Final report: February 2018

Produced by:

UTHealth School of Public Health Brownsville

The University of Texas Health Science Center at Houston
# CONTENTS

- Table of figures ........................................................................................................................................... 3
- Introduction .................................................................................................................................................  4
  - Sociodemographics:............................................................................................................................. 4
- Top Community Health Concerns among Community Key Informants....................................................... 4
- Executive Summary .................................................................................................................................... 5
  - Diabetes and Obesity ........................................................................................................................... 5
  - Diabetes and Obesity Associated Health Issues .................................................................................. 5
  - Behavioral Health and Substance Abuse ............................................................................................. 7
  - Health Education and Preventive Services ........................................................................................... 7
- Access to Health Services ........................................................................................................................... 7
- Background ............................................................................................................................................... 10
- Methods .................................................................................................................................................... 10
- Demographic Portrait of RHP5................................................................................................................ 11
  - Population of RHP5 ............................................................................................................................... 11
  - Social Environment................................................................................................................................ 11
  - Economic Environment .......................................................................................................................... 12
  - Physical Environment............................................................................................................................ 12
- Top Community Health Concerns Among Community Key Informants...................................................... 12
  - Diabetes and Obesity ............................................................................................................................ 13
    - The Burden of Obesity and Diabetes in the Lower Rio Grande Valley, South Texas: Population-Based Research Findings from Data from the Cameron County Hispanic Cohort .................................................................................. 13
    - Impact on the Causes of Death in RHP5 ............................................................................................ 16
    - Impact on Hospitalization and Clinic Usage by Diabetes and Obesity ................................................. 16
  - Behavioral Health and Substance Abuse Needs Across the RHP5 ........................................................ 17
    - Health Education and Preventive Services ......................................................................................... 18
  - Access to Clinical Services/ health professional availability ................................................................. 20
    - Medication and Lack of Treatment ..................................................................................................... 20
    - The Current Health Service Infrastructure and Environment .......................................................... 20
    - Number/Type of Health Professionals ............................................................................................... 21
    - Health Professional Shortage Area .................................................................................................... 23
    - Hospital Sizes and Status .................................................................................................................. 23
    - Healthcare Services ........................................................................................................................... 23
    - RHP5 Health System ........................................................................................................................... 23
    - Health Service Costs .......................................................................................................................... 23
- Other Health Issues .................................................................................................................................. 24
  - Pediatric data: .................................................................................................................................... 25
  - Men’s Health: ..................................................................................................................................... 25
TABLE OF FIGURES

Figure 1: Counties of RHP5 ................................................................. 11
Figure 2: RHP5 counties population growth ....................................... 11
Table 1: RHP5 population age distribution ....................................... 11
Figure 3: Percentage of families living below the Federal Poverty Level ....................................................... 12
Table 2: Prevalence of obesity and obesity-related factors in the LRGV. .................................................... 13
Table 3: Burden of diabetes and metabolic disease in adults .......... 13
Figure 4: Map of United States showing south Texas with the highest rates of diabetes ................................. 13
Table 4: Burden of cardiovascular disease in adults ....................... 14
Figure 5: Leg amputation rates among Medicare beneficiaries showing extreme rates in south Texas. ... 15
Table 5: Causes of Death in RHP5 compared to Texas .................... 16
Table 6: Primary diagnosis with Type 2 Diabetes RHP5 .................... 17
Table 7: Diabetes and obesity underlying major medical conditions seen in RGV clinics ......................... 17
Table 8: Lack of appropriate medication for chronic disease does not depend only on having insurance ... 20
Table 9: Insurance status of CCHC participants .............................. 20
Table 10: Health professionals in RHP5 compared to Texas .......... 21
Table 11: Hospital size and status in RHP5 ..................................... 23
Table 12: Average length of hospital stay by diagnosis code .......... 244
Table 13: Incidence and mortality from cancers in south Texas compared with State and National Data ... 25
Figure 7: Liver and stomach cancer rates in Texas ........................ 244
Table 14: Analysis of the health of men in the CCHC ...................... 255
Figure 8: Distribution of microbiota in CCHC stool ...................... 26
Table 15: Characteristics and risk factors for TB along the US Mexico border ............................................... 266
Figure 9: Risk factors for tuberculosis on the US Mexico border ... 266
INTRODUCTION

This document serves as the updated Community Needs Assessment (CNA) for Region 5 of the State of Texas 1115 waiver. It contains referenced data from many sources including the CDC BRFSS, published weighted data from the University of Texas School of Public Health Regional Campus in Brownsville (primary data directly collected from randomly selected community participants), hospitals in the region, Federally Qualified Health Centers, and state and national sources. It contains data from the Texas Hospital Discharge Data (THDD), the State Health database, and the Texas Cancer Registry. This assessment also summarizes previous assessments conducted in the region that are relevant to current day understanding of needs. The purpose is to update the needs assessment of the Regional Health Partnership 5 (RHP5) region for the extended 1115 waiver Delivery System Reform Incentive Program (DSRIP). This assessment provides insight into the many and changing problems of health disparities and inequalities in the delivery of health services, particularly for those without health insurance or who receive Medicaid and Medicare services.

The major health service needs identified in this assessment are supported by varying levels of existing data. The issues are rooted in extreme levels of economic and health disparities and the unprecedented epidemics of chronic disease (including obesity, diabetes and depression), fueled in part by high levels of adult and childhood obesity. The situation is exacerbated by low levels of health insurance and access to health services, including behavioral health, that would identify individuals with or at risk for chronic conditions and refer them into appropriate programs. We have made a specific effort to evaluate the impact of obesity, diabetes and, where possible, depression on the major conditions for which people are either hospitalized or seen at outpatient clinics. It is clear that diabetes is the underlying cause of many of the top 10 conditions for which people are hospitalized or are seen in clinics. Typically over 50% of those with heart failure, heart attacks, renal disease, leg ulcers have underlying diabetes. It is more complicated to estimate this type of information relating obesity and depression because in most instances the information on these two conditions is not available. If we are to understand the true impact of obesity and depression on clinic visits, hospital and emergency room visits then we will need greater efforts by clinical institutions to improve documentation of these two conditions. Only then can we begin to learn their true impact on hospitalization, duration of hospitalization and number of clinic visits as well as on self-management of chronic conditions.

Sociodemographics: The population of the RHP5 has increased by 7.4% since 2010 to 1.358 million in 2016, and is projected to grow to 1.6 million by 2020. Overall, about 90% are Hispanic and the population is relatively young (mean age 45.3 years) compared with the U.S. as a whole where the mean age is now rising to 50 years (https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml). The percent without high school education range from 25% to 37% with 9.9 average years of education. Median family income ranges from $27,000 to $34,500; about 50% of the Texas and US median. Forty percent of all families live below the federal poverty line, twice the rate for Texas. The liquid asset poverty rate in the region is 65% (http://scorecard.prosperitynow.org/2016/measure/liquid-asset-poverty-rate). Unemployment ranges from 12 to 17%. Eighty percent live in urban and suburban settings, many in ‘colonias’ that are informal settlements with mostly substandard housing and poor infrastructure.

TOP COMMUNITY HEALTH CONCERNS AMONG COMMUNITY KEY INFORMANTS

In a previous needs assessment participants were asked for their top five health priorities

a) Diabetes and Obesity
b) Behavioral Health
We therefore structure this assessment along the lines of these priorities and add a section on other health issues.

EXECUTIVE SUMMARY

Diabetes and Obesity
The prevalence of obesity and diabetes is an overwhelming determinant of health conditions in this region.

- In a randomly selected population based study of over 4500 adults in the RGV (Brownsville, Harlingen and Laredo), 51% were found to be obese (BMI ≥30), and another 31% are overweight (BMI ≥25 < 30).\(^1\)\(^-\)\(^3\)  
- 27.6% of adults have diabetes (2010 ADA definition), among whom 43% are undiagnosed. This is down substantially from over 53% undiagnosed in 2011. 35.5% (26,540) of those diagnosed remain inadequately or untreated.  
- A further 32% have pre-diabetes (ADA definition).\(^2\)\(^,\)\(^3\)  
- Diabetes is responsible for 56% of hospital admissions for Cardiovascular Disease (CVD) and 54% of sepsis.  
- Diabetes is the 5\(^{th}\) most common cause of death in the RGV [http://healthdata.dshs.texas.gov/HealthFactsProfiles](http://healthdata.dshs.texas.gov/HealthFactsProfiles).  
- The cost of diabetes is estimated to be just over 12% of per capita income in the RGV because of very high rates and low income, compared to about 1.9% of per capita income in the US.  
- Lost wages from diabetes in 2017 dollars is $270,000,000 per year in the RGV.\(^2\)

Diabetes and Obesity Associated Health Issues
There are a large number of conditions that are associated with obesity and diabetes in the RGV population including cardiovascular disease, chronic liver disease and liver cancer, peripheral artery disease leading to amputations, bone disease in older people with diabetes, renal failure resulting in dialysis, retinopathy, and depression.

