friends
- with spouse/partner

- with children
- with pets
- with other family members/relatives
- Don't know/Not sure

5. During a usual week my family, other members of my household, or friends exercised with me:

- Yes
- No
- Don't Know/ Not Sure

6. How many times during a usual week do you walk for recreation or exercise in your colonia?

\_\_\_\_\_ (number of times per week)

- Don't walk [Skip to #15 ]

7. When you walk for recreation or exercise, about how many minutes do you spend walking each time you walk?

\_\_\_\_\_ (number of minutes)

8. How many times during a usual week do you walk for transportation purposes, such as walking to get to and from places in your colonia?

\_\_\_\_\_ (number of times per week)

- Don't walk [Skip to # 15]

9. When you walk for transportation purposes, about how many minutes do you spend walking each time you walk?

\_\_\_\_\_ (number of minutes)

10. When you walk in your colonia, do you usually walk?

- On sidewalk
- On road shoulders
- Other, Please specify: \_\_\_\_\_
- Don't Know / Not sure

11. When you walk in your colonia, where do you most often cross the streets?

- Wherever along the streets
- Unmarked intersections
- In marked crosswalks
- At intersections with traffic signals/stop signs

- Other: Please specify: \_\_\_\_\_
- Don't know / Not Sure
- Refused

<<Please fill out the following chart for all children that are in elementary school and live in the home. >>

12. Please fill out the following chart about in your home that may walk to school:

Child (Elementary School Children Only)	Walks to school (Yes or No)	Sex (M or F)	Age	Number of times per week child walks to school	How many minutes does it take your child to walk to school one-way?	Does a parent walk to / from school with child? (Y or N)	If yes, how many times in a usual week does parent walk child <u>to</u> school?	If yes, how many times in a usual week does parent walk child <u>from</u> school?
1								
2								
3								
4								
5								

<<The following questions are your walking to specific destinations in your colonia.>>

13. How many times and number of minutes do you walk the following in your colonia:

Location	If Yes to Q.14, use these two columns		If No to Q. #14 (has a car) – Use this column only
	Number of times per week	Number of minutes walking to get there (one-way)	If you had a car would drive to this location instead of walking?
Grocery Store			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Convenience store			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Hardware store			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Post Office / Mailbox / Postal services			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Fast food restaurant			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Non-fast food restaurant			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Religious institution			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Day care			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Community Center / Recreation Center			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Elementary school			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Bus / transit stop			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Salon / barber shop			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.

Bingo / Party supply store			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No
Garage Sale			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No
Other, please specify			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
Don't know/Not sure			<input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No.
<b>No Others</b>			

14. Which of following barriers keep you from walking or from walking more within your colonia?

Check All that Apply:

- |  |  |
|--|--|
| <input type="checkbox"/> Distances to places are too great<br><input type="checkbox"/> No sidewalks or no continuous sidewalks<br><input type="checkbox"/> No walking paths or trails nearby<br><input type="checkbox"/> Dangerous street-crossing conditions<br><input type="checkbox"/> No crosswalks or pedestrian signals<br><input type="checkbox"/> Too much traffic<br><input type="checkbox"/> Traffic is traveling too fast on roads I need to walk along<br><input type="checkbox"/> No interesting places to walk to<br><input type="checkbox"/> No interesting architecture or landscape to look at<br><input type="checkbox"/> No shopping locations nearby<br><input type="checkbox"/> No parks or recreations places to walk to<br><input type="checkbox"/> Too many hills<br><input type="checkbox"/> No trees or shade<br><input type="checkbox"/> No benches and other places to rest<br><input type="checkbox"/> No safe places to walk nearby<br><input type="checkbox"/> Drug-related activity in the areas where I would walk<br><input type="checkbox"/> Fear of being robbed/attack/ assaulted | <input type="checkbox"/> Not enough lighting at night<br><input type="checkbox"/> Lack of time<br><input type="checkbox"/> Lack of energy or lazy<br><input type="checkbox"/> Lack of knowledge about benefits of walking and/or physical activity<br><input type="checkbox"/> No one to walk with me<br><input type="checkbox"/> No dog to walk with me<br><input type="checkbox"/> Childcare responsibility<br><input type="checkbox"/> Having to carry heavy items<br><input type="checkbox"/> Bad weather<br><input type="checkbox"/> Unattended dogs<br><input type="checkbox"/> Need car at or after work<br><input type="checkbox"/> Too close to US-Mexico border<br><input type="checkbox"/> Too many obstructions in sidewalk area (abandoned cars, mailboxes or poles)<br><input type="checkbox"/> Noise (car music, traffic, other)<br><input type="checkbox"/> Other, please specify:<br><hr/> <input type="checkbox"/> Don't know/Not sure |
|--|--|

15. How do you feel about the following:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Physical activities are important for me to keep healthy.					
Walking is a good way of getting physical activity.					
Biking is a good way of getting physical activity.					
Driving is expensive.					
Public transit is for those who do not own a car.					
Walking is for recreation purposes, rather than transportation.					
Biking is for recreation purposes, rather than transportation.					
Public transportation is necessary in colonias					

<The following questions are about bicycling.>

16. Do you own a working bicycle? <If “no”, go to question 19>

- Yes
- No
- Don't Know/ Not sure

17. How many times during a usual week do you bike in your colonia? <if “no” go to question 19>

- \_\_\_\_\_ number of times per week
- I do not bike

18. For what purposes do you bike?

- For recreation or exercise
- To visit friends
- To go shopping
- To go to work
- To go to religious event or meetings
- To go to service community centers or city hall
- Other, please specify: \_\_\_\_\_

19. Which of following barriers keep you from biking?

Check all that apply:

- |  |  |
|--|--|
| <input type="checkbox"/> Not owning a bike                     | <input type="checkbox"/> Potholes in street or riding path area                                      |
| <input type="checkbox"/> Lack of time                          | <input type="checkbox"/> Too many hills  |
| <input type="checkbox"/> Childcare responsibility              | <input type="checkbox"/> No safe place to bike nearby  |
| <input type="checkbox"/> Lack of energy or lazy                | <input type="checkbox"/> No interesting places to bike to  |
| <input type="checkbox"/> Lack of interest in biking            | <input type="checkbox"/> Fear of bicycle being stolen  |
| <input type="checkbox"/> No one to bike with me                | <input type="checkbox"/> No bike racks at destinations Too close to US-Mexico border                 |
| <input type="checkbox"/> Having to carry heavy items           | <input type="checkbox"/> Too many obstructions in sidewalk area (abandoned cars, mailboxes or poles) |
| <input type="checkbox"/> Fear of injury from cars              | <input type="checkbox"/> Noise (car music, traffic, other)   |
| <input type="checkbox"/> Fear of falling                       | <input type="checkbox"/> Other, please specify:  |
| <input type="checkbox"/> Bad weather                           |  |
| <input type="checkbox"/> Unattended dogs                       | <input type="checkbox"/> _____   |
| <input type="checkbox"/> Distances to places are too great     | <input type="checkbox"/> Don't know / Not Sure   |
| <input type="checkbox"/> No bike lanes or bike trails          | <input type="checkbox"/> Refused   |
| <input type="checkbox"/> Too much traffic                      |  |
| <input type="checkbox"/> Rough street surface                  |  |
| <input type="checkbox"/> Standing water on street or curb area |  |

<<The following questions are about your physical activity.>>

20. When you are at work (any paid job), which of the following best describes what you do? Would you say. . .

- Mostly sitting
- Mostly walking
- Mostly heavy labor or physically demanding work
- Don't know/ Not sure
- Refused

<<We are interested in two types of physical activity - vigorous and moderate. Vigorous activities cause large increases in breathing or heart rate while moderate activities cause small increases in breathing or heart rate.

Please answer even if you have included these activities in previous questions. Now, thinking about the moderate activities you do when you are not working.>>

21. During the last seven days, did you do **moderate** activities for at least 10 minutes at a time, such as brisk walking, biking, vacuuming, gardening, or anything else that causes small increase in breathing or heart rate?

- Yes
- No
- Don't know/Not Sure
- Refused

22. On those days you did **moderate** activities for at least 10 minutes at a time, how many total minutes per day did you spend doing these activities?

