TAYLOR
COUNTY
DEVELOPMENT
AUTHORITY

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CHAIRMAN EDGAR
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JUN 26 2007
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June 11, 2007

Florida Public Service Commission
Chairman Lisa Polak Edgar
2540 Shumard Oak Blvd.
Tallahassee, Florida 32399-3552

Dear Chairman Edgar,

In 2006, the Taylor County Development Authority (TCDA) commissioned a Health Impact Assessment (HIA) of the potential impacts of the Taylor Energy Center, a coal power plant proposed to be locating in our county. We undertook the study as part of the normal due diligence for a project of this type. Healthy Development, Inc. of Tallahassee was selected as an independent expert to conduct the study. It took ten months to complete the analysis and a final copy is of the report is attached for your information.

A Health Impact Assessment can be defined as the estimation of the effects of a specified action on the health of a defined population. Its purpose is to assess the potential health impacts – positive and negative – of policies, programs, and projects; and to improve the quality of public policy decision making through recommendations to enhance predicted positive health impacts and minimize negative ones.

The final report includes an Executive Summary, an At-A-Glance Impact Table, and the Health Impact Assessment. The At-A-Glance Impact Table contains the health impacts and the accompanying recommendations. The booklet also contains the background reports contained in Phase I and Phase II of the report. The HIA has been presented to both the Taylor County Board of County Commissioners and the Perry City Council.

The Taylor County Development Authority sincerely appreciates all you do for the citizens of Florida. We hope you will find the information helpful during your consideration of the Taylor Energy Center project.

Sincerely,

R.C. Breer

Rick Breer, Director of Economic Development
Taylor County Development Authority

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115 W. Green Street ■ P.O. Box 449 ■ Perry, Florida 32348 ■ 850-584-5627 ■ Fax 850-223-0161 ■ tcda@gtcom.net

Healthy Development

Informed Decisions ~ Enhanced Development

Health Impact Assessment

April 2007

Commissioned by

Taylor County Development Authority

Healthy Development Inc.
www.healthydevelopment.us
msimmons@healthydevelopment.us
Phone 850.322.4629

Table of Contents

Final Report

Executive Summary (Final HIA Executive Summary text.doc)

At-A-Glance Impact Table (Final HIA at a glance impact table.doc)

Health Impact Assessment (Final Taylor County HIA.doc) and Healthy Healthy Development Phase II & III Addendum)

Background Reports

Phase I

Report (Healthy Development Phase I Final.pdf)

Appendix One (HIA Phase 1 Appendix One.pdf)

Appendix Two (HIA Phase 1 Appendix Two.pdf)

Appendix Three (HIA Phase 1 Appendix Three.pdf)

Phase II

Executive Summary (HIA Phase II Executive Summary.doc)

Report (Healthy Development Phase II Final.doc)

Addendum (Healthy Development Phase II TAYLORCHP.pdf)

Informed Decisions ~ Enhanced Development

Taylor Energy Center
Health Impact Assessment -- Final Report
At-A-Glance Impact Table
Winter 2007

In 2005, Florida's Taylor County Board of Commissioners advocated for an 800 megawatt coal-fired electric plant to be built four miles south of the County seat, Perry. The Taylor County Development Authority commissioned a Health Impact Assessment (HIA) on the proposed plant. The scope was determined by community stakeholder interviews and surveys and includes (1) risks to health from the plant emissions, specifically, particulate matter, (2) risk to human health from unmitigated carbon dioxide emissions from the plant; and (3) benefits to health from employment from the plant.

Health Impact Assessments do not make comprehensive assessments that ascertain whether a development project is either "good" or "bad" for a community. Rather, an HIA makes recommendations to mitigate the negative and enhance the positive impacts to optimize the population's health. HIAs offer recommendations for each impact that should lead to improved health outcomes over time. The long-term effects of the Taylor Energy Center can be evaluated using indicators provided in the attached table.

Taylor Energy Center impacts investigated included:

- Particulate matter emissions
- Ground level ozone (a secondary pollutant from emissions)
- Carbon dioxide emissions
- Mercury emissions
- Income from minimum salary jobs
- Income from median salary jobs
- Over $100 million in "community contribution" over 40 years

Other factors not associated with the Taylor Energy Center include:

- Smoking attributable mortality

Healthy Development Inc.
www.healthydevelopment.us
msimmons@healthydevelopment.us
Phone 850.322.4629

Taylor Energy Center--Health Impacts	**Health effect (positive, neutral, or negative)**	**Magnitude of Impact**	**Recommendation**	**Long-term Evaluation of TEC's Impact**
Mercury emissions	Negative--potent neurotoxin consumed in fish	Less than 60 pounds of mercury will be emitted per year according to Environmental Consulting & Technology Inc. and they state, "It is anticipated that deposition modeling will demonstrate that mercury deposition due to Taylor Energy Center emissions will be insignificant compared to current mercury deposition rates for North Florida."	Establish baseline mercury levels in the county through hair or blood sampling. The Taylor County Health Department should report mercury levels to the public. Residents should know and meet the fish consumption advisories for fish caught locally.	Florida Department of Health fish consumption advisories should resemble previous years or improve over time even with TEC.
Particulate matter emissions	Negative -- linked to acute and chronic morbidity and mortality	Based on peer-reviewed science and this HIA's calculations, the health impact from particulate matter will be minimal and undetectable over time.	DEP indicates that there are no nonattainment air quality problems in Taylor County. However, no air quality monitor exists in the county. To reassure citizens of their air quality now and after TEC is operational, this HIA recommends that an air quality monitor be installed in the county and monitored by DEP. Make available real-time access to the information online. Establish air quality alerts to warn vulnerable populations and concerned citizens if nonattainment occurs.	After air quality monitor is installed, air quality should not reach non-attainment after TEC is operational.
Ground level ozone (a secondary pollutant from emissions)	Negative -- linked to acute morbidity and mortality	Based on peer-reviewed science and the similarity in the magnitude of risk between ozone exposure and particulate matter exposure, in this HIA's finding the ground level ozone impact will be a similar in magnitude to particulate matter. The impact will likely be minimal and undetectable over time.		

www.healthydevelopment.us
msimmons@healthydevelopment.us
850.322.4629

Taylor Energy Center--Health Impacts	Health effect (positive, neutral, or negative)	Magnitude of Impact	Recommendation	Long-term Evaluation of TEC's Impact
Carbon dioxide emissions	Negative -- global burden of disease estimates predict overall increase in mortality	About 7 million metric tons of carbon dioxide will be emitted per year. This is the most significant negative impact from TEC. Although the health effects from global warming are still an emerging area of health research, this HIA's assessment of negative impact is based on the precautionary principal. Preliminary estimates of global warming from the World Health Organization's global burden of disease project predict overall increases in cardiovascular disease deaths, foodborne and waterborne diseases that cause diarrhea episodes, vectorborne disease such as malaria and dengue fever, natural disasters and fatal unintentional injuries, population displacement and malnutrition. The health impact of global warming could affect billions of people.	This HIA recommends a regular assessment of the County's carbon footprint, as well as a policy to remain carbon negative. Sarasota County may serve as a model for Taylor. A rough estimate of Taylor County's existing forest cover suggests that it sequesters 13 million metric tons of CO2. After the carbon footprint is calculated, pursue selling existing carbon credits on established carbon markets. Adhere to EPAs smart growth principals in future residential and commercial developments to keep carbon dioxide emissions low.	Taylor County should remain carbon negative over time even with TEC.

Taylor Energy Center--Health Impacts	Health effect (positive, neutral, or negative)	Magnitude of Impact	Recommendation	Long-term Evaluation of TEC's Impact
Income from minimum salary jobs	Positive -- increases in income linked with decreases in mortality rates	Based on peer-reviewed science and this HIA's estimations, the impact from the minimum salary income from TEC could substantially reduce the risk of mortality for black employees and their families. The minimum salary would not likely improve the risk of mortality of white employees and their families. The income from TEC could address the significant racial disparities in income and mortality between black and white residents in the county.	Target TEC job recruitment toward a representative or greater proportion of black residents to be trained for technical level jobs at TEC.	TEC will be considered an enhancement to population health and economic development if race-specific mortality rates decline over time.
Income from median salary jobs	Positive -- increases in income linked with decreases in mortality rates	Based on peer-reviewed science and this HIAs estimations, the impact from the median salary income from TEC could substantially reduce the risk of mortality for both black and white employees and their families.	A diverse population of Taylor County residents should be recruited and trained for professional jobs at TEC.	TEC will be considered an enhancement to population health and economic development if race-specific mortality rates decline over time.

www.healthydevelopment.us
msimmons@healthydevelopment.us
850.322.4629

Taylor Energy Center--Health Impacts	Health effect (positive, neutral, or negative)	Magnitude of Impact	Recommendation	Long-term Evaluation of TEC's Impact
Over $175 million in "community contribution" over 40 years	Positive -- if community contribution is spent on fundamental infrastructure linked to improved health.	Based on peer-reviewed science and this HIA's findings, the increase in revenue to the county could improve fundamental services and infrastructure such as schools, health care, recreation, transportation and planning for future development. If these investments were made with a goal of improving population health, reducing economic disparities and enhancing economic development, the health impact could be significant.	According to the Congressional Budget Office, to improve economic growth, governments should enhance labor productivity by improving the knowledge and skills of workers and by investing in materials and equipment available to those workers. This HIA recommends that some portion of the "community contribution" be invested in (1) accessible high quality preschool, (2) improving K-12 school quality (Taylor County's High School has been graded a "D" for the past 3 years), (3) investing in information technology infrastructure and (4) instituting a small business, especially entrepreneurial, incubator program with the help of regional universities.	TEC's presence will be considered an enhancement to population health and economic development if enrollment in high quality preschool increases, school grades improve, local access to information technology improves and small business growth occurs.
Taylor County Baseline Status			**Recommendation**	
Smoking attributable mortality	22% of the deaths in Taylor County (2003), compared to 18% in the State of Florida overall (2001), are attributable to tobacco use. The economic impact to county residents is around $28.5 million dollars in medical and productivity costs annually.		Implement additional smoking cessation programs and provide health prevention and education programs to improve health with funds mandated by the passage of Amendment 4 in November, 2006.	

Informed Decisions ~ Enhanced Development

Taylor Energy Center

Health Impact Assessment

Winter 2007

Healthy Development Inc.
www.healthydevelopment.us
msimmons@healthydevelopment.us
Phone 850.322.4629

Table of Contents

Executive Summary: 3
Introduction: 4
Smoking attributable mortality analysis 5
Risk of Smoking 5
Smoking Conclusions and Recommendations 6
Taylor Energy Center and Mercury Emissions 6
Risk of Mercury 6
Mercury Conclusions and Recommendations 8
Taylor Energy Center and Carbon Dioxide Emissions 9
Risk of Carbon Dioxide 9
Taylor County Forest Carbon Dioxide Calculations: 11
Carbon Dioxide Conclusions and Recommendations 12
Taylor Energy Center and Other Air Pollution Emissions 12
Risk of Air Pollution 12
National Ambient Air Quality Standards 15
TEC's Ambient Criteria Pollutant Estimates 15
TEC Emissions as a Proportion of NAAQS 17
The Science of Air Pollution and Health 18
Evidence of Short Term Health Effects of Particulate Matter and Ground Level Ozone 19
Evidence of Long-Term Health Effects of Particulate Matter 23
Health Impact Calculations of Short-Term (daily) and Long-Term (annual) Particulate Matter 25
Particulate Matter and Ground Level Ozone Conclusions and Recommendations: 27
Jobs and Income 28
Risk of Income Inequality 28
Conclusion and Recommendations for Jobs, Income and Health Impacts 33
HIA Limitations 33
Bibliography 35
Appendix One: 37

Executive Summary:

In 2005, Florida's Taylor County Board of Commissioners advocated for an 800 megawatt coal-fired electric plant to be built four miles south of Perry, the County seat. The Taylor County Development Authority (TCDA) commissioned a Health Impact Assessment (HIA) of the proposed plant. The scope was determined by community stakeholder interviews and surveys. The scope includes (1) risks to health from the air pollution, specifically, particulate matter (PM_{10}), ground level ozone, mercury and carbon dioxide emissions, and (2) benefits to health from employment from the plant and the "community contribution."

Methods: Peer-reviewed scientific evidence was collected on the potential impacts from emissions and economic impacts from Taylor Energy Center (TEC). Mortality effects of PM_{10} were forecast onto local population statistics using a log-linear risk model of population exposure. No point source model for ground level ozone was available however components of ozone were assessed. Mercury emissions will be modeled by Environmental Consulting & Technology Inc. (ECT) during the permitting phase. Carbon dioxide health impacts are an emerging area of health research that will be discussed. The impact of various employment scenarios on health of employees and their families was estimated based on evidence.

Results: Substantial racial disparities in health were identified. During the operational phase of the plant, local air quality will deteriorate slightly with small effects on mortality that would likely be undetectable over time. Carbon dioxide from the plant will contribute to global climate change having overall negative effects on global health. All emissions evaluated, except carbon dioxide, are regulated by state and federal agencies. It is likely that carbon dioxide will be regulated in the near future. The health benefits of the jobs would be greatest if a large proportion of black residents fill the jobs.

Recommendations are:

1. Mercury: Before the plant begins operation, establish baseline mercury levels in a sample of the population in the county through hair or blood sampling. The Taylor County Health Department should report mercury levels to the public. Residents should know and meet the fish consumption advisories for fish caught locally. Long-term evaluation: If TEC mercury emissions are as low as predicted by ECT, the Florida Department of Health fish consumption advisories should resemble previous years or improve over time.
2. Carbon dioxide: This HIA recommends a regular assessment of the County's carbon footprint, as well as a policy to remain carbon negative. Sarasota County, Florida may serve as a model for Taylor. A rough estimate of Taylor County's existing forest cover indicates that it sequesters 13 million metric tons of carbon dioxide. After the carbon footprint is calculated, the county may pursue selling existing carbon credits on established carbon markets. Additional recommendations are to adhere to EPAs smart growth principals in future residential and commercial developments in order to keep carbon dioxide

emissions as low as possible. Long-term evaluation: Taylor County should remain carbon negative.

3. Particulate matter and ground level ozone: DEP indicates that currently there are no non-attainment air quality problems in Taylor County. However, no air quality monitor exists in the county. To reassure citizens of the quality of their air now and after TEC is operational, this HIA recommends that an air quality monitor be installed in the county and monitored by DEP. Real time access to the information online should be made available. Establish air quality alerts to warn vulnerable populations and concerned citizens if non-attainment occurs. Long-term evaluation: After an air quality monitor is installed, air quality should not significantly deteriorate after TEC is operational.
4. Income from minimum salary jobs: Target TEC job recruitment toward a representative or greater proportion of black residents to be trained for technical level jobs at TEC. Long-term evaluation: TEC will be considered an enhancement to population health and economic development if race-specific mortality rates decline over time.
5. Income from median salary jobs: A diverse population of Taylor County residents should be recruited and trained for professional jobs at TEC.
6. The partners in TEC will contribute to the community about $179 million over 40 years: According to the Congressional Budget Office, to improve economic growth, governments should improve labor productivity by improving the knowledge and skills of workers and by investing in materials and equipment available to those workers. This HIA recommends that the "community contribution" be invested in (1) improving K-12 school quality (Taylor County's High School has been graded a "D" for the past 3 years), (2) implementing high quality preschool, (3) investing in information technology infrastructure and (4) instituting a small business, especially entrepreneurial, incubator program with the help of regional universities. The goal of these investments are to encourage local government, business, education, and the community to work together to create a vibrant local economy, through a long-term investment strategy that encourages local enterprise; serves the needs of local residents, workers, and businesses; promotes stable employment and revenues by building on local competitive advantages; protects the natural environment; increases social equity; and is capable of succeeding in the global marketplace.

Introduction:

In the summer of 2005, rural Florida's Taylor County Board of Commissioners advocated for an 800 megawatt coal-fired electric plant to be built four miles south of the county seat, Perry. The county is economically disadvantaged and has poorer health compared to the state average, a condition shared by many rural counties. The county has a history of polluting industry, a 40–year-old paper plant, and an organized opposition that has rallied against the coal plant. In an effort to raise the level of debate between the two opposing sides on the health issues to the county's population involved in the operation of a coal fired electric plant within the county, the Taylor County

Development Authority commissioned Healthy Development Inc. (HDI) to conduct a Health Impact Assessment (HIA) on the proposed plant. Although the HIA did not analyze the paper plant, existing fear and stress about additional pollution pervaded the coal plant issue. Furthermore, stakeholder surveys and public health data identified that racial tensions and health disparities are a significant aspect of the community.

The HIA focused on evaluating the likelihood of change in community health from the dual impact of the air emissions and economic growth contributed by the coal plant. Key themes from community stakeholder interviews and surveys set the scope of the HIA. The Taylor Energy Center (TEC) will emit tons of carbon dioxide into the air from the plant and, currently, carbon dioxide is not regulated. The potential impact from this green house gas will be addressed. Additionally, TEC will emit mercury, particulate matter and the components of ground level ozone (a component of smog). The facility will meet all state and federal air quality criteria. The HIA will give particular attention to risks to health from the particulate matter and ground level ozone during the operational phase of the coal plant and benefits to health from the jobs created by the plant. Limitations of the HIA follow the jobs and health section.

Some residents are fearful of the high rates of cancer and respiratory diseases presently reported in the county. Alternative explanations for these high rates were suggested during the scoping phase including air pollution emissions from the paper mill or from high smoking rates. Further deterioration in air quality produced by the Taylor Energy Center is a major concern for some residents. A smoking attributable mortality analysis was calculated by the Florida Department of Health's Bureau of Epidemiology to ascertain the proportion of deaths in the county that is attributable to smoking. The smoking attributable mortality analysis may shed light on the high cancer and other chronic diseases in the county and is presented first.

Smoking attributable mortality analysis

Risk of Smoking

The Florida Department of Health's Bureau of Epidemiology conducted a smoking attributable mortality analysis for deaths in the county for 2003, the most recent data available. There were 103 deaths in the county and 23 of those deaths were linked to causes of death associated with tobacco use. Therefore, about 22 percent of the deaths that occurred in 2003 are attributable to tobacco use. Statewide, the percentage of death attributable to tobacco use was 18% in 2001[1].

Cigarette smoking is the leading cause of preventable and premature death in the United States. Table 1 lists the diseases that are caused by tobacco use. This list of illnesses associated with tobacco use will shed some light on individual experiences of these illnesses in the county.

The CDC estimates that the cost for medical expenditures and productivity losses related to illnesses associated with smoking to be $4,357 per person in 2006 dollars (CDC 2002). Given that 31.2% of Taylor County residents reported tobacco use, the

[1] http://apps.nccd.cdc.gov/sammec/ accessed February 21, 2007

annual economic impact to county residents is likely to be approximately $28.5 million dollars in medical and lost productivity costs[2].

Smoking Conclusions and Recommendations

Implement and fund additional smoking cessation programs and provide health prevention and education programs to improve health.

Taylor Energy Center and Mercury Emissions

Risk of Mercury

Exposure to high levels of mercury can cause neurologic and kidney disorders (CDC 2004). Because methylated mercury in the aquatic environment bioaccumulates in animal tissues in the food chain, people can be exposed to it by eating fish, shellfish and other seafood. Exposure of childbearing-aged women to mercury is of particular concern because of its potential adverse neurologic effects of mercury to fetuses. Mercury in local water bodies and fish originate from both US and non-US sources.

The combustion of fossil fuels containing mercury will result in emissions of elemental mercury (Hg^0), reactive gaseous divalent mercury (Hg^2+ or RGM), and/or particle-bound mercury (Hg_p). Hg_p is emitted in particulate form, while both elemental mercury and RGM are released in the gaseous state. The deposition characteristics of each of these three mercury species differ. Elemental mercury has a long residence time in the atmosphere and travels long distances (i.e., greater than 50 km) before it is ultimately deposited on the Earth's surface. The other two forms of mercury, RGM and Hg_p, will deposit more locally (i.e., within 50 km) and regionally (i.e., from 50 to several thousand km). Since the fossil fuels planned for the Taylor Energy Center will contain trace amounts of mercury, the facility will be a source of mercury emissions during the operational phase of the plant. Some of the mercury deposited locally can be methylated and could potentially bioaccumulate in fish.