Cardiovascular Disease
- 34% of the CCHC have abnormal carotid intimal thickness, highly associated with obesity, diabetes and metabolic abnormalities.\(^4\)\(^,\)\(^5\) This condition is a well-known risk factor for eventual cardiovascular disease.  
- 21.5% have symptoms of left ventricular diastolic dysfunction based on echocardiograms.\(^6\) This is a precursor of overt heart failure and the major risk factor for this condition is diabetes.  
- Among Mexican Americans, persons with diabetes, obesity, and metabolic syndrome were more likely to have ischemic electrocardiographic abnormalities, longer QTc intervals, and higher resting heart rates.\(^7\) All are early signs of cardiac disease.  
- It appears that much of the cardiovascular disease observed is driven in part by the metabolic abnormalities brought on by diabetes and obesity. We also see an independent association
between subclinical atherosclerosis and NAFLD (see below) among younger subjects; clustering of diabetes, obesity, and metabolic syndrome in this health disparity cohort increases the risk of both liver disease and early atherosclerosis in young adults.8

Liver Disease

- There is high prevalence of chronic liver disease associated with obesity, diabetes and metabolic syndrome in the RGV.
- There is a high prevalence of obesity (BMI≥30 kg/m²; 51%), metabolic syndrome (44%), hepatic steatosis (52%), and elevated ALT (40%) in the CCHC, predicting a high prevalence of NAFLD.9,10
- Participants with elevated ALT were younger, particularly men, who were more obese (p<0.001), and significantly more likely to have metabolic syndrome (p<0.001) and higher Homeostasis Model Assessment Insulin Resistance (HOMA; p<0.001).
- Hepatic steatosis was present in 52% of a sequential subset of the CCHC participants (n=442).9 Excess alcohol use is reported in 3.1% of the CCHC.11
- 79% of liver disease including steatosis and fibrosis is associated with obesity, diabetes and metabolic syndrome in the RGV.
- HCV antibody of 2.3% [n=1,131, 95% CI, 1.2-3.4], compared to 1% prevalence in the U.S. (Watt et al 2016.12
- The prevalence of cirrhosis in CCHC using biomarkers was estimated to be 0.94%; 4-fold higher than the reported national prevalence of 0.27%.13 The highest prevalence (1.87%) was observed in the 25-34 age group, predominantly in male subjects.14
- There is a 22% prevalence of significant fibrosis among CCHC participants with obesity or diabetes based on ADA criteria in comparison with about 10% of fibrosis among CCHC participants without obesity/diabetes.

Peripheral Artery Disease

- There is a high prevalence (3.3-10.3% depending on the clinical measure of ABI-high or ABI-low) of subclinical PAD in this the CCHC.
- A high prevalence of forefoot disease and when coupled with a diabetes rate of over 30%, may predispose this population to adverse limb and foot events accounting for the high frequency of lower limb amputations in RHP5 (Figure 5 in body of report).
- Age and diabetes were significantly associated with PAD.
- Diabetes is an important factor associated with ankle and toe pressure abnormalities in this cohort.
- There is a 9.6% prevalence of Subclavian Artery Stenosis (≥ 15 mmHg) in the CCHC, higher than reported for other population cohorts.
- The significant association of diabetes with inter-arm SBP differences ≥10 mm Hg was notably different than other studies of SAS in random cohorts.

Renal Disease and Retinopathy

- The estimated prevalence of chronic kidney disease in an unpublished study of the CCHC is 6.9% in males and 4.9% in females.
- There is a study of retinopathy underway with no analysis done thus far otherwise little population based data are available on either retinopathy or nephropathy.
Behavioral Health and Substance Abuse

- In the CCHC population based sample, 27.8% overall have depression with higher levels in women compared to men.
- There are an estimated 228,193 (27.8%) adults in the RHP5 population with a measurable level of depression based on a random population based survey (CCHC unpublished data).
- There are 317,300 (30%) of adults with measurable levels of anxiety (CCHC unpublished data).
- Many who report that their mental health is fair or poor or who report substance abuse also report that they have not been able to obtain professional help. Access to behavioral health services continues to be a major barrier.
- Varying self-reported data on behavioral health conditions demonstrate a clear need to better define the level of behavioral health impairment and who is at risk in RHP5.
- Those who know they have diabetes are much more likely to be depressed than those who have diabetes but are unaware of their diabetes.
- The presence of diabetes and depression together greatly reduces the effectiveness of diabetes self-management resulting in higher HbA1c levels. 15
- This latter observation suggests that depression does not cause diabetes in of itself, but that diabetes has a major effect on mental health. Depression is also highly associated with obesity.16
- In 2016, the Meadows Mental Health Policy Institute and the Valley Baptist Legacy Foundation conducted a comprehensive review of the mental and behavioral health system in the 4 counties that comprise RGV, with participation from health service providers and the two local mental health authorities (LMHA's) serving the Rio Grande Valley (not a population survey).
- The assessment established that 25% of the estimated 1.2 million people ages six or older in the Rio Grande Valley have some level of mental health need.
- The most prevalent conditions among adults are major depression, post-traumatic stress disorder, and alcohol dependence disorder.
- Among individuals with behavioral health needs, approximately 80% of adult needs and 66% of pediatric needs could be classified as mild to moderate behavioral health needs.
- There are 45,000 adults and 25,000 children with the most severe needs with most of these individuals living 200% below the federal poverty level.
- The most prevalent conditions for children and youth are self-injury/harming behaviors, substance use disorders, and depression.
- As many as 16% of the adult population has a level of cognitive impairment based on CCHC unpublished data.

Health Education and Preventive Services

- CHWs delivery community-based prevention and health education in the region.
- A Community Wide Campaign implemented in one county of RHP 5 has implemented the use of CHW to conduct outreach and education. This model has been effective in helping participants decrease their BMI and increase physical activity.

Access to Health Services

Health Insurance Coverage

- Recent data (Table 9) suggest that the ACA may have played a larger role than anticipated in RGV because we now see that 42% of the CCHC has some form of health insurance and since the largest increase is in private insurance it strongly suggests the impact of the ACA. This represents a 25% increase in the number of insured. 15
In addition, much of this is impacting the female population and those in the ages of 18-64.

The Current Health Service Infrastructure and Environment

The health service environment is highlighted by substantial deficits in numbers of health professionals in many areas such as primary care, family medicine, general medicine, mental health, community health and public health against a backdrop of substantial health burden of chronic disease with substantial health disparities and unmet behavioral health needs (Table 10). The severity and wide distribution of chronic disease explains much of what is seen in everyday health service provision where individuals see their provider late in illness, often in the emergency rooms.

Number/Type of Health Professionals

- **Physicians:** As of September 2017 there are 1,479 physicians in RGV who provide direct patient care, among whom 766 provide primary care.
- **Nurses and Nurse Practitioners:** There are 4,321 Licensed Vocational Nurses (LVN) in RGV at a rate of 297/100K population which is just over the rate of 287 for Texas.
- **Community Health Workers (CHW):** This category of health worker is relatively newer than the other categories in this report, and CHWs in many Hispanic cultures are common, and thus in RGV the rate of 27.3/100K, though low, is nevertheless higher than the Texas average of 13.7/100K population.
- **Physician Assistant (PA):** This is another area where RGV is equally supplied as Texas as a whole.
- **Nurse Practitioners (NP):** The proportion of NPs in RGV is just over 50% (28.9/100K) compared to Texas (50.2/100K).
- **Behavioral Health Professionals (psychiatrists, psychologists, social workers):**
  - Texas has one of the lowest ratios of psychiatrists to 100K population of any state in the nation and ranks 49th in spending for mental health per capita.
  - RGV has 2.8 psychiatrists/100K population, 33% of the already low level of 7.5/100K population in Texas.
- **Dentists:** Dentists in RGV is second in deficit only to mental health professionals. There are only 22.9 dentists per 100K population compared to 46.8 in Texas.

Health Professional Shortage Area

LRGV has long been a health professional shortage area with particular difficulty in recruiting and retaining primary care and specialist physicians, nurses and physician assistants.

Hospital Sizes and Status

Hospitals in RGV range in size from 49 beds in a small county hospital to over 500 beds in the two largest hospitals in each of the two counties (Table 11).

RGV Health System

- The health system of RGV is composed entirely of for-profit hospitals.
- There are Federally Qualified Health Centers, county health clinics, and private practitioners who constitute the remainder of the health system.

