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# Studying Trail Enhancement Plans - Health Impact Assessment

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# **STUDYING TRAIL ENHANCEMENT PLANS – HEALTH IMPACT ASSESSMENT**

**Continental Divide National Scenic Trail – Cuba, New Mexico**

**Final Report – April 2015**

**University of New Mexico Prevention Research Center  
and Step Into Cuba Alliance**



*“The indescribable innocence and beneficence of Nature...such health, such cheer they afford!”*  
*Walden*, Henry David Thoreau (1817-1842)

This report reflects work on the Studying Trail Enhancement Plans - Health Impact Assessment (STEP-HIA) for the proposed new Cuba Continental Divide National Scenic Trail segment as of April 30, 2015. It is provided to the Santa Fe National Forest and Bureau of Land Management New Mexico for use in preparing an Environmental Impact Assessment and subsequent planning for the proposed project. It was prepared by the University of New Mexico Prevention Research Center and Step Into Cuba Alliance, a partnership of individuals and organizations dedicated to the promotion of walking and hiking for better health in Cuba, NM. In this report, we present information by way of a sequential series of questions that support and lead to predictions and recommendations for the new trail segment.



PREVENTION RESEARCH CENTER  
*Prevention & Population Sciences*



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## **I. BACKGROUND**

### ***Q1. What is Health Impact Assessment and why apply it to the proposed Cuba Continental Divide National Scenic Trail segment?***

Health Impact Assessment (HIA) has been defined as “a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects” (National Research Council, 2011b, p. 5).

Although European countries have used HIA for decades for systematic examination of the potential influence of a proposed policy or environmental project on the health and well-being of a specific population, it is only recently that the United States has adopted this approach. In the United States, HIAs have been used primarily to study health effects concurrent with an Environmental Impact Assessment (EIA) under the 1969 National Environmental Policy Act (NEPA). Application to land use and transportation planning is well accepted, and for the past few years, HIA has been successfully applied to trail planning (Clark County Washington Public Health, 2010; Molina, Ito, James, & Arcaya, 2012; South Carolina Institute of Medicine and Public Health, 2013; Wisconsin Bureau of Environmental and Occupational Health, 2011).

The decision of the United States Forest Service Santa Fe National Forest (USFS) and Bureau of Land Management New Mexico Rio Puerco Field Office (BLM) to develop a new Cuba Continental Divide National Scenic Trail (CDT) segment has direct implications for the health and quality of life of people living in and near Cuba, NM (Davis, Cruz, & Kozoll, 2014). The most obvious connection between trails and health is the potential for providing community members and regional visitors with access to attractive, free, safe, and convenient places for outdoor walking and hiking.

The US Task Force on Community Preventive Services (Community Preventive Services Task Force, 2014) recommends creation of, or enhanced access to, places for physical activity as an evidence-based strategy that communities can use to promote physical activity. Increased access to places to be active is also associated with an improvement in social connection and cohesion, community identity and pride, and the economy. Improved economic status is both a determinant of health and a requirement for discretionary time that can be used for recreation. People who are not physically active incur higher medical costs (Pratt, Macera, & Wang, 2000).

### ***Q2. What is the Studying Trail Enhancement Plans - Health Impact Assessment (STEP-HIA) and how can it enhance Cuba CDT segment planning?***

An analysis of a proposed new Cuba CDT segment to comply with requirements of the NEPA is under way with the supervision of the USFS and BLM. In conjunction with this analysis, a university-community partnership, formed by the University of New Mexico Prevention Research Center (UNM PRC) and the Step Into Cuba Alliance, is conducting an HIA that examines the impact of options for the location and design of the proposed trail and trail amenities on future user health and Cuba-area economy and social capital. In order to inform USFS, BLM, Sandoval County, and Village of Cuba planners, the STEP-HIA has inventoried specific options for trailhead access and trail location. The STEP-HIA team has also gathered data from published New Mexico data sets, public health and recreation literature, and samples of potential users. Extrapolation from these data allows forecasting of future trail use and the effects of trail-planning decisions.

***Q3. Why consider health, health disparities, and health equity as part of the Cuba CDT segment planning?***

Many factors predict the health of human populations. Chief among those that can be positively modified are the personal and environmental conditions in which we live, work, and play. In public health and other related fields, these conditions are referred to as personal and social determinants of health. According to the World Health Organization (WHO), “the social determinants of health are the conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power, and resources at global, national, and local levels” (World Health Organization, 2013). Unequal distributions of money, power, and resources may create unfair living conditions for populations, which, in turn, affect their health, thereby leading to health disparities. Healthy People 2020 (Office of Disease Prevention and Health Promotion, 2015) defines health disparity as “a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage.” Health differences result from systematic inequalities that cause different groups to be excluded, marginalized, and/or underserved because of race, ethnicity, religion, socioeconomic status, gender, age, mental health, (dis)ability, sexual orientation, and geographic location (Office of Disease Prevention and Health Promotion, 2015).

One purpose of an HIA can be “to strengthen the capacity of...communities to shift power relations through advocating for systems and policy change that will improve the conditions where children, families, and communities are healthy. This requires addressing structural and institutionalized inequities based on race, class, gender and geography” (Santa Fe Community Foundation, 2014). The outcome of such efforts, when successful, is improved health equity.

***Q4. What health disparities exist in the Cuba area and New Mexico?***

According to the 2010 US Census (US Census Bureau, 2010), the Cuba area (Cuba County Census Division [CCD] – see Question 6) has a total population of 4,178, including a high percentage of American Indians (AIs)/Alaska Natives (ANs) (Table 1).

Several reports have detailed various health disparities that exist among different populations across the United States (Agency for Healthcare Research and Quality, 2014; Blackwell, Lucas, & Clarke, 2014; Centers for Disease Control and Prevention, 2013b). For example, rates of obesity, a precursor to many other chronic diseases, including heart disease, stroke, diabetes, cancer, renal disease, and osteoarthritis, is higher among Hispanic and AI populations. Nationally, in 2010, AI/AN and Hispanic adults had the highest age-adjusted mean number of physically unhealthy days in the past 30 days compared with other racial/ethnic populations (Zack, 2013). In addition, between 2010 and 2011, a larger percentage of Hispanics and AI/AN adults than of non-Hispanic Whites did not have health insurance; did not complete high school; had an income lower than the federal poverty level; and were unemployed (Centers for Disease Control and Prevention, 2013b).

These reports help us to understand which populations are at risk for poorer health in the Cuba area and New Mexico. In 2011 to 2013, Hispanic and AI adults in New Mexico had a higher age-adjusted prevalence of obesity than non-Hispanic White adults (Figure 1). During the same period, the prevalence of diabetes was twice as high among Hispanics (12.6%) and three times as high among AIs (18.0%) than among non-Hispanic Whites (6.0%) (New Mexico Department of Health, 2014b)

**Table 1. Demographic Characteristics of Residents of the Cuba County Census Division**

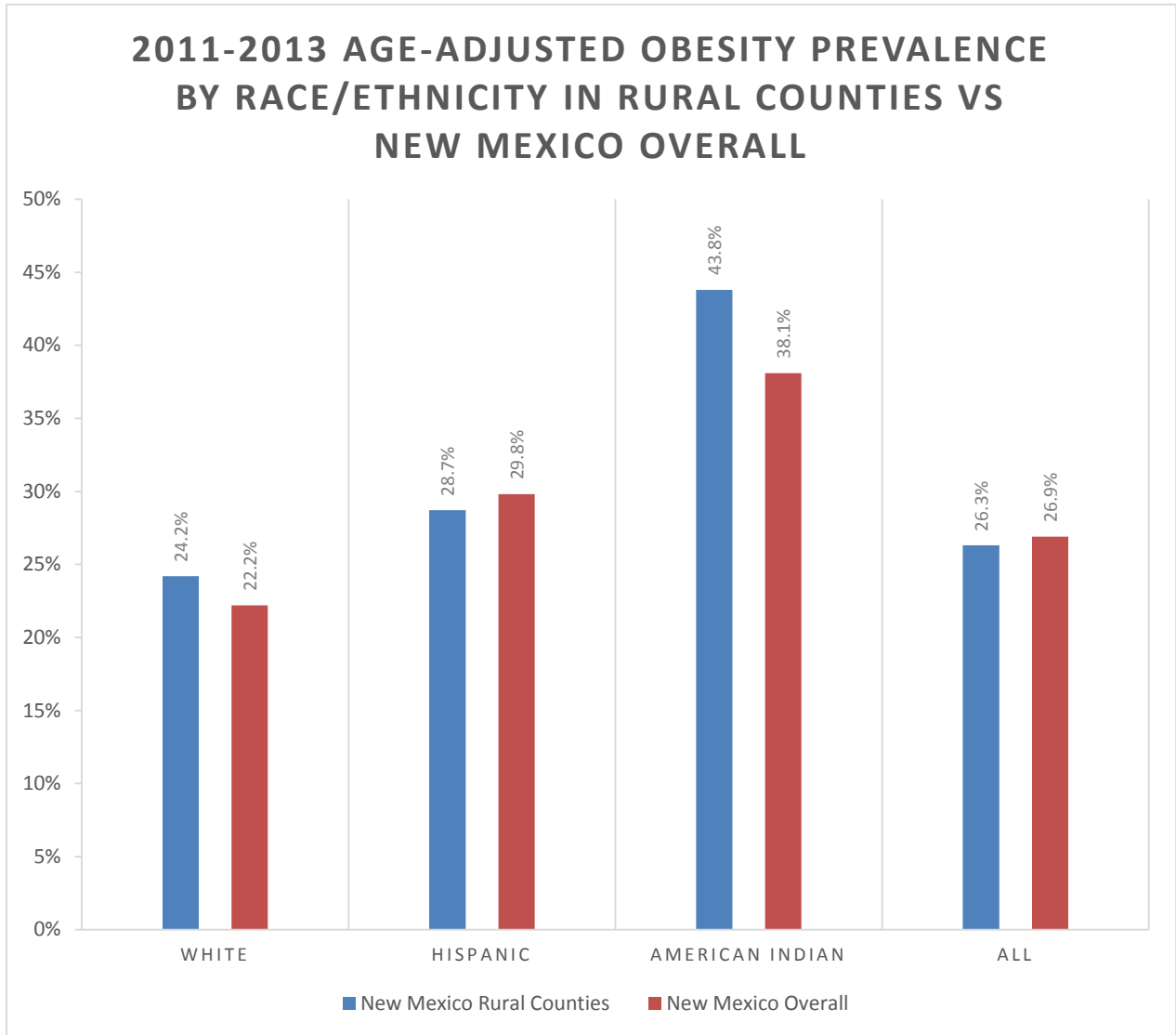
<b>Total Population</b>	4,178
<b>Sex</b>	
Male	2,160
Female	2,018
<b>Age, years</b>	
Under 5	298
Under 15	3,246
Under 18	1,114
18 and older	3,064
20-34	703
35-64	1,476
65 and older	727
<b>Race/ethnicity</b>	
American Indian or Alaska Native	2,358
Hispanic – any race	1,129
Non-Hispanic White	662
Other	29

Source: (US Census Bureau, n.d.)





**Figure 1**



*Source: (New Mexico Department of Health, 2014b)*

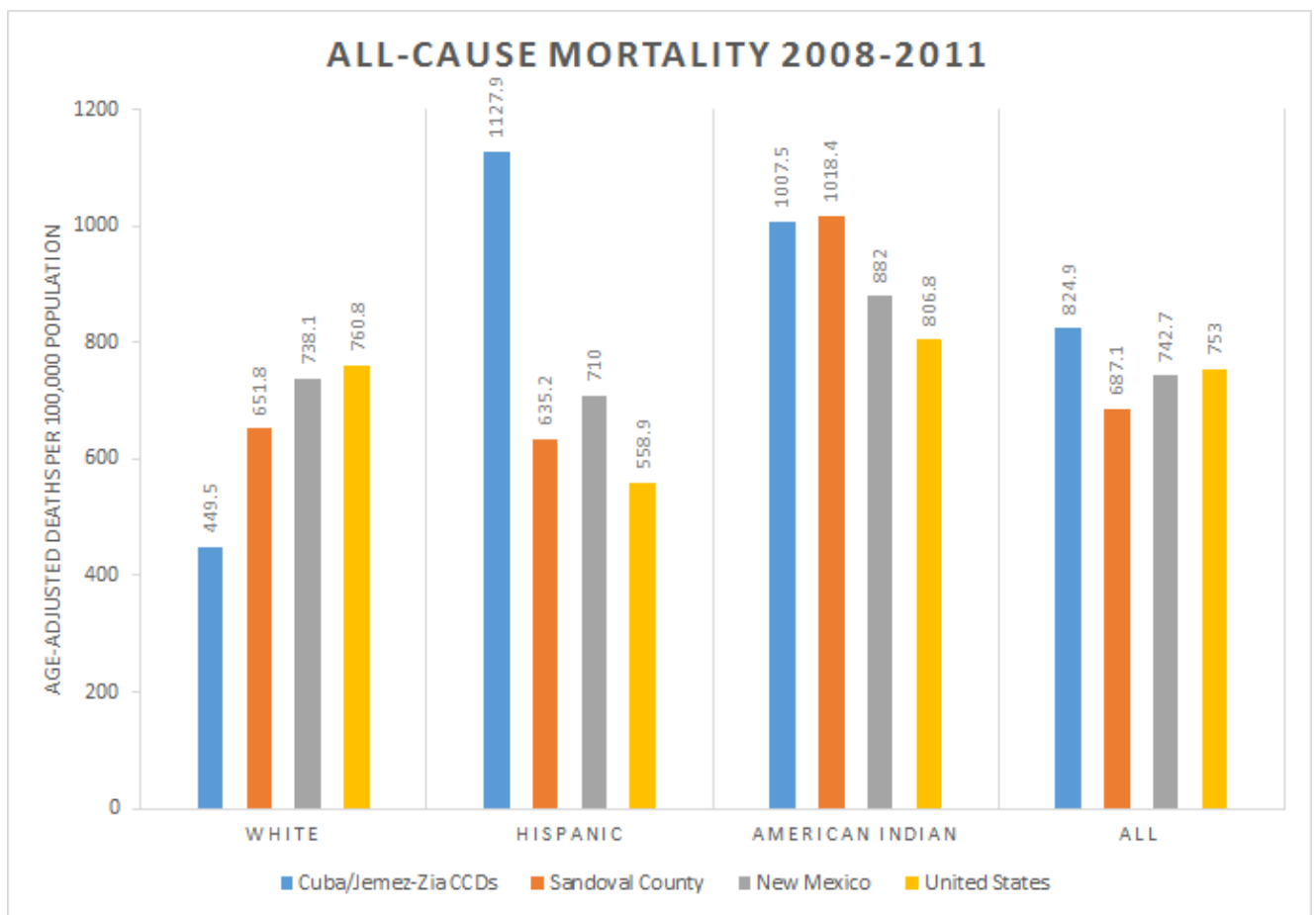
Aside from the racial and ethnic makeup of many small New Mexico communities, the socioeconomic status and rural location of Cuba and places like it may also put the entire community at risk for health-related disparities. According to the Agency for Healthcare Research and Quality (2014), “Rural residents are more likely to be older, poorer, be in fair or poor health and have chronic conditions.” Rural communities have higher rates of obesity, diabetes, cancer, injury, physical inactivity, and poor diet than other areas (Downey, 2013). Sometimes multiple disparities exist. As shown in Figure 1, the higher prevalence of obesity in rural New Mexico is explained in large part by its Hispanic and AI subpopulations.