- \_\_\_\_\_ Minutes per day
- Don't know/Not Sure
- Refused

23. During the last seven days, how many days did you do these moderate activities for at least 10 minutes at a time?

- \_\_\_\_\_ Days last week
- Don't know/Not Sure
- Refused

24. During the last seven days, did you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?

- Yes
- No
- Don't know/Not Sure
- Refused

25. On those days you did vigorous activities for at least 10 minutes at a time, how many total minutes per day did you spend doing these activities?

- \_\_\_\_\_ Minutes per day
- Don't know/Not Sure
- Refused

26. During the last seven days, how many days did you do these **vigorous** activities for at least 10 minutes at a time?

- \_\_\_\_\_ Days last week
- Don't know/Not Sure
- Refused

27. How many hours per day or per week do you usually spend watching television, using a computer, reading, or playing video games, while sitting or lying down?

- \_\_\_\_\_ Hours per day
- \_\_\_\_\_ Hours per week
- Don't Know/ Not Sure
- Refused

28. Do you have any exercise equipment in your home that you use regularly? (if you have one but do not use it regularly mark "no")

- Yes
- No
- Don't know/Not Sure
- Refused

**Built Environment**

29. Please indicate which of the following are present in your colonia:

	Not in colonia	Within walking distance of 1-5 min	Within walking distance of 6-10 min	Within walking distance of 11-15 min	Within walking distance of 21 – 30 min	Within walking distance of 31 min or more
Farmers market						
Fruit/vegetable market						
Grocery Store						
Convenience store						
Hardware store						
Post Office / Mailbox / Postal services						
Fast food restaurant						
Non-fast food restaurant						
Religious institution						
Video store						
Day care						
Community Center / Recreation Center						
Elementary school						
Bus / transit stop						
Salon / barber shop						
Bingo / Party supply store						
Library						
Other, please specify						
Don't know/Not sure						
No Others						

30. Please indicate if you agree or disagree with the following statement about your colonia:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I can do most of my shopping at local stores.					
The streets in my colonia do not have many dead-ends.					
There are many four-way intersections in my colonia.					
The sidewalks in my colonia are well maintained.					

31. How satisfied are you with:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied	Not Applicable
the access to shopping in your colonia						
the quality of elementary school in your colonia						
the level of noise within my colonia						
the number of food stores in your colonia						
the quality of food stores in your colonia						
the cleanliness of the colonias streets						
the number of restaurants in your colonia						
the quality of restaurants in your colonia						
your colonia as a good place to raise children						
your colonia as a good place to live						
the number of recreational facilities (parks, playgrounds, etc) in your colonia						
the quality of recreational facilities (parks, playgrounds, etc) in your colonia						

## Transportation & Safety

32. Do you agree with the following:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Traffic congestion is a problem in our area.					
People drive too fast within my colonia.					
My colonia streets are well lit at night.					
I see and speak to other people when I am walking in my colonia.					
There is a high crime rate in my colonia.					
The crime rate in my colonia makes it unsafe to go on walks during the day.					
The crime rate in my colonia makes it unsafe to go on walks at night.					
Many people bike in my colonia					
Many people walk in my colonia					
People in my colonia know each other					

**<< The next few questions will be about transit services and how or if you use transit >>**

33. How many times during a usual week do you use public transit services? <if you respond "no" go to question 35>

- \_\_\_\_\_ times per week
- Don't use transit services
- No transit available in or near colonia
- Don't know / Not sure
- Refused

34. For what purposes do you use public transit?

- To go to work
- To go to the grocery shopping
- To go to other shopping (i.e. convenient store, drug store, clothing stores)
- To go to service facilities (i.e. bank, post office, doctor's office, restaurants)
- To go to recreational facilities (park, community center)
- To visit friends
- To go to get health services
- Other, please specify: \_\_\_\_\_
- Don't know / Not sure
- Refused

35. Can you tell us what keeps you from using transit (or from using transit more often)?

- Too infrequent
- Unknown schedule
- Weather
- No transit service available to the destinations I need to go to
- No transit service during the times when I need to leave or return
- Owning a car
- Too expensive to use transit
- Takes too much time to use transit
- Unreliable bus schedules
- Too confusing to figure out the transit schedules
- No one I know uses transit
- Having to carry heavy items
- Cannot go to multiple places using transit
- Need a car at or after work
- Other, please specify:
- None
- Don't know/Not sure

## About you

### Nutrition

36. Where does your household buy your **vegetables** ?

Check all that apply:

- Grocery store in your colonia
- Grocery store outside your colonia
- Convenience store in your colonia
- Other, please specify: \_\_\_\_\_ [specify whether it is in or outside his/her colonia]

37. Where does your household buy your **groceries**?

Check all that apply:

- Grocery store in your colonia
- Grocery store outside your colonia
- Convenience store in your colonia
- Other, please specify: \_\_\_\_\_ [specify whether it is in or outside his/her colonia]

38. How often does your household go to buy groceries in a usual week?

\_\_\_\_\_ number of days per week

- Don't know/Not Sure
- Refused

39. How many meals do **you** buy away from home each week on average, including lunch?

- \_\_\_\_\_ Meals per week
- Don't Know/ Not Sure
- Refused

40. How many servings of fruit do you usually eat each day?

0    1    2    3    4    5    6    More than 6

41. How many servings of vegetables do you usually eat each day?

0    1    2    3    4    5    6    More than 6

## Daily Life

42. When did you first move to this colonia?

- \_\_\_\_\_ Year
- Don't Know/Not Sure
- Refused

43. What are the main factors that influenced where you chose to live?

Check all that apply:

- Housing Affordability
- Quality of neighborhood
- Good School
- Close to school
- Good neighbors
- Close to work
- Close to family, relatives or friends
- Close to open spaces (i.e. parks)
- Easy to walk to retail and services
- Easy to access to transit services
- Safe neighborhood
- Other, please specify: \_\_\_\_\_
- Don't Know / Not Sure
- No Others
- Refused

44. Where were you born?

- Texas
- Other State within the United States
- Mexico
- Central or South America
- Other, Please specify: \_\_\_\_\_
- Refused

45. If you were not born in the U.S., how long have you lived in this country?

\_\_\_\_\_ # of years

- Don't Know/Unsure
- Refused

46. How long do you expect to stay in your current residence?

- 1-5 years
- 6-10 years
- 11 or more years
- For the rest of my life
- Don't know / Not Sure
- Refused

47. Do you own or rent the place where you currently live?

- Own
- Rent
- Don't know / Not Sure
- Refused

48. How many functional cars are in your household?

- \_\_\_\_\_ number of cars
- Don't know / Not Sure
- Refused

49. How tall are you without shoes?

- \_\_\_\_\_ (feet and inches, or just inches – please indicate which)
- Don't Know/Not Sure
- Refused

50. About much do you weigh without shoes?

- \_\_\_\_\_ Weight (pounds)
- Don't Know/ Not sure
- Refused

51. How many dogs are in your household?

- \_\_\_\_\_ number of dogs
- Don't know / Not Sure
- None
- Refused

52. Would you say that in general your health is:

- Excellent
- Very Good
- Good
- Fair
- Poor
- Don't Know/ Not Sure

53. What is your sex?

- Male
- Female

54. In which of these age categories do you belong?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 or older
- Refused

55. Which one of these groups would you say best represents your race?

- White
- Hispanic (if yes, please specify below)
  - Central American
  - Mexican American
  - South American
- Black or African American
- Asian
- Native American or Other Pacific Islander
- American Indian, Alaska Native
- Other, please specify: \_\_\_\_\_
- Refused

56. Are you:

- Married
- Divorced
- Widowed
- Separated
- Never Married
- A member of an unmarried couple
- Refused

57. How many children less than 18 years of age live in your household?

- \_\_\_\_\_ number of children
- None
- Refused

58. How many adults live in the household in total?

- \_\_\_\_\_ number of people in household
- Don't Know/Not Sure
- Refused

59. How many unrelated families live in your household?

\_\_\_\_\_ # of unrelated families

60. What is the highest grade or year of school you completed?

- Never attended school or only kindergarten
- Grades 1-6th
- Grades 7-8th
- Grades 9 through 11 (Some high school)
- Grade 12 or GED (High School graduate)
- College 1 year to 3 years (Some college or technical school)
- College 4 years or more (College graduate)
- Graduate school or more
- Other, please specify: \_\_\_\_\_
- Refused

61. Are you currently:

- Employed for wages
- Self-employed
- Out of work for more than 1 year
- Out of work for less than 1 year
- A Homemaker
- A Student
- Retired
- Unable to work
- Others, please specify:
- Refused

62. If you are self-employed, do you work in your colonia or in other colonia?

- In my colonia
- In other colonia
- In city
- Other, please specify:

63. If you are self-employed, do you hire any part-time or full-time employees?

\_\_\_\_\_ # part time employees

\_\_\_\_\_ # full time employees

Don't hire additional employees

Refused

Describe the purpose/service/product of business:

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64. How many hours do you spend in paid employment/self employment in an average week?