Health Service Costs

- The costs of health services have been heavily weighted toward Medicare and Medicaid in RGV, however that appears to have changed to some degree with an increase in overall availability of insurance (increased from 30.1% in 2011 to 43% in 2017).
Because of the lack of access to preventive health services and the high burden of chronic diseases, people are often seen in crisis in emergency departments with advanced manifestations of chronic disease and this drives up the overall cost of treatment and adds to the burden of indigent care of the hospitals and the health system.
BACKGROUND
The Regional Health Partnership 5 (RHP5) in the Texas Center for Medicare/Medicaid 1115 waiver program comprises a wide assortment of public and private institutions in Cameron, Hidalgo, Starr and Willacy counties to address the region’s heavy burden of chronic disease and health disparities. The goal of the 2017 RHP5 updated needs assessment is to provide data to support the decisions regarding the Delivery System Reform Incentive Program (DSRIP) second phase. This needs assessment is intended to update the health portrait of RHP5 in light of 6 years of DSRIP experience and to assist in addressing trends and emerging issues that affect the new direction of the health systems created in the new DSRIP. In this process, we also engage the community and key partners to identify health concerns, priorities, strengths, and opportunities for the future DSRIP enterprise, keeping in mind the major chronic conditions identified and providing the focus of DSRIP over the past 6 years.

Health outcomes and conditions provide a profile of RHP5 through social and economic indicators, as well as the leading causes of morbidity and mortality for RHP5 residents. Existing data drawn from local and state sources, including the U.S. Census Bureau, U.S. Bureau of Labor Statistics, Texas Department of State Health Services, Hospital Discharge data, and local resources such as clinics, hospitals and research data were analyzed and are presented. *Demographic Portrait of RHP5* provides a profile of RHP5 through population, social and economic indicators.

Clinical and Social Determinants of Health
It is now well established that about 80-90% of health is determined by social determinants of health such as housing and lifestyle and its interaction with our genetic background, and only 10%, at best 20%, is determined by clinical care. It is also clear that at least 75% of diabetes, heart disease and cancer are preventable through lifestyle management. Furthermore, even modest to mild depression and anxiety benefit from a healthy lifestyle. Therefore, the big emphasis for the DSRIP program in RHP5 needs to be a strong combination of emphasis on lifestyle management and its interaction with the clinical enterprise. It is without question that people with identifiable clinical conditions require clinical care, but it is indisputable that clinical care not accompanied by effective lifestyle management is likely to be less effective or may fail. So the emphasis requires the creation of a culture of health in RHP5 as a resource for the clinicians, facilitating prescription and implementation of a lifestyle management program to their patients with chronic conditions and the need is pressing. For example, 36.6% of adults in RHP5 have pre-diabetes. These individuals can be prevented from developing diabetes through lifestyle management and counseling.

METHODS

Benchmark Data

*Texas Risk Factor Data:* We have used several data sources from Texas. We use Texas Department of State Health Services (DSHS) vital statistics data for comparison of secondary data indicators.\(^\text{13}\) In addition we are taking advantage of the availability of Texas Hospital Discharge data for certain analyses. The *Behavioral Risk Factor Surveillance System (BRFSS) Prevalence and Trend Data* published by the Centers for Disease Control and Prevention and the US Department of Health & Human Services are benchmark data for Texas that allow us to compare our local data with this report.\(^\text{5}\)

*Healthy People 2020:* Healthy People metrics provides science-based, 10-year national progress in improving American health. The Healthy People initiative is about setting national objectives and monitoring progress to motivate action.\(^\text{15}\)
Cameron County Hispanic Cohort (CCHC): UT School of Public Health Regional Campus has developed a rich database from a long-standing population-based cohort of over 4500 people with substantial clinical, biological, environmental, genomic and lifestyle data. This set of population-based, weighted data provides a means to assess the prevalence of chronic conditions (that often go undiagnosed and untreated), the access to health services, and the pool of undiagnosed and untreated chronic disease conditions in RHP5.

Data from Federally Qualified Health Centers, County Health Departments, hospitals and other medical sources.

DEMOGRAPHIC PORTRAIT OF RHP5

The RHP5 counties of Cameron, Hidalgo, Starr and Willacy are shown in Figure 1. The population of RHP5 increased by 7.4% between 2010 (1.26 million) and 2016 (1.36 million) somewhat less than the projected rate of increase in Figure 2, though population projections indicate that the rate of growth is expected to increase over the coming years. Racial/ethnic diversity varies little within RHP5 from over 90% people of Hispanic origin (mostly Mexican American) in Starr and Hidalgo Counties to just fewer than 90% in Cameron and Willacy. The population remains relatively young with the median age from 28 to 30 (Table 1). Thirty-four percent of the population is under the age of 18 compared to 28% for Texas. This age distribution has remained fairly constant. The proportion of non-Hispanics is under 10%, very different from other Texas regions.

<table>
<thead>
<tr>
<th>Population</th>
<th>&lt;=5 years</th>
<th>6-17 years</th>
<th>18-39 years</th>
<th>40-59 years</th>
<th>&gt;=60 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHP5</td>
<td>117,388</td>
<td>311,088</td>
<td>382,316</td>
<td>266,671</td>
<td>171,852</td>
<td>1,249,315</td>
</tr>
<tr>
<td></td>
<td>9%</td>
<td>25%</td>
<td>31%</td>
<td>21%</td>
<td>14%</td>
<td>100%</td>
</tr>
<tr>
<td>Texas</td>
<td>1,926,502</td>
<td>4,922,315</td>
<td>7,606,212</td>
<td>6,431,411</td>
<td>3,677,982</td>
<td>24,564,422</td>
</tr>
<tr>
<td></td>
<td>8%</td>
<td>20%</td>
<td>31%</td>
<td>26%</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Cameron</td>
<td>35,633</td>
<td>98,003</td>
<td>117,348</td>
<td>90,154</td>
<td>61,152</td>
<td>402,490</td>
</tr>
<tr>
<td>Hidalgo</td>
<td>74,475</td>
<td>193,561</td>
<td>241,969</td>
<td>159,203</td>
<td>98,579</td>
<td>767,787</td>
</tr>
<tr>
<td>Starr</td>
<td>5,511</td>
<td>15,163</td>
<td>17,975</td>
<td>12,893</td>
<td>8,616</td>
<td>60,158</td>
</tr>
<tr>
<td>Willacy</td>
<td>1,569</td>
<td>4,361</td>
<td>5,024</td>
<td>4,421</td>
<td>3,505</td>
<td>18,880</td>
</tr>
</tbody>
</table>

Table 1: RHP5 population age distribution.

SOCIAL ENVIRONMENT

Education levels are key components of health. Overall education attainment in Texas is 18% with less than a High School (HS) degree and the rest are 25% with HS degree, 25% with some college including
associate degree and 25% with graduate education. Educational attainment is not distributed equally across RHP5 counties.\textsuperscript{16,17} State data show that the percent without a high school education ranges from 55\% in Starr County to 36\% in Cameron, while those with just a high school education range from 34\% in Starr County to 49\% in Willacy County. The percent with a college degree or more ranges from 11\% in Starr County to 21\% in Cameron County. The educational level as a whole is very substantially below the Texas average of about 42\% with a high school education or less, while the level in RHP5 counties is in the 70-80\% range.

**ECONOMIC ENVIRONMENT**

The median (middle value) household income in RHP5 ranges from $31.8K in Hidalgo County to $22.9K in Willacy County. This is between 41\% and 57\% of the Texas median income of $55.6K and the same relationship with the US median family income that is the same as Texas. About 40\% of families in RHP5 earn less than $25,000 annually and that is an improvement over the report in 2011 (47\%). In RHP5, 35\% of all families live below the federal poverty line which is twice the proportion for Texas and 2.5 times the proportion in the US. For families with single female head of household, over 60\% live below the poverty line, half again the proportion in Texas and the US (Figure 3).

**PHYSICAL ENVIRONMENT**

80\% of the population of Cameron, Hidalgo and Starr counties reside in urbanized settings, while Willacy County is about half urban and half rural. All of the counties contain settlements known as ‘colonias’, or unincorporated neighborhoods lacking basic infrastructure, mostly rural or semi-rural areas. Families living in ‘colonias’ are usually poor, and often reside in substandard housing, with little or no access to basic services like electricity, indoor plumbing and paved roads. Emergency and police vehicles are less likely to reach these areas and public transportation is usually non-existent. The built environment is also lacking, with little or no access to parks, sidewalks, trails, or grocery stores, creating barriers to a healthy lifestyle. ‘Colonia’ residents are among the many who do not have access to medical care and end up in emergency departments when they are ill. Many of these people do have hourly jobs that are low paying and often temporary. Over sixty percent of Cameron County zip codes have a healthy food outlet, compared with under 60\% in Hidalgo and about 1/3 in Willacy and Starr Counties. There are at least 10 times as many fast food restaurants as grocery stores in RHP5.