Regardless of whether an area is rural, unemployed adults and those living in poor or near-poor households are less likely to have excellent or very good health and are more likely to have heart disease, hypertension, and stroke; respiratory conditions; diabetes; ulcers; kidney disease; liver disease;

arthritis and chronic joint symptoms; pain; sadness, hopelessness, and worthlessness; and nervousness and restlessness than those who are employed or live in wealthier households (Agency for Healthcare Research and Quality, 2014). Moreover, unemployed people are more likely to have cancer, and those living in poorer households have higher rates of obesity (Agency for Healthcare Research and Quality, 2014).

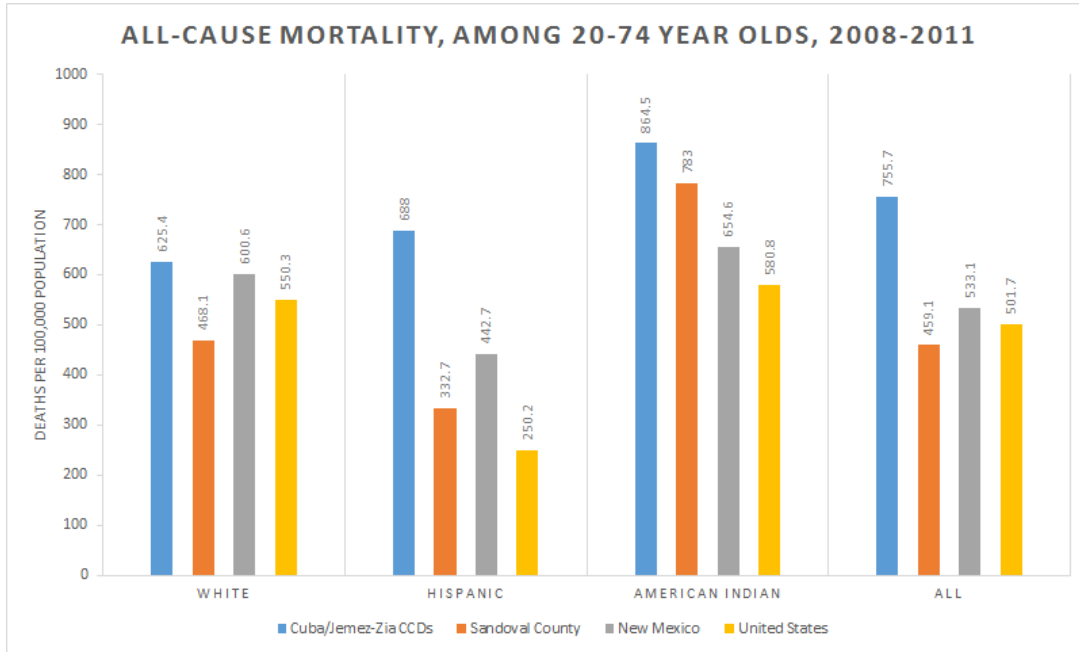
Disparate ethnic (Table 1) and economic (Table 2) circumstances in the Cuba area are detailed in the demographic analysis of the CCD above and in Question 6. Findings of small-area analyses of differences in rates of mortality and deaths due to chronic disease, cardiovascular disease, diabetes, renal disease, and childhood obesity in the Cuba area are particularly striking. New Mexico Small Areas are geographical entities defined by the New Mexico Department of Health (NMDOH) on the basis of population size for the purpose of calculating rates of certain health events (e.g., birth defects, deaths, and hospitalization) There are 109 small areas in New Mexico. The Village of Cuba is within Small Area 91 – Sandoval County Other West and comprises two CCDs (Cuba CCD and Jemez-Zia CCD). Figures 2 to 7 show several comparisons with respect to rates of death and chronic diseases between the Cuba CCD and Jemez-Zia CCD and Sandoval County (in which Cuba is located), New Mexico, and the United States.

**Figure 2**



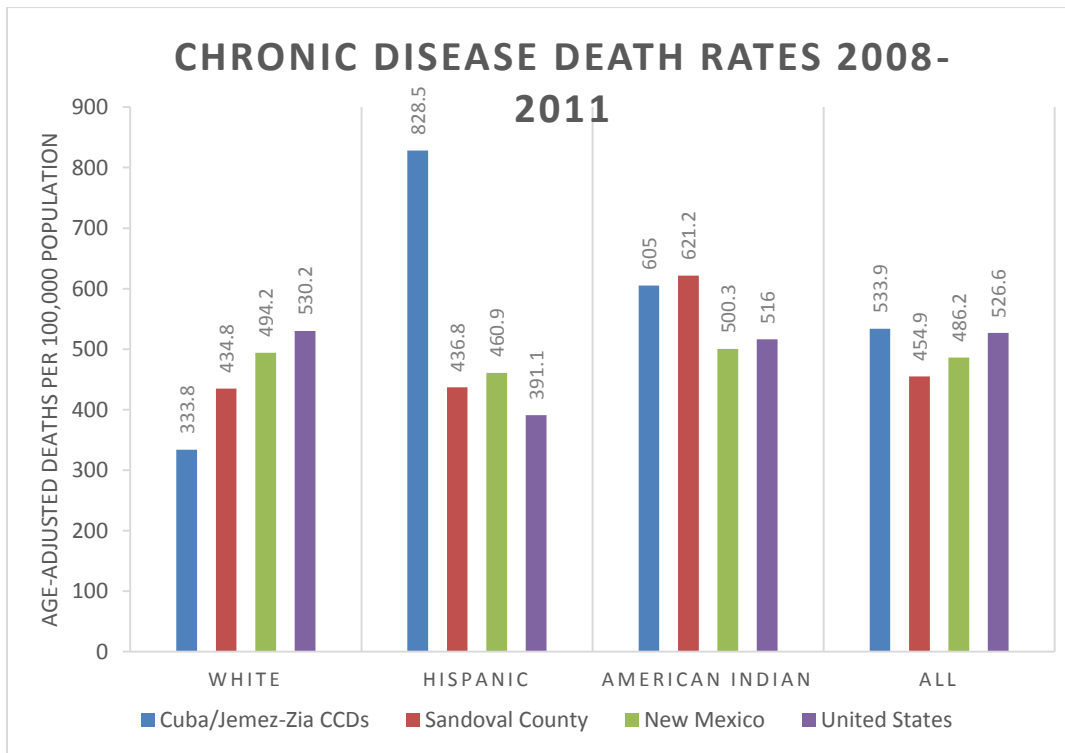
Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)

**Figure 3**



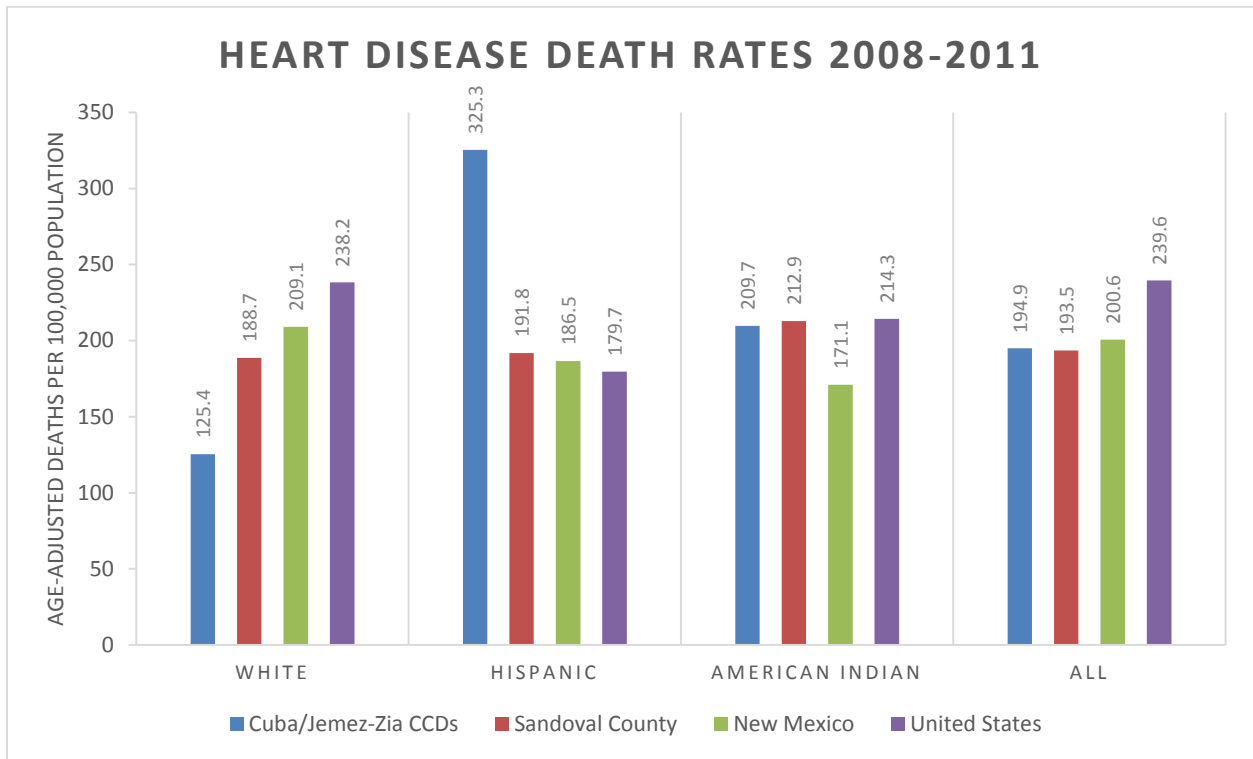
Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)

**Figure 4**



Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)

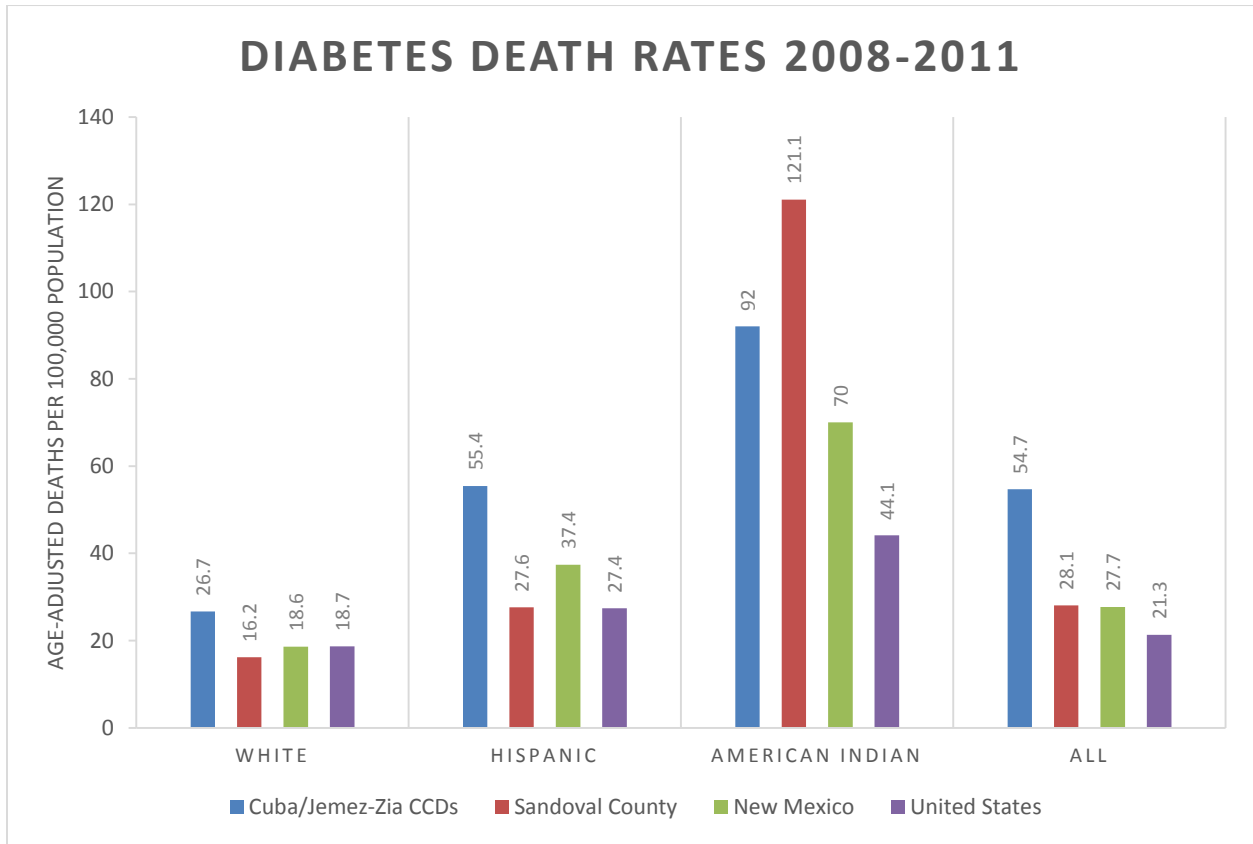
Figure 5



Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)



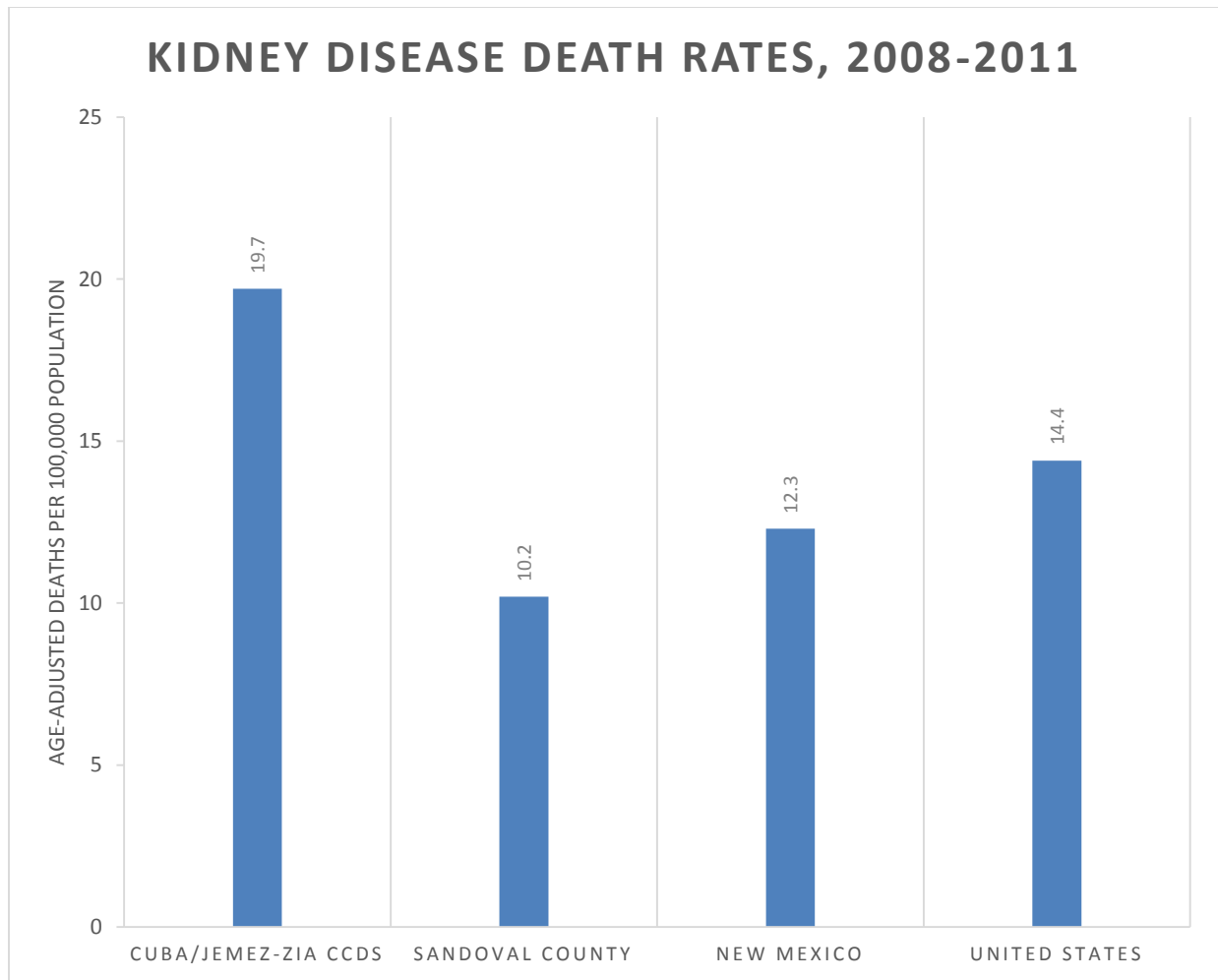
Figure 6



Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)