- \_\_\_\_\_ Hours per Week
- Don't know/ Not sure
- Refused

65. How many months out of the year do you work away from your colonia (seasonal work = where you don't come home daily)?

- \_\_\_\_\_ number of months per year
- Don't know/ Not sure
- Refused

66. Do you have a driver's license?

- Yes
- No
- Don't know/Not Sure
- Refused

67. Is your annual household income from all sources:

- Under 5,000
- 5,000 – 7,499
- 7,500 – 9,999
- 10,000- 12,499
- 12,500 – 14, 999
- 15,000 – 17,499
- 17,500 – 19,999
- 20,000 – 22,499
- 22,500 – 24,999
- 25,000 – 27,499
- 27,500 – 29,999
- 30,000 – 32,499
- 32,500 – 34,999
- 35,000 – 37,499
- 37,500 – 39,999
- Over 40,000
- Don't know/Not Sure

Refused

**Thank you for participating in this survey. The promotora that delivered this will come to pick this up from you. She will also be available to help you fill out any of the questions that were confusing and discuss the survey as desired.**

**Finally, would you be interested on participating on a follow-up of this survey filling a “travel diary” for one week.**

YES

NO

## Actividad Física en las Colonias Texas

Gracias por aceptar contestar nuestra encuesta. Estamos realizando esta encuesta en nombre de la Universidad de Texas A&M. Usted debió haber recibido una postal/carta de parte de la Universidad de Texas A&M diciendo que su familia ha sido seleccionada para participar en esta encuesta. El propósito de esta encuesta es entender las actividades diarias de la población viviendo en las colonias del Sur de Texas. Toda la información obtenida por esta encuesta será confidencial y no es obligatorio contestarla. Si usted se siente incomoda con una pregunta en particular, podemos saltar esa pregunta y continuar con las siguientes. Si en algún momento usted se siente indispuesta podemos detener la encuesta. Si no entiende alguna pregunta, por favor siéntase libre de requerir más información.

Usted puede contactar la Directora de la encuesta, Cecilia Giusti o Meghan Wieters: \_\_\_\_\_, si tiene preguntas después de la entrevista.

**Nombre del participante (nombre código):** \_\_\_\_\_

Incluir dirección

### Sección 1. Actividad Física

68. ¿Cuántas veces durante una semana regular usted camina por recreación, ejercicio, para ir y venir de diferentes lugares, o por alguna otra razón en su colonia?

\_\_\_\_\_ (numero de veces por semana)

No camina [vaya a # 15]

69. ¿Cuando camina, aproximadamente cuantos minutos pasa caminando cada vez que lo hace?

\_\_\_\_\_ (cantidad de minutos)

70. ¿Donde generalmente camina cuando usted esta caminando no por motivos de transportarse ( recreación, ejercicio, relajación) en su colonia?

Marque todas las que apliquen:

- Calles
- Veredas de caminar o correr
- Parques
- Otras, Por favor especifique \_\_\_\_\_
- No se / no estoy seguro(a)

71. Cuando usted camina en su colonia, usted generalmente camina:  
Marque todas las que aplican

- Solo(a)
- Con amigos(as)
- Con esposo(a) / compañero(a)
- Con niños
- Con mascotas
- Con otros familiares/ parientes
- No se / no estoy seguro(a)

72. Durante una semana regular mi familia, otros miembros de mi hogar, o amigos hicieron ejercicio conmigo:

- Si
- No
- No se / no estoy seguro(a)

73. ¿Cuántas veces durante una semana regular usted camina por recreación o ejercicio en su colonia?

\_\_\_\_\_ (numero de veces por semana)

- No camina [vaya a #15 ]

74. Cuando camina por recreación o ejercicio, ¿aproximadamente cuantos minutos usted pasa caminando cada vez que camina?

\_\_\_\_\_ (cantidad de minutos)

75. ¿Cuántas veces durante una semana regular usted camina con el propósito de transportarse, tal como caminar para ir y venir de diferentes lugares en su colonia?

\_\_\_\_\_ (numero de veces por semana)

- No camina [vaya a # 15]

76. Cuando camina para transportarse dentro de la colonias (hacer mandados, o trabajar) ¿aproximadamente cuantos minutos pasa caminando cada vez que lo hace?

\_\_\_\_\_ (cantidad de minutos)

77. Cuando camina en su colonia, usted usualmente camina:

- En banqueta (acera)
- En lateral de caminos
- Otros, por favor especifique: \_\_\_\_\_
- No se / no estoy seguro(a)

78. Cuando camina en su colonia, ¿por donde cruza la calle más a menudo?

- En cualquier lugar de la calle
- Intersecciones sin señalizar
- En cruces peatonales señalizados
- En intersecciones con señales de tránsito/ letrero de alto
- Otros, por favor especifique: \_\_\_\_\_
- No se / no estoy seguro(a)
- Se negó a contestar

**<<Por favor llene la siguiente tabla por todos los niños que están en la escuela primaria y viven en el hogar. >>**

79. Por favor llene la siguiente tabla acerca de alguien en el hogar que pueda caminar a la escuela:

Niño(a) (Escuela Primaria, niños(as) solamente)	Camina a la escuela (Si o No)	Sexo (H o M)	Edad	Cantidad de veces por semana que el niño(a) camina a la escuela	¿Cuántos minutos le toma a su niño(a) para llegar o venir de la escuela?	¿Un padre o madre camina hacia o de la escuela con el niño(a)? (Y or N)	Si camina, ¿cuántas veces en una semana regular camina el padre/ madre con el niño(a) <u>hacia</u> la escuela?	Si camina, ¿cuántas veces en una semana regular camina el padre/ madre con el niño(a) <u>desde</u> la escuela?
1								
2								
3								
4								
5								

<<Las siguientes preguntas son acerca de sus destinos específicos caminando en su colonia.>>

80. Cuantas veces y que cantidad de minutos usted camina lo siguiente en su colonia:

Lugar	Si contesto Si a Q.14, utilice estas dos columnas		Si contesto No a Q. #14 (tiene auto) – Utilice esta columna solamente
	Cantidad de veces por semana	Cantidad de minutos caminando para llegar al lugar (una ida)	¿si tuviera un auto manejaría a este lugar en lugar de caminar?
Tienda de abarrotes			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Ferretería			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Oficina Postal / Buzón/ Servicio postal			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Restaurante de comida rápida			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Restaurante (no comida rápida)			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Institución religiosa			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Guardería			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Centro comunitario / Centro de recreación			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Escuela primaria			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Autobús / parada de transporte			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Salón / estética / peluquería			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Bingo / Tienda de productos para fiestas			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces <input type="checkbox"/> No.
Garaje Sale			<input type="checkbox"/> Si, siempre <input type="checkbox"/> Si, algunas veces

			<input type="checkbox"/> <b>No.</b>
Otros, por favor especifíquelo			<input type="checkbox"/> <b>Si, siempre</b> <input type="checkbox"/> <b>Si, algunas veces</b> <input type="checkbox"/> <b>No.</b>
No se / no estoy seguro(a)			<input type="checkbox"/> <b>Si, siempre</b> <input type="checkbox"/> <b>Si, algunas veces</b> <input type="checkbox"/> <b>No.</b>
<b>No Otros</b>			

81. ¿Cuál de los siguientes obstáculos le impiden caminar o caminar más dentro de su colonia?