**TOP COMMUNITY HEALTH CONCERNS AMONG COMMUNITY KEY INFORMANTS**

In a previous needs assessment participants were asked for their top five health priorities\textsuperscript{1}

1. Diabetes & Obesity
2. Behavioral Health
3. Substance Abuse
4. Health Education
5. Access to Healthcare Services/Preventive Healthcare
6. Other Health Issues (Cancer, infectious diseases)
DIABETES AND OBESITY

Diabetes and obesity are at the root of many of the chronic conditions dominating RHP5 and therefore top the list of needs. Self-reported obesity approaches 35% but the prevalence of obesity, measured in CCHC remains 51%. More encouragingly the proportion of diabetes cases who are undiagnosed and untreated has decreased substantially. On the other hand, pre-diabetes prevalence has increased from 32% to 36.6% reflecting the stubbornly high rate of obesity. However, there are still nearly 75,000 adults with diabetes who are undiagnosed and therefore untreated, along with 35.5% of those diagnosed who are also untreated (that is a total of over 100,000 with diabetes who remain untreated). Much is still required to address these costly disparities. The costs for these two conditions alone runs into the hundreds of millions of dollars for RHP5. Underlying diabetes is present in over 50% of hospital admissions in RHP5 for serious conditions. The RHP5 cost in lost wages alone from diabetes in today’s dollars is about $275 million a year.

The Burden of Obesity and Diabetes in the Lower Rio Grande Valley, South Texas: Population-Based Research Findings from Data from the Cameron County Hispanic Cohort

Overview: Beginning in 2004, the Cameron County Hispanic Cohort (CCHC) has been collecting data from randomly selected households stratified by SES in order to understand the burden of disease in south Texas. This study continues to enroll new participants and now also includes individuals from Harlingen and Laredo. CCHC currently has baseline data on more than 4,500 individuals with nearly 4000 follow up visits. Participants are being followed every five years, and some have now reached the 10-year follow-up with some of the earliest CCHC participants. The general picture is one of health disparity, with a high proportion of individuals in poor health, with multiple conditions, mostly metabolic, and limited access to preventive or medical care.

The Burden of Obesity and Metabolic Diseases: Table 2 shows the burden of obesity in RPH5 is very high, with nearly half of the population obese. Among these just under 9% are morbidly obese. A further third of the population is overweight. Excess weight is thus the norm, bringing with it the consequences of multiple metabolic conditions and co-morbidities, prominent among which is diabetes (Table 3). Overall in the United States the prevalence of diabetes nationally is 9.4% (CDC 2015 data).
Among whom 23.8% were unaware they had the condition. Among Hispanics the national rate is 16.4%. The burden of diabetes in the Lower Rio Grande Valley (LRGV) is 27.6% and is therefore about three times the national levels, and is approaching double that of Hispanics as a group (Table 3).\(^3\) On the other hand, the prevalence of pre-diabetes is about the same as the national level of 33.0%. In association with obesity we find a high proportion of individuals with diabetes have high levels of Visceral Adipose Tissue (VAT), that is: fat within the abdominal cavity. VAT is highly metabolically active resulting in elevated levels of markers of metabolic disease. Increased VAT is associated with development of many complications of obesity, such as cardiovascular disease and liver disease. However, lipids are rarely tested in south Texas, and treatment with lipid lowering agents such as statins is not common.\(^3\)

Metabolic Diseases and Complications: Cardiovascular and Liver Disease: These high rates of obesity and diabetes carry risk of many complications. Commonly, patients with diabetes and prediabetes have metabolic abnormalities, including elevated lipids. Individuals with diabetes have significantly higher diastolic and systolic blood pressure, triglycerides, low density lipoprotein (bad cholesterol) and alanine aminotransferase (ALT: a marker of liver damage) and significantly lower high density lipoprotein (good cholesterol).

Table 4 shows the levels of hypertension and subclinical cardiovascular disease in this population.\(^4,5,7\) The degree of cardiovascular abnormalities appears to be driven more by poor metabolic health than simple obesity.\(^4\) One third of the CCHC (31.8%) has abnormal carotid ultrasound findings. Mean carotid intimal thickness (cIMT) varies across the four obesity phenotypes (p=0.0001); there was no difference among those who were metabolically unhealthy regardless of whether they were obese or not. In RHP5 cardiometabolic risk has a greater effect on early atherosclerosis development than body mass index alone. Non-obese but metabolically unhealthy participants had similar development of subclinical atherosclerosis as their obese counterparts. Interventions to maintain metabolic health among obese and non-obese patients may be a more important goal than weight loss alone.\(^4,5\) Echocardiographic analysis of 488 CCHC participants show that left ventricular diastolic dysfunction (LVDD) is seen in 21.5% of the participants. LVDD is the clinical syndrome of heart failure with preserved ejection fraction, and as has been previously reported, LVDD in RHP5 is associated with the metabolic syndrome. These data reveal that there are many individuals in the population at risk of chronic heart failure, particularly those with poor metabolic health.

Chronic Liver Disease and Hepatocellular Carcinoma associated with obesity and diabetes:

In the U.S., the greatest proportional increase in cases of Hepatocellular carcinoma (HCC) has been seen among Hispanics and non-Hispanic Whites between 45 and 60 years of age. In our region, cancer is second only to heart disease as cause of death (Table 5), with HCC expected to become the second most frequent cause of cancer death among Hispanic men. In South Texas, HCC incidence is twice the national rate. This is likely an underestimate since HCC rates are generally underreported, particularly among Hispanics.\(^25,26\) Hospital discharge data (based on HCC ICD-9 155.0) from South Texas, shows a similar steady increase in HCC since 2000. These alarming HCC rates appear related to NAFLD.\(^27\)

NAFLD is highly associated with obesity and diabetes and represents a spectrum of liver injury from simple steatosis to steatohepatitis that can progress to advanced fibrosis, cirrhosis and HCC. We reported high prevalence of obesity (BMI≥30 kg/m\(^2\); 51%), metabolic syndrome (44%), hepatic steatosis (52%) and elevated ALT (40%) in RHP5 predicting a high prevalence of NAFLD.\(^9,10\) Participants with elevated ALT
were younger, particularly men, were more obese and significantly more likely to have metabolic syndrome and higher Insulin Resistance. Hepatic steatosis was present in 52% of a sequential subset of the CCHC participants. Recent publication on the health of young Hispanic men in RHP5 confirms this trend of extremely high risk for development of liver disease.

The weighted prevalence of HCV antibody is 2.3% (n=1,131, 95% CI, 1.2-3.4). Finally, heavy alcohol consumption affected 3.1% of RHP5 predominately males. Population attributable fractions for liver disease is 7.0% for HCV, but 51.2% for central obesity and 30.0% for diabetes.

Chronic liver diseases result in accumulation of fibrosis which may advance and lead to cirrhosis; the major risk factor for HCC. Liver cirrhosis was estimated using aspartate transaminase to platelet ratio index (APRI) score >= 2, a sensitive and highly specific predictive marker of cirrhosis. The prevalence of cirrhosis is 0.94% which is 4-fold higher than the reported national prevalence of 0.27%. The highest prevalence (1.87%) was observed in the 25-34 age group, predominantly in male subjects. Risk factors independently associated with cirrhosis included central obesity, diabetes, HCV and heavy alcohol consumption with a remarkable population attributable fraction of 65.3% from central obesity. The prevalence of advanced fibrosis (APRI >=1) was 4% and reached 5.22% in the 25-34 age group and 5.07% in the >65 age group. Here again, central obesity was identified as the major risk factor. Individuals with both central obesity and heavy alcohol consumption had cirrhosis or advanced fibrosis at a young age. No known risk factor of cirrhosis was identified in 20% of the subjects.

This suggests that the < 50 age group will be an important population for the detection of early liver disease and the prevention of cirrhosis and HCC. Previous studies in the CCHC emphasized the need for chronic disease intervention in younger Mexican Americans, particularly men. In this study, men had a higher overall prevalence of fibrosis (17.4%) than women (12.1%).

Peripheral Artery Disease: The LRGV has the highest rates of non-traumatic amputation in the nation (Figure 5). In a recent study of over 400 participants in the CCHC we find that 16.7% of the participants have evidence of sub-clinical peripheral artery disease (PAD). Another 13.6% have evidence of foofisease. These participants also reported walking impairment in response to a standardized questionnaire. These individuals are the ones who are likely to progress to severe impairment, ulcers and amputations. The main problems faced in the LRGV are poorly controlled diabetes and lack of access to medical care with the result that diabetes is uncontrolled and patients do not understand the preventive care needed to prevent these devastating and crippling complications of their disease. The foot models in Figure 6 are currently being evaluated in Cameron County as a tool for educating patients with diabetes to emphasize the importance for patients at risk of amputations. Diagnosis and intervention cardiovascular surgery which can prevent amputations are not widely available as they are elsewhere in the nation. 

Impact on the Causes of Death in RHP5

Heart disease remains the major cause of death in RHP5 but it is critical to note that obesity and diabetes are major preventable risk factors for this condition (Table 5). Recent data from the CCHC show that the most common CVD pathology is chronic heart failure, which is usually silent and undiagnosed for many years before decompensation and overt heart failure such that there may be considerable, and significant underreporting of this condition.6

Underlying diabetes and obesity are important risk factors that also weigh heavily on most of the causes of death in RHP5 including malignant neoplasms the second most common cause of death. In addition, obesity and diabetes are key determinants of respiratory disease, strokes, renal disease and liver disease. Less clear is the potential role of mental health conditions including depression. This is not because mental health conditions are not prominent, but mainly because they are often not diagnosed or not entered into the potential diagnoses in the patient records. Furthermore, for example, the Texas Cancer Registry only receives reports from hospitals, and if patients cross to Mexico or go elsewhere for care as they often do if uninsured, they will not appear in the records. Since RHP5 is on the border many people go across the border for health care and medications. There is no good way to track this or measure its impact on disease reporting.