**Figure 7**

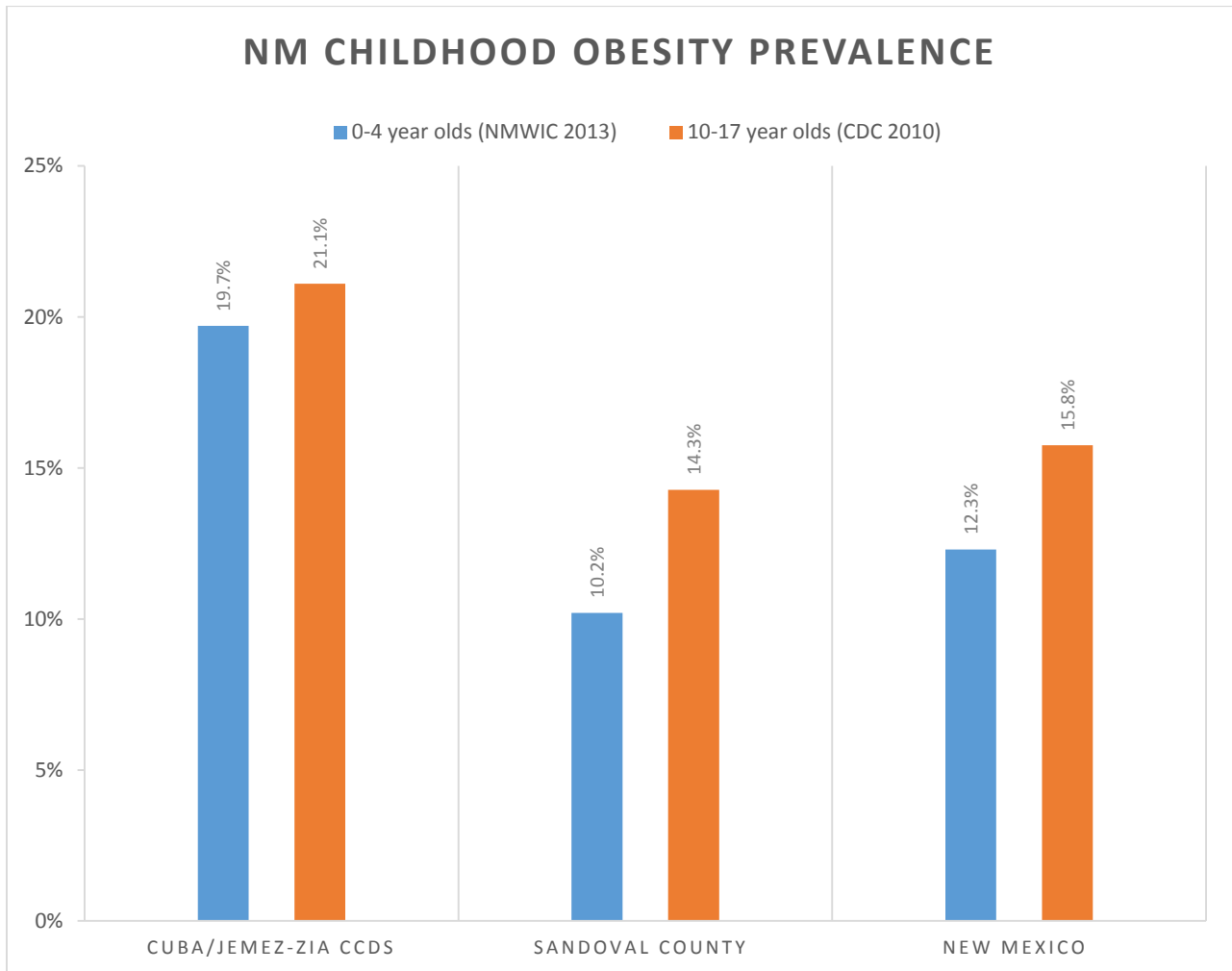


*Source: (Centers for Disease Control and Prevention, 2015; New Mexico Department of Health, 2014a)*

Specifically, Figures 2 to 5 show high rates of death from all causes, all chronic diseases, and heart disease in the Cuba CCD and Jemez-Zia CCD, especially among certain racial/ethnic groups. Figures 6 and 7 show data that reflect a special concern in Cuba and surrounding areas. These areas have a high rate of complications from diabetes, including chronic and end-stage renal disease, which has developed within two generations and shows little sign of peaking. The major cause is a high prevalence of early-onset type 2 diabetes and consequent diabetic nephropathy. Unhealthy diet, physical inactivity, and resulting early-life obesity “set the stage” for this tragic problem. The Presbyterian Medical Services Checkerboard Area Health System, which serves the Cuba area, has more than 500 diabetic patients in regular contact with its clinics. The diabetes-related mortality rate for the Cuba and Jemez-Zia Small Area is almost double that of Sandoval County and New Mexico and even more greatly exceeds that of the United States (Figure 6). The 2008 hospitalization rate for persons with diabetes in Cuba’s zip code was 188.96 per 10,000 population. The total annual charge for these hospitalizations was \$1,384,968, with an average charge per hospitalization of \$11,080. These costs reflect the economic toll of diabetes on the Cuba area (New Mexico Community Data Collaborative, n.d.)

The relationship between childhood obesity and the prevalence in adults of diabetes, diabetic nephropathy, and diabetes-related mortality is well established. Figure 8 shows obesity prevalence in two childhood age groups in New Mexico.

**Figure 8**



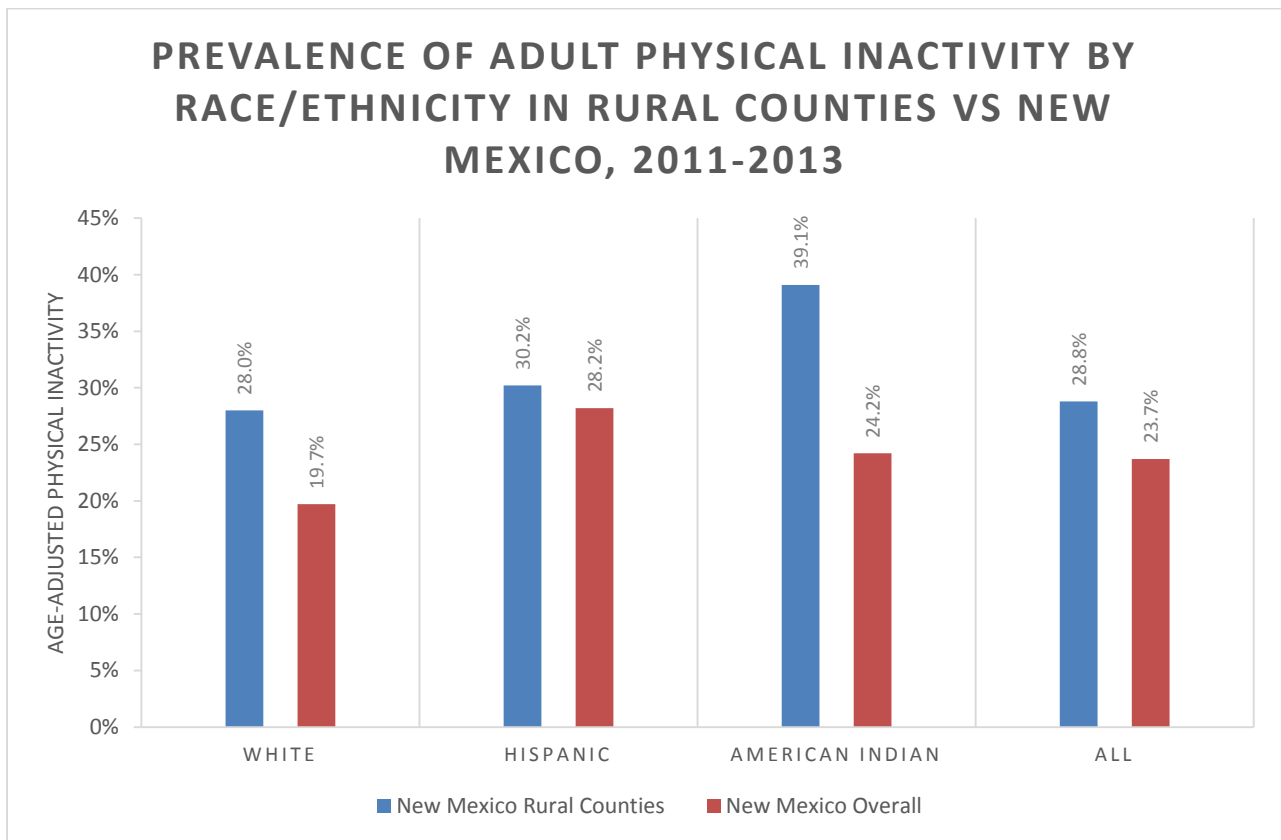
*Source: 2013 New Mexico Women, Infants and Children Nutrition Program (0 to 4 years) and US Centers for Disease Control and Prevention (10 to 17 years) modeled small-area risk estimates based on US Census predictors of obesity (income, ethnicity, education, etc.). Prevalence estimates of obesity among 0- to 4-year olds in 2013 were based on observations from participants in the New Mexico Supplemental Nutrition Program for Women, Infants and Children, which is limited to children living in low-income households. Prevalence estimates of obesity among 10- to 17-year olds in 2010 were not based on observations but were generated by the CDC by using a statistical model of obesity predictors derived from the US Census (income, ethnicity, education, etc.)*

*(New Mexico Community Data Collaborative, n.d.)*

**Q5. How are health disparities experienced in the Cuba area related to the Cuba CDT segment planning?**

Health disparities in Cuba and surrounding areas may be mitigated and, in some cases, prevented through regular physical activity. This possibility is especially important considering that on both national and New Mexico levels, disparities in physical activity rates exist among Hispanic, AI, and rural populations (Figure 9). Hispanic adults engage in less leisure-time physical activity than their non-Hispanic White counterparts (Agency for Healthcare Research and Quality, 2014), and few AI adults and young people meet recommended guidelines for physical activity (Foulds, Warburton, & Bredin, 2013). In addition, rural residents are the least likely to be physically active (Parks, Housemann, & Brownson, 2003), and those who are unemployed, have lower incomes, and live in rural areas have lower rates of walking than other groups (Eyler, Brownson, Bacak, & Housemann, 2003). Furthermore, communities with a lower socioeconomic status have more environment-related barriers to overcome, such as lack of sidewalks, parks, and safe and open green spaces (Taylor, Poston, Jones, & Kraft, 2006). Lack of access to these physical activity resources partly create or compound health risks and their outcomes among residents of the Cuba area.

**Figure 9**



Source: (New Mexico Department of Health, 2014b)

Although it is important to highlight health disparities, it is perhaps more important to think about the resources Cuba has to address them. Cuba is surrounded by scenic public land that can be better used for walking and hiking. Public land managers, including Cuba CDT segment planners, have the potential



to reduce health disparities by creating access to this land to meet the local need for increased physical activity and by incorporating health into decision-making processes that do not traditionally consider health outcomes. The National Prevention Council of the Surgeon General calls for state, tribal, local, and territorial entities to “use data to identify populations at greatest risk and work with communities to implement policies and programs that address highest priority needs” (National Prevention Council, 2014). Therefore, the USFS, BLM, Sandoval County, and Village of Cuba can help to create optimal CDT access for the Cuba-area population by designing the future Cuba segment of the CDT in accordance with the needs of the community. In doing so, these agencies can increase health equity for those living in Cuba and the surrounding area.

**Q6. From where will people likely come to use the proposed Cuba CDT segment?**

In examining anticipated Cuba CDT segment use and health effects, two distinctly different user populations must be considered: 1) people who live in close vicinity to the trail segment in the Cuba area (residents), and 2) people living outside the area who are most likely to travel along US Highway 550 for deliberate or incidental outdoor recreation (visitors). Information about these populations is available and can be assembled from US Census data. The Cuba CCD is closely representative of those living near the trail, with the vast majority of people living in or near the five communities (Census Defined Places [CDP] of Cuba, La Jara, Regina, San Luis, and Torreon (Figure 10).

**Figure 10 – Sandoval County with Cuba and Jemez-Zia County Census Divisions**

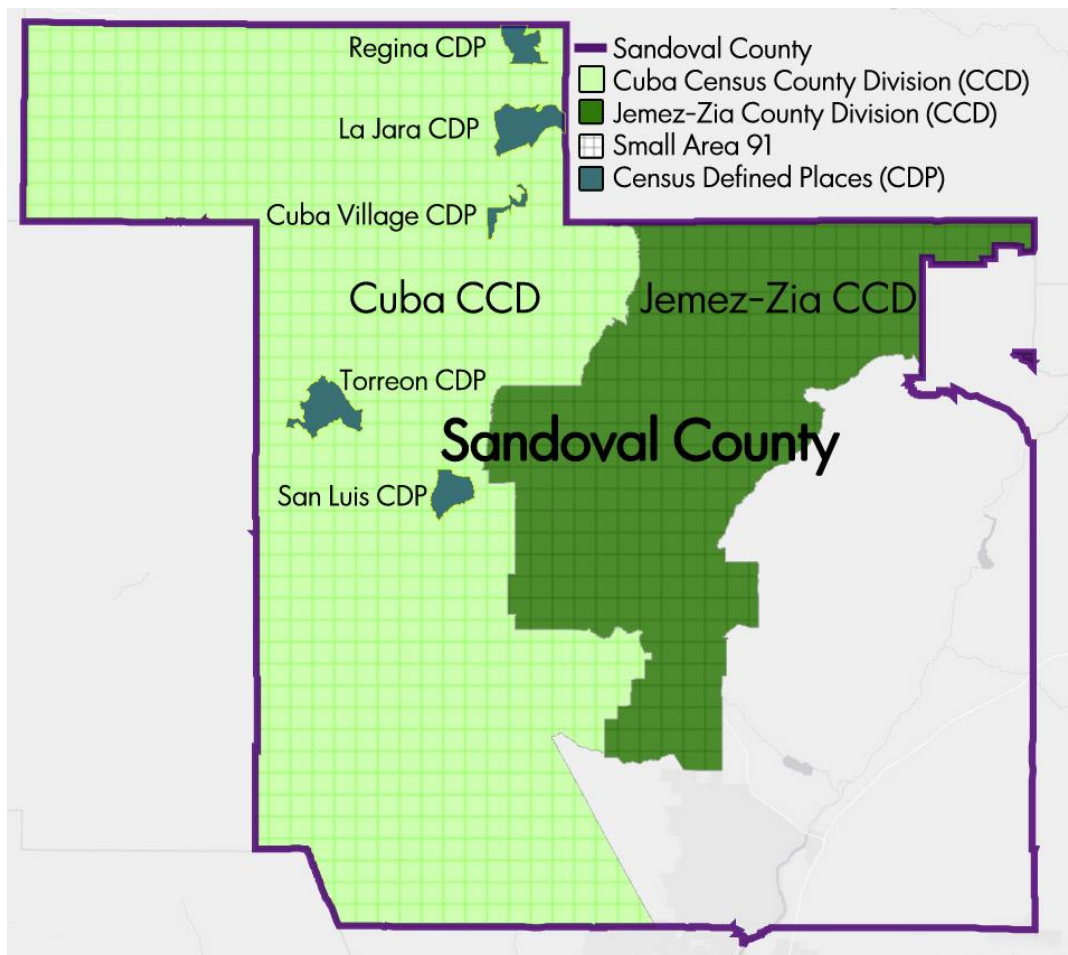


Table 2 shows socioeconomic indicators for the Cuba CCD and New Mexico. The unemployment rate among people in the Cuba CCD civilian labor force is much higher than that in New Mexico generally. The proportion of individuals with an annual household income below the poverty level is more than two times higher in the Cuba CCD than in the state.