In March of 2005, the Environmental Protection Agency (EPA) issued a federal rule to permanently cap and reduce mercury emissions from coal-fired power plants, the largest source of mercury emissions in the US. The Clean Air Mercury Rule (CAMR) will build on EPA's Clean Air Interstate Rule (CAIR) to significantly reduce emissions from coal-fired power plants. Coal-fired power plants are the largest remaining sources of mercury emissions in the country. When fully implemented, these rules will reduce utility emissions of mercury from 48 tons to 15 tons a year.

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[2] County population in 2004 was 20,986 x 31.2% tobacco use in 2002 x $4357 in medical and productivity costs in 2007 equals about $28,528,032 million annually.

Table 1: Diseases caused by smoking or tobacco use

Neoplasms (cancer)
Lip, oral cavity, pharynx
Esophagus
Pancreas
Larynx
Trachea, lung bronchus
Cervix uteri
Urinary bladder
Kidney, other urinary
Cardiovascular diseases
Hypertension
Ischemic heart disease
Other heart disease
Cerebrovascular disease
Atherosclerosis
Aortic aneurysm
Other arterial disease
Respiratory diseases
Pneumonia
Bronchitis
Chronic airway obstruction
Perinatal conditions
Short gestation/low birth weight
Respiratory distress syndrome
Other respiratory-newborn
Sudden infant death syndrome
Burn deaths
Secondhand smoke deaths
Lung cancer
Ischemic heart disease

The Clean Air Mercury Rule establishes "standards of performance" limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program that will reduce nationwide utility emissions of mercury in two distinct phases. The first phase cap is 38 tons and emissions will be reduced by taking advantage of "co-benefit" reductions – that is, mercury reductions achieved by reducing sulfur dioxide and nitrogen oxides emissions under CAIR. In the second phase, due in 2018, coal-fired power plants will be subject to a second cap, which will reduce emissions to 15 tons upon full implementation. Additionally, new coal-fired power plants ("new" means construction starting on or after Jan. 30, 2004) will have to meet stringent new source performance standards (i.e., stack mercury emission rate limits) in addition to being subject to the caps.

The November 5, 2004 edition of the Morbidity and Mortality Weekly Report published by the Centers for Disease Control and Prevention reported on the risk of mercury toxicity in the US (CDC 2004). An analysis of blood mercury levels was undertaken for young children and childbearing-aged women in the US from 1999 to 2002. The authors of this study used the CDC's National Health and Nutrition Examination Survey which began measuring blood mercury levels in these populations in 1999. The data are nationally representative and are based on analysis of cross-sectional data (data were collected at one time and is not longitudinal) for the noninstitutionalized, U.S. household population. The survey consisted of interviews conducted in participants' homes and standardized health examinations conducted in mobile examination centers.

The findings confirmed that blood mercury levels in young children and women of childbearing age usually are below levels of concern. However, approximately six percent of childbearing-aged women had levels at or above a reference dose, an estimated level assumed to be without appreciable harm (>= 5.8µg/L). The percentage of all women aged 16-49 years with mercury levels >= 5.8 µg/L was 5.66% (95% confidence interval 4.04-7.95). The main limitation of this study is that it did not sample an adequate number of women sport anglers who might eat large amounts of fish to characterize the distribution of total blood mercury in this group.

In Taylor County and elsewhere, fish are an important source of food, high in protein and nutrients and low in saturated fatty acids and cholesterol. The short-term strategy to reduce the risk of mercury is to eat fish with low mercury levels and avoid or reduce consumption of fish with high mercury levels. Women who are pregnant or who intend to become pregnant should follow federal and state advisories on consumption of fish.

The Florida (DOH) s of Health and Environmental Protection (DEP) as well as the Florida Fish and Wildlife Conservation Commission collaborate to produce fish consumption advisories for all the water bodies in the state. Table 2 shows the fish consumption advisories for Taylor County by water body, species of fish and for two populations at risk. This is the best source of information about mercury and risk to individuals who eat fish.

Mercury Conclusions and Recommendations

The Taylor Energy Center qualifies as a new coal plant and will be subject to the new source performance standards in addition to meeting the requirements of the Clean Air Mercury Rule and the Clean Air Interstate Rule. ECT states "The Taylor Energy Center will include emission control systems that will reduce total mercury emissions to less than 60 pounds per year. Of this total, less than 10 percent will be RGM and only trace amounts of Hg_p. It is anticipated that deposition modeling will demonstrate that Hg deposition due to Taylor Energy Center emissions will be insignificant compared to current Hg deposition rates for North Florida." This statement by ECT will be subject to scrutiny and verification during the permitting process for the plant.

Table 2: Copy of the Taylor County 2006 Fresh Water Fish Consumption Advisories from the Department of Health's Website.

Taylor			
Water Body (Location)	**Species**	**Women of childbearing age, young children (# of meals)**	**All Other Individuals (# of meals)***
See Table 3 for advisories on marine fish			
Aucilla River	Redbreast sunfish	One per month	Two per week
	Largemouth bass, Bowfin, Gar, Spotted sunfish	One per month	One per week
Econfina River	Redbreast sunfish, Spotted sunfish	One per month	One per week
	Largemouth bass, Bowfin, Gar	One per month	One per month
Fenholloway River	Bowfin	One per month	Two per week
Steinhatchee River	Spotted sunfish	One per month	Two per week
	Largemouth bass, Bowfin, Gar, Redbreast sunfish	One per month	One per week
* All Other Individuals should eat no more than one six ounce meal per week of Largemouth bass, Bowfin, or Gar from freshwater bodies in Florida not listed in this Web Page.			

To see the table mentioned, see Table 3 at www.doh.state.fl.us/environment/community/fishconsumptionadvisories/Freshfishcountyformat.html#Taylor

A proportion of the "community contribution" could be use to establish baseline mercury levels in the county's population through hair or blood sampling. The level of risk established by sampling should be followed by community education concerning mercury and fish consumption if a problem is observed in the population. Until then, the best source of information about the risk from mercury is the fish consumption advisories released by the Florida Department of Health annually. Residents should know and meet the fish consumption advisories for fish caught locally.

Taylor Energy Center and Carbon Dioxide Emissions

Risk of Carbon Dioxide

Carbon dioxide is not classified as a pollutant and, as yet, is not a regulated emission. Carbon dioxide is a green house gas that will be emitted from the TEC. Green house gases raise global temperatures and, as a result, sea levels. Epidemiologists are just beginning to study the impact of rising global temperatures on human health. Research has pointed to a number of effects that may have already occurred. For example, evidence of a link between warming and microbial foodborne, waterborne and mosquito-related illnesses has been observed. Increases in illnesses are also connected to more intense weather disturbances that in part are attributed to increased greenhouse emissions (Hall et al. 2002).

The epidemiological research concerning the health effects of climate change is only now emerging. Thus far the studies that have identified a link between climate change and health have addressed single diseases and local populations. The type of epidemiological evidence that is needed should evaluate global scale impacts affecting human populations at large (Hampton 2006).

The World Health Organization is just beginning to develop standardized comparative risk assessment methods for estimating aggregate disease burdens attributable to different risk factors associated with global warming (Campbell-Lendrum and Woodruff 2006). The assessment is part of the Global Burden of Disease project. The risk assessment has been applied to existing and new models for a range of climate-sensitive diseases in order to estimate the effect of global climate change on current disease burdens and likely proportional changes in the future. The comparative risk assessment approach has been used to assess the health consequences of climate change worldwide and to inform decisions on mitigating greenhouse gas emissions. The approach places climate change within the same criteria for epidemiologic assessment as other health risks and accounts for the size of the burden of climate-sensitive diseases rather than just proportional change, which highlights the importance of small proportional changes in diseases that cause a large burden to individuals and societies.

Health risks associated with climate change identified so far include overall cardiovascular disease deaths, foodborne and waterborne diseases that cause diarrhea episodes, vectorborne disease such as malaria and dengue fever, natural disasters and fatal unintentional injuries, population displacement and malnutrition (Campbell-Lendrum and Woodruff 2006). These exercises by the World Health Organization help clarify important knowledge gaps such as a relatively poor understanding of the role of nonclimatic factors (socioeconomic and other) that may modify future climatic influences and a lack of empirical evidence and methods for quantifying more complex climate–health relationships. These exercises highlight the need for risk assessment frameworks that make the best use of traditional epidemiologic methods and that also fully consider the specific characteristics of climate change. These include the long-term and uncertain nature of the exposure and the effects on multiple physical and biological systems that have the potential for diverse and widespread effects, including high-impact events like hurricanes. Ultimately though, it is clear from the perspective of the World Health Organization that the health impact of global warming could affect the health of billions of people.

ECT estimates that about seven million metric tons of carbon dioxide will be emitted per year. This is the most significant negative impact from TEC. It is reasonable to assume that the carbon dioxide emitted from TEC will contribute to global climate change and human health will be impacted. At a minimum, the coastline of Taylor County is likely to experience sea level rise between seven and 23 inches within the next century (Intergovernmental Panel on Climate Change 2007). Beyond sea level rise, the evidence is too sparse to assess the impact of carbon dioxide emissions on the health of residents of Taylor County. Although the health effects from global warming are still an emerging area of health research, this HIA's assessment of most significant negative impact is based on the precautionary principal.

Taylor County Forest Carbon Dioxide Calculations:

Unlike other areas that have proposed coal fired utilities, Taylor County is in the unique position with respect to carbon dioxide, as it is the Forest Capital of Florida. Much of the county's land area is currently forested. Plants and soil sequester carbon dioxide and Taylor County's forests are a source of sequestration, sometimes referred to as "carbon sinks." The forest cover in the county sequesters' carbon dioxide in ongoing plant growth through needles, bark and soil. What follows is a rough estimation of the possible sequestration ability of the local forest cover.

The assumptions that were made for this rough calculation are the following:

- 450,000 acres of pine (converted to hectares for calculation, source Taylor County Extension Office)
- 20 year old forest
- All Loblolly Pine
- Non-organic soil
- Bark and tree only (calculation does not include soil)

Source: Steve Bohl, Deputy Forest Management Chief, Florida Division of Forestry
Source of table for carbon stocks for loblolly pine stands: Journal of Forestry, July/August 2004
Source of Equation for Carbon Sequestration Calculation: Smith et al, 2006 U.S. Department of Agriculture. Methods for calculating forest ecosystems and harvested carbon with standard estimates for forest types of the United States.
http://www.treesearch.fs.fed.us/pubs/22954
http://www.fs.fed.us/ne/newtown_square/publications/technical_reports/pdfs/2006/ne_gtr343.pdf (full text)

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1 hectare = 2.417 acres
1 metric ton = 2,204 lbs
For loblolly pine forest:
Conversion of carbon sequestration for hectares to acres= 153,306 lbs of Carbon/2.471 = 63,428 lbs per acre.
Conversion of carbon dioxide pounds per acre to metric tons per acre= 63,428 lbs per Acre/2204 = 28.8 tons/acre,

Estimated emission of carbon dioxide from TEC: 7,001,799 metric tons annual
Estimated sequestration of carbon dioxide from Taylor County pine stocks: 450,000 acres X 28.8 metric tons per acre = 12,960,000 metric tons per year or about 13 million metric tons. This estimate does not calculate the full carbon footprint of the county that would include automobiles, existing industry and other carbon dioxide emissions and, on the contrary, other sources of sequestration. It is quite likely that the county is currently and will continue to be carbon dioxide negative after TEC begins operation.

Carbon Dioxide Conclusions and Recommendations

TEC will emit about seven million metric tons of carbon dioxide. This is the most significant negative impact from TEC. Although the health effects from global warming are still an emerging area of health research, this HIA's assessment of negative impact is based on the precautionary principal. Preliminary estimates of the global burden of disease from global warming include overall increase in cardiovascular disease deaths, foodborne and waterborne diseases that cause diarrhea episodes, vectorborne disease such as malaria and dengue fever, natural disasters and fatal unintentional injuries, population displacement and malnutrition. The health impact of global warming could affect billions of people.

This HIA recommends a regular assessment of the County's carbon footprint, as well as a policy to remain carbon negative. Sarasota County, Florida may serve as a model for Taylor because of its efforts to undertake a comprehensive ecological footprint. A rough estimate shows Taylor County's existing forest cover sequesters about 13 million metric tons of carbon dioxide. After the carbon footprint is calculated, the county may pursue selling existing carbon credits on established carbon markets. In addition, the county should adhere to EPA's smart growth principles in future residential and commercial developments that can be tailored to rural communitiies.

Taylor Energy Center and Other Air Pollution Emissions

Risk of Air Pollution

In addition to carbon dioxide and mercury, TEC emissions will include criteria pollutants. This section will describe the health effects of criteria pollutants, the EPA National Ambient Air Quality Standards limits and present the estimated emissions from TEC provided by ECT. Healthy Development Inc. uses the estimates provided by ECT for the Health Impact Assessment with confidence, because these estimates will be provided to DEP and/or EPA for permitting TEC. DEP and EPA require appropriate methodology for estimating emissions for permitting.

EPA identifies six criteria pollutants as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. They include sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide, ozone and lead. Five of the six pollutants will be discussed and defined next using the US Environmental Protection Agency's Green Book on Criteria Pollutants[3] [4]. Threshold concentrations of criteria pollutants are called National Ambient Air Quality Standards (NAAQS)[5].

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[3] http://wfww.epa.gov/oar/oaqps/greenbk/o3co.html 9/28/06

[4] Lead will not be discussed because the most significant contributors of lead are lead gasoline additives, non-ferrous smelters, and battery plants; not coal-fired electricity plants. ECT estimates that lead emissions will be less than 0.1 ton per year.

[5] http://www.epa.gov/air/criteria.html

Sulfur Dioxide
High concentrations of sulfur dioxide (SO_2) affect breathing and may aggravate existing respiratory and cardiovascular disease. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children and the elderly. Sulfur dioxide is also a primary contributor to acid deposition, or acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country.

Ambient sulfur dioxide results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills and from nonferrous smelters.

Nitrogen Dioxide
Nitrogen dioxide (NO_2) is a brownish, highly reactive gas that is present in all urban atmospheres. Nitrogen dioxide can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Oxides of nitrogen are an important precursor both to ground level ozone and acid rain, and may affect both terrestrial and aquatic ecosystems. The major mechanism for the formation of nitrogen dioxide in the atmosphere is the oxidation of the primary air pollutant nitric oxide. Oxides of nitrogen play a major role, together with volatile organic compounds, in the atmospheric reactions that produce ground level ozone. Oxides of nitrogen form when fuel is burned at high temperatures. The two major emissions sources are transportation vehicles and stationary fuel combustion sources such as electric utility and industrial boilers.

Particulate Matter
Airborne particulate matter (PM) consists of many different substances suspended in air in the form of particles (solids or liquid droplets) that vary widely in size. Particulate matter includes dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as sulfur dioxide and volatile organic compounds are also considered particulate matter.

Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of sulfur dioxide) and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death. The major subgroups of the population that appear to be most sensitive to the effects of particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment in the United States. Particulate matter is more harmful to human health the smaller it is. Particles less than 10 micrometers in diameter include both fine and coarse particles and are referred to as

PM_{10}. Fine particulate matter is a component of coarse particulate matter. Fine particles are defined as less than 2.5 micrometers in diameter and are referred to as $PM_{2.5}$. Fine particles pose the greatest health concern because they can pass through the nose and throat and get into the lungs. The TEC has provided estimates of ambient coarse particulate matter for this health impact assessment. The proportion of fine particulate matter within coarse particulate matter can range between 50 and 80 percent (Boldo, Vedina, LeTertre, Hurley, Mucke, Ballester, Aguilera and Eilstein 2006)

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. When carbon monoxide enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues, and can lead to acute or chronic effects. Health threats are most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Exposure to elevated carbon monoxide levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.

On average, 77% of the nationwide carbon monoxide emissions are from transportation sources. The largest emissions contribution comes from highway motor vehicles. Thus, the focus of carbon monoxide monitoring has been on traffic-oriented sites in urban areas where the main source of carbon monoxide is motor vehicle exhaust. Other major carbon monoxide sources include wood-burning stoves, incinerators and industrial sources.

Ground level ozone

Ground level ozone (O_3) is a photochemical oxidant and the major component of smog. While ozone in the upper atmosphere is beneficial to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of ozone at ground level are a major health and environmental concern. Ozone is not emitted directly into the air but is formed through complex chemical reactions between precursor emissions of volatile organic compounds and oxides of nitrogen in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak ozone levels occur typically during the warmer times of the year. Both volatile organic compounds and oxides of nitrogen are emitted by transportation and industrial sources. Volatile organic compounds are emitted from sources as diverse as autos, chemical manufacturing, dry cleaners, paint shops and other sources using solvents.

The reactivity of ozone causes health problems because it can damage lung tissue, reduce lung function and sensitize the lungs to other irritants. Scientific evidence indicates that ambient levels of ozone not only affect people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to ozone for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. This decrease in lung function generally is accompanied by symptoms including chest pain, coughing, sneezing and pulmonary congestion.

National Ambient Air Quality Standards

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment (see Table 3). The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu g/m^3$).

TEC's Ambient Criteria Pollutant Estimates

The Taylor Energy Center will report emissions for five of the six criteria pollutants to the Florida Department of Environmental Protection and the US Environmental Protection Agency. These include sulfur dioxide, nitrogen dioxide, particulate matter, and carbon monoxide. Appendix One has an overview and discussion of the modeling methodology for estimating the criteria pollutants from TEC. This model estimates the amount of ambient pollutants that are "on the ground, where they are breathed." TEC air quality impacts were estimated using five years of meteorological data. Table 4 shows the TEC air quality impact estimates for sulfur dioxide, oxides of nitrogen, particulate matter and carbon monoxide.

TEC will not report estimates of ambient ground level ozone. Ground level ozone is formed by a complex series of chemical reactions involving primarily oxides of nitrogen and volatile organic compounds during warm ambient air temperatures in the presence of sunlight. Since ground level ozone is a secondary pollutant, assessment of ambient impacts is typically conducted on a regional basis rather than for individual emission sources such as TEC. For individual emission sources, such as the TEC, there are no generally accepted methods readily available to estimate ground level ozone impacts.

Table 3: National Ambient Air Quality Standards from EPA's Website

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None
	35 ppm (40 mg/m^3)	1-hour(1)	None
Lead	1.5 $\mu g/m^3$	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 $\mu g/m^3$)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	Revoked(2)	Annual(2) (Arith. Mean)	
	150 $\mu g/m^3$	24-hour(1)	
Particulate Matter ($PM_{2.5}$)	15.0 $\mu g/m^3$	Annual(3) (Arith. Mean)	Same as Primary
	35 $\mu g/m^3$	24-hour(4)	
Ozone	0.08 ppm	8-hour(5)	Same as Primary
	0.12 ppm	1-hour(6) (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-------
	0.14 ppm	24-hour(1)	-------
	-------	3-hour(1)	0.5 ppm (1300 $\mu g/m^3$)

Source: www.epa.gov/air/criteria.html

(1) Not to be exceeded more than once per year.

(2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

(3) Not to be exceeded more than once per year on average over 3 years.

(4) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$.

(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$ (effective December 17, 2006).

(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(7) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1, as determined by appendix H. (b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

Ambient (on-the-ground, where it is breathed) air quality in Taylor County is currently not monitored[6] as Taylor County has no air quality monitoring station. DEP conducted some air monitoring in the county in the 1980s and found no nonatttaiment issues for sulfur dioxide and particulates in the county. Currently, air quality estimates for Taylor County are modeled from Leon County monitors combined with local meteorological data. Criteria pollutants from stack emissions in the county are annually reported and monitored.

Table 4: Taylor Energy Center- Preliminary Prevention of Significant Deterioration Class II Impacts - AERMOD Modeling Results

Pollutant	Averaging Period	Maximum Impacts (µg/m3)	Florida AAQS		
			AAQS		% of AAQS
		Max.	($\mu g/m^3$)	(ppm)	(%)
SO_2	Annual	0.884	60	0.02	1.5
	24-Hour	5.8	260	0.1	2.2
	3-Hour	16.3	1,300	0.5	1.3
NO_2	Annual	0.464	100	0.05	0.5
PM_{10}	Annual	0.133	50	N/A	0.3
	24-Hour	0.87	150	N/A	0.6
CO	8-Hour	23.2	10,000	9	0.2
	1-Hour	71.6	40,000	35	0.2

AAQS = Ambient Air Quality Standards
Source: ECT, 2006.
See Appendix 1 for a description of the table.