Marque todas las que apliquen:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> La distancia a los lugares es muy grande</li> <li><input type="checkbox"/> No hay aceras o no hay aceras completas</li> <li><input type="checkbox"/> No senderos para caminar o veredas cercanas</li> <li><input type="checkbox"/> Calles peligrosas para cruzar</li> <li><input type="checkbox"/> No cruces peatonales o señales para peatones</li> <li><input type="checkbox"/> Mucho tránsito</li> <li><input type="checkbox"/> El tránsito vehicular es muy rápido en las vías por donde necesito caminar</li> <li><input type="checkbox"/> No hay lugares interesantes hacia donde caminar</li> <li><input type="checkbox"/> No hay arquitectura o paisaje interesante para mirar</li> <li><input type="checkbox"/> No hay lugares para comprar cercanos</li> <li><input type="checkbox"/> No hay parques o lugares de recreación hacia donde ir</li> <li><input type="checkbox"/> Muchas lomas</li> <li><input type="checkbox"/> No hay árboles o sombra</li> <li><input type="checkbox"/> No hay bancas y otros lugares para descansar</li> <li><input type="checkbox"/> No hay lugares seguros para caminar</li> <li><input type="checkbox"/> Actividades relacionadas con drogas en las áreas donde podría caminar</li> <li><input type="checkbox"/> Miedo a ser asaltado(a)/ atacado(a)</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> No suficiente iluminación en la noche</li> <li><input type="checkbox"/> Falta de tiempo</li> <li><input type="checkbox"/> Falta de energía o flojera</li> <li><input type="checkbox"/> Falta de conocimiento acerca de los beneficios de caminar y/o la actividad física</li> <li><input type="checkbox"/> No hay nadie que me acompañe</li> <li><input type="checkbox"/> No hay perro que me acompañe</li> <li><input type="checkbox"/> Responsable de cuidar niño(a)</li> <li><input type="checkbox"/> Tener que cargar cosas pesadas</li> <li><input type="checkbox"/> Mal clima</li> <li><input type="checkbox"/> Perros sueltos</li> <li><input type="checkbox"/> Necesito auto en o después del trabajo</li> <li><input type="checkbox"/> Muy cerca de la frontera EU-México</li> <li><input type="checkbox"/> Muchos obstáculos en las aceras (autos abandonados, buzones o postes)</li> <li><input type="checkbox"/> Ruido (música de los autos, tránsito, otros)</li> <li><input type="checkbox"/> Otros, por favor especifique:</li> <li><input type="checkbox"/> _____<br/>No se /No estoy seguro(a)</li> </ul> |
|--|--|

82. Que opina acerca de lo siguiente:

	Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo
Las actividades físicas son importantes para mantenerme saludable.					
Caminar es una buena forma de tener actividad física					
Andar en bicicleta es una buena forma de tener actividad física					
Manejar es costoso.					
El transporte publico es para los que no tienen auto					
Caminar es para recrearse, no para transportarse					
Andar en bicicleta es con el propósito de recrearse no para transportarse.					
El transporte publico es necesario en colonias					

**<Las siguientes preguntas son acerca de andar en bicicleta.>**

83. ¿Usted tiene una bicicleta que trabaje (una bicicleta que se puede usar)? <Si responde no pase a la pregunta 19>

- Si
- No
- No se/ No estoy seguro(a)

84. ¿Cuántas veces durante una semana regular usted anda en bicicleta en su colonia? <si responde no pase a la pregunta 19>

- \_\_\_\_\_ numero de veces por semana
- Yo no ando en bicicleta

85. ¿Cuáles son los motivos por los que anda en bicicleta?

- Por recreación o ejercicio
- Para visitar amigos
- Para ir de compras
- Para ir a trabajar
- Para ir a eventos religiosos o reuniones
- Para ir a centros de servicio comunitario o al palacio municipal
- Otros, por favor especifique: \_\_\_\_\_

86. ¿Cuál de los siguientes obstáculos le impiden andar en bicicleta?

Marque todas las que apliquen:

- |  |  |
|--|--|
| <input type="checkbox"/> No tener una bicicleta                                    | <input type="checkbox"/> Hoyos en la calle o en caminos para andar   |
| <input type="checkbox"/> Falta de tiempo   | <input type="checkbox"/> Muchas lomas  |
| <input type="checkbox"/> Responsable de cuidar niño(a)                             | <input type="checkbox"/> No hay un lugar cerca que sea seguro para montar bicicleta                          |
| <input type="checkbox"/> Falta de energía o flojera                                | <input type="checkbox"/> No hay lugares interesantes a donde ir en bicicleta                                 |
| <input type="checkbox"/> Falta de interés para andar en bicicleta                  | <input type="checkbox"/> Miedo a que la bicicleta se la roben  |
| <input type="checkbox"/> No hay nadie que me acompañe                              | <input type="checkbox"/> No hay estacionamiento de bicicletas. (lugares para estacionar su bicicleta segura) |
| <input type="checkbox"/> Tener que cargar cosas pesadas                            | <input type="checkbox"/> Muy cerca de la frontera EU - México  |
| <input type="checkbox"/> Miedo de accidentarme con un auto                         | <input type="checkbox"/> Muchos obstáculos en las aceras (autos abandonados, buzones o postes)               |
| <input type="checkbox"/> Miedo de accidentarme porque me puedo caer                | <input type="checkbox"/> Ruido (música de los autos, tránsito, otros)  |
| <input type="checkbox"/> Mal clima   | <input type="checkbox"/> Otros, por favor especifique:   |
| <input type="checkbox"/> Perros sueltos  | <input type="checkbox"/> _____   |
| <input type="checkbox"/> La distancia a los lugares es muy grande                  | <input type="checkbox"/> No se /No estoy seguro(a)   |
| <input type="checkbox"/> No hay carriles para bicicletas o senderos para ciclistas | <input type="checkbox"/> Se negó contestar   |
| <input type="checkbox"/> Mucho tránsito  |  |
| <input type="checkbox"/> El pavimento de la calle es muy áspero                    |  |
| <input type="checkbox"/> Agua estancada en la calle                                |  |

<<Las siguientes preguntas son acerca de su actividad física.>>

87. Cuando usted esta en el trabajo (cualquier trabajo remunerado), cual de las siguiente opciones describe mejor ¿que hace? Usted diría...

- Principalmente sentado
- Principalmente caminando
- Principalmente trabajo pesado o trabajo que demanda esfuerzo físico pesado
- No se /No estoy seguro(a)
- Se negó a contestar

<<Estamos interesados en dos tipos de actividad física – vigorosa y moderada. Actividades vigorosas producen un gran incremento en el ritmo respiratorio o cardiaco mientras que actividades moderadas causan un pequeño incremento en el ritmo respiratorio y cardiaco.

**Por favor conteste incluso si usted ha incluido estas actividades en preguntas anteriores. Ahora pensando acerca de actividades moderadas que usted hace cuando no esta trabajando.>>**

88. ¿Durante los pasados siete días, usted realizo actividades **moderadas** durante al menos 10 minutos a la vez, tales como un vigoroso paseo, andar en bicicleta, pasar la aspiradora, trabajar en el jardín, o cualquier otra cosa que cause un pequeño incremento en el ritmo respiratorio o cardiaco?

- Si
- No
- No se /No estoy seguro(a)
- Se negó a contestar

89. Los días que usted realizo actividades **moderadas** por al menos 10 minutos en cada ocasión, ¿Cuántos minutos totales por día usted paso haciendo esas actividades?

- \_\_\_\_\_ Minutos por día
- No se /No estoy seguro(a)
- Se negó a contestar

90. ¿Durante los últimos siete días, cuantos días usted realizo estas actividades **moderadas** durante al menos 10 minutos a la vez?

- \_\_\_\_\_ días la semana pasada
- No se /No estoy seguro(a)
- Se negó a contestar

91. ¿Durante los últimos siete días, usted realizo actividades **vigorosas** durante al menos 10 minutos a la vez, tal como correr, aerobics, trabajo pesado de jardín, o cualquier otra cosa que cause un gran aumento en el ritmo respiratorio y cardiaco?

- Si
- No
- No se /No estoy seguro(a)
- Se negó a contestar

92. Los días que usted realizo actividades **vigorosas** por al menos 10 minutos en cada ocasión, ¿Cuántos minutos totales por día usted paso haciendo esas actividades?

- \_\_\_\_\_ Minutos por día
- No se /No estoy seguro(a)
- Se negó a contestar

93. ¿Durante los últimos siete días, cuantos días usted realizo estas actividades **vigorosas** durante al menos 10 minutos en cada ocasión?

- \_\_\_\_\_ Días la semana pasada
- No se /No estoy seguro(a)
- Se negó a contestar

94. ¿Cuántas horas por día o por semana usted regularmente se la pasa viendo televisión, usando una computadora, leyendo, o jugando video juegos, mientras esta sentado(a) o acostado(a)?