**Table 2. Socioeconomic Indicators for the Cuba CCD and New Mexico**

<b>Indicator</b>	<b>Cuba CCD</b>	<b>New Mexico</b>
In civilian labor force, but unemployed (%)	18.3	9.7
Annual income below poverty level (%)		
All persons	41.5	20.4
Persons under 5 years of age	70.0	33.0
Person under 18 years of age	59.2	28.9
Persons 65 years of age or older	19.3	12.1

*Source: (US Census Bureau, n.d.)*

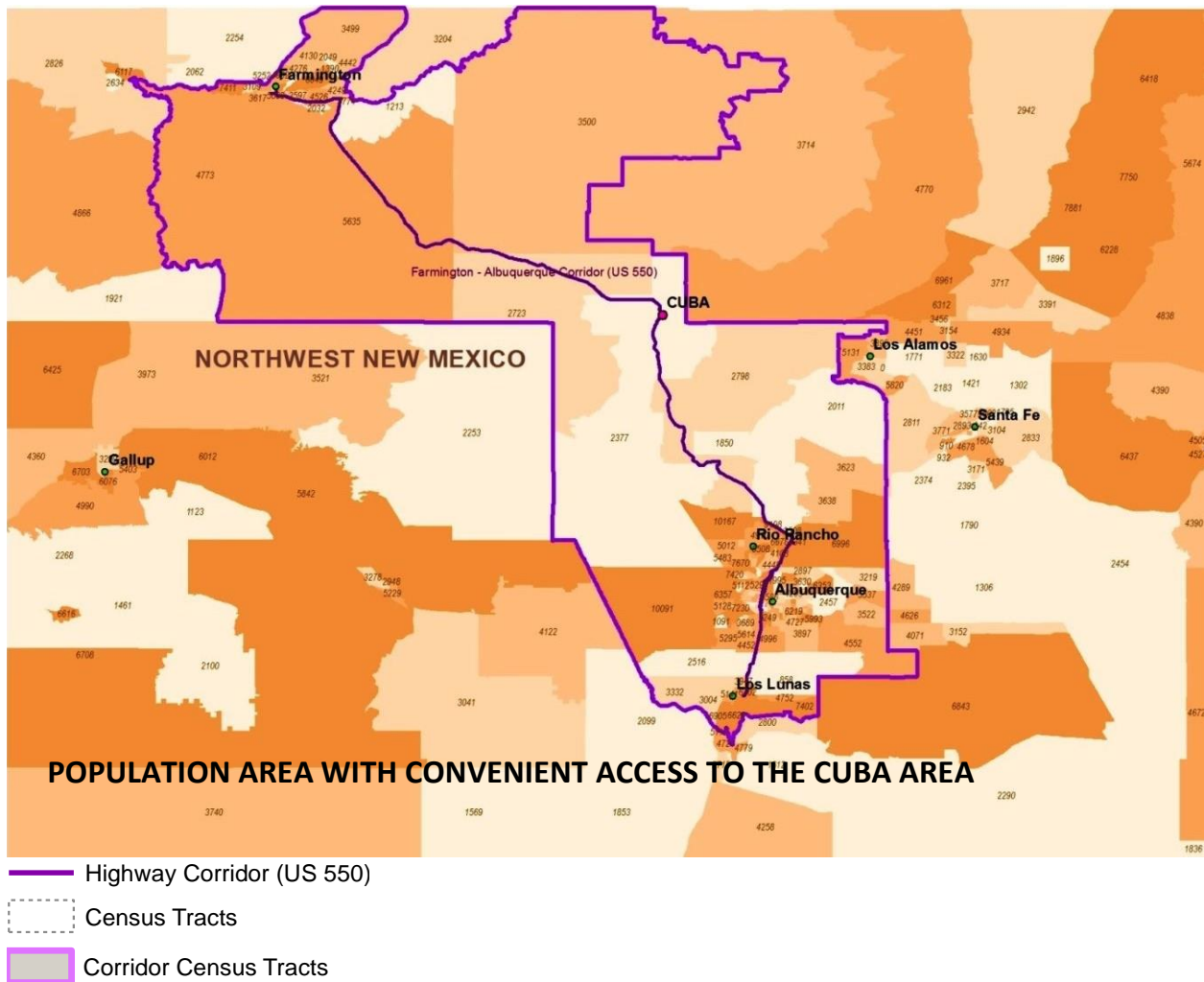


People living in census tracts adjacent to the US Highway 550 corridor comprise the population considered most likely to use the new Cuba CDT segment (Figure 11). Cuba is located half way along the nearly 200-mile corridor connecting the Albuquerque metropolitan area in central New Mexico to Farmington in the northwest corner of the state. There are more than 965,000 people living in the 217 census tracts that border the corridor and are within a 2-hour drive of Cuba (Figure 11). Albuquerque and Farmington have some of the highest annual median income levels in the state at \$47,989 and \$52,472, respectively, whereas the annual median income in Cuba is \$38,594 (US Census Bureau, n.d.). Use of the new CDT segment

by people from the high-income communities could have important economic implications for Cuba.

One of STEP-HIA’s objectives is to determine the patterns of use of the Cuba CDT segment for these resident and visitor populations and extrapolate the consequent effects on health, the local economy, and social capital in the Cuba area.

**Figure 11 – Census Tracts Adjacent to US Highway 550**



*Mapping: Thomas N. Scharmen, M.A., M.P.H., Epidemiologist, Office of Community Assessment, Planning and Evaluation, Albuquerque Metro & Northwest Regions, Public Health Division, New Mexico Department of Health*

*Source: (New Mexico Community Data Collaborative, n.d.)*

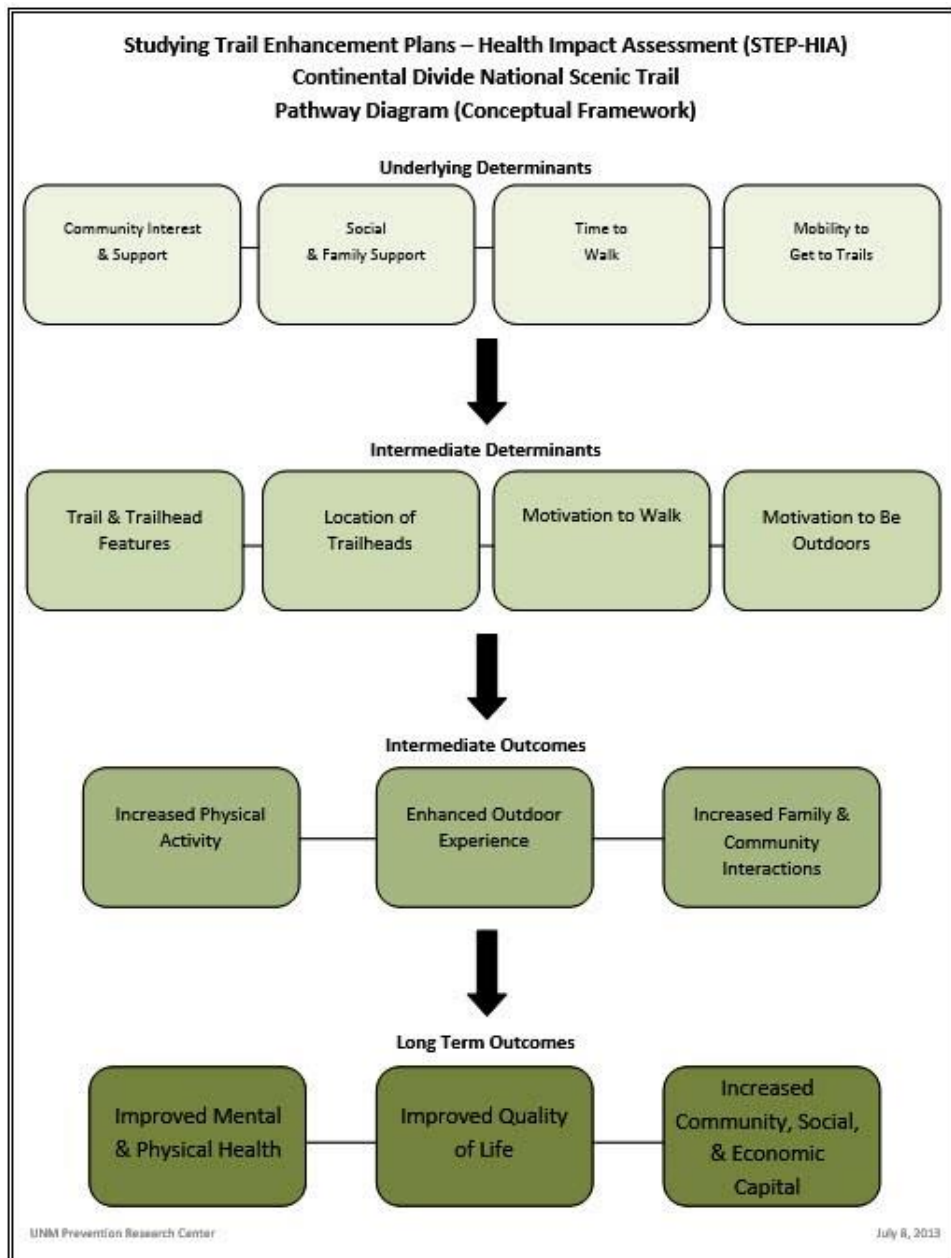
**Q7. What is the conceptual framework of STEP-HIA?**

Early in the scoping stage of the HIA, the STEP-HIA team developed a pathway diagram that provided a conceptual framework for the project. Development of the pathway was an iterative process that involved a series of meeting discussions to link desired health and health-related determinants to existing conditions and desired outcomes. Meeting participants included the STEP-HIA team, community members (Step Into Cuba Alliance), and land managers. The pathway diagram (Figure 12) identifies two levels of determinants (underlying and intermediate) and two levels of outcomes (intermediate and long term) that surfaced at the meetings. Multiple factors that influence each other were identified at each level.

Underlying determinants represent factors that influence people to walk and be active. Intermediate determinants combine to cause people to take action (i.e., to walk), and are most likely to be influenced by the design of the proposed Cuba CDT segment. Intermediate outcomes occur in those who walk regularly, whereas long-term outcomes represent community-level change that could happen over time.

Stakeholder feedback was crucial to the design of the pathway, and the meetings held with public land managers and the Step Into Cuba Alliance were important to ensuring that the pathway could accurately frame the proposed HIA. Of special interest was the high priority stakeholders put on increased community, social, and economic capital. The pathway was used to orient literature reviews and surveys to inform the HIA and make projections.

**Figure 12**



## II. CUBA CDT SEGMENT POTENTIAL EFFECTS ON HEALTH

### ***Q8. What do studies tell us about being outdoors, physical activity, and health?***

Healthy energy balance (defined by the type and quantity of food and amount of physical activity) improves indicators of metabolic and cardiovascular health. Physical activity alone, even without dietary change, has been demonstrated to improve many facets of health (Kozoll & Davis, 2012). The *2008 Physical Activity Guidelines for Americans* (US Department of Health and Human Services, 2008) highlights the following current evidence supporting the benefits of physical activity. All-cause mortality (death rate from all causes) is 30% lower among the most active compared with the least active adults, with a clear dose-response relationship (the greater the activity level, the lower the death rate). The most active adults have a 20% to 35% decrease in the risk of coronary heart disease, cerebrovascular disease, stroke, hypertension, and atherogenic dyslipidemia (cholesterol disorders causing arterial blockage), with a similar effect among all ages and both sexes. Active adults have a 30% to 40% lower risk of developing diabetes than their sedentary peers, with a clear dose-response relationship and similar effect among all ages and both sexes. A systematic review conducted by WHO determined that the risk of mortality among inactive 20- to 74-year olds could be reduced by up to 22% by walking (World Health Organization Regional Office for Europe, 2014).

There is strong evidence that physical activity maintains current weight, promotes weight loss when combined with a calorie-restricted diet, and prevents weight regain after weight loss. Physical activity also has been shown to reduce the amount of abdominal and intra-abdominal fat and to be beneficial for musculoskeletal health, functional health, cancer incidence, and mental health, including cognitive function among elderly persons (Etgen et al., 2010). There is also accumulating evidence that any activity performed outdoors or in view of a natural environment can have positive effects on quality of life. Cognitive function, particularly in children (including sustained attention and interest and improved problem solving), can be improved by having a nearby natural environment (McCurdy, Winterbottom, Mehta, & Roberts, 2010; Wells, 2000). Mood and self-esteem have also been shown to improve as a result of exposure to the natural environment (Barton & Pretty, 2010). Barton and Pretty found that men had the most dramatic improvement in mood, whereas youth and the mentally ill had the most improvement in measures of self-esteem. Nature-exposure-related reductions in stress and anxiety, irritability and anger, accident rate, and employee illnesses have also been demonstrated in studies summarized by Barton and Pretty.

### ***Q9. How much physical activity is recommended for health?***

The preponderance of evidence for the positive health effects of physical activity has led to the formulation of guidelines for the intensity, duration, and frequency of physical activity by Americans. The current guidance, the *2008 Physical Activity Guidelines for Americans* (US Department of Health and Human Services, 2008), calls for unimpaired adults to engage in at least 2.5 hours of moderate intensity aerobic activity, such as walking at 3 miles per hour, or at least 1.25 hours of vigorous aerobic activity, such as running a 10-minute mile, each week. The guidelines call for children and youth to engage in aerobic activity of at least moderate intensity for 1 hour each day. Activity remains beneficial even if divided into intervals as short as 10 minutes. Trail walking of 7.5 miles per week achieves the recommended adult activity level, whereas walking 18 miles per week achieves the recommended level for children and youth.

Recent US survey data (Centers for Disease Control and Prevention, 2013a) indicate that 51.6% of Americans and 52.2% of New Mexicans meet the minimum guidelines for aerobic activity. Alarming, in

2013, 24.5% of New Mexican adults reported performing absolutely no physical activity outside of work (New Mexico Department of Health, 2014b). Moreover, these data are based on self-reports, which have been demonstrated to overstate activity levels when compared with studies measuring activity with instruments such as accelerometers (Tucker, Welk, & Beyler, 2011). Studies using accelerometer monitoring of the activity of children aged 6 to 11 years showed compliance with minimum guideline requirements in 42% of participants but a dramatic decline - to 8% - in adolescents (Troiano et al., 2008). This phenomenon was also documented by Jago (2008).