TEC Emissions as a Proportion of NAAQS

It should be remembered that the purpose of the National Ambient Air Quality Standards is to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Notice in Table 4 the column heading called "% of AAQS." ECT estimates that all of the criteria pollutants emitted from TEC will be at less than 3% of the National Ambient Air Quality Standards. Given the purpose of the ambient air quality standards, then the estimated emissions from TEC should not affect public health, including sensitive populations. The health impact assessment analyzed peer-reviewed scientific evidence and calculated and/or estimated impacts to assess the affect TEC will likely have on Taylor County residents.

7 Personal communication with the Florida Department of Health, Division of Air Resource Management

The Science of Air Pollution and Health

In this section, the result of a review of scientific evidence is presented. Scientific researchers, especially those of the World Health Organization, are primarily concerned about the harmful health effects of ground level ozone and particulate matter. The review represents the latest peer-reviewed scientific knowledge (Krzyzanowski, Cohen, Anderson, and the WHO Working Group 2006). Before describing the findings, it is important that the terminology is clearly understood by all audiences.

There are numerous scientific journal articles published concerning particulate matter and ground level ozone. Air pollutants are regulated and data are collected in the same way and for the same time periods in countries all over the world, especially in the North America and Europe. Funding has been provided for epidemiologists to use air quality and health outcome data to study the effects of pollutants on human populations. Toxicology and clinical studies with animals have provided convincing support for the mechanisms of many of the epidemiological studies (Krzyzanowski et al. 2006).

Epidemiologists and other scientists study the effects of the pollutants on people in different locations, among different age groups and sometimes during different seasons. There are two types of studies of humans and pollution, short and long term studies. Short-term studies concern daily (24 hour) fluctuations in air pollution and its effects on daily death rates. Long-term studies follow populations over years and determine the impact of air pollution on death rates. Researchers at the World Health Organization and in European countries have specialized in short-term studies whereas researchers in the United States have specialized in the long-term studies (for more information see Krzyzanowski et al. 2006).

For either short or long term studies, these scientists use statistics to compare, for example, the mortality rate of people exposed to pollutants to the mortality rate of people not exposed to the pollutants in natural settings (non-experimental situations). In simple terms, the average outcome of people exposed is compared to the average outcome of people not exposed. But within both the exposed and non-exposed group, there is a great deal of variation in mortality that the statistical methods take into account.

Given the number of studies on the impact of pollution on health, there also is variation in the effects found by the different studies. It is possible, however, to take the "average" impact of a pollutant from the great variety of different scientific studies. This is called a meta-analysis. The short-term pollutant impact studies have been subject to meta-analyses. A meta-analysis takes all available scientific evidence published that meets certain quality criteria and recalculates the effects of the pollutant to compute a summary estimate of health effects. Using meta-analysis provides additional confidence in the impact due to the fact that extreme positive or negative research findings from the variety of scientific evidence are narrowed to average impact. The health impact assessment will use the results of two meta-analyses on short-term effects of particulate matter and ground level ozone from the World Health Organization

Task Force (2004) and another from the journal Epidemiology (Anderson, Atkinson, Peacock, Sweeting, and Marston 2005).

Both meta-analyses and individual scientific research efforts use tests of statistical significance to identify effects that are unlikely to have occurred by chance. Statistical significance means that the researchers used methods to determine with 95 percent confidence that the impact found is not due to chance. A statistically significant finding is one that is not considered to be due to random fluctuation. The evidence presented next communicates the effect size as either risk ratios or odds ratios. A "risk ratio" is the ratio of the percentage of an event occurring in one group to the percentage of an event occurring in another group. Another way to say it is that it is the risk of developing a disease relative to exposure. "Odds ratio" is defined as the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. Both risk and odds ratios can be estimated from samples and can be adjusted for other influences. Risk ratios are the easiest to interpret. A risk ratio of 2.0 means the risk, for example, of dying in the year for one group is twice that of another group. A risk ratio of 1.20 would mean that the risk of dying in the year for the one group is 20% higher than the other group.

As mentioned previously, scientific consensus has emerged that the pollutants most harmful to health are ground level ozone and particulate matter. However, both particulate matter and ground level ozone are comprised of many different harmful chemicals. Sulfur dioxide is harmful to humans when it attaches to particulate matter (this is a simplified version of the complex chemistry that occurs in the atmosphere, for more information see Schlesinger and Cassee 2003). Nitrogen oxides are also ingredients in particulate matter and ozone. Epidemiological studies of pollutant exposures investigate the mixtures of pollutants in outdoor air rather than individual pollutants (World Health Organization Task Force 2004). Toxicological research on animals can investigate a single pollutant at a time and this research has further informed epidemiologists.

Next, summary estimates of short-term (or daily) effects of particulate matter (PM_{10}) and ground level ozone are presented. The meta-analyses show that for each increase in PM_{10} or O_3 there is an increase in the risk of a poor health outcome. The outcomes presented are mortality, hospitalizations, cough and medication use. In order to conclude that there are negative effects of either PM_{10} or O_3, the findings must be statistically significant.

Evidence of Short Term Health Effects of Particulate Matter and Ground Level Ozone

To get a sense of the amount of ambient particulate matter Table 5 compares Alachua County's total to TEC. Alachua County has maximum 24 hour mean PM_{10} $\mu g/m^3$ of 61 from all sources (Table 4)[7]. TEC's maximum 24 hour mean increase in PM_{10} μg/m^3 of will be about 0.87 according to ECT. The annual ambient mean for Alachua is 18.7 whereas the estimated increase in ambient particulate matter mean for TEC is 0.133.

Table 5: 2005 Coarse particulate matter (PM_{10}) monitoring data for Alachua County and Taylor Energy Center's Preliminary Prevention of Significant Deterioration Class II Impacts - AERMOD Modeling Results

	Annual mean PM_{10} μg/m^3	Maximum 24-hour PM_{10} μg/m^3
Gainesville, Alachua County Florida*	18.700	61.000
	Estimated Increase in the Annual mean PM_{10} μg/m^3	Estimated Increase in the Maximum 24-hour PM_{10} μg/m^3
Taylor Energy Center**	0.133	0.870

Source: *United States Environmental Protection Agency Air Quality Quick Look Report (AMP450) and **Environmental Consulting & Technology, Inc. 2000 www.ectinc.com.

Mortality

Table 6 shows the summary estimates for the three short-term mortality outcomes including all-cause, cardiovascular and respiratory mortality for 24-hour PM_{10} and 8-hour ozone. The increase in daily mortality for each 10 μg/m^3 increase in PM_{10} was 0.6%, 1.0%, and 0.5% for all-cause, respiratory, and cardiovascular mortality respectively[8]. The increase in mortality for each 10 μg/m^3 increase in 8-hour ozone was 0.2% and 0.4% for all-cause and cardiovascular mortality respectively. The estimate for respiratory mortality and ozone was not statistically significant. Notice that the increase in risk of death for PM_{10} and O_3 are a similar magnitude for each 10 μg/m^3 increase in either pollutant. The association of the pollutants with early death is statistically significant.

[7] Leon County's particulate matter is not shown as it only monitors fine rather than coarse particulate matter.

[8] μg/m^3 is spoken as "micrograms per cubic meter of air"

Table 6: Summary of short-term risk ratios estimates (and 95% confidence intervals) for a 10 μg/m^3 increase in pollutant for all-cause and cause specific mortality ж

Mortality	Age	PM_{10} (24 hour)	Ozone (8-hour)
All-cause	All age	1.006* (1.004, 1.008) 10 studies	1.002* (1.000, 1.003) 8 studies
Respiratory	All age	1.010* (1.001, 1.018) 9 studies	0.999 ('0.995, 1.004) 8 studies
Cardiovascular	All age	1.005* (1.001, 1.010) 10 studies	1.004* (1.003, 1.005) 5 studies
* statistically significant			

ж The source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

Hospitalizations

Table 7 shows the summary estimates for two respiratory hospitalization outcomes for a short-term 10 μg/m^3 increase in 24-hour PM_{10} and 8-hour ozone. Neither of the ozone estimates was statistically significant. Three studies were summarized for respiratory hospitalizations for people 65 and older and the short-term summary estimated effect was a 0.7 percent increase in respiratory hospitalizations for a 10 μg/m^3 in PM_{10}. Only one study provided evidence for all ages of people with Chronic Obstructive Pulmonary Disease (COPD). Hospitalizations for people with COPD increased by 1.1 percent for each 10 μg/m^3 increase in PM_{10} within a 24 hour period.

Table 7: Summary of short-term risk ratios estimates (and 95% confidence intervals) for a 10 μg/m^3 increase in pollutant for respiratory hospital admissions ж

Hospital Admissions	Age	PM_{10} (24 hour)	Ozone (8-hour)
Respiratory	All ages	COPD 1.011* (1.007-1.015) 1 study (all ages) §	1.001 (0.991, 1.012) 2 studies
Respiratory	65+	1.007* (1.002, 1.013) 3 studies	1.005 (0.998, 1.012) 2 studies
* statistically significant			

ж Unless otherwise noted the source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

§ Anderson HR, Atkinson RW, Peacock JL, Sweeting MJ, and Marston L. 2006. Ambient particulate matter and health effects - Publication bias in studies of short-term associations. Epidemiology 16 (2): 155-163.

Cough

A variety of findings were summarized for cough for patients with chronic respiratory diseases including asthma. Table 8 shows the short-term summary estimates for cough from 24-hour PM_{10} and 8-hour ozone on children and people of all ages. The particulate matter analysis findings were not statistically significant. The ozone analysis findings were also not statistically significant.

Table 8: Summary of short-term odds ratios (95% confidence intervals) for a 10 $\mu g/m^3$ increase in pollutant for cough ж

Cough	Age in years	PM_{10} (24 hour)	Ozone (8-hour)
Children with asthma or chronic respiratory symptoms	5-15	0.999 (0.987, 1.011) 19 studies	1 study not statistically significant
Populations with asthma or chronic respiratory symptoms	All ages	1.008 § (0.998–1.017) 5 studies	2 studies not statistically significant

* statistically significant

ж Unless otherwise noted the source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf
§ Anderson HR, Atkinson RW, Peacock JL, Sweeting MJ, and Marston L. 2006. Ambient particulate matter and health effects - Publication bias in studies of short-term associations. Epidemiology 16 (2): 155-163.

Table 9: Summary odds ratios (95% confidence intervals) for a 10µg/m^3 increase in pollutant for medication use ж

Medication use	Age in years	PM_{10} (24 hour)	Ozone (8-hour)
Children with asthma or chronic respiratory symptoms	5-15	1.005 (0.981, 1.029) 17 studies	1.410* (1.052-1.890) 1 study
Adults with asthma or chronic respiratory symptoms	16-70	Mixed results: 1 out of 4 studies was statistically significant	Mixed results: 1 out of 2 studies was statistically significant

* statistically significant
ж The source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

Medication Use
Table 9 shows the impact on short-term medication use from particles and ozone on children and adults with asthma or chronic respiratory symptoms. PM_{10} analysis findings for symptomatic children were not statistically significant. Particulate matter findings for symptomatic adults were mixed with one out of four studies finding a statistically significant impact. Only one study was cited for ozone and symptomatic children. It found that there was a 41.0 percent increase in medication use for each 10 µg/m^3 increase in an 8 hour ozone measurement. The confidence interval on this single study is large and suggests the need for more research to validate the findings. Mixed results were identified for symptomatic adults and 8-hour ozone increases with one out of two studies with statistically significant findings.

Evidence of Long-Term Health Effects of Particulate Matter

Long-term exposure to combustion related fine-particles of air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality (Pope, Burnett, and Thun et all. 2002). Table 10 shows that fine particulate matter ($PM_{2.5}$) is associated with all cause, lung cancer, and cardiopulmonary mortality. Each 10 µg/m^3 increase in $PM_{2.5}$ is associated with approximately a 4%, 6% and 8% increase in risk of all-cause, lung cancer, and cardiopulmonary mortality, respectively. The risk of premature mortality is even higher for former and current smokers (Pope et al. 2004).

Table 10: Adjusted long-term risk ratios associated (and 95% confidence intervals) with a 10ug/m3 increase in PM2.5 pollutant for all-cause, lung cancer and cardiopulmonary mortality

Outcome/Disease	$PM_{2.5}$
All-cause	1.04* (1.02, 1.08)
Cardiopulmonary	1.06* (1.02, 1.10)
Lung Cancer	1.08* (1.01, 1.05)

* statistically significant
Source: Pope, et al. 2002

Table 11: TEC short-term particulate matter effects on various causes of death, daily death rates per 100,000 people using meta-analysis summary estimates

Short-term (24 hours)	Summary Estimate of Relative Risk (95% CI)	3 Yr Age Adjusted Death Rate 2003-2005	3 Yr Age Adjusted Death Rate / 365	Expected Percentage Increase in Daily Death Rate from Each TEC Max 24 Hour Increase in PM10 in Taylor County (95% CI)	Number of Studies
All Cause Mortality	1.006 (1.004, 1.008)	910.1	2.49	0.00130 (0.0003,0.0007)	10
Respiratory	1.01 (1.001, 1.018)	36.0	0.10	0.00009 (0.00009, 0.0007)	9
Stroke (Cardiovascular Disease)	1.005 (1.001, 1.010)	62.0	0.17	0.000074 (0.00009, 0.0009)	10
Heart Disease (Cardiovascular Disease)	1.005 (1.001, 1.010)	220.0	0.60	0.00026 (0.000064, 0.00064)	10

CI-Confidence Interval
Source: World Health Organization Task Force. 2004. Meta-analyses of time-series studies and panel studies of particulate matter and ozone. www.euro.who.int/document/e82792.pdf 10/6/2006

Health Impact Calculations of Short-Term (daily) and Long-Term (annual) Particulate Matter

The scientific evidence reviewed shows that particulate matter has both short-term (daily) and long-term (annual) effects on human health. Both short and long term health effects use the same log-linear risk model of population exposure except that the long term studies mathematically reduce the estimate of PM_{10} to $PM_{2.5}$ by multiplying the PM_{10} estimate by 60% (Cohen, Anderson, Ostro, Dev Pandey, Krzyzanowski, Künzli, Gutschmidt, Pope, Romieu, Samet and Smith 2004 and Pope 2005).

For PM_{10} the equation is = $RR^{\sqrt{\;}\,X/10}$ where X= PM_{10} and RR is the risk ratio for all-cause or a specific cause of death. For $PM_{2.5}$ the equation is the same except X is multiplied by 0.6. The result of each equation is then multiplied by the appropriate Taylor County three-year age adjusted mortality rate including all-cause, respiratory, stroke, heart disease, and chronic lower respiratory disease. It was beyond the scope of this analysis to calculate morbidity impacts because hospital discharge data was necessary to calculate impacts on illness and these data were not available for this assessment.

TEC's maximum 24 hour mean PM_{10} $\mu g/m^3$ is 0.87 and constitutes a fraction of the relative risk identified in the meta-analysis which is for a 10 $\mu g/m^3$ increase in PM_{10} (see Tables 5 and 6). Table 11 shows the calculated summary estimates for the three short-term mortality estimates for all-cause, respiratory, and cardiovascular with increases in daily mortality for each 10 $\mu g/m^3$ increase in PM_{10} was 0.6%, 1.0%, 0.5% and 0.5% for all-cause, respiratory, stroke and cardiovascular respectively. The percentage increase for all-cause, respiratory, and cardiovascular daily mortality as a result of estimated TEC particulate matter is 0.001%, 0.00009% and 0.00007% respectively. In summary, these percentage increases in daily mortality in Taylor County as a result of TEC particulate emissions is estimated to be well below a one percent increase. It would be difficult to detect such a small change in mortality daily and it would likely appear as random fluctuation.

Long-term exposure to combustion related fine-particles of air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality (Pope et al 2002). Long-term exposure analysis uses annual PM_{10} estimate and TEC annual PM_{10} estimate is 0.133 (Table 5). TEC's annual PM_{10} contribution to the county is much less than the relative risk identified in Pope et al. (2002) which is for a 10 $\mu g/m^3$ increase in PM_{10} (Table 10). Table 12 shows the calculated summary estimates for the four long-term mortality estimates for all-cause, chronic lower respiratory disease, heart disease and lung cancer. The percentage increase for all-cause, chronic lower respiratory disease, heart disease and lung cancer long-term mortality from the estimated increase in particulate matter from TEC is 0.285%, 0.017%, 0.102% and 0.04% respectively. In summary, the percentage increase in long-term mortality in Taylor County as a result of TEC particulate emissions is also below a one percent increase.

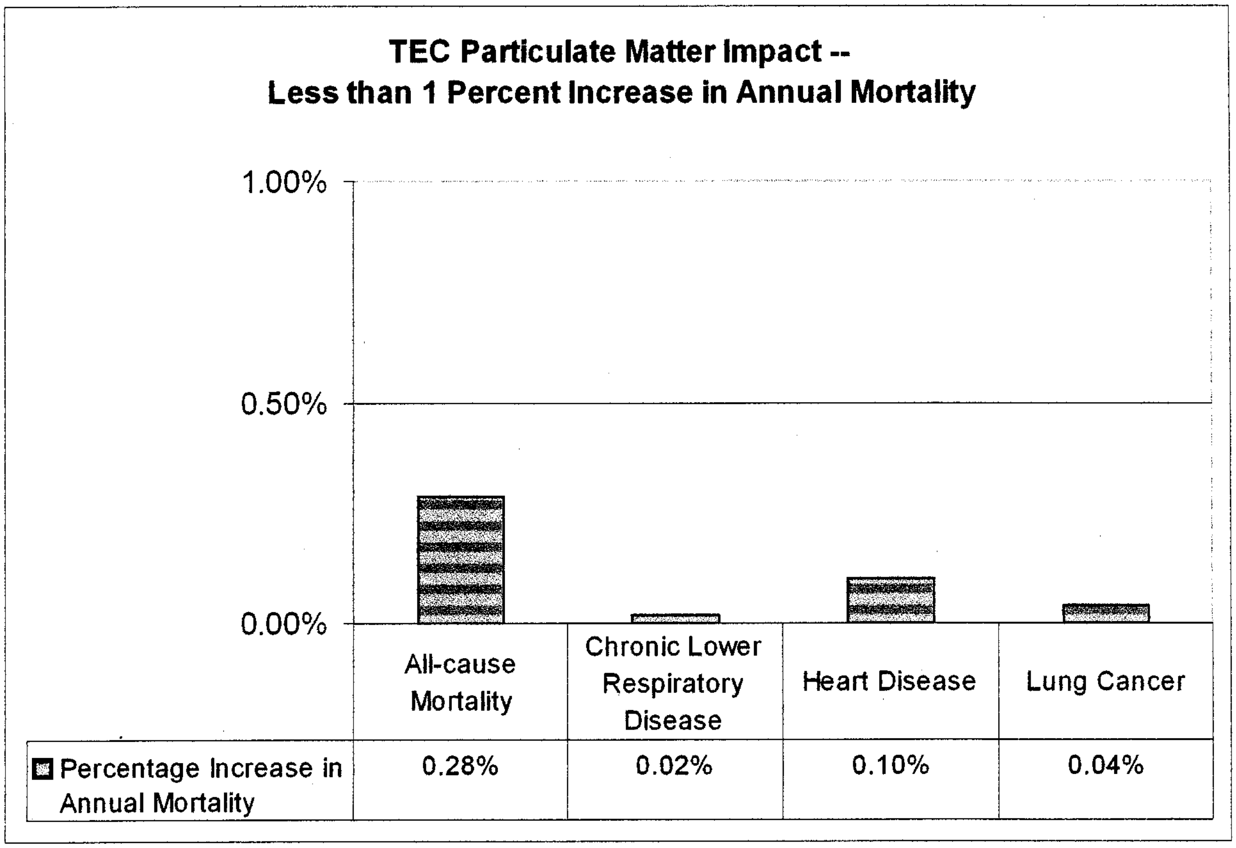
Table 12: Long-term fine particulate matter relative risk and impacts on 3 year age adjusted death rates per 100,000 population

Long-term (annual)	Relative Risk (95% CI)	3 yr Age Adjusted Death Rate per 100,000 2003-2005	Expected Percentage Increase in Annual Death Rate per 100,000 from TEC's Annual Max Increase in PM_{10} for Taylor County (95% CI)	Number of years for an additional death in Taylor County
All-cause	1.04 (1.02, 1.08)	910.1	0.285 (0.16, 0.61)	17
Chronic Lower Respiratory Disease (Cardiopulmonary)	1.06 (1.02, 1.10)	38.9	0.017 (0.007, 1.033)	284
Heart Disease (Cardiopulmonary)	1.06 (1.02, 1.10)	220.0	0.102 (0.043, 0.205)	47
Lung Cancer	1.08 (1.01, 1.16)	66.5	0.041 (0.005-0.079)	117

CI=Confidence Interval
Source: Pope CA, Burnett RT, Thun MJ, et al. 2002. Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate air pollution. JAMA: Journal of the American Medical Association vol. 287, pp. 1132-1141.