- \_\_\_\_\_ Horas por día
- \_\_\_\_\_ Horas por semana
- No se /No estoy seguro(a)
- Se negó a contestar

95. ¿Usted tiene algún equipo para ejercicio en su hogar que use regularmente? (Si usted tiene uno que no use regularmente marque “no”)

- Si
- No
- No se /No estoy seguro(a)
- Se negó a contestar

**Entorno físico (construido)**

96. Por favor indique cuales de los siguientes estan presentes en su colonia:

	No en la colonia	A una distancia caminando de 1 a 5 minutos	A una distancia caminando de 6 a 10 minutos	A una distancia caminando de 11 a 15 minutos	A una distancia caminando de 21 a 30 minutos	A una distancia caminando de 31 minutos o mas
Mercado agrícola						
Mercado de frutas/ vegetales						
Tienda de abarrotes						
Tienda de 24 horas						
Ferretería						
Oficina Postal / Buzón/ Servicio postal						
Restaurante de comida rápida						
Restaurante (no comida rápida)						
Institución religiosa						
Tienda de videos						
Guardería						
Centro comunitario / Centro de recreación						
Escuela primaria						
Autobús / parada de transporte						
Salón / estética / peluquería						
Bingo / Tienda de productos para fiestas						
Biblioteca						
Otros, por favor especifíquelo						
No se / no estoy seguro(a)						
No Otros						

97. Por favor diga si usted esta de acuerdo o en desacuerdo con los siguientes enunciados acerca de su colonia:

	Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo
Puedo hacer la mayor parte de mis compras en tiendas de la localidad.					
En mi colonia no hay muchas calles sin salida.					
Hay muchas intersecciones de calles de dos vías en mi colonia.					
Las aceras en mi colonia tienen muy buen mantenimiento					

98. Que tan satisfecho esta con:

	Muy satisfecho(a)	Satisfecho(a)	Neutral	Insatisfecho(a)	Muy insatisfecho(a)	No aplica
La oportunidades para comprar en su colonia						
La calidad de la escuela primaria en su colonia						
El nivel de ruido en mi colonia						
El numero de tiendas de comida en su colonia						
La calidad de las tiendas de comida en su colonia						
La limpieza de las calles de la colonia						
La cantidad de restaurantes en su colonia						
La calidad de los restaurantes en su colonia						
Su colonia como un buen lugar para educar niños(as)						
Su colonia es un buen lugar para vivir						
La cantidad de instalaciones para el recreo (parques, juegos de niños(as), etc.) en su colonia						
La calidad de las instalaciones para el recreo (parques, juegos de niños(as), etc.) en su colonia						

## Transporte y Seguridad

99. ¿Usted esta de acuerdo con lo siguiente?:

	Totalmente de acuerdo	De acuerdo	Neutral	En desacuerdo	Totalmente en desacuerdo
El congestionamiento vehicular es un problema en nuestra área					
La gente maneja muy rápido en mi colonia					
Las calles de mi colonia esta bien iluminadas en la noche					
Ve y hablo con otras gentes cuando camino en mi colonia					
Hay un alto nivel de crimen en mi colonia					
El nivel de criminalidad en mi colonia la hace insegura para caminar durante el día					
El nivel de criminalidad en mi colonia la hace insegura para caminar durante la noche					
Mucha gente anda en bicicleta en mi colonia					
Mucha gente camina en mi colonia					
La gente en mi colonia se conoce entre si					

**<< Las siguientes preguntas son acerca del servicio de transporte público y como o si usted lo utiliza >>**

100. ¿Cuántas veces durante una semana regular usted usa el servicio de transporte público? <si responde "no" pase a la pregunta 35>

- \_\_\_\_\_ veces por semana
- No uso el servicio de transporte
- No hay servicio de transporte en la colonia o colonia cercana
- No se /No estoy seguro(a)
- Se negó a contestar

101. ¿Cuáles son los motivos por los que utiliza el transporte público?

- Para ir a trabajar
- Para ir a comprar a la tienda de abarrotes
- Para ir a realizar otras compras (e. g. tienda 24 horas, farmacia, tienda de ropa)
- Para ir a locales de servicios (e. g. banco, oficina postal, consultorio medico, restaurante)
- Para ir a instalaciones recreativas (e. g. parque, centro comunitario)
- Para visitar amigos
- Para ir a servicios de salud
- Otro, por favor especifique: \_\_\_\_\_
- No se /No estoy seguro(a)
- Se negó a contestar

102. ¿Puede decirnos que la abstiene de usar el transporte publico (o de usar el transporte publico mas seguido)?

- Falta de frecuencia (no pasan continuamente)
- Horario desconocido
- El clima
- No hay transporte disponible para ir a los lugares que necesito llegar
- No hay servicio de transporte cuando necesito salir o regresar
- Tener un auto
- Es muy caro usar el transporte publico
- Se pierde mucho tiempo usando transporte publico
- El horario de los autobuses no es confiable
- Es muy confuso calcular el horario del transporte
- Nadie que yo conozca usa el transporte publico
- Tener que llevar artículos muy pesados
- No se puede ir a muchos lugares usando transporte publico
- Necesito auto para ir o regresar del trabajo
- Otro, por favor especifique: \_\_\_\_\_
- Ninguna
- No se /No estoy seguro(a)

## Acerca de usted

### Nutricion

103. ¿Dónde compra su familia los **vegetales**?

Marque todas las que apliquen:

- En la tienda de comestibles de su colonia
- En la tienda de comestibles afuera de su colonia
- En la tienda de abarrotes de su colonia
- Otros, por favor especifique: \_\_\_\_\_ [especifique si esta dentro o fuera de su colonia]

104. ¿Donde compra su familia sus **comestibles**?

Marque todas las que apliquen:

- En la tienda de comestibles de su colonia
- En la tienda de comestibles afuera de su colonia
- En la tienda de abarrotes de su colonia
- Otros, por favor especifique: \_\_\_\_\_ [especifique si esta dentro o fuera de su colonia]

105. ¿Que tan a menudo su familia va a comprar comestibles en una semana regular?

\_\_\_\_\_ cantidad de días por semana

- No se /No estoy seguro(a)
- Se negó a contestar

106. ¿Cuántas veces come usted fuera de casa cada semana en promedio, incluyendo el almuerzo?

- \_\_\_\_\_ Comidas por semana
- No se /No estoy seguro(a)
- Se negó a contestar

107. ¿Cuántas porciones de fruta come usted usualmente cada día?

0    1    2    3    4    5    6    Mas de 6

108. ¿Cuántas porciones de vegetales come usted usualmente cada día?

0    1    2    3    4    5    6    Mas de 6

## Vida diaria

109. ¿Cuándo se mudó por primera vez a esta colonia?

- \_\_\_\_\_ Año
- No se /No estoy seguro(a)
- Se negó a contestar

110. ¿Cuáles son los principales razones que influenciaron donde escogió vivir?  
Marque todas las que apliquen:

- Vivienda económica
- Calidad del vecindario
- Buena escuela
- Cercanía a la escuela
- Buenos vecinos
- Cercanía al trabajo
- Cercanía a familia, parientes o amigos
- Cercanía a espacios abiertos (e. g. parques)
- Facilidad para caminar hacia tiendas y servicios
- Facilidad para usar servicio de transporte público
- Vecindario seguro
- Otros, por favor especifique:
- No se /No estoy seguro(a)
- No otros
- Se negó a contestar

111. ¿Dónde nació usted?

- Texas
- Otro estado dentro de los Estados Unidos
- México
- Centroamérica o Sudamérica
- Otro, por favor especifique: \_\_\_\_\_
- Se negó a contestar

112. Si usted no nació en los EU, ¿que tanto tiempo ha vivido en este país?

- \_\_\_\_\_ # de años
- \_\_\_\_\_ No se /No estoy seguro(a)
  - \_\_\_\_\_ Se negó a contestar

113. ¿Cuánto tiempo espera permanecer viviendo en su residencia actual?

- 1-5 años
- 6-10 años
- 11 o mas años
- El resto de mi vida
- No se /No estoy seguro(a)
- Se negó a contestar

114. ¿Usted es dueño(a) o renta el lugar donde actualmente vive?

- Dueño(a)
- Rento(a)
- No se /No estoy seguro(a)
- Se negó a contestar

115. ¿Cuántos autos funcionando hay en su familia?

- \_\_\_\_\_ cantidad de autos
- No se /No estoy seguro(a)
- Se negó a contestar

116. ¿Qué tan alto(a) es usted sin zapatos?