***Q10. What do we know from the literature about the influence of trails on physical activity levels?***

Health authorities (Zaza, Briss, & Harris, 2005) strongly recommend creation of or enhanced access to places for physical activity because of the strong evidence of their effectiveness in increasing physical activity and improving physical fitness. Despite this recommendation, it is only in the past 10 to 15 years that studies have examined the effect of trails on physical activity. Some evidence shows that the effect can be significant. The 2001 Indiana Trails Study (Trails and Greenways Clearinghouse, n.d.), which surveyed trail users on six different trails in Indiana, found that, for all six, more than 70% of users reported that they were getting more exercise as a direct result of the trail. A similar survey of six trails in Illinois (Trails for Illinois, 2012) found that at least 30% of users visited a trail 21 or more times in the past year, with the average time of the visit being 1 to 2 hours. Sixty-eight percent of trail users reported traveling 5 miles or less to reach the trail, and 32% expected to spend more than 150 minutes walking there, time sufficient to meet recommended weekly levels of physical activity.

In southeastern Missouri, 55% of trail users who responded to the Bootheel and Ozark Health Projects survey were exercising more than before they had access to a trail (Brownson et al., 2000). Intercept surveys of 1,148 users of a new trail in Greenville, SC, showed that 91% of users reported using the trail for exercise (Price, Reed, & Muthukrishnan, 2012). In a survey of adults performed at a community clinic in Texas, the perception of living close to a trail was associated with a 1.5-times greater odds of walking at least 30 minutes once a week (Pierce, Denison, Arif, & Rohrer, 2006). A cross-sectional survey of more than 3,000 adults (Librett, Yore, & Schmid, 2006) showed that using trails once a week was associated with a 2.3-times greater odds of being regularly active. An intercept study of 414 adult users of a new community trail found that 23% were new exercisers who were more dependent on the trail as a primary outlet for physical activity than habitually active exercisers (Gordon, Zizzi, & Pauline, 2004).

In Greenville, SC, a random telephone survey found that among 726 respondents living a median distance of 7.59 miles from a rail trail, 24.9% had used it in the previous 6 months (Price & Reed, 2014). Of this group, 15% (3.74% of those surveyed) used it for at least 30 minutes 3 days per week. Perceptions of the trail being too far away (53%), or not knowing about it (38.9%), were dominant reasons for non-use.

***Q11. What do studies tell us about trail location, design factors, and amenities that correlate with increased trail use?***

Cleanliness, naturalness, aesthetics, safety, and appropriateness of development were found to correlate with use of a 150-mile Chicago River trail corridor (Gobster & Westphal, 2004). Reynolds (2007) studied three urban trails and identified the strongest use correlates as, in descending order, mixed views, streetlights, good trail conditions, and trailside facilities. Pierce et al. (2006) reported that the strongest correlates of use in Greenville, SC, were free access (no fee), distance markers, convenient location, and attractive trail design and scenery. A comprehensive review of the literature on trails and physical activity (Starnes, Troped, Klenosky, & Doehring, 2011) identified other strong environmental

correlates of use as available parking at access points, permanent surfacing, length greater than ¼ to ½ mile, good trail condition, lack of noise and litter, and location near home. A study of hikers (13.3% of total visitors) at Rocky Mountain National Park in Colorado (Collingwood, Adcock, & Librett, 2007) found that most (72.7%) hike less than 1 day during a weekly visit and chose the least strenuous hikes (69%; 1.6 to 5.1 miles; elevation gain, 150 to 916 feet). Price and Reed (2014) determined that the two trail features liked most by 181 users of a Greenville, SC, rail trail were convenient location (33%) and scenic beauty (19%).

The Path Environment Audit Tool (PEAT) (Troped & Cromley, 2005) is a computer-based instrument allowing trained observers to assess physical characteristics of community trails and paths, including design, amenity, and aesthetics/maintenance items. The following modified PEAT audit items capture relevant correlates of future Cuba CDT segment use.

#### TRAIL SEGMENT DESIGN FEATURES PROMOTING USE

##### **Access**

- Access Point – *there are one or more official access points (points where the trail intersects a road, trailhead, or designated access path)*
- Gate(s) or Bollard(s) – *there are one or more gate(s) (structure that can be swung, drawn, or lowered to block trail entrance) or bollard(s) (a barrier post, usually 30 to 42 inches tall, used to inhibit vehicular traffic) on the segment that prevents access by vehicles.*

##### **Scenic Attractiveness**

- Scenic Viewpoint(s)/Point(s) of Interest – *there are one or more scenic viewpoints/points of interest (designated areas developed at key locations to afford trail users an opportunity to view significant landforms, landscape features, or wildlife habitat)*
- Vegetative Cover – *the majority of the trail segment has continuous lateral visibility (lack of visible vegetative interruption to both sides of the trail)*
- Sensory appeal – *there is minimal visible glass, litter, graffiti, bad odor, noise, and animal droppings*

##### **Destination Points**

- Destination Points – *trail segments are designed to provide identified natural destinations or turnaround points (high points, scenic viewpoints, interesting landforms, landscape features) that will constitute an incentive for people to reach the point*

##### **Safety**

- Signage – *there is signage (a board, post, or placard that displays written, symbolic, or pictorial information about the trail or surrounding area) to increase safety and comfort on the trail*
- Intersection with Roads – *there are crossing features to enhance safety of crossing roads*
- Condition of Path Surface – *there are few bumps, holes, and weeds growing in the surface*
- Temporary Barriers – *there are few non-permanent barriers affecting the surface condition, such as water, puddles, ice, snow, and mud*
- Cross-Slope – *most of the slope across the width of the path (i.e., in the direction perpendicular to the direction someone would walk) is flat or gentle (< 3% slope)*
- Sufficient Site Distance – *site distance (the ease of seeing oncoming users along the trail) is good for most of the trail segment*

- Sufficient Vertical Clearance – *vertical clearance (the vertical dimension that must be cleared of all tree branches and other obstructions that would otherwise obstruct movement along the trail) is > 2.5 meters or 100 inches*

**Ease of Use**

- Slope – *the slope, slant, or grade of the segment along the length of the segment (in the direction parallel to the trail) is predominantly flat or gentle (< 3%) as opposed to moderate (3% to 5%) or steep (> 5%)*

**Amenities** – *Items related to the characteristics of trailhead(s) or access point(s)*

- Lighting – *there is sufficient lighting for early morning or late evening use*
- Restroom(s) – *there are restroom facilities that are functional and clean*
- Bench(es) – *there are benches that are structurally sound and have good sitting surfaces*
- Picnic Table(s) – *there are picnic tables that are structurally sound and clean*
- Water Source(s) – *there is easily available potable water from a drinking fountain, faucet, or nearby source*
- Garbage Can(s) – *there are regularly emptied garbage cans with secure covers*
- Car Parking – *there is an adequately surfaced and spacious public parking area adjacent to the trail segment, connected to the trail segment, and intended for trail users*
- Bike Rack(s) – *there are bicycle racks in good repair that are intended for trail users*
- Mass Transit Stop – *there is a designated bus or van stop with regularly scheduled service*

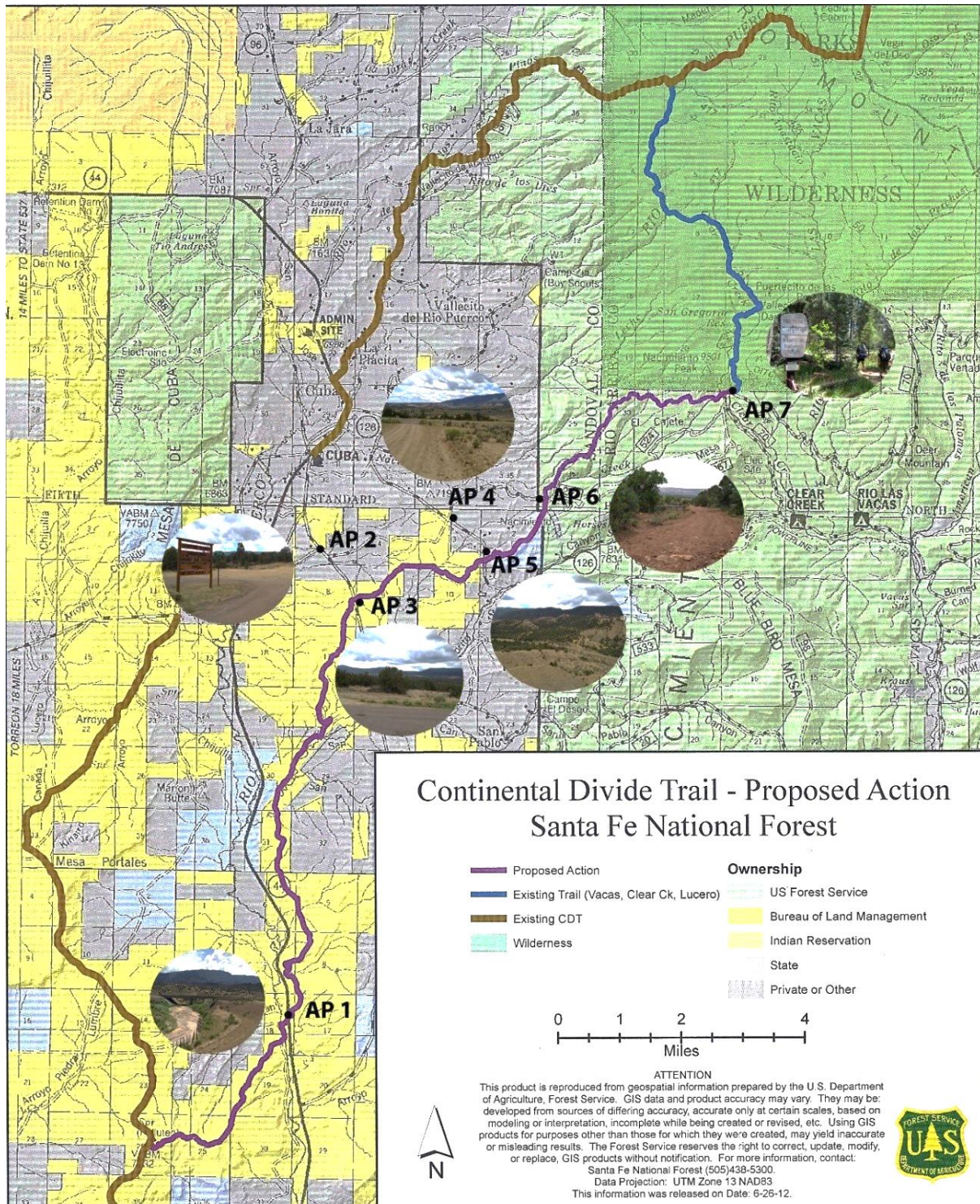




**Q12. In what ways could future users access the proposed Cuba CDT segment?**

In 2013, STEP-HIA performed an on-site physical assessment of seven potential access points to the proposed Cuba CDT segment (Figure 13).

**Figure 13 – Cuba CDT Segment Access Points**



## Access Point 1 (AP1) – US Highway 550

### **Access**

- closest access for visitors from the Albuquerque metro area
- easy stopping for travelers on US Highway 550, including equestrians
- remote for regular use by Cuba-area population

### **Scenic Attractiveness: modest**

- open views of Nacimiento Mountain range, Rio Puerco, and La Ventana Mesa
- southbound segment follows a dirt BLM road for ½ mile and then gradually ascends 4 more miles along a valley to the top of La Ventana Mesa
- northbound segment parallels US Highway 550 over flat terrain to the first of several arroyo crossings (after 1 mile)

### **Destination Points**

- La Ventana Mesa – 4½ miles southbound
- sandstone ridge north of Arroyo Hondo crossing – 6 miles northbound

### **Safety issues**

- proximity to busy high-speed traffic
- need for highway signage to warn motorists of a trailhead pull-out
- police surveillance feasible

### **Ease of Use: easy to moderate**

- gradual ascent to La Ventana Mesa southbound – 400 vertical feet
- flat terrain with arroyo crossings northbound

### **Amenity Potential**

- restrooms
- benches
- picnic tables
- garbage cans
- mass transit stop (Sandoval County Rio Metro Regional Transit)
- no potential for lighting or water

### **Special Considerations**

The proposed Cuba CDT segment passes across the Rio Puerco and under a US Highway 550 bridge at this access point. According to the BLM Rio Puerco Field Office, the Rio Puerco was once stabilized with surfacing for livestock crossing (J. Sippel, personal communication, 2013). However, we have repeatedly inspected this crossing during different seasons and found the usual situation to be a river level of at least 1 to 2 feet with a large expanse of mud on either side. We anticipate that most users would avoid the river crossing most times of the year. For this reason, trailheads would be desirable on either side of the highway for pull-out of users interested in walking either north or south. Trailhead maintenance here would be required of the BLM or New Mexico Department of Transportation (NMDOT), but possible dual use as a highway rest stop (no other between Albuquerque and Farmington) is a consideration. At many times during the year, a crossing of the Arroyo Hondo may be considered infeasible by those walking northbound because of water, mud, or quicksand. Through-hikers may detour to Cuba and AP2 by way of US Highway 550 or the current CDT and NM Highway 197.

## Access Point 2 (AP2) – Sandoval County Road 11 across from Sandoval County Fairgrounds

### **Access**

- across Sandoval County Road 11 from Sandoval County Fairgrounds
- closest access for most Cuba residents (1 mile)
- short drive for US Highway 550 travelers

### **Scenic Attractiveness: modest**

- views of Nacimiento Mountain range when walking south along Sandoval County Road 11 to AP3

### **Destination Points**

- Village of Cuba (1 mile north for through-hikers)
- CDT crossing (1 mile south)
- see AP3

### **Safety**

- proximity to occasional high-speed traffic
- need for highway signage to warn motorists of a trailhead pull-out
- crosswalk could be developed across Sandoval County Road 11 to fairgrounds
- police surveillance exists

### **Ease of Use: easy**

- flat walk south along Sandoval County Road 11 with gradual descent and ascent to next low ridge

### **Amenity Potential**

- tent camping and recreational vehicle parking
- equestrian facilities
- lighting
- potable water source
- restrooms
- benches
- picnic tables
- garbage cans
- mass transit stop (Sandoval County Rio Metro)

### **Special Considerations**

Sandoval County is developing its fairgrounds for year-round indoor and outdoor use. A proposal to reconstruct, widen, and re-pave Sandoval County Road 11 to its junction with US Highway 550, 2½ miles south of AP1, has been developed. A pedestrian walkway and bikeway from Cuba to the fairgrounds and CDT, as well as an equestrian trail from the fairgrounds to the CDT and US Highway 550, are included in the proposal. Re-routing of the Jemez Mountain Trail Scenic Byway along Sandoval County Road 11 would be possible after the project. Trailhead maintenance here would be required of Sandoval County.

## Access Point 3 (AP3) – Sandoval County Road 11 south of Sandoval County Fairgrounds

### **Access**

- reasonably close access for most Cuba residents and US Highway 550 travelers (2 miles)

**Scenic Attractiveness: modest to significant**

- southbound trail segment climbs to forested sandstone ridge with scenic views, rock formations, and petrified wood; ridge can be followed for 2 miles south
- northbound segment follows a low, flat forested ridge to AP4

**Destination Points**

- beginning of sandstone ridge – ½ mile southbound
- end of sandstone ridge – 2½ miles southbound
- AP4 – 2 miles northbound

**Safety**

- somewhat remote location
- proximity to occasional high-speed traffic
- need for highway signage to warn motorists of a trailhead pull-out
- crosswalk could be developed for CDT across Road 11
- police surveillance feasible

**Ease of Use: easy to moderate**

- rapid ascent of sandstone ridge of 100 vertical feet southbound
- gradual ascents and descents on sandstone ridge southbound
- flat terrain northbound

**Amenity Potential**

- restrooms
- benches
- picnic tables
- garbage cans
- no potential for lighting or water

**Special Considerations**

Trailhead maintenance here would be required of the BLM or Sandoval County.