TEC's increase in fine particulate matter would likely cause one additional death in the county of all-cause mortality in 17 years, chronic lower respiratory disease in 284 years, and heart disease in 47 years within the county. Figure 1 shows that the annual increase in mortality from different causes of death will be less than one percent. It would be difficult to detect such a small change in mortality over time and would likely appear as random fluctuation.

Figure 1: TEC particulate matter impact-- Less than 1 percent increase in annual mortality

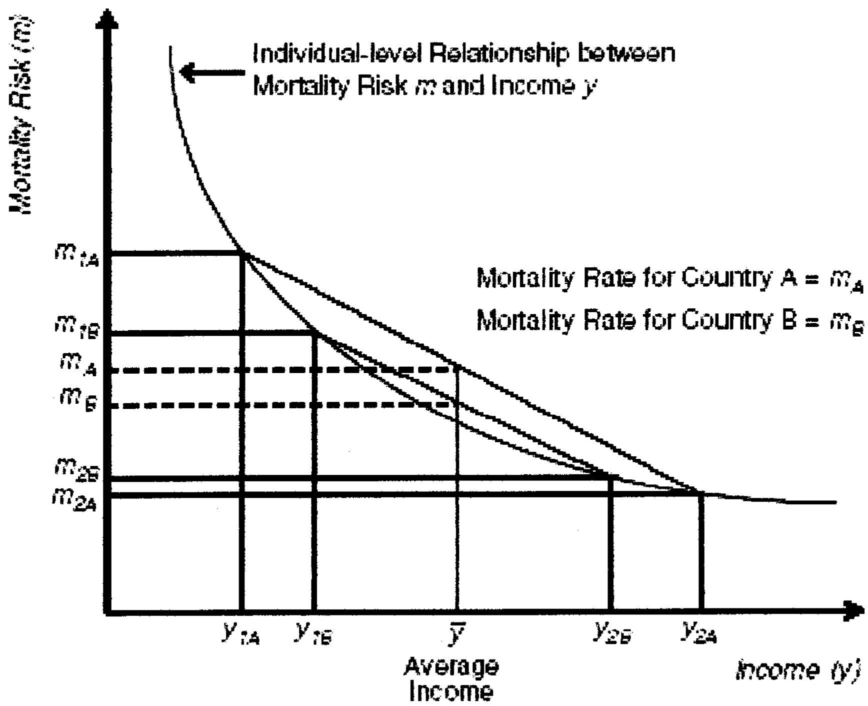


Particulate Matter and Ground Level Ozone Conclusions and Recommendations:
In sufficient amounts during a day, particulate matter is linked to premature death and hospitalization. Based on peer-reviewed science and this health impact assessment calculation using local health data, TEC's estimated maximum particulate matter impact will at most increase daily mortality by 0.001%.

In sufficient amounts over years, particulate matter is linked to premature death. Based on peer-reviewed science and this health impact assessment calculation using local health data, the long-term health impact from TEC's estimated particulate matter impact will at most have 0.3% increase in the annual mortality rate. Both the daily and long-term effects on mortality will be undetectable over time.

In sufficient amounts over a day, ground level ozone is linked to increased daily mortality and medication use. The ozone impact could not be calculated because there are no standard point source models. Based on peer-reviewed science, the similarity in the magnitude of risk between ozone exposure and particulate matter exposure, and TEC emissions estimates, this HIA finds that the ground level ozone impact will be a similar magnitude to particulate matter. The impact will likely be minimal and undetectable over time.

Figure 2: Relationship between average income and mortality risk.



Source: Lynch et al. 2004, Subject to copyright

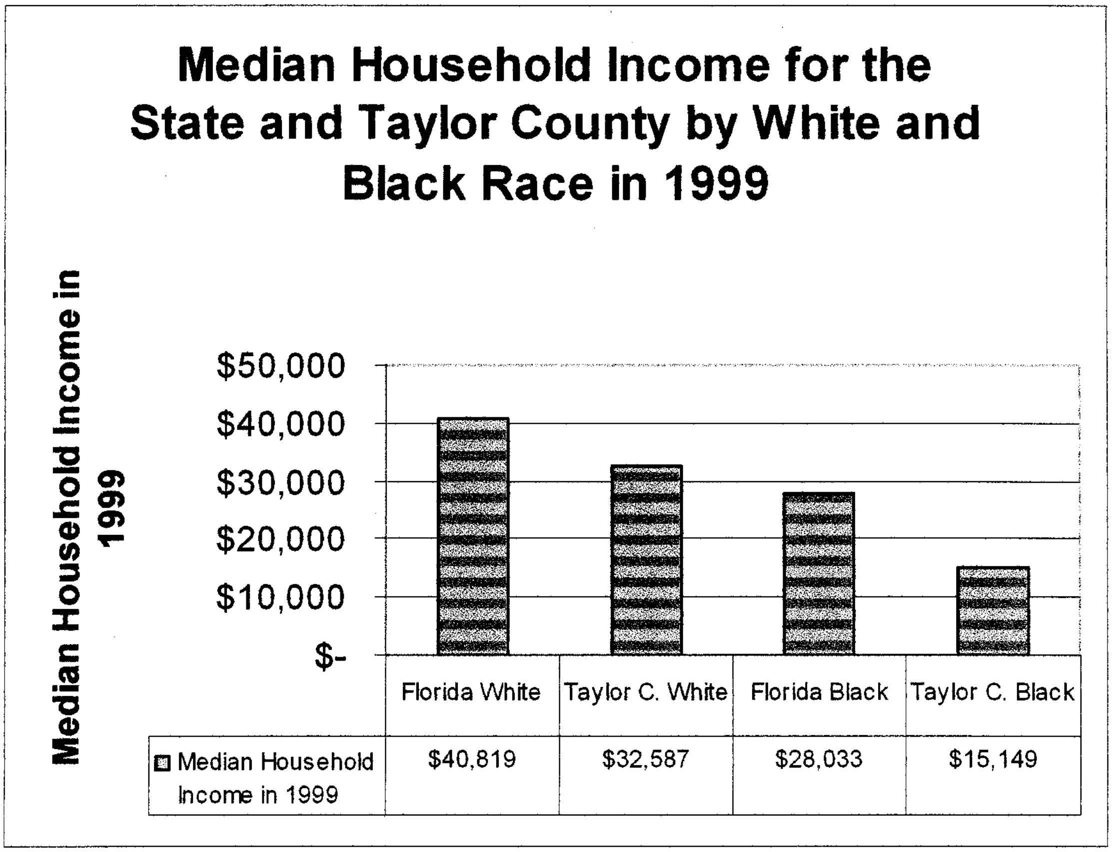
Jobs and Income

Risk of Income Inequality

Data from the US Census and Florida Vital Statistics were used to ascertain baseline health and estimate employment impacts on Taylor County employees. The North Central Florida Regional Planning Council conducted an economic impact analysis and estimated that 66 local residents will be employed by the plant out of the 180 total jobs at the TEC[9]. Additionally, the council estimates that 388 indirect jobs will be created in the county that, for example, will come from increases in restaurants and office suppliers. A community contribution payment from the partners in the plant will be given to Taylor County by the plant is currently estimated at $179 million to be paid over 40 years. It is beyond the scope of this analysis to estimate the impact of indirect job creation and the substantial "community contribution" payment to the county, although both should have positive health impacts.

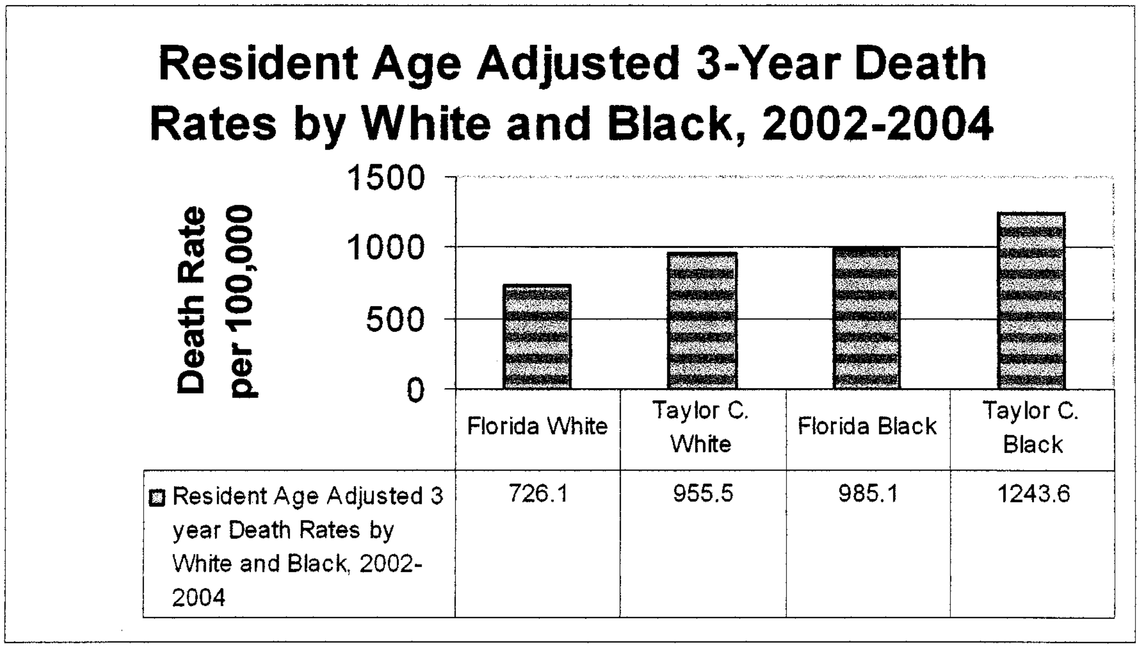
[9] http://ncfrpc.org/ 2005

Figure 3:



Source: 2000 US Census

Figure 4:



Source: Florida Charts www.floridacharts.com

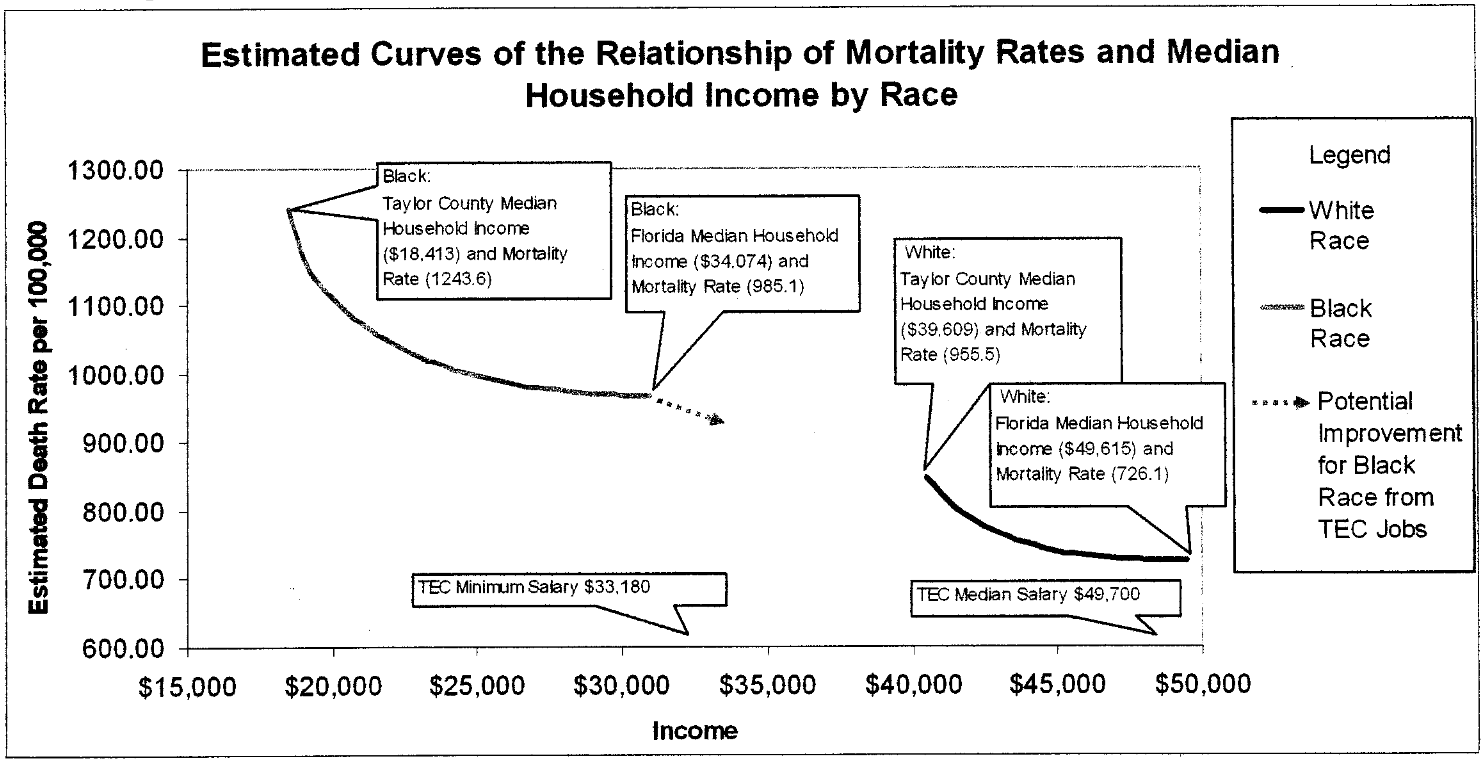
The scientific evidence on the relationship between health and economic development is broad and systematic review papers about impacts of income on health were adapted for this HIA. In general, health status improves as income increases (Subramanian, Belli, and Kawachi 2002). Extensive evidence strongly supports the notion that individual health is a concave function of individual income (Lynch, Smith, Harper, Hillemeir, Ross, Kaplan, and Wolfson 2004; and Wagstaff and van Doorslaer 2000; see Figure 2).

Health and income inequality are largely found to be inversely related. Figures 3 and 4 show the inverse relationship between mortality and income by race in Florida and Taylor County. We used the income and corresponding death rate for Taylor County and for Florida as two end points and mathematically constructed a regular arch curved relationship between them (Lynch et al. 2004). This line was then used to estimate the change in death rate for a given change in income. This was done separately for the income and death rates by black and white race. One curve represents the relationship for the members of the black race and another curve represents the relationship for the white race (Figure 5).

Several employment scenarios using TEC minimum and median salaries were calculated using the estimated change in death rates per income change (Tables 13 and 14). All income data was adjusted to 2006 dollars using the consumer price index. Age and income specific death rates were not available for this analysis.
Figures 3 and 4 show substantial racial disparities in income and mortality in Taylor County and Florida. The jobs at TEC can be a mechanism for improving individual income that is linked to their individual risk for death. Reducing income inequality by raising the incomes of more disadvantaged people will improve the health of poor individuals, help reduce health inequalities, and increase average population health (Lynch et al. 2004).

Figure 5 shows the estimated median household income and mortality rate curves by black and white residents in Taylor County and Florida. The orange curve represents the potential improvement in black Taylor County resident mortality rates if household income approached the income for the average black Floridian. The maroon curve represents the potential improvement in the white Taylor County resident mortality rate as incomes approach the white Floridian average. The graph indicates that there is more room for improvement among blacks than white residents. The absolute difference between income and mortality indicators for blacks is larger than the same indicators for whites. Given the potential decrease in mortality by increasing income to the state average, we hypothesize beyond the data with the dashed orange line, that increasing income for black employees may further reduce their risk of death. The bottom of the graph shows the minimum and median salaries for TEC jobs.

Figure 5: Potential decrease in mortality rates by changing income (2006 dollars)



Source: Florida Charts http://www.floridacharts.com/charts/chart.aspx, US Census 2000, and Taylor Energy Center.

Tables 13 and 14 extrapolate from the information in Figure 5 based on several TEC employment scenarios. Median household income is used here as a proxy for the median income of individuals in the county since these data were unavailable from the US Census. As a result, the authors make the assumption that median household income and individual salary have the same influence on mortality risk for employee families. Table 13 assumes that all 66 jobs will be paid the minimum salary of $33,180 in 2006 dollars. If all the 66 jobs went to black residents, we forecast that their individual risk of mortality would decline to about the state average. In roughly five and one half years, one death would be averted among those 66 employees and their families assuming an age distribution similar to the general population. The age distribution of the employees will likely be of working age and healthier than the general population. The deaths averted estimate is considered the potential maximum impact because it overestimates deaths averted since we did not use age-adjusted death rates. Age adjusted death rates for working age people between 18 and 55 were not available by race.

Table 13 shows that if all the minimum salary jobs are given to white residents, there would likely be no impact on individual risk of mortality since the median household income for white residents is already higher than the minimum salary. If half of the 66 jobs went to white and black residents equally, the impact on family risk for mortality would positively impact black employees' families only.

Table 14 assumes that 10 Taylor County residents are hired for TEC jobs that pay the median salary of $49,700. Again, the greatest positive impact on employee's family's risk of death is to black employees. With 10 black employees receiving the median salary jobs, a death to those employees would be averted in roughly 35 years. We do not forecast beyond the data that black employee family risk of death would be less that the state average, however the TEC median salary is much greater than the black state resident median household income. Possibly the median salary would further reduce the family mortality rate below the state rate. Therefore, it is possible that a black employee family death would be averted even before 35 years. If the 10 median salary jobs were given to white employees,' these employees individual risk of death would decrease to around the state average as the median household income is close to the median TEC salary. As a result, we forecast that among the 10 white employees a death would be averted in almost 44 years among those 10 employees.

Table 13: Individual Risk of Death by Race for TEC Minimum Income $33,180 (2006 dollars)

Employee Race	Number of Employees	Current Family Risk for Death (mortality rate per 100,000)	Forecasted Family Risk of Death (mortality rate per 100,000) with TEC Minimum Salary of $33,180	Maximum Forecasted Deaths Averted per Year for the TEC Employees and Family*	Forecasted Years Until One Death is Averted for the TEC Employees and Family
Black	66	1243.6	965.1	0.184	5.44
White	66	955.5	955.5	0	0
Black	33	1243.6	965.1	0.092	10.88
White	33	955.5	955.5	0	0

* Race specific age-adjusted death rates were unavailable for these calculations. This is a maximum estimate since employees are working age and healthier than the total population and their individual risk of death is probably less than the total mortality rate by race for the county used here.

Conclusion and Recommendations for Jobs, Income and Health Impacts

Based on peer-reviewed science and this HIA's estimations, the impact from the minimum salary income from TEC could substantially reduce the risk of mortality for black employees and their families. The minimum salary would not likely improve the risk of mortality of white employees and their families. The income from TEC could address the significant racial disparities in income and mortality between black and white residents in the county. Target TEC job recruitment toward a representative or greater proportion of black residents to be trained for technical level jobs at TEC.

Based on peer-reviewed science and this HIAs estimations, the impact from the median salary income from TEC could substantially reduce the risk of mortality for both black and white employees and their families. A diverse population of Taylor County residents should be recruited and trained for professional jobs at TEC.

Table 14: Individual Risk of Death by Race for TEC Median Income $49,700 (2006 dollars)

Employee Race	Number of Employees	Current Family Risk for Death (mortality rate per 100,000)	Forecasted Family Risk of Death (mortality rate per 100,000) with TEC Median Salary of $49,700	Maximum Forecasted Deaths Averted per Year for the TEC Employees and Family*	Forecasted Years Until One Death is Averted for the TEC Employees and Family
Black	10	1243.6	965.1 or lower	0.028	35.91
White	10	955.5	727.5	0.023	43.86
Black	5	1243.6	965.1 or lower	0.014	71.81
White	5	955.5	727.5	0.011	87.72

* Race specific age-adjusted death rates were unavailable for these calculations. This is a maximum estimate since employees are working age and healthier than the total population and their individual risk of death is probably less than the total mortality rate by race for the county used here.