- \_\_\_\_\_ (pies y pulgadas, o solo pulgadas, por favor indique cual)
- \_\_\_\_\_ (si prefiere, pueda usar centímetros)
- No se /No estoy seguro(a)
- Se negó a contestar

117. ¿Aproximadamente cuanto pesa sin zapatos?

- \_\_\_\_\_ Peso (libras)
- \_\_\_\_\_ (si prefiere, pueda usar kilogramos)
- No se /No estoy seguro(a)
- Se negó a contestar

118. ¿Cuántos perros hay en su hogar?

- \_\_\_\_\_ cantidad de perros
- No se /No estoy seguro(a)
- Ninguno
- Se negó a contestar

119. Usted podría decir que en general su salud es:

- Excelente
- Muy buena
- Buena
- Regular
- Pobre
- No se /No estoy seguro(a)

120. ¿Cuál es su sexo?

- Masculino
- Femenino

121. ¿A cual de estos grupos de edad pertenece?

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 o mas
- Se negó a contestar

122. ¿Cuál es estos grupos usted diría representa mejor su raza?

- Blanco
- Hispano (Si eligió esta respuesta, por favor especifique enseguida)
  - Centroamericano
  - México-americano
  - Sudamericano
- Negro o Afroamericano
- Asiático
- Americano nativo o de las Islas del Pacifico
- Indio Americano, Nativo de Alaska
- Otro, por favor especifique: \_\_\_\_\_
- Se negó a contestar

123. Esta usted:

- Casado(a)
- Divorciado(a)
- Viudo(a)
- Separado(a)
- Nunca se ha casado
- Miembro de una pareja sin casarse
- Se negó a contestar

124. ¿Cuántos niños menores de 18 años viven en su hogar?

- \_\_\_\_\_ cantidad de niños
- Ninguno(a)
- Se negó a contestar

125. ¿Cuántos adultos en total viven en su hogar?

- \_\_\_\_\_ cantidad de personas en la familia
- No se /No estoy seguro(a)
- Se negó a contestar

126. ¿Cuántas personas que no son de su familia viven en su hogar?

\_\_\_\_\_ # de no familiares

127. ¿Cuál es el más alto nivel o año de escuela que usted completo?

- Nunca asistió a la escuela o jardín de niños
- De 1er. a 6to. año
- De 7mo. a 8vo. año
- De 9 a 11 (algún bachillerato)
- De 12do o GED (Graduado(a) de bachillerato)
- Universidad 1 a 3 años (Alguna universidad o escuela técnica)
- Universidad 4 años o mas (Graduado(a) de universidad)
- Posgrado o mas
- Otro, por favor especifique: \_\_\_\_\_
- Se negó a contestar

128. Esta usted actualmente:

- Empleado por salario
- Auto-empleado
- Sin trabajo por mas de 1 año
- Sin trabajo menos de 1 año
- Ama de casa
- Un(a) estudiante
- Retirado(a)
- Incapacitado(a) para trabajar
- Otro, por favor especifique: \_\_\_\_\_
- Se negó a contestar

129. Si usted trabaja por su cuenta, ¿Usted trabaja en su colonia o en otra colonia?

- En mi colonia
- En otra colonia
- En la ciudad
- Otro, por favor especifique: \_\_\_\_\_

130. Si usted trabaja por su cuenta, ¿usted contrata empleados /trabajadores por medio tiempo o por tiempo completo?

\_\_\_\_\_ # empleados de medio tiempo

\_\_\_\_\_ # empleados tiempo completo

- No contrato empleados
- Se negó a contestar

Describa el propósito/servicio/ de su negocio:

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131. ¿Cuántas horas pasa usted en trabajo remunerado en una semana regular?

- \_\_\_\_\_ Horas por semana
- No se /No estoy seguro(a)
- Se negó a contestar

132. ¿Cuántos meses al año usted trabaja fuera de su colonia (se va para el norte / o pasa en trabajo temporal donde no viene a la casa todos los días)?

- \_\_\_\_\_ cantidad de meses por año
- No se /No estoy seguro(a)
- Se negó a contestar

133. ¿Tiene licencia de conducir?

- Si
- No
- No se /No estoy seguro(a)
- Se negó a contestar

134. Su ingreso anual familiar de todos sus fuentes:

- Menos de 5,000
- 5,000 – 7,499
- 7,500 – 9,999
- 10,000- 12,499
- 12,500 – 14, 999
- 15,000 – 17,499
- 17,500 – 19,999
- 20,000 – 22,499
- 22,500 – 24,999
- 25,000 – 27,499
- 27,500 – 29,999
- 30,000 – 32,499
- 32,500 – 34,999
- 35,000 – 37,499
- 37,500 – 39,999
- Mas de 40,000
- No se /No estoy seguro(a)

- Se negó a contestar

Gracias por participar en esta encuesta. La promotora que le dejó esta encuesta vendrá a recogerla. Ella también estará disponible para ayudar a contestar cualquier pregunta que fuese confusa y aclarar la encuesta si lo desea.

Finalmente, por favor indique si tendría interés en participar en un seguimiento de esta encuesta llenando un “diario de actividad semanal”.

- SI
- No

## Appendix B: Environmental Audit Tool

<b>Colonia Environmental Audit Tool 1. LOT AUDIT</b>			Study Site: EL Cenizo	Lot ID:
Date:	Time:	Temperature:	Humidity:	Auditor:

LAND USE (map code)
Single family housing [    ]
Multifamily housing [    ]
Mobile homes [    ]
Municipal buildings [    ]
Offices [    ]
Vacant/undeveloped lots [    ]
Restaurants [    ]
Grocery stores [    ]
Other commercial, specify: _____ [    ]
Community center [    ]
Religious institutions [    ]
Other, specify: _____ [    ]
BUILDING
<b>Building Conditions</b> (map code)
Finished construction [    ]
Unfinished [    ]
Under construction [    ]
Abandoned [    ]
Broken window [    ]
<b>Total Number of Buildings Per Lot:</b> _____ buildings
<b>Cleaness and Maintenance of Building</b>
_____  _____  _____  _____
Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)
<b>House has a porch-like area visible from the street (yes/no)</b>

GARDEN
<b>Lot/house has potted plants visible from the street (yes/no)</b>
<b>Lot/house has a garden visible from the street (yes/no)</b>
<b>Cleaness and Maintenance of the Garden</b>
_____  _____  _____  _____
Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)
FENCE
<b>Fence Setback from Sidewalks:</b> _____ feet
<b>Fence Type</b>
Chain link [    ]
Other visually permeable fences [    ]
Visually impermeable fence [    ]

**Colonia Environmental Audit Tool 2. SEGMENT AUDIT**

Study Site: EL Cenizo

Segment ID:

Date:

Time:

Temperature:

Humidity:

Auditor:

SIDEWALKS
<p><b>Completeness</b></p> <p>On one side [    ]: partial or complete (circle one)</p> <p>On both sides [    ]: partial or complete (circle one)</p> <p>No sidewalks [    ]</p> <p><b>Surface Materials:</b> [all concrete]</p> <p><b>Surface Conditions</b></p> <p>Weeds [    ]</p> <p>Excessive cross slope [    ]</p> <p>Uneven surface [    ]</p> <p>Cracks and holes [    ]</p> <p>Other, specify: _____ [    ]</p> <p>None of the above (good) [    ]</p> <p><b>Obstructions</b></p> <p>Mailboxes [    ]</p> <p>Poles or signs [    ]</p> <p>Parked cars [    ]</p> <p>Abandoned cars [    ]</p> <p>Trees/vegetations [    ]</p> <p>Garbage cans [    ]</p> <p>Other, specify: _____ [    ]</p> <p><b>Sidewalk Width:</b> _____ feet</p> <p><b>Number of Curb Cuts</b></p> <p>_____ total or _____ per lot (avg.)</p>
ROAD ENVIRONMENTS
<p><b>Surface Material:</b></p> <p><b>Surface Condition</b> (bumps/ cracks/ holes)</p> <p style="text-align: center;"> ----- ----- ----- ----- </p> <p>Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)</p>