Access Point 4 (AP4) – Duke City County Road near NM Highway 126

**Access:**

- more distant from Cuba (3 to 3½ miles) for local residents and US Highway 550 travelers
- travel for up to ¾ mile on rarely maintained dirt Duke City County Road and BLM road may be required (depending on trailhead location)

**Scenic Attractiveness: modest to significant**

- southbound segment follows a low, flat forested ridge to AP3
- northbound segment crosses the Arroyo Hondo Canyon and ascends to a ridge top with dramatic views in all directions

**Destination Points**

- AP3 – 2 miles southbound
- Arroyo Hondo Canyon – 1/3 mile northbound

- ridge top – 1¼ mile northbound
- AP5 – 1½ mile northbound

#### **Safety**

- somewhat remote (unless located adjacent to NM Highway 126)
- police surveillance unlikely (unless located adjacent to NM Highway 126)

#### **Ease of Use: easy to moderate**

- flat terrain southbound
- ascent and descent at Arroyo Hondo Canyon northbound – 75 vertical feet
- gradual ascent from canyon rim to ridge top northbound – 100 vertical feet
- steady descent from ridge top to AP5 northbound – 250 vertical feet

#### **Amenity Potential**

- restrooms
- benches
- picnic tables
- garbage cans
- no potential for lighting or water

#### **Special Considerations**

There are options for locating a trailhead at the junction of Duke City County Road and NM 126, along Duke City County Road, or on a little-used BLM road intersecting the CDT. A spur trail or road walk of up to ¾ mile may be required. At many times during the year – unless a short bridge is constructed – a crossing of the Arroyo Hondo may be considered infeasible because of water, mud, or quicksand. Northbound hikers may detour along the BLM road and Duke City County Road to NM Highway 126 to AP5 or Eureka Mesa Road to AP6. Trailhead maintenance here would be required of BLM or Sandoval County.

Access Point 5 (AP5) – New Mexico Highway 126

#### **Access**

- distant from Cuba (4½ miles) for local residents and US Highway 550 travelers

#### **Scenic Attractiveness: modest to significant**

- southbound segment ascends to a ridge top with dramatic views in all directions and then gradually descends to and crosses the Arroyo Hondo Canyon
- northbound segment ascends to a plateau with views of Cuba Mesa and the Nacimiento Mountain range, Nacimiento Mine tailings (copper ore and azurites of interest), and cliffs dropping dramatically from the north

#### **Destination Points**

- ridgetop – ¼ mile southbound
- Arroyo Hondo Canyon – 1¼ mile southbound
- AP4 – 1½ mile southbound
- Nacimiento Mine tailings – ½ mile northbound
- AP6 – 1¼ mile northbound

#### **Safety**

- somewhat remote location
- proximity to occasional high-speed traffic hidden by turn to north
- need for highway signage to warn motorists of a trailhead pull-out
- crosswalk could be developed for CDT across NM Highway 126
- police/county sheriff surveillance feasible

**Ease of Use: easy to moderate**

- steady ascent to ridge top southbound – 250 vertical feet
- gradual descent to Arroyo Hondo Canyon rim southbound – 100 vertical feet
- descent and ascent at Arroyo Hondo Canyon southbound – 75 vertical feet
- gradual ascent to and descent from mine tailings plateau to AP6 northbound

**Amenity Potential**

- restrooms
- benches
- picnic tables
- garbage cans
- no potential for lighting or water

**Special Considerations**

Trailhead maintenance here would be required of the BLM, NMDOT, or Sandoval County.

Access Point 6 (AP6) – Eureka Mesa County Road

**Access**

- distant from Cuba (5 miles) for local residents and US Highway 550 travelers
- travel over unmaintained rough dirt road of up to ½ mile required

**Scenic Attractiveness: significant**

- southbound segment ascends to a plateau with views of Cuba Mesa and the Nacimiento Mountain range, Nacimiento Mine tailings, and cliffs dropping dramatically from the north
- northbound segment crosses Nacimiento Creek below its canyon, ascends steeply on a ridge through ponderosa-oak forest, gently rises and traverses a high plateau along a steep side canyon of Nacimiento Canyon, crosses small aspen meadows, rises through old growth forest, crosses alpine meadows, and joins Forest Road 70 within a few hundred feet of the parking area for the Las Vacas Trail to San Gregorio Reservoir.

**Destination Points**

- Nacimiento Mine tailings – ½ mile southbound
- AP5 – 1¼ mile southbound
- Nacimiento Creek – ½ mile northbound
- ponderosa-oak plateau – 1 mile northbound
- aspen meadows – 3 miles northbound
- alpine meadows – 4¼ miles northbound
- AP7 – 5 miles northbound

**Safety**

- somewhat remote

- police surveillance unlikely

**Ease of Use: easy to difficult**

- gradual descent from and ascent to mine tailings plateau southbound
- steep climb to ponderosa-oak plateau northbound – 1200 vertical feet
- ascent varies from gradual to moderate from plateau to alpine meadows northbound – 800 vertical feet
- gradual descent from alpine meadows to AP7 northbound

**Amenity Potential**

- restrooms
- benches
- picnic tables
- garbage cans
- no potential for lighting or water

**Special Considerations**

Improvement of Eureka Mesa Road from the end of its pavement for up to ¼ mile to a trailhead at this access point would facilitate use of this scenic section of trail. Trailhead maintenance here would be required of the USFS.

Access Point 7 (AP7) – San Gregorio Lake Trailhead, Forest Road 70

**Access**

- scenic drive up the west face of the Nacimiento Mountain range, very distant from Cuba (14 miles)

**Scenic Attractiveness: significant**

- southbound segment crosses alpine meadows along upper Nacimiento Creek above its canyon, descends gradually through old-growth forest to small aspen meadows, and reaches a ponderosa-oak plateau before making a steep descent to AP6
- northbound segment crosses flat fir-spruce forest into the San Pedro Parks Wilderness for 1 mile until arriving at San Gregorio Reservoir

**Destination Points**

- alpine meadows – ¾ mile southbound
- aspen meadows – 2 miles southbound
- ponderosa-oak plateau rim – 4 miles southbound
- San Gregorio Reservoir – 1 mile northbound

**Safety**

- somewhat remote but popular recreation destination in summer months
- USFS patrol is primarily seasonal

**Ease of Use: easy to moderate**

- gradual ascent from AP7 to alpine meadows northbound
- descent varies from gradual to moderate from alpine meadows to ponderosa-oak plateau northbound – 800 vertical feet

### Amenity Potential

- existing USFS-maintained trailhead
- restrooms
- benches
- picnic tables
- garbage cans
- no potential for lighting or water

### Special Considerations

AP7 is the current Las Vacas-San Gregorio Reservoir trailhead. It is a popular summer destination because of its proximity to the reservoir and San Pedro Parks Wilderness. The proposed southbound CDT segment would help to disperse the intensity of use of Las Vacas Trail during summer months. Trailhead maintenance here is already provided by the USFS.

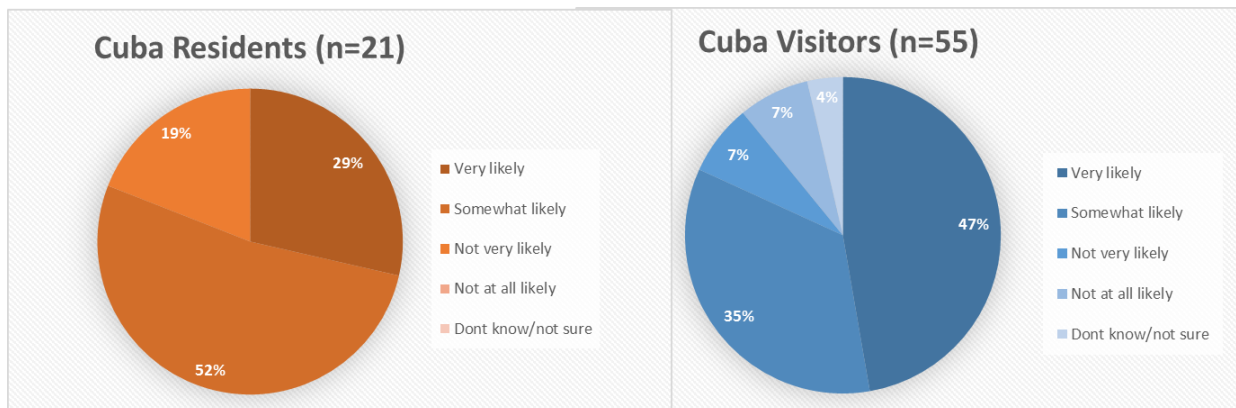
### Q13. What would attract the greatest number of people to the proposed Cuba CDT segment?

A questionnaire (the UNM PRC General Survey) with a cross-sectional design was administered annually by the UNM PRC Village Interventions and Venues for Activity (VIVA) project to a convenience sample of Cuba-area residents in 2011, 2012, and 2013. Survey measures assessed individual walking behavior, walking support from family and friends, and opinions on the importance of walking. The 3 years of data from the survey were aggregated (n = 230) and analyzed in order to identify and compare self-reported walking facilitators and barriers among various demographic subgroups.

Most persons (85%) reported walking regularly despite citing significant barriers such as *too busy/no time, health problems, no motivation, I do not like walking, no places to walk, and nobody to walk with*. Almost one-third of respondents reported walking for their health. Other common reasons given for walking were *desire to be physically active, no transportation, to do work around house or ranch, a desire to lose weight, love of nature, to run errands, to de-stress, to support family members, for fun and because a healthcare provider recommended it*.

Two STEP-HIA surveys of 73 persons from the Cuba area and US Highway 550 corridor were conducted at multiple sites during 2013 and 2014. Among questions asked on both surveys was “How likely would you be to walk or hike the Continental Divide Trail/come to Cuba to walk or hike on the Continental Divide Trail once the new section of trail is finished?” More than 80% of those surveyed said they were *very likely* or *somewhat likely* to use the Cuba CDT (Figure 14).

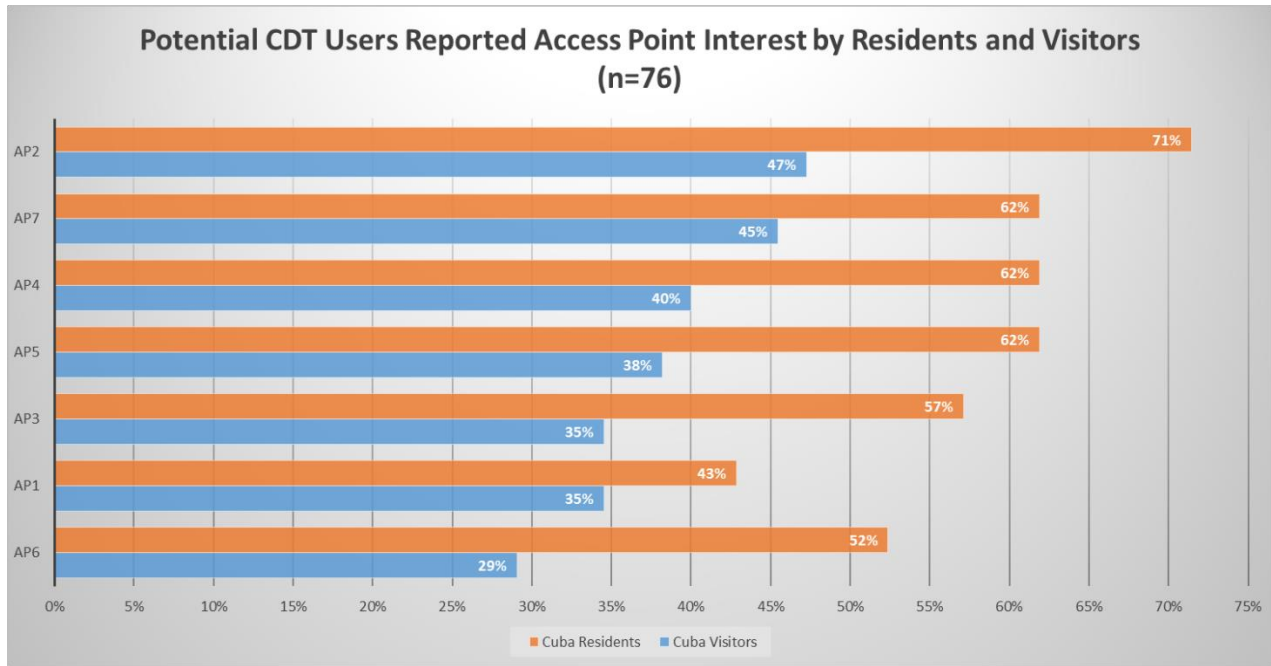
Figure 14





In response to another question, “If you were going to walk or hike the Continental Divide Trail, which trailheads do you think you would use?”, participants in both surveys reported interest in trailheads at all access points identified by the on-site physical assessment (Figure 15).

**Figure 15**



In addition to surveys, 52 in-depth interviews of Cuba-area residents were conducted by the UNM PRC in 2011, analyzed by using NVivo qualitative data analysis software, and coded for themes. Several interviewees remarked on trails and the proposed Cuba CDT segment, citing natural beauty, access to the forest and Cuba, the tourist attraction of existing trails, and the related business potential. Specific comments focused on the trails and economic potential included the following:

*“This [CDT] would open up a whole area of forest, so I think it would be incredibly important – To have a National Forest ¾ mile from the city limits is really something.”*

*“I want to see the CDT done passing close to Cuba and the fairgrounds...totally connected right into town...[I’m] proud of what we have created.”*

*“[The Fisher Trail] has the potential to be a tourist venue—people could stop in and take a trip—a little day trip and take a picnic; not only for the community, but for the highway traffic.”*

*“ [Cuba] is a cute little town with a lot of potential. I think the businesses could do better, but they have to want to.”*

Other interviewees spoke about potential barriers to trail building efforts:

*“This is a town where people don't like change very much – it is a really interesting atmosphere of pushing away change and I think it has hurt Cuba and the surrounding areas...we really love our rural area and we don't want to become the city.”*

*“I think that the disbursement of the population encourages people not to walk – most things are too far to walk.”*



### III. CUBA CDT POTENTIAL EFFECTS ON CUBA ECONOMY

#### ***Q14. What do studies tell us about the effect of trails on local economies?***

Poverty, a social determinant of health, is common in rural communities and particularly severe in the Cuba area (Table 2). The average annual reported taxable gross receipts for businesses in Cuba between 2008 and 2011 (Table 3) reflect the Village’s economic dependence on retail trade, accommodation, and food services. A surprising high percentage of retail sales, 74.59% in 2012, occur at gasoline station stores. Accommodation and food services are provided by 16.9% of business establishments in Cuba (CLRSearch.com, 2015).

**Table 3. Reported Annual Gross Receipts in Cuba, 2008-2011, According to Revenue Source**

<b>Revenue Source</b>	<b>Amount (\$)</b>
All taxable services	\$41,040,155
Retail, accommodation, and food services	\$21,386,007
Retail trade	\$17,346,391
Accommodation and food services	\$4,039,616

*Source: (New Mexico Finance Authority, 2015)*

Developing recreation and tourism infrastructure such as trails has the potential to reduce disparities not only in local-area health but also in the local economy. Limited information exists on the economic

impact of outdoor recreation and tourism on small, rural communities, but there is a known relationship between economic well-being and health (National Research Council 2011a; Deaton 2003; Bielicki 1986).

An economic impact study conducted on trails in Minnesota (Venegas 2009) determined that a notable amount of state revenue is provided by out-of-state visitors, who comprise the majority of trail users. A high proportion of visiting hikers and walkers spend money on lodging, meals, trail fees and access, and consumer items produced locally. The study supports the concept that trail access in rural areas can be an effective economic development strategy for local communities and the state overall.