Impact on Hospitalization and Clinic Usage by Diabetes and Obesity

In this needs assessment we have tried to assess the impact of the major conditions of obesity, diabetes and depression on a number of events or outcomes including principle diagnosis, clinic visits, hospitalization, length of hospitalization, emergency department use, intensive care unit admission and length of stay.

Table 6 shows the proportion of people hospitalized with principle diagnoses that also had underlying type 2 diabetes drawn from the Texas Hospital Discharge databases for 2014-2016. Consistent with what was reported in the original needs assessment, many of these principle diagnoses have a much higher proportion of diabetes as ancillary diagnosis than would be expected from the prevalence of diabetes in the general population. Not at all surprising is the high proportion of heart attacks, strokes, hear failure renal disease, hypertension, limb ulcers and sepsis associated with diabetes. What is more surprising is the high proportion of people with Alzheimer’s disease with underlying diabetes and it strongly suggests considerable difficulty in diabetes control among those with Alzheimer’s disease. These data show that prevention of diabetes would be perhaps the single most important goal for decreasing the overall frequency and cost of health services. It is known that prevention of diabetes is much more effective than control of diabetes in reducing the high impact of diabetes on lost wages32-34, and it appears that such is likely true for reducing hospitalizations as well. Given the high prevalence of pre-diabetes in our population (see CCHC data below), the prevention of progression to diabetes should be a major focus.

<table>
<thead>
<tr>
<th>Causes of Death RHP5 2013&amp;2014</th>
<th>N</th>
<th>Rank</th>
<th>Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of the Heart</td>
<td>3289</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>2811</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>648</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Total accident</td>
<td>577</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>573</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Chronic liver disease and cirrhosis</td>
<td>561</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>474</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>417</td>
<td>8</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>261</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Renal Disease</td>
<td>219</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Other not classified</td>
<td>4073</td>
<td>100808</td>
<td></td>
</tr>
<tr>
<td>All Causes</td>
<td>14434</td>
<td>183303</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Causes of Death in RHP5 compared to Texas.
An effort to examine the impact of obesity and depression in a similar fashion was unsuccessful. This appears to be because obesity is rarely inserted as an underlying diagnosis, and similarly it appears that depression may not be evaluated consistently in hospitalized patients with other primary diagnoses because the frequency of depression as a secondary diagnosis was very low. This observation suggests that much more work needs to be done to provide all of the relevant diagnoses for hospitalized patients in order to evaluate the impact of these underlying conditions (e.g. diabetes, obesity and depression) on the frequency of hospitalization as well as the length of hospitalization.

Similarly, we examined the impact of diabetes and obesity on clinic visits for RHP5. Table 7 shows the number of clinic visits by condition with the percentage of underlying diabetes and obesity. These data support the conclusions above that prevention of diabetes (and obesity) are major obstacles to reducing costs of hospitalizations and clinic visit. Similar to hospital discharge data, the proportion of those with heart disease, stroke, renal disease, hypertension, liver disease and even cancer (as well as Alzheimer’s) are well above the expected prevalence based on the prevalence of diabetes in the general population.

Note the section on cancer (see Other Health Issues). Many of the prevalent cancers in the community are highly associated with obesity and diabetes.

**BEHAVIORAL HEALTH AND SUBSTANCE ABUSE NEEDS ACROSS THE RHP5**

Behavioral health is a problem in the community. In the CCHC population based sample, 27.8% overall have depression, and 16.4% measures of cognitive impairment, with high levels in women. Importantly, depression is strongly associated with having a diagnosis of diabetes.\textsuperscript{15,16,35} Regardless of whether the depression is due to the diabetes, depression increases the difficulty of attaining good diabetes control (HbA1c <9%). On the other hand, people unaware that they have diabetes, do not have higher levels of depression than those without

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total</th>
<th>DM %</th>
<th>Obese %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Heart Disease</td>
<td>2071</td>
<td>1125</td>
<td>54.3%</td>
</tr>
<tr>
<td>2. Stroke</td>
<td>284</td>
<td>159</td>
<td>56.0%</td>
</tr>
<tr>
<td>3. Chronic Kidney Disease</td>
<td>1600</td>
<td>1049</td>
<td>65.6%</td>
</tr>
<tr>
<td>4. Hypertension</td>
<td>11558</td>
<td>6476</td>
<td>56.0%</td>
</tr>
<tr>
<td>5. Chronic Liver Disease</td>
<td>172</td>
<td>86</td>
<td>50.0%</td>
</tr>
<tr>
<td>6. Cancer</td>
<td>698</td>
<td>258</td>
<td>37.0%</td>
</tr>
<tr>
<td>7. Hyperlipidemia</td>
<td>14952</td>
<td>7469</td>
<td>50.0%</td>
</tr>
<tr>
<td>8. Diabetes</td>
<td>10160</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>9. Obesity</td>
<td>16345</td>
<td>5527</td>
<td>33.8%</td>
</tr>
<tr>
<td>10. Depression / Anxiety</td>
<td>4043</td>
<td>1371</td>
<td>33.9%</td>
</tr>
<tr>
<td>11. Alzheimers / Dementia</td>
<td>222</td>
<td>88</td>
<td>39.6%</td>
</tr>
<tr>
<td>12. Eclampsia</td>
<td>10</td>
<td>3</td>
<td>30.0%</td>
</tr>
</tbody>
</table>

Table 7: Diabetes and obesity underlying major medical conditions seen in RGV clinics.
diabetes. This latter observation suggests that depression does not cause diabetes in of itself, but that diabetes has a major effect on mental health. Depression is also highly associated with obesity.

In 2016, the Meadows Mental Health Policy Institute and the Valley Baptist Legacy Foundation conducted a comprehensive review of the mental and behavioral health system in the 4 counties that comprise RHP5, with participation from health service providers and the two local mental health authorities (LMHA’s) serving the Rio Grande Valley.

The assessment established that 25% of the estimated 1.2 million people ages six or older in the Rio Grande Valley have some level of mental health need. There are 45,000 adults and 25,000 children with the most severe needs with most of these individuals living 200% below the federal poverty level. The most prevalent conditions among adults are major depression, post-traumatic stress disorder, and alcohol dependence disorder. The most prevalent conditions for children and youth are self-injury/harming behaviors, substance used disorders, and depression.

The largest service gaps identified relate to crisis services and ongoing intensive treatments that provide out-of-home placement for children and youth as opposed to inpatient care. There are service gaps in affordable housing and lack of residential treatment for patients with alcohol and substance use disorders.

Other service limitations include:

- Unmet needs due to population growth
- Lack of robust programs for crisis diversion for youth and adults
- Lack of recourses that impact that ability to provide case-management and prevent super-utilization
- Underdeveloped continuity of care across inpatient and community-based outpatient services
- Lack of residential treatment for alcohol and substance use disorders
- Limited diversion from incarceration programs for individuals with behavioral health needs

Among individuals with behavioral health needs, approximately 80% of adult needs and 66% of pediatric needs could be classified as mild to moderate behavioral health needs. The report indicates that these specific types of needs can best be addressed at the primary care level. An Integrated Behavioral Health care approach should be used and adopted more widely to address these needs. Integrated Behavioral Health (IBH) is a holistic approach to care where the physical and behavioral health needs of a patient are addressed through research-based approaches and a team approach to care. Briefly, the IBH model tends to include a behaviorist as part of the care team who is included in the preparation of the day’s cases, is always available for warm handoffs from the providers during the patient visits, and provides on-going case management of the patient so that the behavioral issues are addressed with someone who has the expertise and time but coordinates fully with the other providers on the team.

The Behavioral Health Systems Assessment provides action steps for addressing the unmet needs in RHP5. The report also indicates that while there is strong leadership and expertise from organizations in the region for the provision of behavioral health care, there are unmet needs across the spectrum of behavioral health conditions.

Health Education and Preventive Services

Through the Random Dialing Landline Telephone Survey (RDLTS), 47% reported obtaining health information from their doctor; higher than the 43% nationally, 19% from the internet, almost identical to the US rate. However, this information is deceptive because few of the population now have land lines, particularly those of lower economic status who are the most vulnerable. In fact, the region has one of the
The largest digital divides in the nation, with two of the lowest rates of computer ownership and Internet use by individuals (https://www.dallasfed.org/~media/microsites/cd/colonias/econop.html). However, data from the CCHC demonstrate that over 80% have access to digital phones capable of text messaging, a favorite means of communication in the RHP5. However, this does not equate to access to online sources of information. According to the Centers for Disease Control (CDC) Community Guide to Preventive Services, the Community Wide Campaign (CWC) model is an effective tool to increase physical activity and other lifestyle change behaviors. “Many community sectors work together to implement community-wide campaigns to increase physical activity using highly visible, broad-based, multicomponent strategies (e.g., social support, risk factor screening, health education). Campaigns may focus on physical activity alone or include other cardiovascular disease risk factors such as nutrition and tobacco use” (https://www.thecommunityguide.org/findings/physical-activity-community-wide-campaigns). The CWC model includes the use of media, small group support, tailored individual education and community events to create awareness, coupled with environmental and policy changes to increase individual’s access to healthy options, like fruits and vegetables and safe, affordable places to exercise. However, this requires substantial environmental and policy changes within the community and municipalities in order to create the conditions where these activities are available. This is a major goal of the CWC model.