HIA Limitations

Like other types of forecasts, this HIA makes projections about the central tendencies (averages and medians) of the indicators investigated. The HIA made assumptions and faced certain limitations in making those forecasts. PM_{10} calculations were limited by the lack of particulate matter measurements locally. The employment estimation made several assumptions including that 1) the local average risk of death for an individual and their family can change during employment, 2) households have the same racial composition, 3) salary has the same relationship to risk of death as median household income, and finally, 4) race, income and mortality relationships have remained the same since the 2000 Census.

The additional or averted death estimates in this HIA are a standardized measure used to communicate to the non-scientific reader. Reduction in air quality due to PM will reduce one life in approximately 15 years for all causes of mortality. Conversely, employing only black residents to fill all 66 minimum salary jobs is expected to avert a death among those employees' families in approximately five and one-half years. For the PM_{10} and employment analysis, the death increase and deaths averted are simply communicating a change in mortality risk.

Although in general economic development improves population health, it is by no means automatic. The equality of the distribution of economic opportunities is central to health improvement (Subramanian et al. 2002). The HIA showed that if all the minimum salary jobs went to white residents of Taylor County, there essentially would be no improvement in population health due to TEC employment. It is clear that if the job opportunities are not distributed throughout the local population, especially recruiting minorities, the economic development effect on health will not be realized. The development authority expects enhanced economic development from the coal plant. The $179 million "community contribution" payment and the indirect jobs would contribute to that development. However, if the benefits of that economic development do not address racial disparities in income, there will likely be no effect on race-specific mortality rate disparities as well. For this reason, this HIA recommend tracking the race-specific morality rates over the long-term. Economic development that aims to improve the economy as well as health should make every effort to decrease mortality rates and raise incomes especially among Taylor County's black residents.

Bibliography

Anderson, H.R., Atkinson, R.W., Peacock, J.L., Sweeting, M.J., and Marston, L. 2005. Ambient particulate matter and health effects: publication bias in studies of short-term associations. Epidemiology vol. 16, pp.155-163.

Boldo E, Medina S, LeTertre A, Hurley F, Mucke HG, Ballester F, Aguilera I, and Eilstein D. 2006. Apheis: Health impact assessment of long-term exposure to PM2.5 in 23 European cities. European Journal of Epidemiology vol. 21, pp. 449-458.

Campbell-Lendrum D., and Woodruff R. 2006. Comparative Risk Assessment of the Burden of Disease from Climate Change. Environmental Health Perspectives vol. 114 no. 12, pp. 1935-1941

CDC 2002. Annual smoking-attributable mortality, years of potential life lost, and economic costs --- United States, 1995—1999. Morbidity and Mortality Weekly Review April 12, vol .51, no. 14, pp. 300-3.

CDC. 2004. "Blood mercury levels in young children and childbearing-aged women—United States, 1999-2002. Morbidity and Mortality Weekly Report, Nov. 5.

Cohen AJ, Anderson HR, Ostro B, Dev Pandey K, Krzyzanowski M, Künzli N, Gutschmidt K, Pope CA, Romieu I, Samet JM and Smith KR. 2004. "Chapter 17: Urban Air Pollution" in Comparative Quantification of Health Risks Global and Regional Burden of Diseases Attributable to Selected Major Risk Factors, Volume 2, pp 1394.

Hall GV, D'Souza RM, and Kirk MD. 2002. Foodborne disease in the new millennium: out of the frying pan and into the fire? Medical Journal of Australia vol. 177, no. 11/12, pp.614-618.

Hampton T. 2006. Researchers study the health effects of environmental change. JAMA, vol. 296, no. 8, pp. 918-920.

Krzyzanowski M, Cohen A, Anderson R, and the WHO Working Group. 2006. Quantification of health effects of exposure to air pollution. Occupational and Environmental Medicine vol. 59:791-793.

Lynch J, Smith GD, Harper S, Hillemeir M, Ross N, Kaplan GA, and Wolfson M. 2004. Is Income Inequality a Determinant of Population Health? Part 1. A Systematic Review. Milbank Quarterly 82:5-99.

Pope CA, Burnett RT, Thun MJ, et al. 2002. Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate air pollution. JAMA vol. 287, pp. 1132-1141.

Pope CA. 2005. Personal Communication 9/17/2005

Pope CA, Burnett RT, Thurston GD, Thun MJ, Calle EE, Krewski D, Godleski JJ. 2004. Cardiovascular mortality and long-term exposure to particulate air pollution Circulation vol. 109, pp. 71-77.

Schlesinger RB, Cassee F 2003 Atmospheric secondary inorganic partiucalte matter: the toxicological perspective as a basis for health effects risk assessment. Inhalation Toxicology vol. 15, pp 197–235.

Subramanian SV, Belli P, and Kawachi I. 2002. The macroeconmic determinants of health" Annual Review of Public Health 23:287–302.

Wagstaff A, and van Doorslaer ED. 2000. Income inequality and health: What does the literature tell us? Annual Review of Public Health 21:543-567.

United Nations Intergovernmental Panel on Climate Change Climate Change 2007: the Scientific Basis http://www.ipcc.ch/SPM2feb07.pdf

World Health Organization Task Force. 2004. Meta-analyses of time-series studies and panel studies of particulate matter and ozone. www.euro.who.int/document/e82792.pdf 10/6/2006.

Appendix One:

Taylor Energy Center: Preliminary Prevention of Significant Deterioration Class II Impacts - AERMOD Modeling Results

Taylor Energy Center
Preliminary PSD Class II Modeling

Overview

Taylor Energy Center (TEC) preliminary air quality impacts with respect to Prevention of Significant Deterioration (PSD) Class II increment consumption and the Florida Ambient Air Quality Standards (AAQS) were estimated using the EPA AERMOD dispersion model, five years of hour-by-hour meteorological data, and a comprehensive receptor grid. Each of these major modeling issues, as well as the modeling results, is discussed in the following sections.

AERMOD Model

The AMS/EPA Regulatory Model (AERMOD) modeling system was used to conduct the ambient air impact analysis. EPA approved use of AERMOD as a Guideline on Air Quality Modeling (GAQM) Appendix A preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD modeling system consists of meteorological and terrain pre-processing programs (AERMET and AERMAP, respectively) and the AERMOD dispersion model. The latest version of AERMOD (Version 04300 – October 27, 2004) was used to assess TEC air quality impacts at receptors located within 50-km of the project site.

Meteorological Data

The AERMOD meteorological preprocessor AERMET (Version 04300) was used to process surface and upper air meteorological data collected at the Tallahassee Municipal Airport (Weather Bureau, Air Force and Navy [WBAN] Station No. 93805). Raw surface and upper air data for the years 2000 to 2004 was obtained from the National Climatic Data Center (NCDC). Missing surface and upper air data (i.e., data gaps) were filled in accordance with EPA guidance.

Receptor Grids

Receptors were placed at locations considered to be *ambient air*, which is defined as "that portion of the atmosphere, external to buildings, to which the general public has access."

Consistent with GAQM and FDEP recommendations, the ambient impact analysis used the following Cartesian receptor grids:

- Near-Field Cartesian Receptors: Receptors beginning from the main boiler stack and extending out to 3 kilometers (km) at 100-meter spacing.
- Mid-Field Cartesian Receptors: Receptors between 3 km and extending to approximately 6 km at 250-meter spacing.

- Far-Field Cartesian Receptors: Receptors between 6 km and extending to approximately 15 km at 500-meter spacing.

Model Results

A summary of the PSD Class II area modeling results are provided on Table 1. TEC impacts for all PSD pollutants are below the PSD significant impact levels (SILs) with one exception - the highest 24-hour average sulfur dioxide (SO_2) impact of 5.8 $\mu g/m^3$ exceeded the PSD SIL of 5.0 $\mu g/m^3$ by 15 percent.

TEC air quality impacts are projected to be well below the PSD Class II increments and FAAQS. The highest Taylor Energy Center 24-hour average SO_2 impact is only 6.4 and 2.2 percent of the PSD Class II increment and FAAQS, respectively. TEC air quality impacts for all other PSD pollutants and averaging times are lower.

Table 1. Taylor Energy Center
Preliminary PSD Class II Impacts - AERMOD Modeling Results

Pollutant	Averaging Period	Maximum Impacts (μg/m³) 2000	2001	2002	2003	2004	Max.	PSD Class II Standards: SIL (μg/m³)	% of SIL (%)	Exceed SIL (Y/N)	Increment (μg/m³)	% of Increment (%)	Florida AAQS: AAQS (μg/m³)	AAQS (ppm)	% of AAQS (%)
SO_2	Annual	0.735	0.521	0.726	0.884	0.763	0.884	1	88.4	N	20	4.4	60	0.02	1.5
	24-Hour	5.8	4.3	5.5	5.3	5.0	5.8	5	115.9	Y	91	6.4	260	0.1	2.2
	3-Hour	14.9	16.3	14.6	13.6	14.0	16.3	25	65.1	N	512	3.2	1,300	0.5	1.3
NO_2	Annual	0.386	0.274	0.381	0.464	0.401	0.464	1	46.4	N	25	1.9	100	0.05	0.5
PM_{10}	Annual	0.110	0.078	0.109	0.133	0.114	0.133	1	13.3	N	17	0.8	50	N/A	0.3
	24-Hour	0.87	0.64	0.83	0.80	0.76	0.87	5	17.4	N	30	2.9	150	N/A	0.6
CO	8-Hour	23.2	22.3	21.6	22.6	22.6	23.2	500	4.6	N	N/A	N/A	10,000	9	0.2
	1-Hour	63.9	71.6	53.7	62.7	59.5	71.6	2,000	3.6	N	N/A	N/A	40,000	35	0.2

SIL = Significant Impact Level
AAQS = Ambient Air Quality Standards

Source: ECT, 2006.

Informed Decisions ~ Enhanced Development

Taylor Energy Center

Health Impact Assessment--Phase 1 of 3
Summer 2006

Table of Contents

Introduction to Phase One 1
- Limits to This Study 1
- Scope 2
- Criteria for Analysis 3

Health Impact Assessment Explained 3
A Social Model of Health and Well-being 4
Health Impact Assessment of the Taylor Energy Center 5
Scoping and Stakeholder Perspectives 5
- Concerns 6
- Desires 6

Demographic Characteristics of Taylor County and the City of Perry 6
Baseline Health Status of Taylor County Residents 9
Air Quality 11
Water Quality 13
Phase Two 14
Appendix One: 16
Appendix Two: 32
Appendix Three: 40

Healthy Development, Inc.
Tallahassee, Florida
850.591.6555 ~ 850.322.4629
www.healthydevelopment.us info@healthydevelopment.us

Introduction to Phase One

Healthy Development, Inc. (HDI) was hired by the Taylor County Development Authority (TCDA) to conduct a health impact assessment (HIA) of the pending Taylor Energy Center (TEC), an 800 megawatt coal fired electric plant slated to be built over the next four years in rural Taylor County, Florida.

Taylor officials anticipate elevating the county's economic, health and social conditions by bringing TEC jobs to the area that come with a full benefits package for employees. Conversely, many community members fear health impacts of the plant's harmful emissions to the area's air and water. This study is intended to inform the community as to the expected risks and benefits of the plant's operation. It is also important to note that this study functions under the premise that the coal plant will be built as planned - as does the Taylor County Development Authority.

Phase one of the study (there are three phases) addresses the areas outlined below and describes the specific scope of the full study.

Phase One contract requirements:

1. Qualitative Data Collection:
    a. Expert, stakeholder, and key informant perspectives
    b. Community concerns identified through a blend of methods including press clips, public testimony, etc. - evaluated using issue specific scientific literature review
2. Collection of existing population data: sources: Health Departments and other government statistics such as US Census of population, housing and the economy, etc.

Limits to This Study

Although the scope of this study is more fully described below, it is important to lay out what this study will and will not address. The breadth of issues surrounding the health of Taylor County in context to the Taylor Energy Center is immense. Issues of transportation, housing, air and water quality, lifestyle, other industrial operations, economic factors, access to health services, social cohesion and capital, racial disparities, education, social equity and justice and more will be impacted by the development of the plant. All are valid areas of study.

Despite those issues' relationship to the TEC project, it is only feasible to study those of most concern and interest to the community, and those that have available data with which to analyze the health impacts to the population.

Federal and state regulations dictate reporting of criteria pollutants that effect human health. If the emissions are not regulated, such as carbon dioxide, and/or no data are available, population-based analysis is not feasible. See Table 1 below for a description of the data requirements for population health analysis.

Scope

The scope was determined by stakeholder concerns and available data. As such, this HIA will **investigate** many aspects of the impact of the TEC on the health of Taylor County. However, **quantitative analysis** will only be undertaken for the investigation of the impact on life expectancy (mortality) from the TEC's reported criteria pollutants and the impact of income on employee's life expectancy.

Life expectancy is the outcome measurement for several reasons. First, comparisons can be made between the impact of emissions and employment. Second, using available data is economical and faster than using hospital discharge data. Hospital discharge data is not population-based and would require substantial time and data manipulation to investigate the impact of emissions on hospitalization rates[1]. Finally, life expectancy is a indicator of illness (morbidity); shorter life span implies earlier sickness and lower quality of life. The impact on illness and quality of life will be investigated and will accompany the life expectancy analysis.

The study will investigate or analyze the health impacts of the TEC in the following areas:

1. Human health aspects of emissions by:
    a. analyzing the impact of criteria pollutants on life expectancy
    b. investigate the impact of criteria pollutants on illness
    c. investigating carbon dioxide
    d. investigating measurable surface and groundwater impacts[2]
    e. compare death rates of Taylor County with Madison, Dixie, Hamilton, Hendry, Washington and Suwannee Counties
2. Human health aspects of the economic impact by:
    a. analyzing economic issues related to employment and its relationship to death rates and life expectancy
        i. race

[1] Some HIAs use hospital discharge data to look at specific illnesses (morbidity). This HIA uses only available data in a population-based format. Hospital discharge data is available for each discharge and is not population-based. For example, if a person was admitted to the hospital for asthma three times within a year, there would be three discharge records for one person. In order to analyze these data, Healthy Development would need to disaggregate the data so that one person is identified for the three discharges. The contract for this HIA is for the use available population-based data only and will not look at illnesses represented in hospital discharges.

[2] Mercury is not a criteria pollutant and TEC plant emissions estimates for mercury are currently not available for analysis.

ii. income
iii. health insurance
iv. In short, the study will predict impacts on life expectancy of TEC employees according to various employment levels and scenarios.

b. exploring economic multiplier effects
c. exploring the issues of job training

3. Smoking Attributable Mortality Rate analysis

Finally, the study will give recommendations as to what steps should be taken to enhance the expected positive benefits of the plant's operation and minimize the negative impacts in a wide range of areas.

Criteria for Analysis

The table below defines what is required for quantitative analysis for issues related to the TEC for HIA.

Table 1: Criteria for forecasting population health impacts:

1. A statistically significant level of the risk has been identified in scientific peer reviewed journal article or other source
2. The risk is applicable to a general population identifiable from a source such as Vital Statistics records or US Census data.
3. The risk level can be applied mathematically to the population. For example, it is a percentage, risk or odds ratio or is a multivariate equation where all the components of the equation are known or can be credibly estimated.

Health Impact Assessment Explained

HIA's are performed for all manner of development scenarios: energy, housing and town development, water resource and supply, parks and recreation and transportation. They are prospective and used to assess impact to specific populations using relevant data.

Health Impact Assessment (HIA) – Components and Applications

- HIAs define both positive and negative health impacts within specific populations and allow for design or policy change recommendations to optimize health
- HIAs often analyze social and economic impacts of projects on effected populations
- HIAs bring public health issues to the attention of decision makers, potentially improving project design and implementation
- HIAs contain specific protocol and an ethic based on improving the social determinants of health

HIA methods:

- collect qualitative data from stakeholders and experts with surveys and focus groups for the purpose of HIA scoping
- use a variety of sources of data including reported governmental data for the purpose of analysis
- collect health risk information from peer-reviewed journal articles and other sources
- employ a mixture of epidemiological and demographic statistical techniques
- project statistics onto maps using Geographic Information Systems (GIS).

A Social Model of Health and Well-being

HIA is based on a holistic, social model of health which recognizes that the well-being of individuals and communities is determined by a wide range of economic, social and environmental influences as well as by heredity and health care. As such, Healthy Development subscribes to the World Health Organization's definition of health which is:

> Health is a state of complete physical, mental and social well-being and not merely the absence of disease[3].

This definition is much broader than (but encompasses) the traditional medical model which defines health as freedom from disease which can be diagnosed clinically and is concerned primarily with treating symptoms rather than their underlying causes.

[3] http://www.who.int/about/definition/en/

Health Impact Assessment of the Taylor Energy Center

HDI conducted a rapid health impact assessment (HIA) for the Jefferson and Madison County Health Departments in September, 2005. This rapid assessment focused on the health impacts of particulate matter and mercury emissions from the Taylor Energy Center. This TCDA HIA is a more in depth study on health, social and economic impacts on Taylor County citizens. Taylor County officials will have the potential to enhance the positive impacts and minimize the negative impacts of the project with the foresight that the HIA analysis brings.

The operational phase of the energy plant has raised concerns about air and water pollution on one hand and, on the other, the increase in health and well-being brought by the positive economic impacts on county residents' health. This HIA will focus on (1) environmental health, (2) the economic impacts from added jobs and the population newly covered by health care insurance and (3) the social determinants of health.

Scoping and Stakeholder Perspectives

Fundamental to an HIA is gathering stakeholder and community member input about their concerns and desires for a proposed project, program or policy. The scope of an HIA is determined in part by community and stakeholder input. In Taylor County, many community stakeholders representing a variety of perspectives and constituencies were interviewed or surveyed regarding Taylor County in general, and the Taylor Energy Center specifically. Names were supplied by the TCDA. Those selected were not required to participate and their input is confidential. In addition, press clippings and other coverage of public meetings were used to collect the concerns and perspectives of the community regarding the plant's construction.

Two themes emerged from many of the stakeholders: (1) pollution and (2) economic development. Other often cited concerns were racial tensions and disparity and lack of political empowerment (this study uses the term social capital). Examples of lack of social capital cited by community members include the absence of a public vote on the coal plant and/or their assertion that little or no information was available to the public about TEC's impacts.

The length and breadth of the comments by opponents was greater than other stakeholders from a variety of constituencies. Some community members in opposition to the plant that were not identified as stakeholders independently contacted HDI to provide input. Summary of stakeholder perspectives:

Concerns

- Overall poor health of county residents
- County's high level of smoking rates
- Racial Disparities, Racism
- Remaining fear from bombing range experience
- Poverty and lack of economic development
- General illness
- Respiratory illnesses
- Cancer
- Odor
- More pollution at night
- Haze over Perry
- Health impacts of TEC are unknown
- Fetal health
- Cancer
- Global Warming
- Water needed by TEC to operate will come at no cost to TEC
- Impact to tax roll of TEC acreage
- Negative effects of combined emissions from Buckeye and TEC

Desires

- Nature coast identity is strong
- Retirees will be attracted to Taylor County
- Health insurance from TEC will elevate health status of the entire community over time
- Land development of the coast will improve Taylor County overall
- Economic development opportunities are increased
- Maintain small town charm
- Clean, non-polluting industry and business growth for the county
- No TEC in Taylor County

Demographic Characteristics of Taylor County and the City of Perry

This section highlights demographic characteristics of the city, county and state. The health impact assessment will calculate impacts using basic demographic characteristics collected from the US Census and from Florida Department of Health vital statistics data.