BUFFER AREA (between sidewalks and lot fences/lines)
<p>Abandoned car [    ]</p> <p>Garbage [    ]</p> <p>Broken toy or play equipment [    ]</p> <p>Mail box [    ]</p> <p>Steep slope [    ]</p> <p>Drainage Problem/Standing Water [    ]</p> <p>Other, specify: _____ [    ]</p>
ROADSIDE ENVIRONMENTS
<p><b>Greenery</b> [    ]</p> <p style="text-align: center;"> ----- ----- ----- ----- </p> <p>None(1) (2) (3) (4) A lot (5)</p> <p><b>Shade</b> [    ]</p> <p style="text-align: center;"> ----- ----- ----- ----- </p> <p>None(1) (2) (3) (4) A lot (5)</p> <p><b>Power Lines</b> [    ]</p> <p style="text-align: center;"> ----- ----- ----- ----- </p> <p>None(1) (2) (3) (4) A lot (5)</p>
PEOPLE COUNTS
<p>Number of <b>teenagers</b> walking: _____</p> <p>Number of <b>teenagers</b> bicycling: _____</p> <p>Number of <b>children</b> walking: _____</p> <p>Number of <b>children</b> bicycling: _____</p> <p>Number of <b>middle-aged adults</b> walking: _____</p> <p>Number of <b>older adults</b> walking: _____</p> <p>Number of <b>people on wheelchair</b> or mobility assistance equipment: _____</p>

**Colonia Environmental Audit Tool 3. SEGMENT PERCEPTION AUDIT**

Study Site: EL Cenizo

Date:

Time:

Temperature:

Humidity:

Auditor:

Segment ID: \_\_\_\_\_.

Segment ID: \_\_\_\_\_.

How much noise pollution in segment?  
(car music, construction, factories, etc)

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall convenience for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall visual quality

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall cleanliness and maintenance  
(litter/ graffiti/ broken facility, etc.)

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall safety for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall attractiveness for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Comments:

How much noise pollution in segment?  
(car music, construction, factories, etc)

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall convenience for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall visual quality

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall cleanliness and maintenance  
(litter/ graffiti/ broken facility, etc.)

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall safety for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Overall attractiveness for walking

\_\_\_\_\_

Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Comments:

**Colonia Environmental Audit Tool 4. POINT DATA AUDIT**

Study Site: EL Cenizo

Street ID/Name:

Date:

Time:

Temperature:

Humidity:

Auditor:

**ROADSIDE ELEMENTS****Bus Stop**

Bus stop with shelter and bench [      ]

Bus stop with bench only [      ]

Bus stop with shelter only [      ]

Number bus stops with just a stop sign [      ]

Basketball Hoop [      ]

Lighting [      ]

Crosswalk [      ]

Stop Sign [      ]

**SIGNAGE (streets, fences or buildings)**

Way-finding aids [      ]

Cultural/ religious message or event [      ]

Political message or event [      ]

Neighborhood/social message/event [      ]

Security warning sign [      ]

No trespassing/ beware of dog [      ]

Unreadable sign or billboard [      ]

Commercial advertisement [      ]

Other, specify: \_\_\_\_\_ [      ]

Other, specify: \_\_\_\_\_ [      ]

Other, specify: \_\_\_\_\_ [      ]

## Appendix C: Codebook for GIS and survey data

### Webb County Tax Appraisal District

Excel file obtained from Webb County Tax Appraisal District was linked to GIS layers (Webb County Planning Department) by creating a field in both the GIS layer and this spreadsheet with the block and lot number (from the legal description of each property).

The following variables were available in the Webb County Tax Appraisal District file :

**imprv\_type** = improvement type, R=residential, M= (not consistently defined) mobile home or multifamily, C= Commercial

**yr\_blt** = year built, (lots of missing values)

**class\_cd** = no key to code provided, unsure of values

**living\_area** = estimated square footage of living area

**land\_type\_cd** = no key to code provided, unsure of values

**ld\_sqft** = land square footage

**ld\_acre** = land acreage

**legal\_desc** = legal description, contains lot and block number (used to create new field to be able to join appraisal district to parcels in GIS).

**owner\_id** = owner id created by appraisal district

**prop\_val\_yr** = property value year, primarily 2006

**pct\_own** = unknown, number equals 100 for all

**prop\_type** = property type, R= residential, MH= mobile home – incomplete or inaccurate because it has all properties as mainly R, only 2 MH, no commercial.

**hood** = plat or neighborhood (CNZ001)

**map\_id**= map id, only a few records filled in

**prop\_id**= property id, created by appraisal district

**geo\_id**= geo id, probably refers

**owner\_name**= owner name

**address** = first field contains majority of addresses, both number and street name in one field

**address** = some additional addresses with both number and street contained here because a carryover of the owner name (additional names or long names) are also put into address 1.

**address** = third variable with same name does not seem to contain any data

**city** = city is indicated, mostly Laredo, contains small towns, also lists El Cenizo

**state** = state (Texas)

**zip** = zip code

**prop\_val\_yr** = property value year (2006)

**land\_hstd\_val** = land homestead? value

**land\_non\_hstd\_val** = land non-homestead? value

**imprv\_hstd\_val** = improvement homestead? value

**imprv\_non\_hstd\_val** = improvement non-homestead? value

**appraise\_val** = appraised value

**assessed\_val** = assessed value

**market** = market value

**ag\_use\_val** = agricultural use value (no data)

**ag\_market** = agricultural market (no data)

**state\_cd** = state code (key code provided), missing values

## State Codes

code	description
A	REAL RESIDENTIAL
A1	REAL RESIDENTIAL SINGLE FAMILY
A2	REAL RESIDENTIAL MOBILE HOME
A5	REAL RESID_BLDG INCOMPLETE
B1	REAL RESIDENTIAL MULTI FAMILY
C1	REAL VACANT RESIDENTIAL
C2	REAL VACANT COMM & INDUSTRIAL
C3	REAL VACANT RURAL & RECREATION
D1	ACREAGE QUALIFIED AGR LAND
D2	ACREAGE NON-QUALIFIED LAND
D4	REAL, ACREAGE, UNDEVELOPED LAND
E1	REAL FARM/RANCH IMPROVEMENTS
F1	REAL, COMMERCIAL
F2	REAL, INDUSTRIAL
G	PRODUCING OIL,GAS AND MINERAL RESERVES
G1	PRODUCING OIL, GAS AND MINERAL RESERVES
G2	PROD COAL/SULPHUR ETC
G2A	PRODUCING COAL/LIGNITE
G3	NONPROD OIL/GAS/COAL/SULPH
G3A	NON PRODUCING OIL & GAS
G6	COAL RESERVES
G7	DISPOSAL WELLS/INJ
J	UTILITIES
J1	WATER SYSTEMS
J2	GAS COMPANIES
J3	ELECTRIC COMPANIES
J4	TELEPHONE COMPANIES
J5	RAILROADS
J6	PIPELINES
J6A	PIPELINES - OTHER PERS
J7	CABLE TV
J8	COMPR, PUMP, MTR STA & DEHYD
J8A	SEPAR, HTR TRTR, GYLCOL UNIT
L	BUSINESS PERSONAL
L1	TANGIBLE PERSONAL, COMMERCIAL
L1A	COMMERCIAL -VEHICLES 1 TON & OVER
L1G	COMMERCIAL, MACHINERY & EQUIPMENT
L2	BUSINESS INDUSTRIAL
L2A	INDUS VEHICLES 1 TON & OVER
L2B	PIPESTOCK
L2C	INDUS INVENTORY & MATERIALS

## Webb County Planning & Physical Development Department

GIS files obtained from Webb County Planning Department include:

- School district.shp
- 2002 Area 10ft Contours.shp
- Colonias& Subdivisions.shp -- this file contains the parcels (lots) for El Cenizo (cropped to use just for El Cenizo = El Cenizo.shp
- ETJ07.shp = extra territorial jurisdiction
- Hydrology.shp
- Precincts.shp
- ProposedFloodZones.shp = 25?, 100, 500 year flood zones
- Transportation.shp = centerline street layer

In order to link the parcel layer in GIS with appraisal district file – the following fields were added to the layer within the GIS layer:

**Blk\_lot\_ad** = block number, lot number

**Siteadd** = address number (obtained after fieldwork performed)

**Street** = address street name

This was done by selecting a set of lots on the GIS system, looking at an 8 ½ X 11 map received from the City of El Cenizo which had the address number on the lots, and a full plat map (hardcopy –electronic not available) from the appraisal district then inputting into the attribute table the block number and lot number in a field (to be used to link to other tables), and the site address number and street name. This was completed for 927 lots (publicly-held lots did not always have a site address, 1 parcel was listed in the appraisal district as unplatted on Cadena St.).