The CWC model with CHW led health education has been effective in one county in the region and could be expanded to other areas. A Cameron County based CWC prevention program provided free exercise classes, support for built environment infrastructure (trails, sidewalks, lighting, community gardens, etc.), policy implementations focused on active living and food access, local media campaign and CHW-small group and home-visit delivery model in nine cities in Cameron County. The CWC has reached over 8,000 individuals with prevention education focused on lifestyle change and weight-loss as a means to prevent chronic diseases like diabetes, hypertension and address low-levels of depression. Body Mass Index (BMI), physical activity and fruit/vegetable consumption were measured as outcomes. In 2017, 42% of the 1,747 participants reached with at least two CHW encounters decreased their BMI by at least one point and 67.5% lost weight. Thirty-one percent of participants who did not meet physical activity recommendations at first encounter, did so by the final visit and 45.8% of individuals showed an increase in fruit and vegetable consumption at their final follow-up visit (https://www.thecommunityguide.org/findings/physical-activity-community-wide-campaigns). Given the region’s unique needs including a highly uninsured low-income population with limited access to healthcare, this is a promising evidence-based approach to address the health education and prevention needs of the region.

The Community Preventive Services Task Force (CPSTF) also recommends interventions that engage community health workers to prevent cardiovascular disease (CVD) among clients at increased risk (https://www.thecommunityguide.org/findings/cardiovascular-disease-prevention-and-control-interventions-engaging-community-health). There is some early evidence for this approach in the region, as the first wave of 1115 waiver funded projects implemented this approach with positive outcomes.

Community Health Workers (CHW) are effectively utilized in the region to deliver community-based prevention and health education and there is a need to expand this workforce to cover the large number of low-income, uninsured.

There are other initiatives in the region that are focused on health promotion and disease prevention. One of these is Unidos Contra la Diabetes (UCD), a cross sector collective impact effort focused on reducing the prevalence of diabetes in the Rio Grande Valley. Through this initiative, fifty organizations are working together and partnering to create systems changes that will support diabetes prevention. Strategies toward this effort were implemented in 2016.
ACCESS TO CLINICAL SERVICES/HEALTH PROFESSIONAL AVAILABILITY

Access to comprehensive, quality health services is important for the achievement of health equity and for increasing the quality of a healthy life for everyone. Access to health services means the timely use of personal health services to achieve the best health outcomes. It requires three distinct steps: 1) Gaining entry into the health care system; 2) Accessing a health care location where needed services are provided; and 3) Finding a health care provider with whom the patient can communicate and trust.15

Medication and Lack of Treatment

Nearly half the patients diagnosed with diabetes are not on appropriate medications. Table 8 shows how widespread this is in the community.2 Combining that with the fact that 43% of adults with diabetes are undiagnosed shows that only about 30% of those with diabetes in the community are under adequate treatment.

The CCHC program has tracked access to health services since 2004 (Table 9). In the earliest 6-7 years, the prevalence of insurance was 31.4% for all types of health insurance (private, Medicaid and Medicare). Only 11.9% had private health insurance. In those early studies, males were significantly more likely to have health insurance and 88% of those over 65 have insurance from Medicare. Factors associated with not having private insurance in RHP5 include being born in Mexico, years living on the border, poverty and not completing high school. Being employed or married increased the chance of having private health insurance. While we do not know how each factor limited access to health services, they provide an overall portrait of those without insurance and access. However, obtaining diagnosis and treatment is not related to being employed or even better educated. Since much employment is hourly, taking time off work is costly, and is often with employers not offering insurance.4 Furthermore, focus group studies confirm that fear (now exacerbated by current political climate) and denial are also important barriers to accessing health care in this population.19 Presently, however the recent data (Table 9) suggest that the ACA may have played a larger role than anticipated in RHP5 because we now see that 42% of the CCHC has some form of health insurance and since the largest increase is in private insurance it strongly suggests the impact of the ACA. This represents a 25% increase in the number of insured. In addition, much of this is impacting the female population and those in the ages of 18-64.

The Current Health Service Infrastructure and Environment

The health service environment is highlighted by substantial deficits in numbers of health professionals in many areas such as primary care, family medicine, general medicine, mental health, community health and public health against a backdrop of substantial health burden of chronic disease with substantial
health disparities and unmet behavioral health needs (Table 10). The severity and wide distribution of chronic disease explains much of what is seen in everyday health service provision where individuals see their provider late in illness, often in the emergency rooms.

### Number/Type of Health Professionals

#### Physicians:
As of September 2017 there are 1,479 physicians in RHP5 who provide direct patient care, among whom 766 provide primary care. There are 101 direct care physicians and 52.6 primary care physicians per 100K population in RHP5 and these are 42% and 44% respectively less than the Texas average, and this places RPH5 at the 67th rank compared to Texas Counties for direct care physicians and 93rd for primary care physicians. The number of direct care and primary care physicians has not kept pace with the population growth resulting in fewer physicians per 100K population. This is in contrast with the very high degree of health disparities and disease burden, particularly of obesity and diabetes, in the population. There are 39 family medicine physicians, that is, 2.9 per 100K population. This is 30% fewer family physicians per 100K population compared to the Texas average. Similarly, there are 15.5 family practice physicians per 100K population, fully 25% lower than the Texas average of 20.2 family practice physicians per 100K population. There is only half the number of general practitioners per 100K population in RHP5 compared to Texas average of 2.6 per 100K. Pediatrics is the only area where there is parity, indeed higher number per 100K in RHP5 (13.8) compared to 12.8 per 100K in Texas. However, the population in RHP5 is substantially younger than the Texas population as a whole (Table 1). While some of this will likely change with the start of the UTRGV School of Medicine, that will require several years to mature as medical students graduate and remain as interns and residents, and as further residents are recruited from outside the RGV.

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Pop/Worker</th>
<th>Workers/100K Pop</th>
<th>Rank in Counties</th>
<th>Ratio RHP5/Texas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Health Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>398</td>
<td>3570</td>
<td>27.3</td>
<td>~9</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>3855</td>
<td>7325</td>
<td>13.7</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Dentists</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>333</td>
<td>7078</td>
<td>22.9</td>
<td>~115</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>13,216</td>
<td>2136</td>
<td>46.8</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>Emergency Medical Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>2131</td>
<td>625</td>
<td>146.3</td>
<td>~233</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>62003</td>
<td>455</td>
<td>219.6</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>Nurses LVN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>4321</td>
<td>337</td>
<td>296.8</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>80993</td>
<td>349</td>
<td>286.8</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td>Nurses RN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>7392</td>
<td>197</td>
<td>507</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>224780</td>
<td>125.6</td>
<td>795</td>
<td>0.63</td>
<td></td>
</tr>
<tr>
<td>Nurse Practitioners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>421</td>
<td>3458</td>
<td>28.9</td>
<td>143</td>
<td>0.58</td>
</tr>
<tr>
<td>Texas</td>
<td>14,191</td>
<td>1990</td>
<td>50.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Care MDs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>1479</td>
<td>984</td>
<td>101</td>
<td>67</td>
<td>0.56</td>
</tr>
<tr>
<td>Texas</td>
<td>50948</td>
<td>554</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Care MDs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>766</td>
<td>1901</td>
<td>52.6</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>20578</td>
<td>1372</td>
<td>72.9</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Psychiatrists</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>41</td>
<td>35,511</td>
<td>2.8</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>2112</td>
<td>13,371</td>
<td>7.5</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>Psychologists</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5 (2010)</td>
<td>160</td>
<td>9099</td>
<td>11</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>Texas (2010)</td>
<td>7639</td>
<td>3696</td>
<td>27</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Physicians Assistants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHP5</td>
<td>401</td>
<td>3631</td>
<td>27.5</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Texas</td>
<td>7617</td>
<td>3707</td>
<td>27.0</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Health professionals in RHP5 compared to Texas. DSHS Center for Health Statistics RHP5 Pop. 1,455,971 Texas Pop. 28,240,245.
Nurses: There are 4,321 Licensed Vocational Nurses (LVN) in RHP5 at a rate of 297/100K population which is just over the rate of 287 for Texas. The growth of the LVN workforce has kept up to a large degree with population growth. However, for Registered Nurses (RN) the 7,392 RNs provide an average of 507/100K population, fully 37% below the rate of 795/100K overall in Texas. The situation is even worse for nurse practitioners. Thus for RNs and Nurse Practitioners, despite the heavy disease burden and disparities, the available workforce per 100K is substantially below that of average rates in Texas.