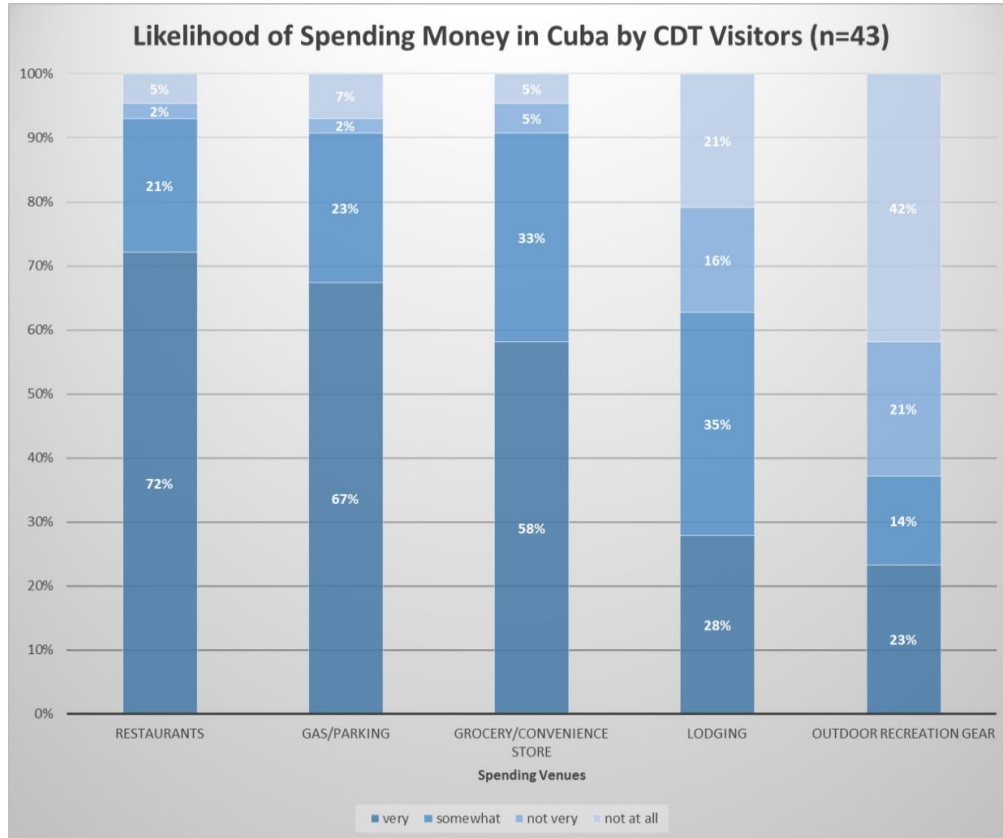
Another economic impact study, from the Rails-to-Trails Conservancy (2007), suggests that trails which pass through rural town centers may have a larger economic impact than suburban and urban trails (Tomes & Knoch, 2009). The trail user survey in this study found that 86% of users of a rural trail in Pennsylvania purchased consumable goods for an average of \$30.30 per user and a total of more than \$3.6 million dollars annually. In a 2012 trail user survey by Portland State University in Oregon, enormous market potential was identified because trail users were found to be more likely to stop in small towns than other sightseers and were also more likely to purchase food and drinks (Fuchs et al., 2012).



**Q15. What might visitors using the proposed Cuba CDT spend in Cuba?**

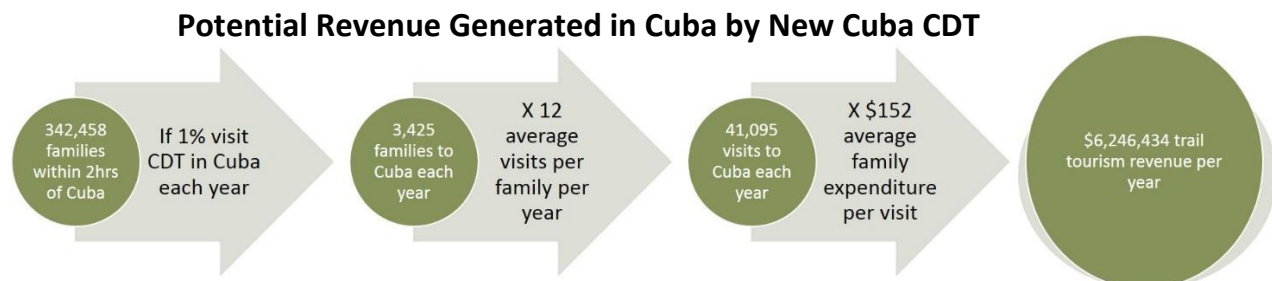
In the two STEP-HIA surveys performed in 2013 and 2014, potential visitors to the Cuba CDT were asked how likely they would be to spend money in Cuba during a visit. All 43 respondents indicated that they would be *somewhat likely* to spend money in Cuba during their visit, and 95% reported that they would be *very likely* to spend money in Cuba. Figure 16 shows survey responses regarding the likelihood of spending money in Cuba, according to type of business, by those likely to visit the Cuba CDT.

**Figure 16**



A 2013 STEP-HIA survey further questioned five respondents who were likely to visit the Cuba CDT and spend money, asking how much they would spend on each of the following items: restaurants; gas/parking; grocery/convenience stores; motel/bed and breakfast; and hunting, fishing, and camping gear. Individual responses ranged from \$70 to \$240, with an average of \$152. Both of the STEP-HIA surveys asked Cuba visitors “About how many times a year do you think you would walk or hike the Continental Divide Trail for the day?” One of the 42 respondents was excluded from the analysis as an outlier because of reporting that he/she would visit 365 times a year. The other 41 responses ranged from 1 to 20 times a year, with an average of 3.3. Assuming that 1% of all households with vehicle access within the US Highway 550 corridor are likely to visit the Cuba CDT, the potential annual economic activity generated by “Cuba CDT trail tourism” could exceed \$1.7 million (Figure 17).

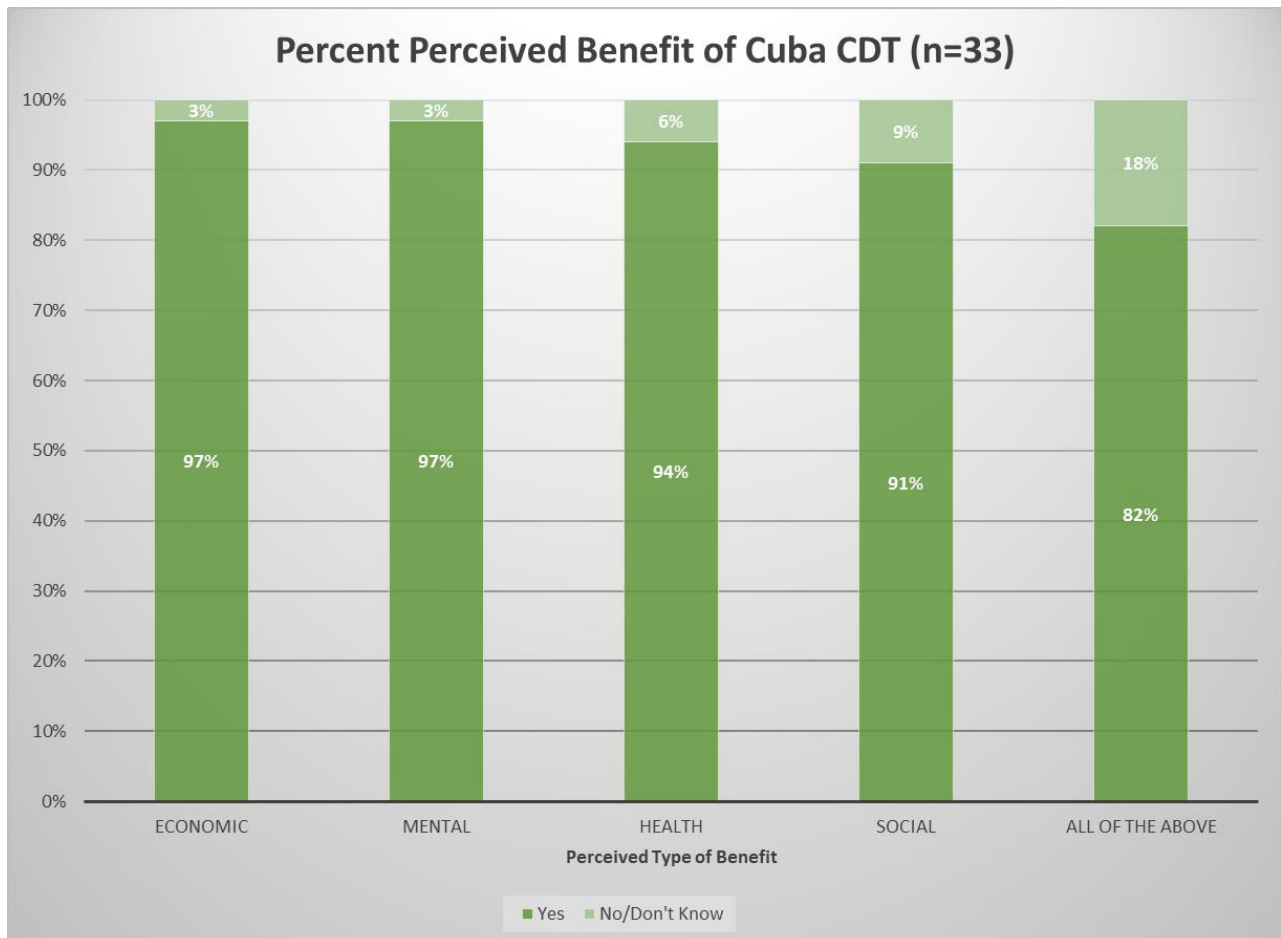
**Figure 17**



State-level information on the outdoor recreational economy can also inform Cuba CDT segment planners on the potential positive economic impact of the new trail segment. Most New Mexicans are engaged in outdoor recreation, and 41% use trails (Outdoor Industry Foundation, 2006). In New Mexico in 2011 and 2012, 68,400 jobs, \$6.1 billion of consumer spending, and \$1.7 billion in wages (4.86% of total wages) resulted from the state’s outdoor recreation industry (Outdoor Industry Association, 2013). Extrapolation by population proportion predicts that, in the Cuba CCD, 137 potential jobs would be related to outdoor recreation. This number far exceeds that of currently available positions - according to any inclusion criteria.

Another question posed by the 2013 STEP-HIA survey (n = 33) was “Do you think Cuba will economically benefit from the new CDT segment?” Respondents were also asked whether they perceived mental, social, or health benefits from the Cuba CDT proposal. As show in Figure 18, the overwhelming majority believed that the new CDT segment would bring economic, social, health, and mental health benefit to the Village of Cuba.

**Figure 18**



#### IV. CUBA CDT POTENTIAL EFFECTS ON CUBA SOCIAL CAPITAL

##### ***Q16. What do studies tell us about the effect of trails on social capital?***

Health is influenced by many factors, some of which include genetics, policy, socioeconomic status, and environmental impacts (Centers for Disease Control and Prevention, 2011). These factors in turn affect the totality of the quality of life of each individual living in a community. WHO defines quality of life as “a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment” (World Health Organization, 1997, p. 1).

Social capital can be used as one measure for assessing quality of life. Central aspects of social capital include relations of trust; reciprocity and exchanges; common rules, norms, and sanctions; and connectedness, networks, and groups (Pretty, 2003). It is the sense of an individual’s level of trust in his or her community.

Several studies suggest that the more walkable a community, the greater its social capital (Active Living Research, 2009; Leyden, 2003). Because walking provides adequate physical activity (Siegel, Brackbill, & Heath, 1995) and physical activity directly pertains to health (Etgen, et al., 2010), walking, social capital, and health are interrelated. Areas to walk – such as the proposed Cuba CDT segment – provide individuals with the opportunity to socially engage and interact with others, thereby increasing the social capital of the community.

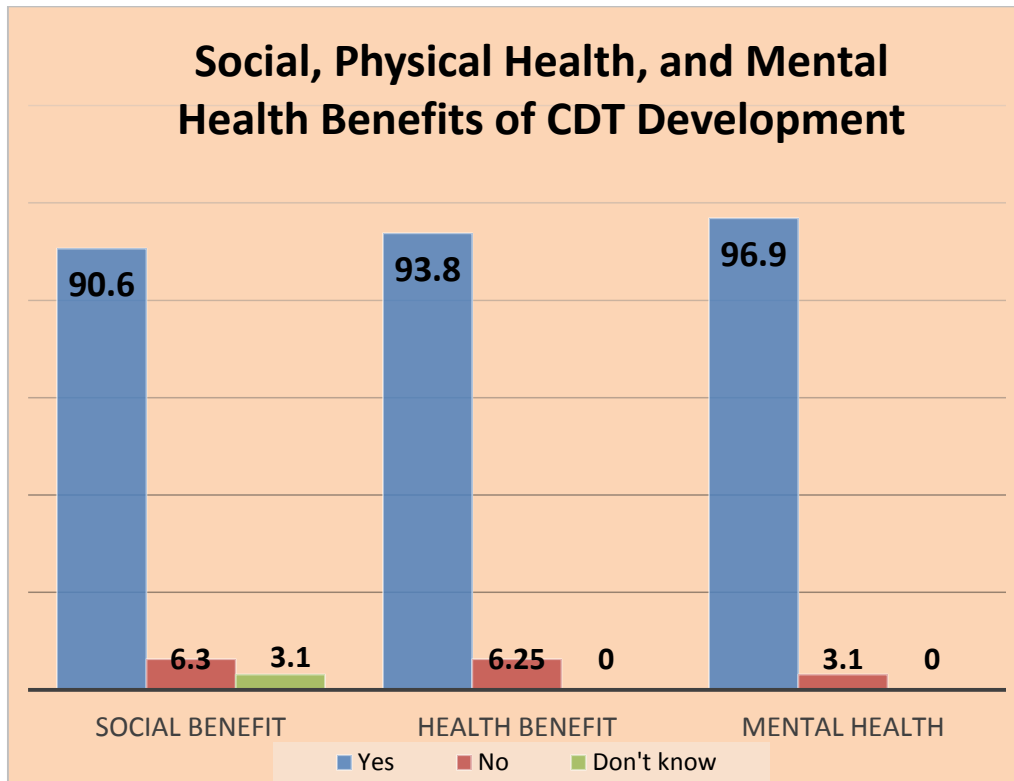
Several studies have correlated enhanced social capital with the usage of trails (Moore & Shafer, 2001; Shafer, Lee, & Turner, 2000). In a mixed methods study conducted in Indiana on the Clear Creek and Bloomington Rail Trails, residents characterized the trails as being good for the “development and cohesion of the neighborhood” (Corning, Mowatt, & Chancellor, 2012). There was also an indication that trails foster community relations and family bonding. In addition, research showed that walkers generally use trails for bonding with family and friends (Lee, Scott, & Moore, 2002). Trails provide access for walking, thereby linking physical activity, social capital, and health and embodying a potential to contribute to the enhancement of individual quality of life.



**Q17. What effects might the proposed Cuba CDT segment have on Cuba area social capital?**

Perceived benefits reported in the 2013 STEP-HIA survey are shown in Figure 19. For each benefit (social, health, and mental health), more than 90% of respondents said that the Cuba CDT trail segment would provide that benefit.