The exact format of block number and lot number field was added for all parcels in the Excel spreadsheet for the appraisal district data. This allows a JOIN in GIS between lotfdata.shp (essentially el cenizo.shp) with table lotfdata.txt (contains appraisal district data and fieldwork data)

## **ENVIRONMENTAL AUDIT Data**

### **Lot Data**

Field data collected were added as attributes of an exported database file (lotfdata.txt) and rejoined using the **Blk\_lot\_ad** to the spatial layer.

**LUSE1 and LUSE2 were created attributes to record the land uses noted in the fieldwork notes on the base maps. These land uses did not always match up with what the appraisal district indicates is on the site.**

#### **LUSE1**

S= Single Family,  
MH=Mobile Home might be Multifamily,  
M= Mobile Home,  
C=Commercial,  
O = Office  
A = Abandoned  
V= Vacant

#### **LUSE2**

S= Single Family,  
MH=Mobile Home might be Multifamily,  
M= Mobile Home,  
C=Commercial,  
O = Office  
A = Abandoned  
V= Vacant

BldgCd attribute was created to identify the status of the structure on the site. Field assessment determined if the structure was complete (finished), in the process of being worked on (Under construction), or no progress seemed to be taking place and the structure was not complete (Unfinished).

**BldgCd** - building condition

F = Finished  
UC = Under construction  
U = Unfinished

**Nobldgs** = number of buildings on the site (1-3)

**clean** = rating of cleanliness and maintenance of lot (1=Very Poor to 5 = Very Good)

**porch** = Y = Yes or N = No

**bldprx** = building proximity to street C=close to street , F = Far from street

**plants** = potted plants in front yard, Y=Yes, N=No, Null= 0

**garden**= Cleanness and Maintenance of the Garden, rating of gardens visible in front yard (1=Very Poor to 5 = Very Good)

**fence** = type of fence

C= Chain Link,  
VI = Visually Impermeable,  
VP= Visually Permeable

## **Point Data**

File pointdata\_cons.shp

Point data was recorded by placing graphic points where each noted feature was shown on the field maps. A code was developed for each feature and then for each and every point, the X Y coordinates were looked up using the graphic point and then the XY coordinates were included in the spreadsheet with the point data (code added for the features as well). This was done for approximately 1000 points.

18WHL = 18 Wheel Truck in ROW  
ABCAR = Abandoned Car  
AD = Advertisement  
B = Bus stop  
BBS = Bus stop with Bench and Shelter  
BCMB = Blocking or in ROW Cluster Mailbox  
Bench = Bench alone, informal bus stop or simply seating  
BKB = Basketball Hoop  
BKD= Blocking Debris  
BKMB = Blocking Mailbox  
BKMB = Blocking Mailbox  
BKTC = Blocking Trash Can  
BKTR= Blocking Trash  
CHAIR = Chair in ROW  
DEBRIS = Debris in front area of lot  
DOG = Loose Dog in immediate area  
DUMP = Dumpster  
FHYDRT = Fire Hydrant  
FORSALE = For Sale sign  
GRAV = gravel  
GS, G = Graffiti  
L = Light Pole  
LI = Light Pole internal to property  
MANHOLE = Manhole  
MB = Mailbox  
NBC= Non-blocking car, not in driveway or on street (front yard or in ROW)  
NBCMB = Non-blocking Cluster Mailbox  
NBD = Non-blocking debris  
NBMB = Non-blocking mailbox  
NBTC = Non-blocking trash can  
NBTR = Non-blocking trash  
NDRWY = no driveway  
NPK = No Parking sign  
NT = No trespassing  
P = Political sign  
S = Security sign  
SALESTENT = sales tent (only 1 noted – selling watermelon)  
STEEP = Steep driveway or area  
TIRES = Tires in ROW, piled up  
W = wayfinding  
WATER = Water Tower  
WEED = Weeds in ROW

YR = yellow reflectors

### **Segment Data**

File segmentdata.shp

Segment data includes perception data and sidewalk data.

Sidewalk\_fiel = sidewalk= new or none (0, Null)

Greenry = ranking of amount of greenery for a segment of roadway (1 =none to 5= a lot)

Shade= ranking of amount of shade for a segment of roadway (1 =none to 5=a lot )

Noise\_1 = How much noise pollution in segment? 1 = A little to 5 = A lot

Noise\_2 = How much noise pollution in segment? 1 = A little to 5 = A lot

Conv\_1 = Overall convenience for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Conv\_2 = Overall convenience for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Visq\_1 = Overall visual quality Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Visq\_2 = Overall visual quality Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Clean\_1 = Overall cleanliness and maintenance Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Clean\_2 = Overall cleanliness and maintenance Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Safety\_1 = Overall safety for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Safety\_2 = Overall safety for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Attract\_1= Overall attractiveness for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

Attract\_2 = Overall attractiveness for walking Very Poor(1) Poor(2) Average(3) Good(4) Very Good (5)

## **Appendix D: Travel Diary**

**Example of Travel Diary (in Spanish) on next pages.**

## Diario Del Transporte

Gracias por aceptar participar en nuestro estudio. Por favor, anote todos los viajes que usted haga durante un día por cuatro días de la semana en que usted está usando el GPS. Para cada día usted utilizará una hoja nueva para registrar todos sus viajes.

**¿Qué es un viaje?** Un viaje es cuando usted sale de un lugar para ir a otro destino/lugar.

**¿Qué es un medio de transporte?** Es la manera que usted usa para llegar de un lugar. El medio de transporte puede ser: caminando, conducir un coche, tomar el autobús, carpooling, ir en bicicleta, o tomar un taxi. Es.

**¿Cómo registro la hora que salgo de un lugar o que llego mi destino?** Por favor lleve esta hoja con usted durante el día.

Cuando usted esté a punto de irse para ir a otro lugar, anote el tiempo aproximado en el que usted está saliendo. Cuando llegue a su destino, anote la hora en que llegó.

**¿Qué quiere decir "razón principal de este viaje"?** Esto es una simple explicación de porqué va a ese lugar. Por ejemplo, ¿Está visitando a amigo? ¿Va a trabajar? ¿Va de compras? Pueden haber muchas razones para cada viaje. Elija la razón principal por la que usted va a su lugar de destino.

**Ejemplo de un día en el diario de transporte:**

Miércoles \_\_\_\_\_

FECHA: el 10 de octubre de 2007

NOMBRE: EJEMPLO

Viaje	¿Dónde comenzó este viaje? ----- Indique por favor la intersección o dirección	¿Adónde va en este viaje? ¿Cuál es su destino para este viaje? ----- Indique la localización (intersección o dirección)	¿Hora que usted empezó este viaje?	¿Hora que usted llegó a su destino?	¿Qué forma de transporte utilizó para ir a su destino?  Auto/ Bus / Caminando /Bicicleta Otra: EXPLICAR	¿Cuál es la razón principal de este viaje?
1	Mi casa 1234 Cadena	Mi trabajo 4567 Victoria	6:35 am	7:25 am	Auto	Para trabajo
2	Mi trabajo	Restaurante Alvarez 2456 Main St.	11:45 am	11:55 am	Caminando	Para comer
3	Restaurante	Mi trabajo	12:30 pm	12:45 pm	Caminando	Para trabajo
4	Mi trabajo	HEB 183 y cerca de Monterrey St.	6 pm	6:30 pm	Auto	Para obtener comida y otras cosas para la casa
5	HEB	Mi casa	7:25 pm	7:45 pm	Auto	Regresar a mi casa
6	Mi casa	Mi vecino 4567 Morales	8:38 pm	8:45 pm	Caminando	Para visitar a mi amiga
7	Mi vecino	Mi casa	9:30 pm	9:35 pm	Caminando	Para regresar a mi casa.

Miércoles

FECHA: \_\_\_\_\_

NOMBRE: \_\_\_\_\_

Viaje	¿Dónde comenzó este viaje? -----  Indique por favor la intersección o dirección	¿Adónde va en este viaje? ¿Cuál es su destino para este viaje? -----  Indique la localización (intersección o dirección)	¿Hora que usted empezó este viaje?	¿Hora que usted llegó a su destino?	¿Qué forma de transporte utilizó para ir a su destino?  Auto/ Bus / Caminando /Bicicleta Otra: EXPLICAR	¿Cuál es la razón principal de este viaje?
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						