Community Health Workers (CHW): This category of health worker is relatively newer than the other categories in this report, and CHWs in many Hispanic cultures are common, and thus in RHP5 the rate of 27.3/100K, though low, is nevertheless higher than the Texas average of 13.7/100K population. This is more reflective of the longstanding presence of CHWs (known in Spanish as ‘Promotores’) in South Texas than a reflection of an adequate or really robust CHW presence. This category of health worker is gaining stature throughout the US as these local residents and community members are able to communicate with a cultural acuity and authenticity that the more professional and especially outsiders do not possess. They are trained and certified through a 160 hour Department of State Health Services course to provide culturally competent education, lifestyle and behavior change support, and to help navigate clients to social services and through the healthcare system. There are 8 RHP5 DSRIP projects (out of 78 total projects) that used CHWs during the first phase of the waiver. The number of CHWs in the region has grown due to waiver support and innovative deployment of health workers has resulted in effective approaches to delivering health education and prevention outside of the clinic/medical office setting. The region has several CHW support networks which allow the certified CHWs to obtain require hours of continuing education and share best practices. Many of the DSRIP projects for RHP5 will feature the role of CHW in delivery of effective health services at a low cost.

Physician Assistants (PA): This is another area where RHP5 is equally supplied as Texas as a whole. However, given the very significant deficit in physician numbers, these valuable members of the Health Workforce remain inadequate to achieve more complete community care. As managed care becomes more common in RHP5, we expect the numbers of PAs to increase.

Nurse Practitioners (NP): This is yet another group of providers able to expand primary care under the guidance of physicians. Currently the proportion of NPs in RHP5 is just over 50% (28.9/100K) compared to Texas (50.2/100K). Although this is a large increase from 2012, it is nevertheless 42% lower compared to Texas. Along with PAs, this group will greatly expand the availability of primary care, and will also likely, along with PAs, provide liaisons with sources of telemedicine for both primary care and selected specialty care where both are in short supply.

Behavioral Health Professionals (psychiatrists, psychologists, social workers): Texas has one of the lowest ratios of psychiatrists to 100K population of any state in the nation and ranks 49th in spending for mental health per capita. RHP5 has 2.8 psychiatrists/100K population, 33% of the already low level of 7.5/100K population in Texas. Similarly, there are 11 licensed psychologists/100K in RHP5 compared to 25.8/100K in Texas. Again, RHP5 has 40% of the rate of mental health professionals as in the state. There are about 45 social workers/100K in RHP5 compared to 68/100K in Texas so a 35% lower rate of social workers in RHP5 compared to Texas overall.

Dentists: The situation with dentists in RHP5 is second in deficit only to mental health professionals. There are only 22.9 dentists per 100K population compared to 46.8 in Texas. This is nearly a 50% difference in the number of dentists in RHP5 compared to Texas population as a whole.
Health Professional Shortage Area
RHP5 has long been a health professional shortage area (HPSA) with particular difficulty in recruiting and retaining primary care and specialist physicians, nurses and physicians. The poverty, remoteness, lack of an academic health educational center, and cultural and language barriers all contribute to the difficulty in recruiting and retaining health professionals.

Hospital Sizes and Status
Hospitals in RHP5 range in size from 49 beds in a small county hospital to over 500 beds in the two largest hospitals in each of the two largest counties (Table 11). Many are full service hospitals. There are no trauma units under level 3. All of the general hospitals in the region are for profit.

Healthcare Services
The services provided are diverse, with the understanding that many specialty areas are not available in RHP5.

RHP5 Health System
The health system of RHP5 is composed almost entirely of for-profit hospitals. There are Federally Qualified Health Centers (FQHC), county health clinics, and private practitioners who constitute the remainder of the health system. There is no hospital district in three of the counties, including the two largest. Private hospitals are the safety net for all of the population. Specialty care is provided in RHP5 where possible, but many people are referred to UTMB or other larger medical centers often with funds from the county indigent care program. However, these funds are limited and often are consumed within a few months of the beginning of the fiscal year. Finally, many people cross the border to Mexico for a range of services from diagnostic, to treatment including the purchase of drugs that are available without prescription in the border towns of Mexico.

Health Service Costs
The costs of health services have been heavily weighted toward Medicare and Medicaid in RHP5, however that appears to have changed to some degree with an increase in overall availability of insurance (increased from 30.1% in 2011 to 43% in 2017). Because of the lack of access to preventive health services and the high burden of chronic diseases, people are often seen in crisis in emergency departments with advanced manifestations of chronic disease and this drives up the overall cost of health services.
treatment and adds to the burden of indigent care of the hospitals and the health system. For example, Table 12 shows the estimated added length of stay in hospital when diabetes obesity or depression are present thus adding cost to the hospitalization.

OTHER HEALTH ISSUES

Obesity, diabetes and cancers: Several significant complications of obesity and diabetes are frequently found in these populations. Table 13 compares incidence and mortality from several cancers in south Texas, with rates in Texas and the nation. Many of these cancers are associated with obesity and are classically cancers of the gut, such as stomach and liver. Significantly higher rates of liver and stomach cancers are seen (Figure 7). In the CCHC we find that liver cancer is the third most commonly reported cancer in close relatives who are men and sixth for women, and stomach cancer is 4th in men and 5th in women. When we look at data from local Federally Qualified Health Centers (FQHC), we find that among patients with advanced liver disease, 9.7% report alcohol abuse, but 77.7% have no history of alcohol use, and are therefore classified as non-alcoholic fatty liver disease (NAFLD). Very few have hepatitis C (HCV), since the weighted prevalence of antibody is 2.3%. Similarly, the weighted prevalence of Hepatitis B Surface antigen is 3.35%. Neither infection is significantly contributing to chronic liver disease in our population. Patients with chronic liver disease who report alcohol abuse are almost exclusively men. Along with diabetes and obesity we are experiencing an epidemic of NAFLD in our region, leading to high rates of cirrhosis and liver cancer. Given the low level of health insurance, this leads to large numbers of patients who should be eligible for transplantation yet are without access. For liver and stomach cancer, late diagnosis leads to increased mortality. Liver cancer is a result of continued insults to the liver. This cancer used to be mostly due to viral infections and alcohol abuse, but recently liver cancer is becoming epidemic, with rates rising internationally, mostly associated with obesity and diabetes. As shown in Table 13 the rates of liver cancer in Texas are 10.3/100,000. This compares with 8.4/100,000 nationally. Figure 7 shows the relative amounts of liver cancer, and in south Texas rates, colored deeper red on the map, rates as high as 16/100,000 are reported. Since all these reports come from hospitals, and so many of the population are uninsured, it is reasonable to assume these are underestimates. Liver cancer is preceded by fibrosis of the liver and cirrhosis. Accordingly, we estimated rates of these preconditions in the CCHC.
and found that about 19% of this population based sample had liver fibrosis, and by far the biggest risk factors in these people were obesity and diabetes.\textsuperscript{9,10,14}

**Other Common Cancers:**

**Cervical Cancer:** Table 13 shows cervical cancer to be common in the region. Many uninsured women do not have access to Pap smears. Recent efforts funded by CPRIT, have led to screening of an additional 10,000 eligible women not screened in the last three years. Among these, 11.4\% required colposcopy for further diagnosis, and 2.6\% of them required treatment. Thirteen were diagnosed with cancer, 9 cervical and 4 endometrial cancers. Lack of access to this kind of screening and care is widespread in the region. Access to mammography for early detection of breast cancer is also lacking.

**Pediatric data:** Data from the Cameron County Hispanic Cohort show that Hispanic children and adolescents (ages 8 to 18) have high prevalence of central obesity. Thirty percent of the children studied were obese or overweight, with a high prevalence of central obesity (54\% vs. 33\% nationally). Among children with central obesity, there are many indicators of metabolic diseases such as prediabetes and fatty liver disease, as well as dyslipidemia and hypertension. Children with central obesity had significantly higher prevalence of the components of the metabolic syndrome. They had significantly higher BMI, waist-to-hip ratio ($p<0.0001$), systolic and diastolic blood pressures, triglycerides and low density lipoprotein (“bad cholesterol”). They also had lower high density lipoprotein (“good cholesterol”) and lower adiponectin which is protective against heart disease. They had higher insulin resistance and higher liver function tests suggestive of fatty liver disease which can lead to cirrhosis and even liver cancer. These findings were more common in females.