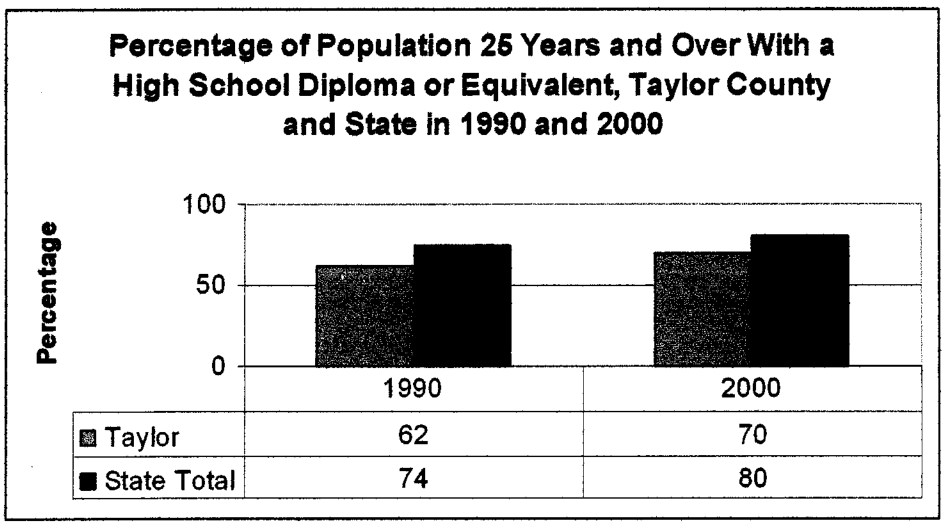
Demographic characteristics of both the City of Perry and Taylor County are shown in Table 2. Most of the county's black residents (76%) live within the city limits. Gender and education rates are similar between the city and county. Chart 1 shows that 80 percent of state residents compared to 70 percent of Taylor County residents had a high school diploma or equivalent at age 25 and older. Achievement of a high school diploma has improved over time for both the state and county. Chart 2 shows that the average state household earned approximately 30 percent more income than Taylor County households. Chart 3 shows median household income statistics by white and black race for Taylor County residents compared to the state[4].

Table 2: Selected Demographic Characteristics of the City of Perry and Taylor County.

	City of Perry		Taylor County	
	Number	Percent	Number	Percent
White	3,835	56%	14,988	78%
Black	2,819	41%	3,666	19%
Other	193	3%	602	3%
Male	3,201	47%	9,833	51%
Female	3,646	53%	9,423	49%
High School Diploma, Equivalent or Less	3126	71%	9155	71%
More than High School	1304	29%	3759	29%

Source: US Census, 2000 Race and Gender from the summary file 1 and education from summary file 3 sample.

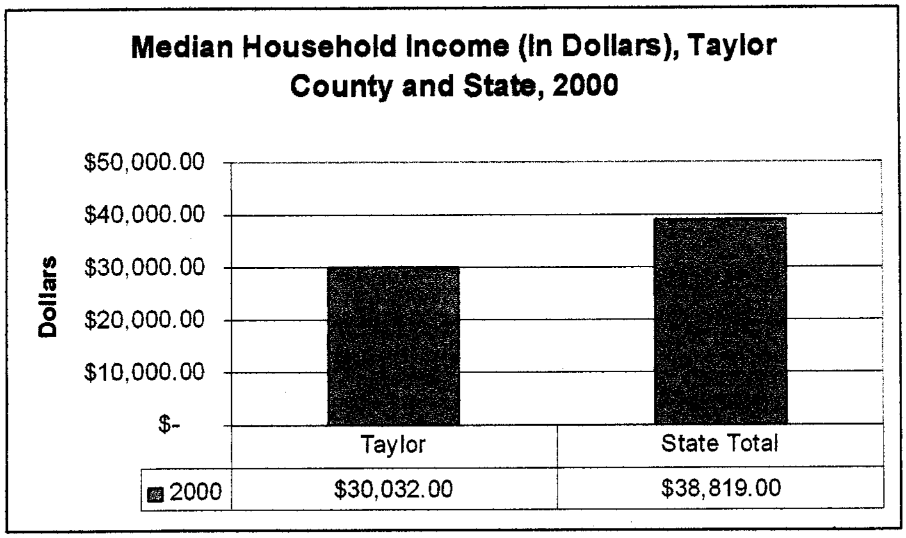
Chart 1.



Source: Florida Charts--http://www.floridacharts.com/charts/CensusData.aspx

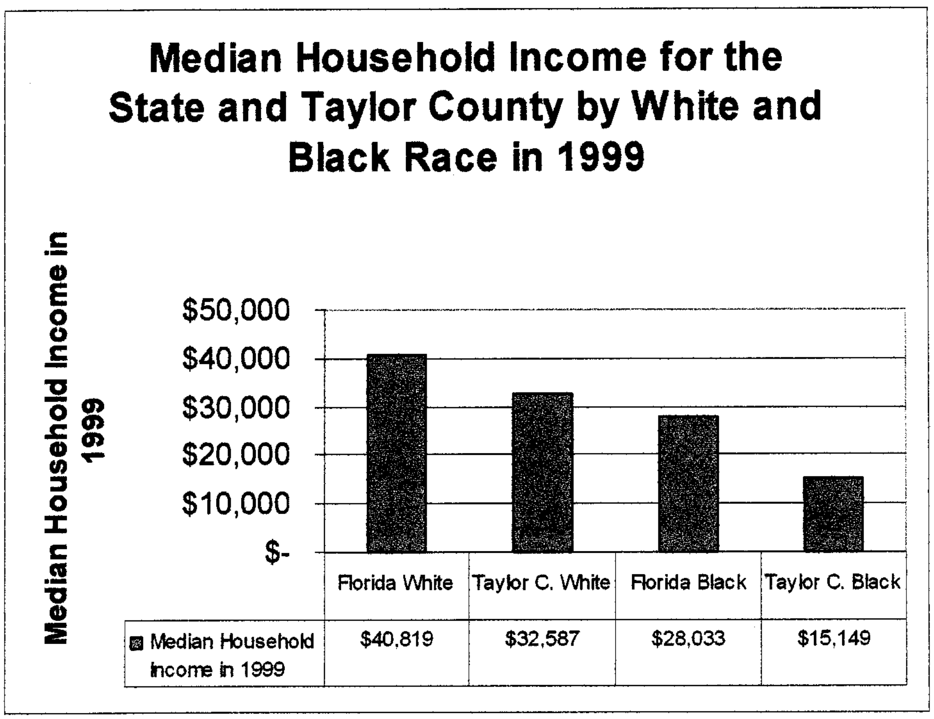
Chart 2:

[4] Most race statistics in this report reference white and African-American (black for brevity). Hispanic ethnicity still comprises a small proportion of the population and their estimates unstable.



Source: Florida Charts--http://www.floridacharts.com/charts/CensusData.aspx

Chart 3:

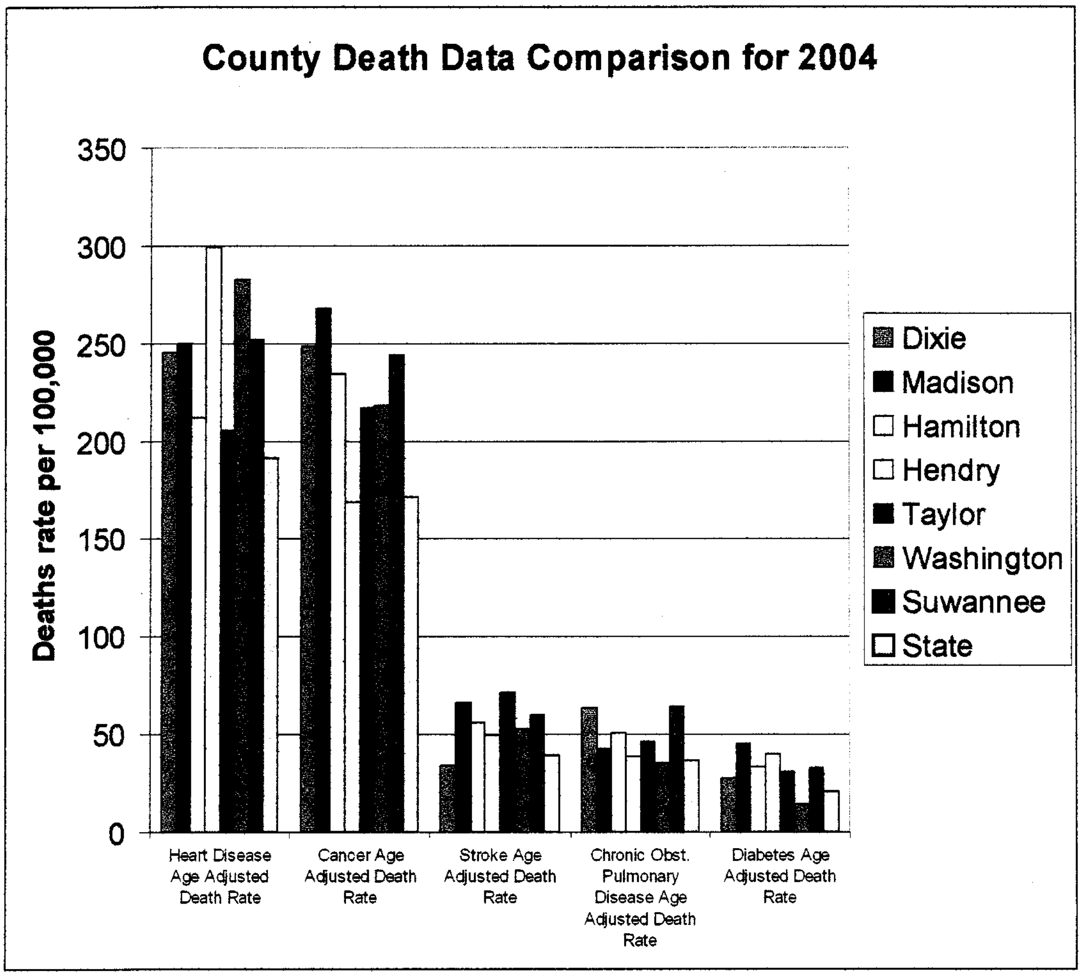


Source: US Census 2000

Baseline Health Status of Taylor County Residents

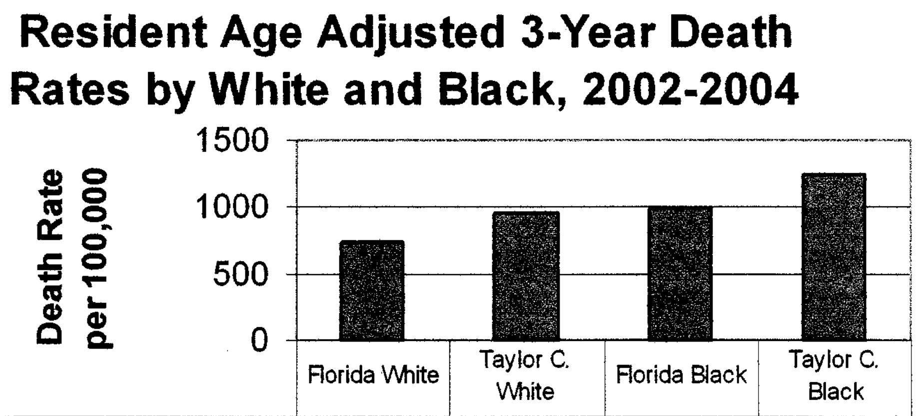
The current (baseline) health conditions of Taylor County residents will also be used for quantitative analysis as a part of the Health Impact Assessment. Chart 4 shows that the age-adjusted death rates for Taylor County residents are higher than the state average for the top five causes of death. Taylor County residents have higher average death rates for heart disease, cancer, stroke, chronic lower respiratory disease (CLRD), and diabetes than the state average. Other counties are included in Chart 4 for comparison. Chart 5 shows state and Taylor County three year age adjusted death by black and white. Table 3 shows selected lifestyle and behavioral issues for the county. Compared to the state, residents are more likely to be obese and to smoke. Residents are less likely to exercise than the rest of the state.

Chart 4:



Source: County Death Data Comparison, 2004, Florida Charts
http://www.floridacharts.com/charts/SpecReport.aspx?RepID=372

Chart 5:



	Florida White	Taylor C. White	Florida Black	Taylor C. Black
Resident Age Adjusted 3 year Death Rates by White and Black, 2002-2004	726.1	955.5	985.1	1243.6

Source: Florida Charts, Taylor County Health Profile

Table 3: Behavioral Risk Factors, 2002

	Taylor County	State
Adults who currently smoke	31%	22%
With no regular vigorous physical activity	81%	76%
Who engage in no leisure-time physical activity	37%	26%
Who are overweight (BMI >25)	35%	35%
Who are obese (BMI>=30)	30%	22%

Source: Florida Charts--Taylor County Chronic Disease Profile, Behavioral Risk Factors (BRFSS) Data 2002.
http://www.floridacharts.com/charts/SpecReport.aspx?RepID=377

Table 4 shows estimates of health insurance coverage for residents. These are estimates since the data were reported at different time periods and percentages could only be approximated. Medicaid and Medicare cover about 37 percent of residents; whereas, 28 percent of the county's residents are uninsured. Blue Cross and Blue Shield of Florida covers about 31 percent of the population. With this information, it can be roughly estimated that about 5 percent of the rest of the population may be covered by some other sort of private health insurance. For more information on baseline health status of Taylor residents, see appendices one and two.

Table 4: Health insurance coverage estimates for Taylor County

	Number	Approximate percentage
Blue Cross Blue Shield of Florida (April 2006)+	5950	31%
Other private health care insurance*	?	~5%
Medicaid (Jan. 2006)**	3,796	20%
Medicare (2003)***	3,227	17%
Uninsured (2002)****	5,392	28%
Total Population (US Census 2000)	19,256	100%

+ Personal communication with Blue Cross Blue Shield of Florida
* Estimated
** Agency for Health Care Administration...
*** US Department of Health ad Human Resources, Centers for Medicaid and Medicare Services, www.cms.hhs.gov/MedicareEnrpts/
**** Prevalence of Major Behavioral Risk Factors in Taylor County A Report from the 2002 County Behavior Risk Factor Surveillance System (BRFSS) Survey Bureau of Epidemiology Florida Department of Health

Air Quality

Ambient (on-the-ground, where it is breathed) air quality in Taylor County is currently not monitored[5]. Air quality estimates for Taylor County are created from Leon County monitors combined with meteorological data. In the 1980s, particulates and sulfur dioxide were measured at below state and federal standard limits. Criteria pollutants from stack emissions in the county are annually reported and monitored.

From discussions with the Department of Environmental Protection (DEP), it was represented that several steps are required to install an air quality monitoring system in the county that would be managed by DEP. The monitor would need open land in an appropriate area without trees or buildings in addition to a power source. The cost is estimated at $70,000; however the Florida Legislature would have to provide the money in order for DEP to operate the monitoring system.

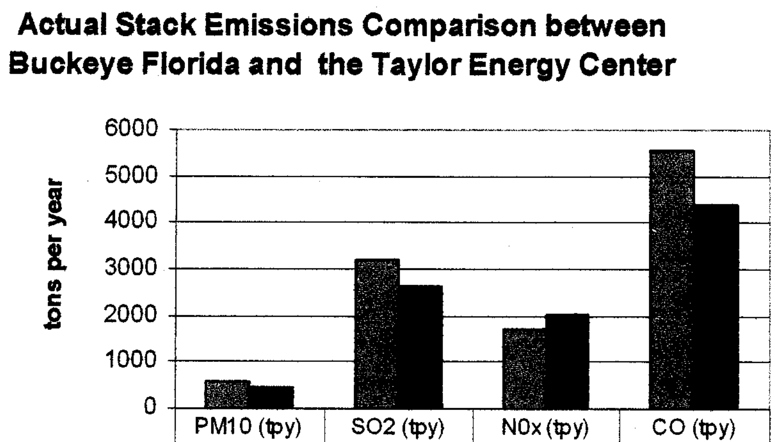
Personal communication with the Florida Department of Health, Division of Air Resource Management

Theoretically, the monitor could be accessible at all times over the internet and could link to an alert system in case of poor air quality.

Some stakeholders were concerned about the emissions from Buckeye Florida and the TEC. Both Buckeye and TEC are required to and will report pollutants that are associated with human health impacts called criteria pollutants. The pollutants reported from both industries include particulate matter (PM_{10})[6], sulfur dioxide (SO_2)[7], nitrogen oxides (NO_X)[8], and carbon monoxide (CO)[9].

The stack height of TEC will be 700 feet. The TEC stack height is designed to be high enough to prevent downwash of the emissions plume. According to TEC, this stack height, which conforms to Good Engineering Practices, will enhance the dispersion of emissions resulting in lower ground-level concentrations of inhale-able (ambient) pollutants[10]. Chart 6 shows the stack emissions of criteria pollutants from Buckeye Florida for 2005 compared to the anticipated permitted emissions from TEC.

Chart 6:



	PM10 (tpy)	SO2 (tpy)	NOx (tpy)	CO (tpy)
Buckeye 2005*	584.7	3214.6	1700.8	5568
Taylor Energy Center (projected actual emissions)**	436.5	2619.1	2037.1	4365.2

* Source: Florida Department of Environmental Protection Electronic Annual Operating Report, Emissions by Report Facility 2005.
** Based on anticipated permitted emissions and assumed capacity factor of 90 percent (Sources: Environmental Consulting & Technology 2006 and Taylor Energy Center, 2006).

6 See Particulate Matter: Health and Welfare at www.epa.gov/air/particlepollution/health.html
7 See Health and Environmental Impacts of SO_2 at www.epa.gov/oar/urbanair/so2/hlth1.html
8 See Health and Environmental Impacts of NOx at www.epa.gov/oar/urbanair/nox/hlth.html
9 See Health and Environmental Impacts of CO at www.epa.gov/air/urbanair/co/hlth1.html
10 FDEP rule for GEP is Rule 62-210.550 Stack Height Policy, Florida Administrative Code

The Health Impact Assessment will use TEC ambient emissions estimates to calculate the impacts on health from the coal plant. Those estimates will be used in population health analysis where possible (see Table 1).

The Florida Department of Environmental Protection (DEP) recently received approval from the Environmental Regulation Commission to implement more stringent air emission standards. The new standards will help the state meet the requirements of the U.S. Environmental Protection Agency's (EPA) Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR)[11].

As part of CAIR, Florida's power plants will be required to reduce emissions of nitrogen oxides and sulfur dioxide, which contribute to the formation of fine particles and ground-level ozone. CAMR will build on CAIR regulations to significantly reduce mercury emissions from coal-fired power plants. Going beyond federal requirements, Florida's plan for implementing CAMR will result in greater mercury reductions than those required by the EPA.

This study will investigate, where feasible, any impacts these new regulations may have on the TEC and its emission levels.

In addition, the study will examine carbon dioxide despite the fact that it is not a reportable and measured emission. There is a substantiated probability of heightened federal restrictions on CO2 emissions in the coming years. Rising sea levels associated with rising temperatures on earth over time have the potential to significantly impact coastal communities like Taylor County.

Water Quality

The water issue most common in the concerns about the operation of the TEC is mercury pollution and poisoning. Baseline levels of mercury are interpreted into fish consumption warnings for Florida's waters by the Department of Health, the Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission.

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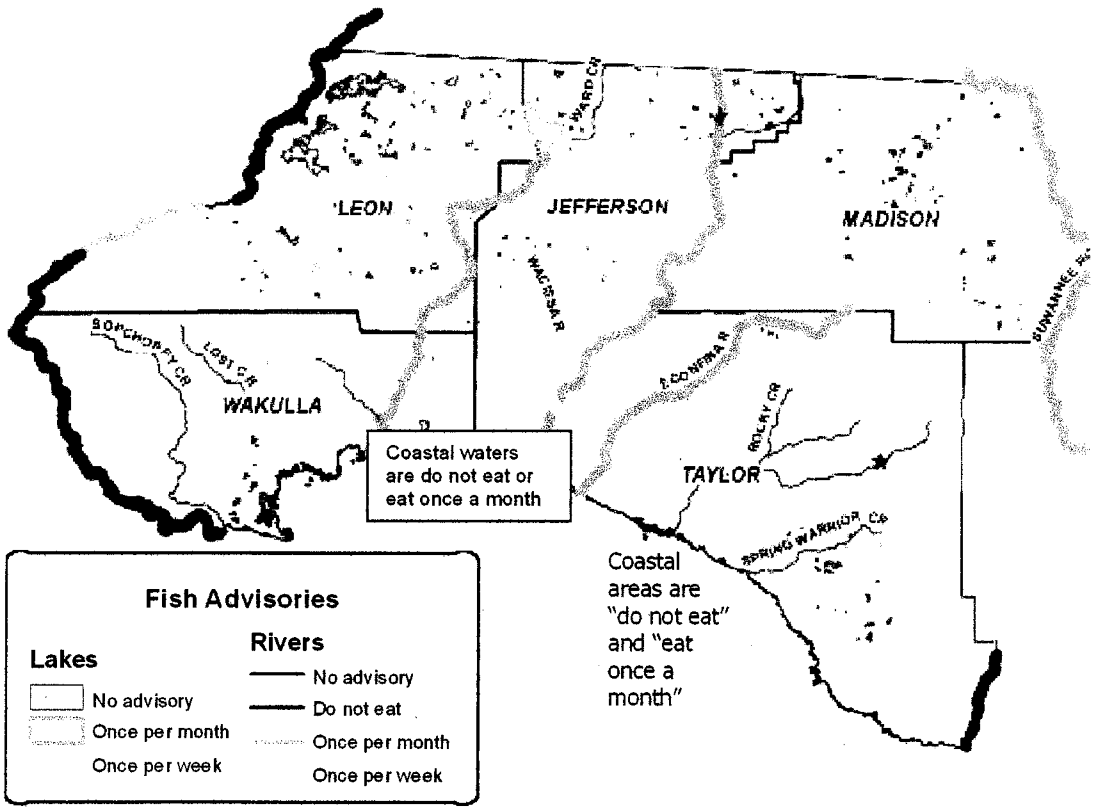
[11] Source: DEP Division of Air Resource Management, www.dep.state.fl.us/air

Chart 5: Map of fish consumption advisories*



Citation: "Your guide to eating fish caught in Florida." Florida Department of Health, Prepared in cooperation with Florida Department of Environmental Protection and Florida Fish and Wildlife Conservation Commission.
*These advisories are for women of childbearing age and children. The water body advisories represent the highest alert for any fish species.