**Figure 19**



A qualitative analysis of Cuba residents’ thoughts on social capital is even more revealing. The 2011 UNM PRC interview data collected from 52 Cuba-area residents included the following comments:

*“Social connection is another part of well-being so it is a double whammy--you feel better from walking and you have had some social interaction in a positive way.”*

*“There is a social aspect to it--we walk, we talk, we visit--and from there some people will say come to my house--it actually expands your acquaintances--I have made new friends.”*

*“If I miss, I feel bad, I want it to invigorate me to want to walk more--a push.”*

*“There are dangers--dogs, snakes, tripping--but they don't bother me--I was raised in the mountains--as long as I am with somebody, walking with someone, it doesn't matter. It is great to share and talk about either how your day went--that is part of the therapy right there.”*

*“I walk and socialize--in a community like this where we have long cold winters and we don't have access to social stuff to socialize with other people--we get enclosed and then we get the depression--and we don't realize it is a disease--and we don't do something about it and we go to the other side where you are just feeding the depression.”*

*“Building trail is a real community building project. It was a great way for us to get to know each other and it was rewarding seeing what we accomplished, working together.”*



## **V. PREDICTIONS OF HEALTH AND HEALTH-RELATED IMPACT**

Predictions regarding Cuba CDT segment use and its impact can be made from the literature and the statistical and survey information described in this document. The following assumptions were made on the basis of the best available data on the combined health impact on all trail users and the economic and social capital impact on the Cuba area. The prevalence of physical inactivity in rural counties in New Mexico derived from 2013 NM Behavioral Risk Factor Surveillance System data (unadjusted) (New Mexico Department of Health, 2014b) is 32%. We assume that this is an accurate representation of the Cuba population.

### **Health Impact**

- User days and the percentage of users achieving recommended levels of physical activity will increase with knowledge of the Cuba CDT segment availability, convenient access (including parking), scenic beauty, minimally strenuous initial trail segments, perceived safety, and well-designed destination points.
- Mortality rates will decline among 20- to 74-year-old Cuba CDT users as a result of increased Cuba CDT use and users achieving higher levels of physical activity.



- Hospitalization rates for diabetes will decline in the Cuba area as a result of increased Cuba CDT use and users achieving higher levels of physical activity.
- Prevalence of physical inactivity and consequent medical expenditures will decline as a result of CDT use and influence (New Mexico Department of Health, 2014b; Pratt, et al., 2000).
- Obesity prevalence will decline in the resident and visitor populations as a result of increased Cuba CDT use and users achieving higher levels of physical activity.

#### **Cuba-Area Economic Impact**

- Gross receipts from retail, accommodation, and food sales in Cuba will rise as the number of visitors using the Cuba CDT increases.
- The percentage of residents perceiving economic benefit will rise as the number of visitors using the Cuba CDT increases.

#### **Cuba-Area Social Capital Impact**

- The percentage of residents reporting social benefit will increase as the number of Cuba CDT users increases.
- Comments of residents reflecting increased social capital will increase as the number of Cuba CDT users increases.

Assumptions made about access points, other features of design, and amenities have the potential to dramatically affect impact projections and should be considered carefully by trail planners and developers. We have chosen five possible scenarios that are not mutually exclusive and could be realized through sequential cooperative projects.

#### **Scenario 1: No trail segment developed**

Cuba-area residents continue to walk and hike under the influence of local walking and hiking program efforts, such as those offered by the Step Into Cuba Alliance. Additional health benefits relating to healthier weight, reduction of cardiac risk-factor prevalence, and better diabetes prevention and control are infrequently realized. No improvement in CDT-related Cuba expenditures occurs. Community cohesion and values are not enhanced by connection to the CDT or its visitors. Visitors do not incorporate planned or impromptu walking on the CDT into trips made on US Highway 550 for other reasons. The level of recreational hiking (including on the CDT) in the Cuba area very slowly increases because of rising general societal interest.

- **30% (adjusted for self-reported information) of Cuba-area residents and CDT visitors meet or exceed recommended physical activity levels**
- **Resident mortality remains unchanged: 755.7/100,000 or 31.6 deaths each year among 20- to 74-year olds**
- **32% of Cuba-area residents remain physically inactive (New Mexico Department of Health, 2014b); as a result, \$719,000 in annual medical expenditures**
- **Obesity prevalence of residents and visitors remains unchanged: 26.9% (see Figure 1)**
- **Cuba-area walking and hiking increases 5% over 5 years**
- **Cuba gross receipts from retail, accommodation, and food sales increase 2% because of inflation: \$428,000**
- **Residents perceive no additional economic benefit from the CDT**
- **Residents perceive no additional social benefit from the CDT**
- **Resident comments and observations reflect no increased social capital**

### **Scenario 2: Trail segment has no formal access points**

Some Cuba-area residents and visitors discover the CDT and develop informal ways to access it. Very few persons regularly walk shorter distances on it for health or recreation. Promotion of its use by the Village of Cuba, Sandoval County, USFS, and BLM is minimal. Additional health benefits of walking and hiking the CDT are infrequently realized. A modest increase in visitors for CDT-related activity occurs, but impromptu visitor walking or hiking on the CDT does not increase. A minimal increase in CDT-related expenditures is realized. Community cohesion and values are not enhanced by connection to the CDT or its visitors.

- **30% (adjusted for self-reported information) of Cuba-area residents and CDT visitors meet or exceed recommended physical activity levels**
- **Resident mortality remains unchanged: 755.7/100,000 or 31.6 deaths each year among 20- to 74-year olds**
- **32% of Cuba-area residents remain physically inactive (New Mexico Department of Health, 2014b); as a result, \$718,898 in annual medical expenditures**
- **Obesity prevalence of residents and visitors remains unchanged: 26.9%**
- **Cuba-area walking and hiking increases 10% over 5 years**
- **Cuba gross receipts from retail, accommodation, and food sales increase 5%: \$1,070,000**
- **A few residents (5% of those surveyed) perceive additional economic benefit from the CDT**
- **Residents perceive no additional social benefit from the CDT**
- **Resident comments and observations reflect no increased social capital**

### **Scenario 3: Trail segment has trailhead at Sandoval County Road 11 crossing; modest regard for design**

Major access for Cuba-area residents and visitors is along a paved road with infrequent traffic only 2 miles from the Village of Cuba. The trailhead provides local residents the choice of an easy, flat walk to the east or a more challenging and scenic hike to the west. Within 1 year of construction, 465 people (10% of area residents) have done one or the other at least once. Seventy people (15% of resident users) now use the trail regularly in good weather. Visitor use becomes significant, especially on early spring and late fall weekends and during the Sandoval County Fair. CDT use increases even more when Sandoval County widens and resurfaces County Road 11 and develops a new walkway and bikeway from town. The Village, County, USFS, and BLM actively promote the CDT for recreation. Local trail advocates and health care providers promote it for improved health. Additional health benefits relating to healthier weight, reduction of cardiac risk-factor prevalence, and better diabetes prevention and control proportionate to increased walking and hiking are realized.

- **40% (adjusted for self-reported information) of Cuba-area residents and CDT visitors meet or exceed recommended physical activity levels**
- **Resident mortality improves: 748/10,000 or 31 deaths each year among 20- to 74-year olds (2 lives saved in 5 years)**
- **Obesity prevalence of residents and visitors improves: 24%**
- **30% of Cuba-area residents remain physically inactive (New Mexico Department of Health, 2014b); as a result, \$674,000 in annual medical expenditures - \$45,000 saved annually**
- **Cuba-area walking and hiking increases 25% over 5 years**
- **Cuba gross receipts from retail, accommodation, and food sales increase 8%: \$1,711,000 (consistent with HIA survey findings)**
- **Many residents (50% of those surveyed) perceive additional economic benefit from the CDT**

- **Many residents (50% of those surveyed) perceive additional social benefit from the CDT**
- **Resident comments and observations reflect modest increase in social capital**
  - **Cuba begins to experience identification as a "trail town" and develops more than 50 local volunteers who do trail maintenance and assist governments to begin an ongoing CDT promotional campaign**
  - **Visitors come to know Cuba as a CDT "Gateway Community"**
  - **Cuba-area residents become knowledgeable about the CDT and other trails and become a source of information for extended families and visitors**

**Scenario 4: Trail segment has trailheads at Sandoval County Road 11 crossing and fairgrounds; modest regard for trail design and significant regard for fairgrounds trailhead amenities**

The walkway and bikeway from the Village are completed quickly, and Sandoval County constructs a trailhead across from the entrance to its fairgrounds that has lighting, toilets, a water source, and a picnic area. Some Cuba-area users and visitors park here and walk to the auxiliary trailhead 1 mile away. Use of parking for tent camping and recreational vehicles at the fairgrounds increases 50% within a year of CDT development, with many visitors walking or driving for the day to the auxiliary trailhead. Within 1 year of construction, 25% of area residents have used the new CDT at least once. One hundred seventy-five people (15% of first-time local visitors) now use the walkway or CDT regularly under various weather conditions. Visitor use becomes very significant, especially on early spring and late fall weekends and during the County Fair. The Village, County, USFS, and BLM actively promote the CDT for recreation. Local trail advocates and health care providers promote it for improved health. Additional health benefits relating to healthier weight, reduction of cardiac risk-factor prevalence, and better diabetes prevention and control proportionate to increased walking and hiking are realized.

- **50% (adjusted for self-reported information) of Cuba-area residents and CDT visitors meet or exceed recommended physical activity levels**
- **Resident mortality improves: 725/100,000 or 30 deaths each year among 20- to 74-year olds (6.5 lives saved in 5 years)**
- **26% of Cuba-area residents remain physically inactive (New Mexico Department of Health, 2014b); as a result, \$584,000 in annual medical expenditures - \$135,000 saved annually**
- **Obesity prevalence of residents and visitors further improves: 23%**
- **Cuba-area walking and hiking increases 50% over 5 years**
- **Cuba gross receipts from retail, accommodation, and food sales increase 12%: \$2,566,000**
- **Most residents (95% of those surveyed) perceive additional economic benefit from the CDT**
- **Most residents (95% of those surveyed) perceive additional social benefit from the CDT**
- **Resident comments and observations reflect marked increase in social capital**
  - **Cuba rapidly becomes identified as a "trail town" and rapidly develops more than 50 local volunteers who do trail maintenance and volunteer at the trailhead on many weekends**
  - **Governments actively conduct a CDT promotional campaign led by the Sandoval County Department of Tourism**
  - **Cuba CDT is designated a stop on the Jemez Mountain Trail National Scenic Byway**
  - **Visitors come to know Cuba as a CDT "Gateway Community" and, prompted by trailhead volunteers and others, return regularly to experience other nearby segments of the CDT, as well as other local trails**
  - **Cuba-area residents become knowledgeable about the CDT and other trails and become a source of information for extended families and visitors**

**Scenario 5: Trail segment has multiple trailheads including Sandoval County Road 11 crossing, fairgrounds, and others, providing day-hike opportunities from one to another; careful regard for design and amenities**

Sandoval County, the BLM, and the USFS cooperate to design a sequential series of four to seven trailheads at access points that provide opportunities for a variety of hiking experiences between them. At each trailhead, kiosk information suggests multiple day hikes of 1 to 8 hours, with descriptions of what each has to offer. Signage on the Cuba CDT marks mileage and provides for interpretative information at trailheads. The walkway and bikeway from the Village are completed quickly, and Sandoval County constructs a trailhead across from the entrance to its fairgrounds that has lighting, toilets, a water source, and a picnic area. Some Cuba-area users and visitors park here and walk to the auxiliary trailhead 1 mile away. Use of parking for tent camping and recreational vehicles at the fairgrounds increases 100% within a year of CDT development, with many visitors staying at the fairgrounds or local motels or bed and breakfasts for a night to several days. Within 1 year of construction, 50% of area residents have used the new CDT at least once. Three hundred fifty people (15% of first-time local visitors) now use the walkway or CDT regularly in varying weather conditions. Visitor use can become heavy, especially on early spring and late fall weekends and during the County Fair. Multiple trailheads, however, help with user dispersion. The Village, County, USFS, and BLM actively promote the CDT for recreation. Local trail advocates and health care providers promote it for improved health. Additional health benefits relating to healthier weight, reduction of cardiac risk-factor prevalence, and better diabetes prevention and control proportionate to increased walking and hiking are realized.

- **65% (adjusted for self-reported information) of Cuba-area residents and CDT visitors meet or exceed recommended physical activity levels**
- **Resident mortality improves: 714/100,000 or 30 deaths each year among 20- to 74-year olds (9 lives saved in 5 years)**
- **20% of Cuba-area residents remain physically inactive (New Mexico Department of Health, 2014b); as a result, \$449,000 in annual medical expenditures - \$270,000 saved annually**
- **Obesity prevalence of residents and visitors further improves: 20%**
- **Cuba-area walking and hiking increases 150% over 5 years**
- **Cuba gross receipts from retail, accommodation, and food sales increase 20%: \$4,277,000**
- **Almost all residents (99% of those surveyed) perceive additional economic benefit from the CDT**
- **Almost all residents (99.9% of those surveyed) perceive additional social benefit from the CDT**
- **Resident comments and observations reflect dramatic increase in social capital**
  - **Cuba rapidly becomes identified as a "trail town" and rapidly develops more than 100 local volunteers who do trail maintenance and volunteer at the trailheads on many weekends**
  - **Governments actively conduct a CDT promotional campaign led by the Sandoval County Department of Tourism**
  - **Cuba CDT is designated as multiple stops on the Jemez Mountain Trail National Scenic Byway**
  - **Visitors come to know Cuba as a CDT gateway community and, prompted by trailhead volunteers and others, return regularly to experience other nearby segments of the CDT, as well as other local trails**
  - **Cuba-area residents become knowledgeable about the CDT and other trails and become a source of information for extended families and visitors**

- **A “trail fest” event is held annually at the fairgrounds, with local volunteers leading day hikes on the CDT and other trails**

## **VI. RECOMMENDATIONS AND STEP-HIA FUTURE PLANS**

Walking and hiking generated by the new Cuba CDT segment will have health and health-related benefits proportionate to trail use. Beneficiaries will be individuals and families near Cuba and the US Highway 550 corridor, Cuba businesses, and the Cuba community at large. Certain design features and trailhead amenities can be predicted to increase these benefits, as described in projections made from the literature and survey findings cited in this document.

On the basis of our literature review and interview/survey information, we are comfortable providing the following general recommendations:

1. The Cuba CDT segment should be designed to allow for access at multiple locations and be connected as closely to the Village of Cuba as possible. A pedestrian walkway and bikeway along Sandoval County Road 11 to the Sandoval County Fairgrounds and CDT, as already proposed by Sandoval County, would be the closest and best connection.
2. Sandoval County and its fairgrounds management should be incorporated into planning for amenities for trailheads and overnight visitors, including a plan for construction and maintenance of any Road 11 trailheads.
3. Initial segments of trail from each trailhead or road crossing will be most heavily used and, in order to attract the most use, should offer scenic attractions, one or more destination or turnaround points, and relatively easy initial walking on a gentle or no slope. An option to route the trail on the sandstone ridge south of the Road 11 crossing and north of the Arroyo Hondo will attract many visitors because of its scenic beauty and proximity to Cuba.
4. Safety should be enhanced by trailhead amenities, provision for patrol by law enforcement personnel, and removal of, or design to avoid, trail impediments of mud, water, and steep cross-slope. Rio Puerco, Arroyo Hondo, and other drainage crossings may require structures to allow walkers and hikers to remain out of water or mud.
5. Interpretative trailhead signage and distance markers should be provided, whenever possible, throughout the segment.
6. Stakeholders such as the Cuba Village Council, Sandoval County Fairgrounds and Tourism Department, Step Into Cuba Alliance, NMDOT, Mid-Region Council of Governments, and interested individuals and businesses should be engaged by the USFS and BLM to review the final proposed Cuba CDT plan draft. This may help to ensure that feasible preferences and ideas for the trail that may maximize its future use are incorporated into the design.

The STEP-HIA team intends to monitor the planning and construction process for the Cuba CDT segment while serving as a liaison for information and public input to all project stakeholders. We thank the staff of the Santa Fe National Forest and Cuba Ranger District for their openness to considering health and health-related impact in designing this important project for Cuba and New Mexico.

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