**Men’s Health:** The health of men in the region is particularly poor, especially younger men. Table 14 shows alarming rates of obesity and diabetes as well as other adverse health measures in men under the age of 35 years. In addition, their higher rates of smoking, drinking, and liver enzyme levels show that this population is at particular risk of NAFLD. This population of young men is especially difficult to access since they

<table>
<thead>
<tr>
<th>Table 13: Incidence and mortality from cancers in south Texas compared with State and National Data.</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National and State Data</td>
<td>South Texas Recruitment Counties</td>
</tr>
<tr>
<td>Age adjusted rates/100,000</td>
<td>US (NCI 2015)</td>
<td>Texas</td>
</tr>
<tr>
<td>Liver</td>
<td>8.2</td>
<td>10.3</td>
</tr>
<tr>
<td>Stomach</td>
<td>7.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Pancreas</td>
<td>12.4</td>
<td>11.8</td>
</tr>
<tr>
<td>Colon/Rectum</td>
<td>42.2</td>
<td>40.2</td>
</tr>
<tr>
<td>Lung</td>
<td>58.7</td>
<td>58.1</td>
</tr>
<tr>
<td>Kidney</td>
<td>15.6</td>
<td>18.1</td>
</tr>
<tr>
<td>Prostate</td>
<td>137.9</td>
<td>115.7</td>
</tr>
<tr>
<td>Cervix Uteri</td>
<td>7.7</td>
<td>9.2</td>
</tr>
<tr>
<td>Breast</td>
<td>124.8</td>
<td>113.1</td>
</tr>
</tbody>
</table>

**Table 14: Analysis of the health of men in the CCHC.**

<table>
<thead>
<tr>
<th>18-34 yrs</th>
<th>35-64 yrs</th>
<th>≥55 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese (BMI&gt;30kg/m²)</td>
<td>49.9</td>
<td>52.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>16.9</td>
<td>26.3</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>51.3</td>
<td>60.6</td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>33.7</td>
<td>42.5</td>
</tr>
<tr>
<td>Elevated triglycerides</td>
<td>37.5</td>
<td>56.9</td>
</tr>
<tr>
<td>Elevated LFTs</td>
<td>70.2</td>
<td>70.4</td>
</tr>
<tr>
<td>Health insurance</td>
<td>19.2</td>
<td>30.5</td>
</tr>
<tr>
<td>Current smoker</td>
<td>35.4</td>
<td>29.5</td>
</tr>
<tr>
<td>Sometimes drinks alcohol</td>
<td>61.3</td>
<td>65.0</td>
</tr>
<tr>
<td>Heavy Drinking</td>
<td>8.2</td>
<td>7.5</td>
</tr>
</tbody>
</table>
rarely seek medical care, have low rates of insurance, and often a belief that neither are of importance to them.\textsuperscript{11}

**The Microbiome on the border:** Distribution of microbiota in stool samples from the Human Microbiome Project (HMP) and the Cameron County Hispanic Cohort. The CCHC specimens have a distinct pattern differing from HMP pattern, and consistent with studies of the microbiome in obesity (Figure 8).\textsuperscript{37}

**Dengue and West Nile on the border:** Dengue and West Nile are endemic along the US-Mexico Border and have been for many years. In 2004, estimates of past infection were 40\% seroprevalence in Brownsville, TX, and 78\% in Matamoros, Tamaulipas, Mexico, across the border. Dengue antibody prevalence in Brownsville (denoting past infection) estimated from CCHC data in 2012 was 38\%. In 2017, the prevalence in recently recruited CCHC participants has risen to 54\%. Since Zika is spread by the same mosquito (Aedes \textit{egypti}), we can assume that this virus will also become endemic. West Nile virus is also endemic in the area with prevalence of antibody estimated at around 15\%. The increase in rates in Matamoros compared with Brownsville may be attributed to a larger population, with more crowding and poor housing, thus increasing mosquito exposure.

**Other Infectious diseases of importance in the region:** Diabetes is the biggest risk factor for tuberculosis on the Texas/Mexico border and this program was among the first to report this important risk factor with studies among tuberculosis patients both sides of the border (Table 15 and Figure 9). This observation has now been recognized internationally by the World Health Organization and other agencies. We now know that in RHP5 the population attributable fraction (PAF) for TB (14.4\%) in diabetes is considerably higher than that for AIDS (6.4\%) because of the sheer number of people at risk. Table 15 shows that the risk for TB in diabetes differs from the classical risks (drug and alcohol abuse, incarceration etc.) in that it affects more women and more middle aged individuals.\textsuperscript{38,39} At the same time this program was also among the first to report increased resistance of TB isolates in patients with diabetes, compared with those without.\textsuperscript{40,41}
SUMMARY

The relative health needs of RHP5 remain somewhat the same. That is that obesity (51% of adults) and diabetes (27.8% of adults) still top the list primarily because they are the big risk factors for a very wide range of costly and debilitating conditions. It is clear that addressing diabetes in particular would dramatically reduce the disease burden and improve not only the health of RPH5 but also the economic health of the region. The overall economic cost of diabetes and obesity in RHP 5 is well over a billion dollars annually including cost of care and lost wages, not to mention the social and emotional cost to individuals and families. The majority of cases of heart disease, liver disease, renal failure, blindness, amputations, and even depression are associated with diabetes and obesity. Longer hospitalization times, more frequent emergency and clinic visits are attributable to diabetes and obesity and their related conditions. Most will not know that diabetes is the number one risk factor for TB in RHP5. In addition infections by influenza and pneumococcus are more virulent in those who are obese and or with diabetes. 32% of the population has pre-diabetes and there is no coherent program to address this that is apparent in RHP5. Without addressing this issue, it is difficult to see how RHP5 will reduce the future burden of diabetes and obesity. The goals of the new DSRIP program are aimed in part to address diabetes but there are no indications that pre-diabetes is addressed in the bundles.

Cancer is the second leading cause of deaths in RHP5 and the leading cause of deaths in Hispanics in general. Because cancer is a generic term for many types of cancers, it is clear that this has not yet entered into the general perception of a need. Moreover, obesity is leading the way toward equality with smoking as the major risk factor for many cancers and diabetes simply enhances that risk. So in terms of cancer, the two major issues that need to be addressed in RPH5 have nothing to do with clinical care, but rather lifestyle management including smoking, diet and physical activity. It is important to recall that 75% of diabetes, heart disease and cancer are preventable (according to ADA, AHA and ACS). We have highlighted liver cancer as an important example of a cancer associated with obesity and diabetes in the assessment. However, breast cancer, GI cancers including pancreatic cancers, all strongly associated with obesity and diabetes are high on the list of cancers in RHP5.

Behavioral health is clearly a major issue, one that is in the minds of the community and in the minds of many in the health profession. However, the data for assessing it are very limited making it difficult to assess the burden and impact of depression, anxiety, dementia, and substance abuse. What is clear from the general scientific literature and from some limited work in RHP5 is that depression usually accompanies all chronic diseases, e.g. diabetes, heart disease, cancer, and the presence of depression reduces self-management effectiveness and even enhances early death from cancer despite treatment. We have no data on the impact of behavioral health on frequency of clinic visits, hospital visits, length of hospital stay etc. The issue is that behavioral health, especially mild to moderate depression, and substance abuse are poorly assessed and almost never entered into the diagnostic list impeding the ability to assess its overall impact. One of the key things that is needed is better training of service providers to assess and diagnose behavioral health in their patients and indeed in all their populations for clinics. Without better population based and clinic based information assessment of the impact is very limited and probably way under estimated.

Health service accessibility is a major issue in RHP5. Over 50% of RHP5 has little or no access to health services because of lack of insurance. In addition as shown RHP5 remains woefully understaffed for providers especially primary care providers. Everyone recognizes this as a key issue and we show data in this assessment that it profoundly affects whether people get diagnosed and treated when they have
diabetes, as well as hypertension and high cholesterol among other things. We show that a substantive portion of the population (21%) has evidence of early heart failure. All of these conditions require the availability of a medical home where these conditions can be diagnosed and treated. Furthermore these are one again mostly preventable and therefore should be approached with new ideas and new methods that are community based in partnership with health professionals.
DATA SOURCES AND REFERENCES


APPENDIX A: GLOSSARY OF ACRONYMS

BRFSS: Behavioral Risk Factor Surveillance System
CCHC: Cameron County Hispanic Cohort
CHW: Community Health Worker
CIMT: Carotid Intima-Media Thickness
CPRIT: Cancer Prevention Institute of Texas
CVD: Cardio Vascular Disease
CWC: Community Wide Campaign
DM: Diabetes Mellitus
DSRIP: Delivery System Reform Incentive Program
FQHC: Federally Qualified Health Centers
HMP: Human Microbiome Project
LMHA: Local Mental Health Authorities
LRGV: Lower Rio Grande Valley
NAFLD: Non-Alcoholic Fatty Liver Disease
NCDs: Non-Communicable Diseases
NP: Nurse Practitioner
PA: Physician Assistant
PAD: Peripheral Artery Disease
RDLTS: Random Dialing Landline Telephone Survey
RGV: Rio Grande Valley
RHP5: Regional Health Partnership 5
T2DM: Type 2 Diabetes Mellitus
UTMB: University of Texas Medical Branch
UTRGV: University of Texas Rio Grande Valley