Chart 5 shows a map of Taylor and surrounding counties and the current fish consumption warnings for the most at-risk population, women of childbearing age and children. The water body advisories represent the highest alert for any fish species.

Where feasible, this study will further investigate the impacts of mercury to Taylor County residents. Other ground and surface water issues, including baseline conditions, will be investigated in subsequent phases.

Phase Two

With the approval of the TCDA, phases two and three will be adjusted to include the quantitative analysis of changes in life expectancy from ambient criteria pollutants and TEC jobs to Taylor residents. Investigations into other items listed in the scope above include, but are not limited, to TEC impacts on illness and carbon dioxide, surface and groundwater impacts, issues of job training and economic multiplier effects. Phase two will collect the scientific peer reviewed data for the analysis and investigation of these concerns. Phase three will report the final Health Impact Assessment where the quantitative analysis and investigations will be reported. Recommendations to optimize health will be made in the phase three report.

Healthy Development, Inc.

Kathy Baughman McLeod
Communications and Policy
Phone: (850) 591-6555
Email: kbmcleod@healthydevelopment.us

Melanie Simmons, PhD
Research and Development
Phone: (850) 322-4629
Email: msimmons@healthydevelopment.us

info@healthydevelopment.us
www.healthydevelopment.us
Fax: (850) 942.6555

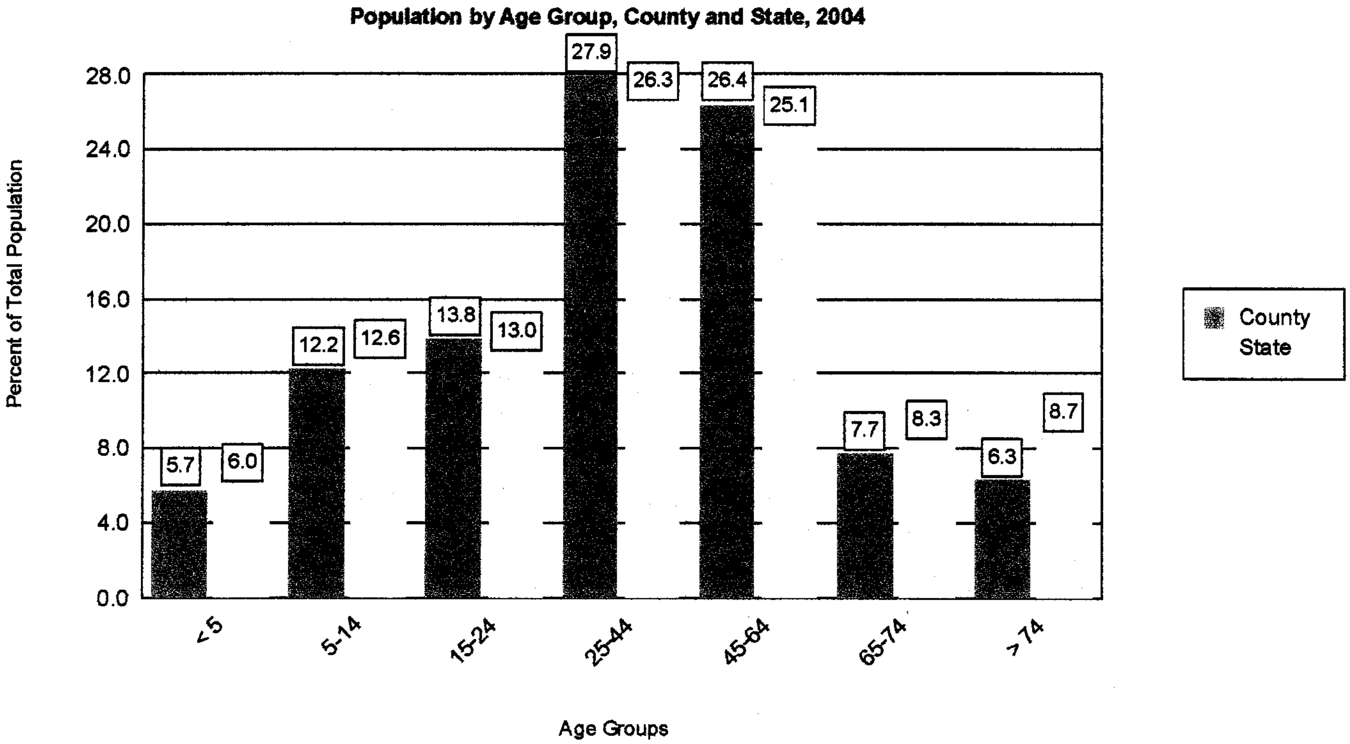
1015 Alachua Ave.
Tallahassee, FL 32308

Appendix One:
Florida Department of Health, County Health Profile

Population by Age and Gender

	County - 2004						State - 2004		
	Number			Percentage			Percentage		
Age group	Male	Female	Total	Male	Female	Total	Male	Female	Total
< 5	616	587	1,203	5.5	5.9	5.7	6.2	5.7	6.0
5-14	1,300	1,270	2,570	11.7	12.9	12.2	13.1	12.1	12.6
15-24	1,573	1,330	2,903	14.2	13.5	13.8	13.6	12.4	13.0
25-44	3,480	2,370	5,850	31.3	24.0	27.9	27.1	25.6	26.3
45-64	2,825	2,705	5,530	25.4	27.4	26.4	24.6	25.5	25.1
65-74	745	865	1,610	6.7	8.8	7.7	7.9	8.8	8.3
> 74	564	756	1,320	5.1	7.6	6.3	7.5	9.9	8.7
Total	11,103	9,883	20,986	100.0	100.0	100.0	100.0	100.0	100.0

Data Source: Population Estimates from the Executive Office of the Governor



Population Trends (1990-2000)

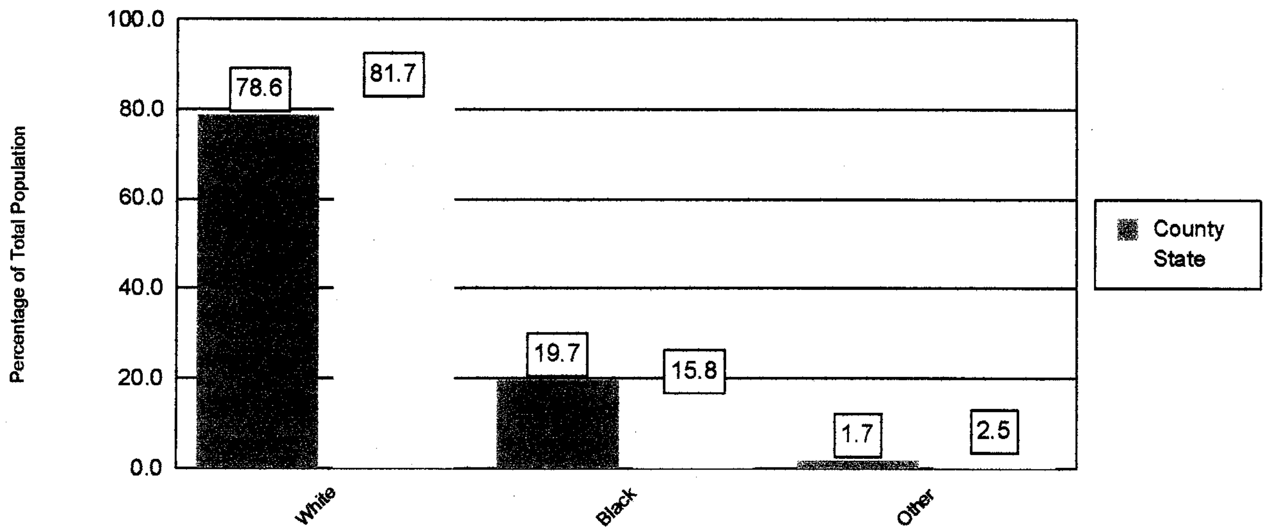
1990 Population	2000 Population	Net Change	Percent Change 1990-2000	Percent Change-State 1990-2000	Population Density - 2000 (persons/sq. mi.)	Population Density -State -2000 (persons/sq. mi.)
17,111	19,256	2,145	12.5	23.5	18.5	296.4

Population by Race

	COUNTY		STATE
Race	Population	Percentage	Percentage
White	16,487	78.6	81.7
Black	4,132	19.7	15.8
Other	358	1.7	2.5
TOTAL	20,977	100.0	100.0

Data Source: Population estimates from the Office of the Governor

Population Percentage by Race, County and State, 2004

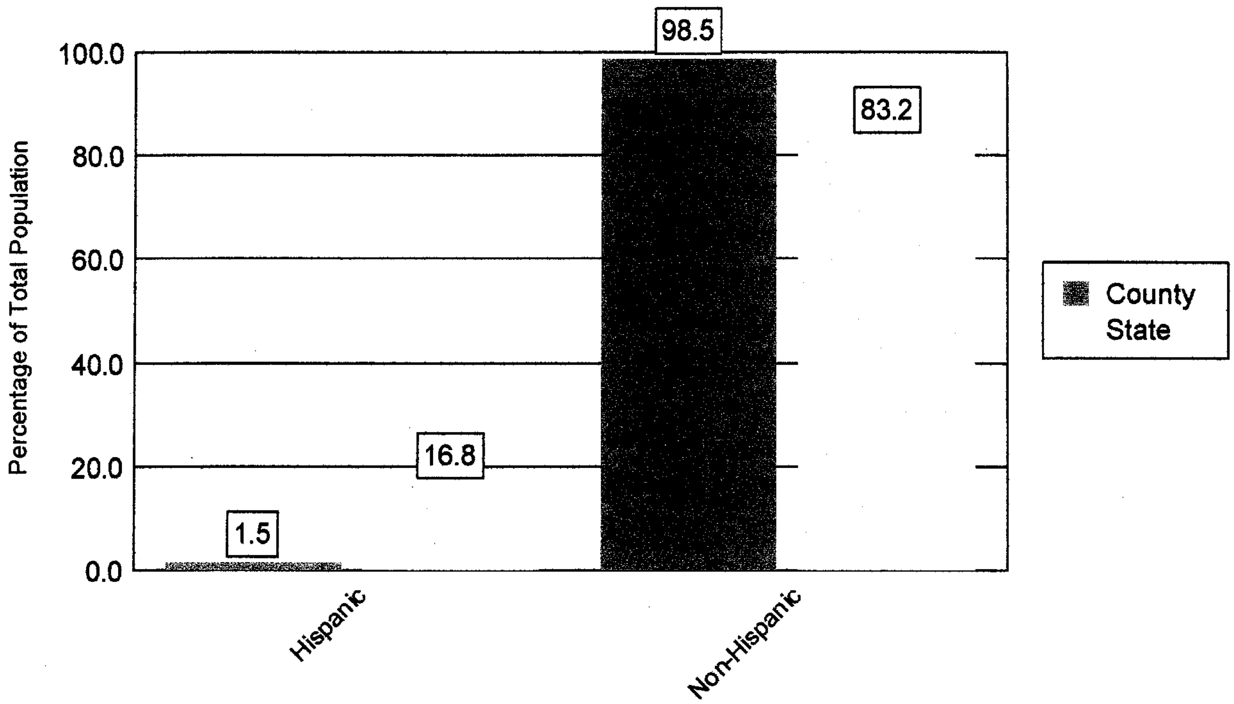


Hispanic Population

	COUNTY		STATE
Ethnicity	Number	Percentage	Percentage
Hispanic	295	1.5	16.8
Non-Hispanic	18,961	98.5	83.2
Total	19,256	100.0	100.0

Data Source: 2000 U.S. Census, Data includes all races

Hispanic Population Percentage, County and State, 2000

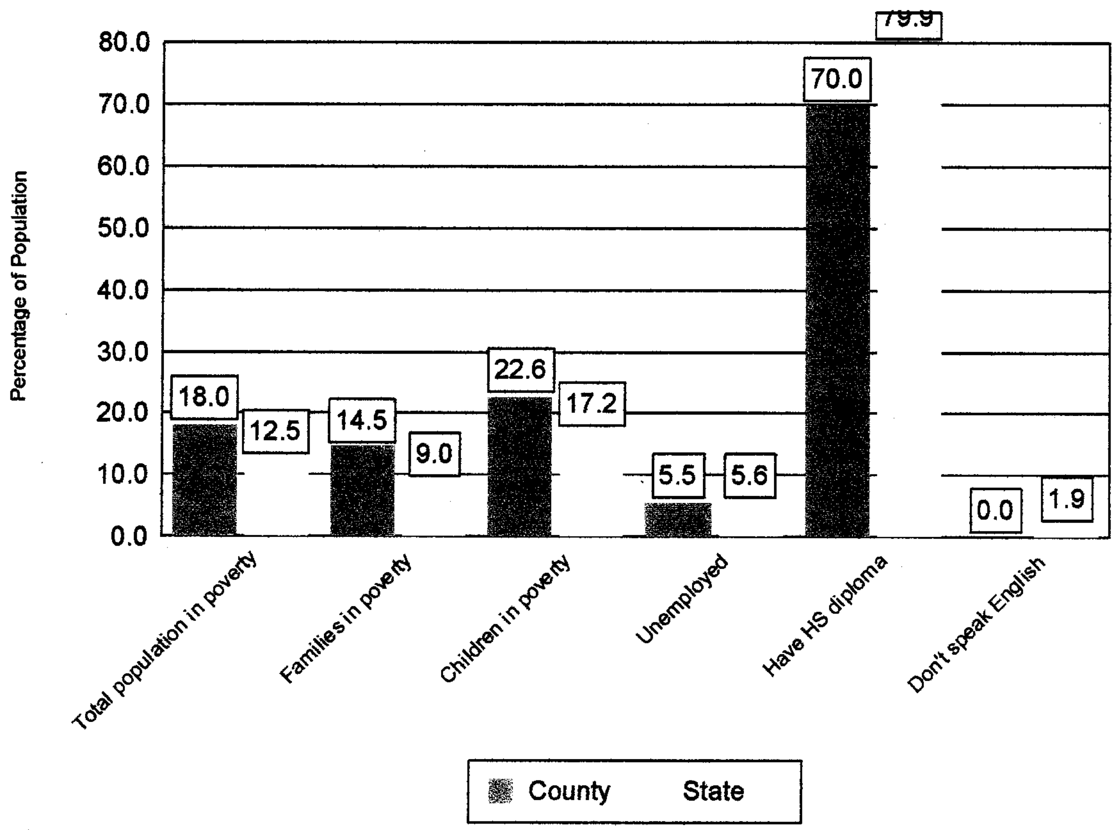


Socioeconomic Indicators

	COUNTY 1990	COUNTY 2000	COUNTY Quartile	STATE 2000
Percent of total population below poverty level	20.7	18.0	3	12.5
Percent of families below poverty level	16.1	14.5	4	9.0
Percent of population under 18 below poverty level	31.7	22.5	3	17.2
Percent of civilian labor force which is unemployed	7.5	5.5	3	5.6
Median household income	21,380	30,032	1	38,819
Percent of population > 25 with a high school diploma	62.0	70.0	1	79.9
Percent of population > 5 that doesn't speak English		0.0	1	1.9
Median age		37.8	2	38.7

Data Source: 2000 U.S. Census

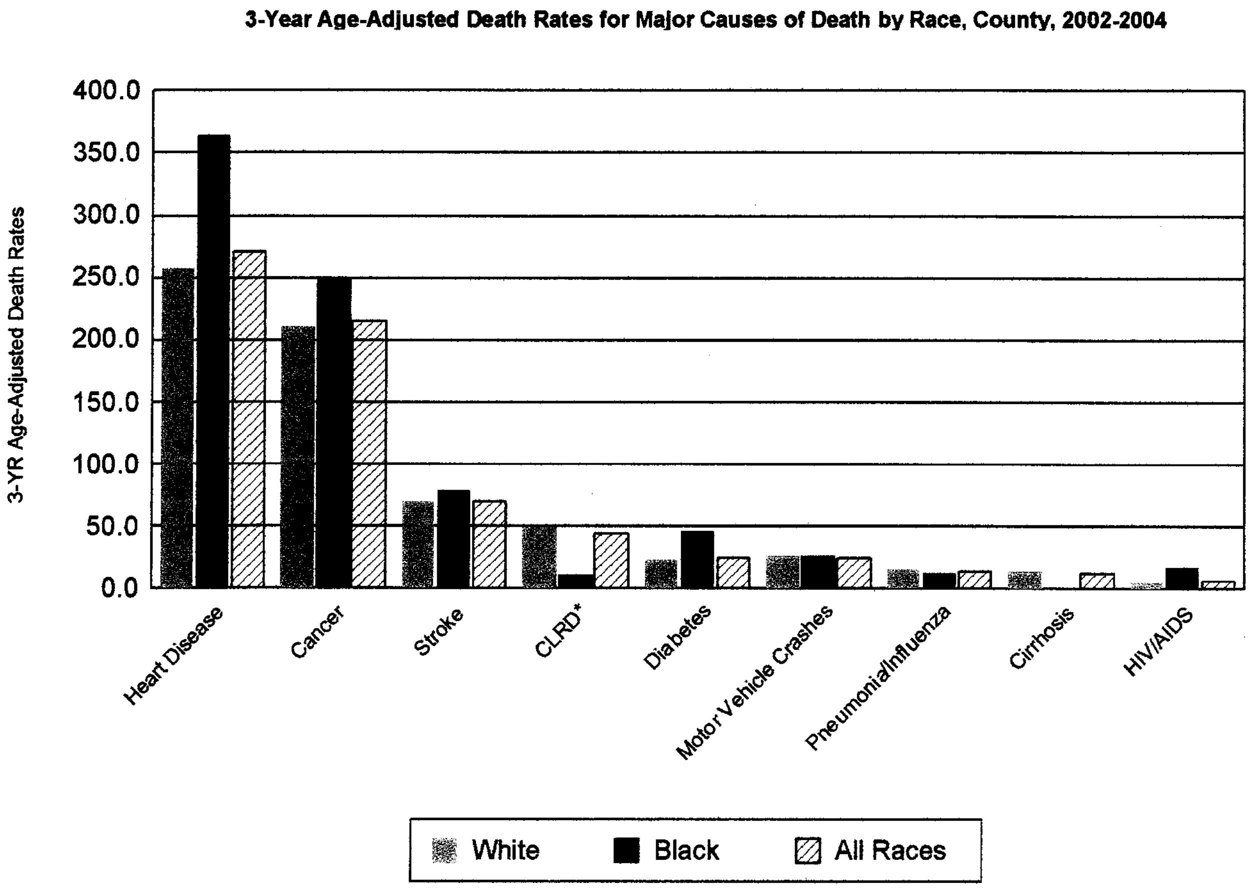
Selected Socioeconomic Indicators, County and State, 2000



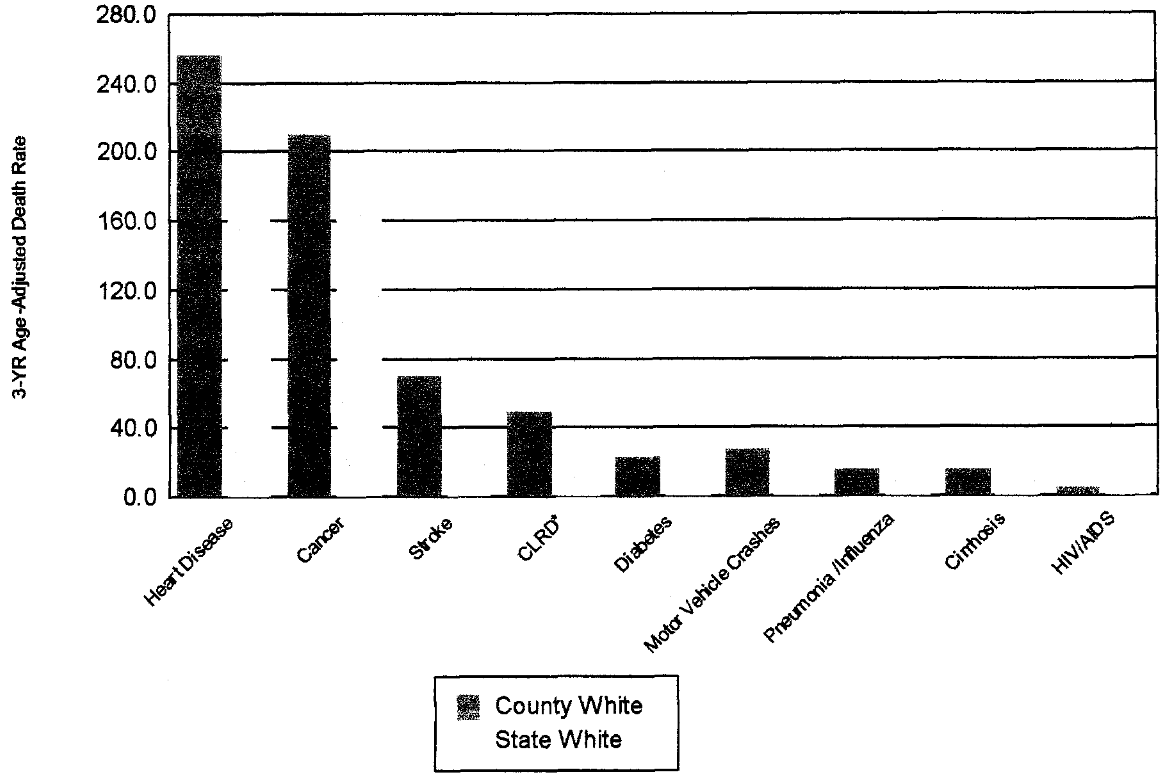
Major Causes of Death

Resident 3-Year Age-Adjusted Death Rates, 2002-04, by Cause	COUNTY White	COUNTY Quartile	COUNTY Black	COUNTY Quartile	COUNTY All Races	COUNTY Quartile	STATE White	STATE Black	STATE All Races
Total Deaths	955.5	4	1,243.6	4	985.2	4	726.1	985.1	748.4
Heart Disease	256.4	4	363.8	4	269.9	4	199.2	266.9	204.3
Cancer	209.8	4	249.5	3	215.3	4	173.0	205.9	174.7
Stroke	69.2	4	79.4	2	70.3	4	39.0	75.2	42.0
CLRD*	49.2	3	10.9	1	43.9	2	39.1	26.6	38.1
Diabetes	22.6	3	46.5	2	25.3	3	18.4	50.3	20.8
Motor Vehicle Crashes	26.8	3	26.1	3	24.9	3	19.0	18.5	18.5
Pneumonia/Influenza	15.2	2	13.0	2	13.9	2	12.7	17.2	13.1
Cirrhosis	14.9	4	0.0	1	12.7	3	11.3	7.4	10.7
AIDS/HIV	4.7	4	16.7	2	6.5	3	4.6	43.6	10.2

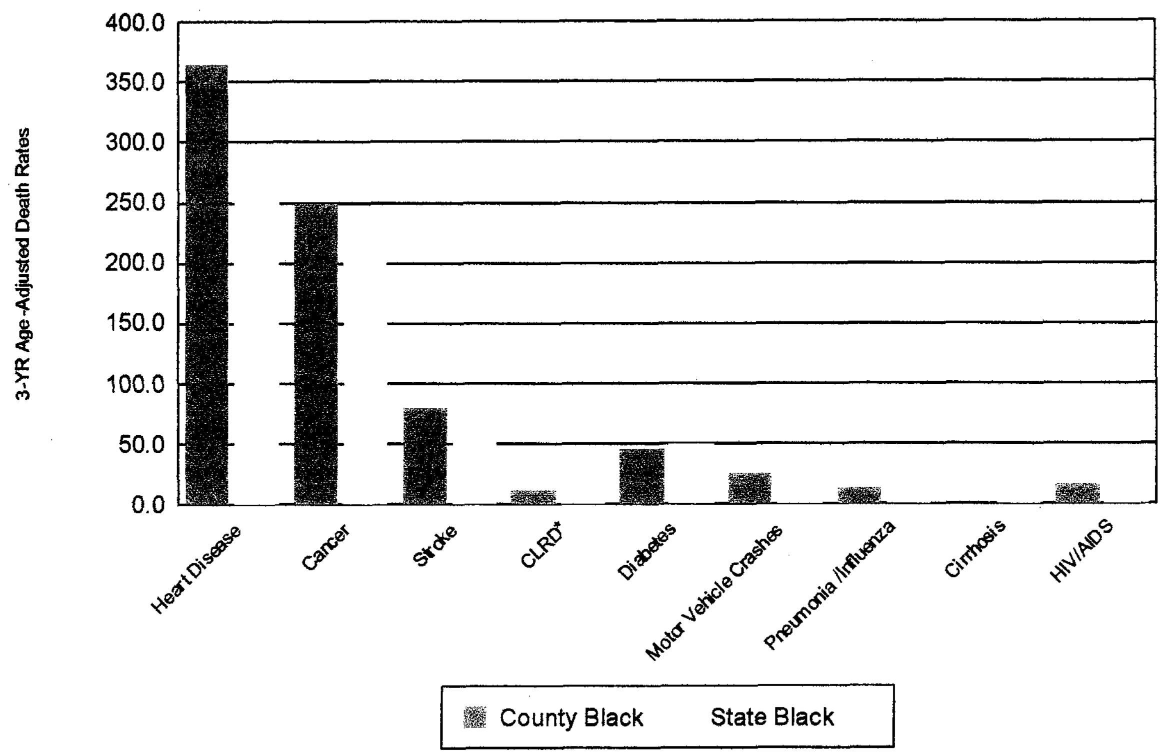
Data Source: Florida Office of Vital Statistics
*Chronic Lower Respiratory Disease



3-Year Age-Adjusted Death Rates for Major Causes of Death, White, County and State, 2002-2004



3-Year Age-Adjusted Death Rates for Major Causes of Death, Black, County and State, 2002-2004

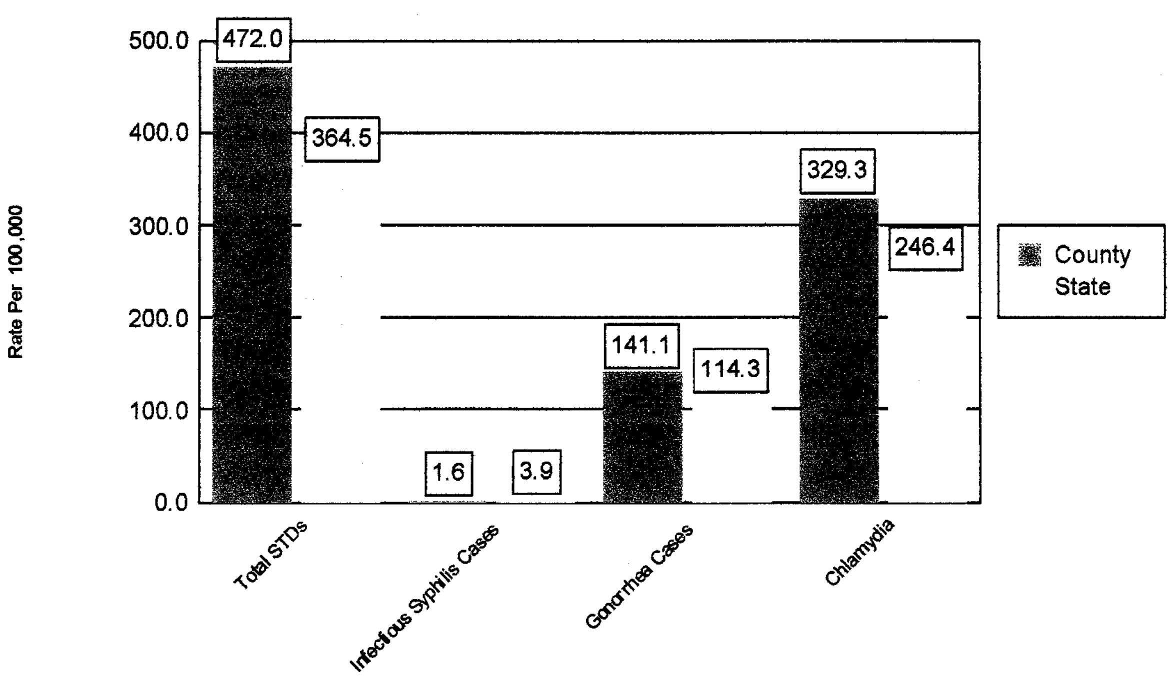


Communicable Diseases

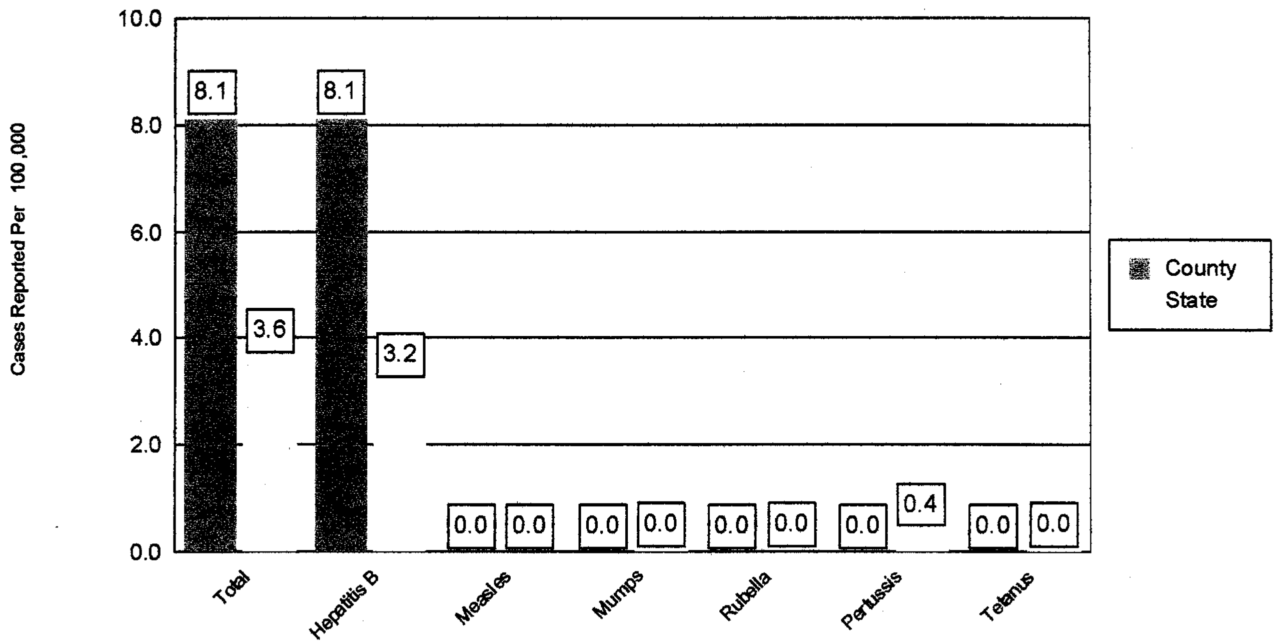
	COUNTY			STATE
	Number of Cases (annual avg.) 2002-2004	3-Yr Rate per 100,000 2002-2004	Quartile	3-Yr Rate per 100,000 2002-2004
Sexually Transmitted Diseases (STD)				
Total Gonorrhea, Chlamydia & Infectious Syphilis	97.0	472.0	4	364.5
Infectious Syphilis Cases	0.3	1.6	4	3.9
Gonorrhea Cases	29.0	141.1	4	114.3
Chlamydia	67.7	329.3	4	246.4
Vaccine Preventable Diseases				
Vaccine Preventable Diseases Total	1.7	8.1	4	3.6
Hepatitis B Cases	1.7	8.1	4	3.2
Measles	0.0	0.0	1	0.0
Mumps	0.0	0.0	1	0.0
Rubella	0.0	0.0	1	0.0
Pertussis	0.0	0.0	1	0.4
Tetanus	0.0	0.0	1	0.0
AIDS and Other Diseases				
AIDS Cases	1.7	8.1	1	29.9
Meningococcal Meningitis	0.0	0.0	1	0.2
Hepatitis A Cases	0.0	0.0	1	3.2
Tuberculosis Cases	0.0	0.0	1	6.2

Data Source: Division of Disease Control, Florida Department of Health

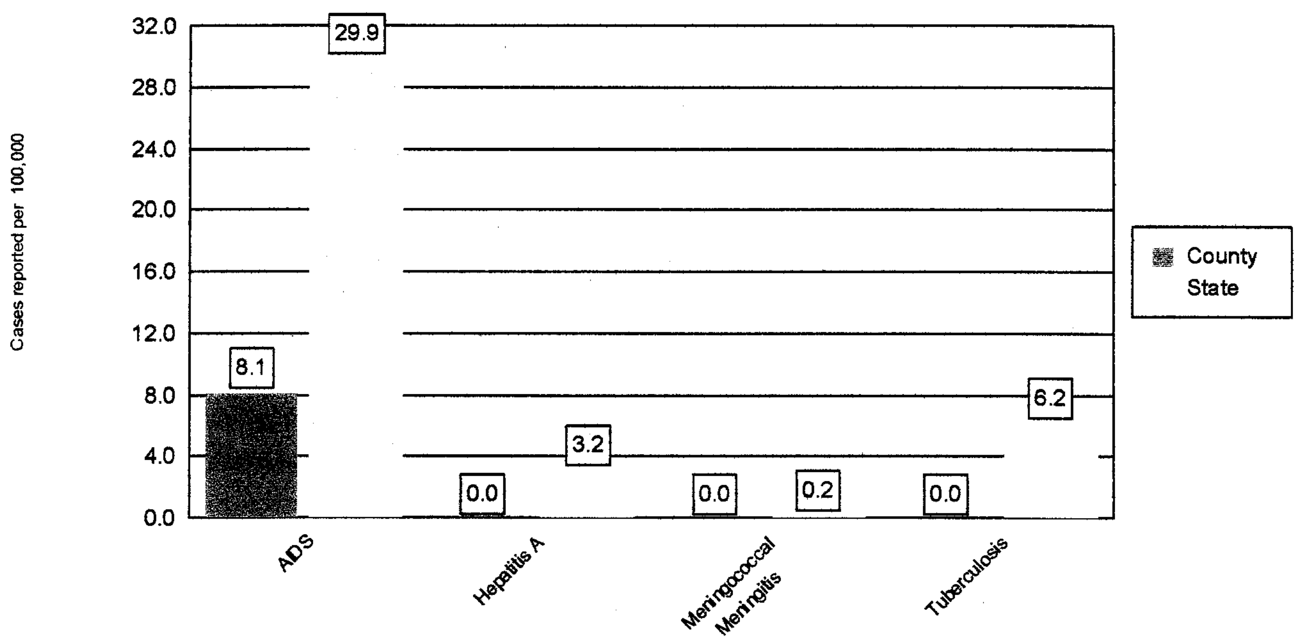
Reported Sexually Transimitted Disease Cases per 100,000, County and State, 2002-2004



Reported Vaccine Preventable Disease Cases per 100,000, County and State, 2002-2004



Reported Cases of AIDS, Hepatits A, Meningitis and TB per 100,000, County and State, 2002-2004



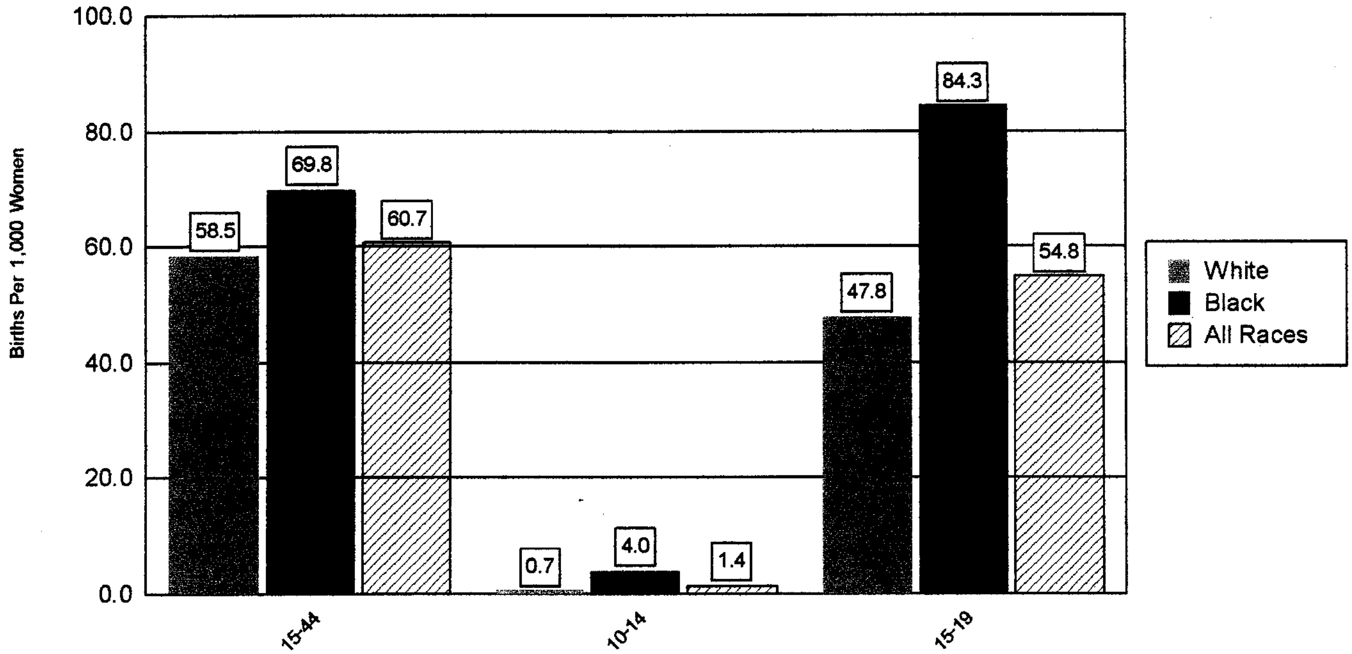
Maternal & Child Health

Indicator (3-YR Figures, 2002-04)	COUNTY White**	Quartile	Black**	Quartile	Hispanic	Quartile	All Races	Quartile	STATE
Births									
Total Births (3-yr annual avg.)	171.0	1	49.7	2	2.7	1	224.0	1	
Births to Mothers ages 15-44, per 1,000*	58.5	2	69.8	3			60.7	2	62.8
Births to Mothers ages 10-14, per 1,000*	0.7	3	4.0	4			1.4	4	0.7
Births to Mothers ages 15-19, per 1,000*	47.8	2	84.3	4			54.8	3	42.8
Percent of Births to Unwed Mothers	36.6	3	87.9	4	12.5	1	47.8	4	40.2
Infant Deaths									
Infant Deaths (0-364 days) per 1,000 Births	13.6	4	6.7	1	125.0	4	13.4	4	7.3
Neonatal Deaths (0-27 days) per 1,000 Births	7.8	4	6.7	2	0.0	1	7.4	4	4.8
Postneonatal Deaths (28-364 days) per 1,000 Births	5.8	4	0.0	1	125.0	4	6.0	4	2.6
Low Birth Weight									
Percent of Births < 1500 Grams	1.6	4	5.4	4	0.0	1	2.5	4	1.6
Percent of Births < 2500 Grams	6.0	1	14.8	3	0.0	1	8.2	3	8.5
Prenatal Care									
Percent of Births with 1st Trimester Prenatal Care	90.6	4	79.6	3	100.0	4	88.0	4	84.1
Percent of Births with Late or No Prenatal Care	1.4	1	2.1	1	0.0	1	1.6	1	3.3

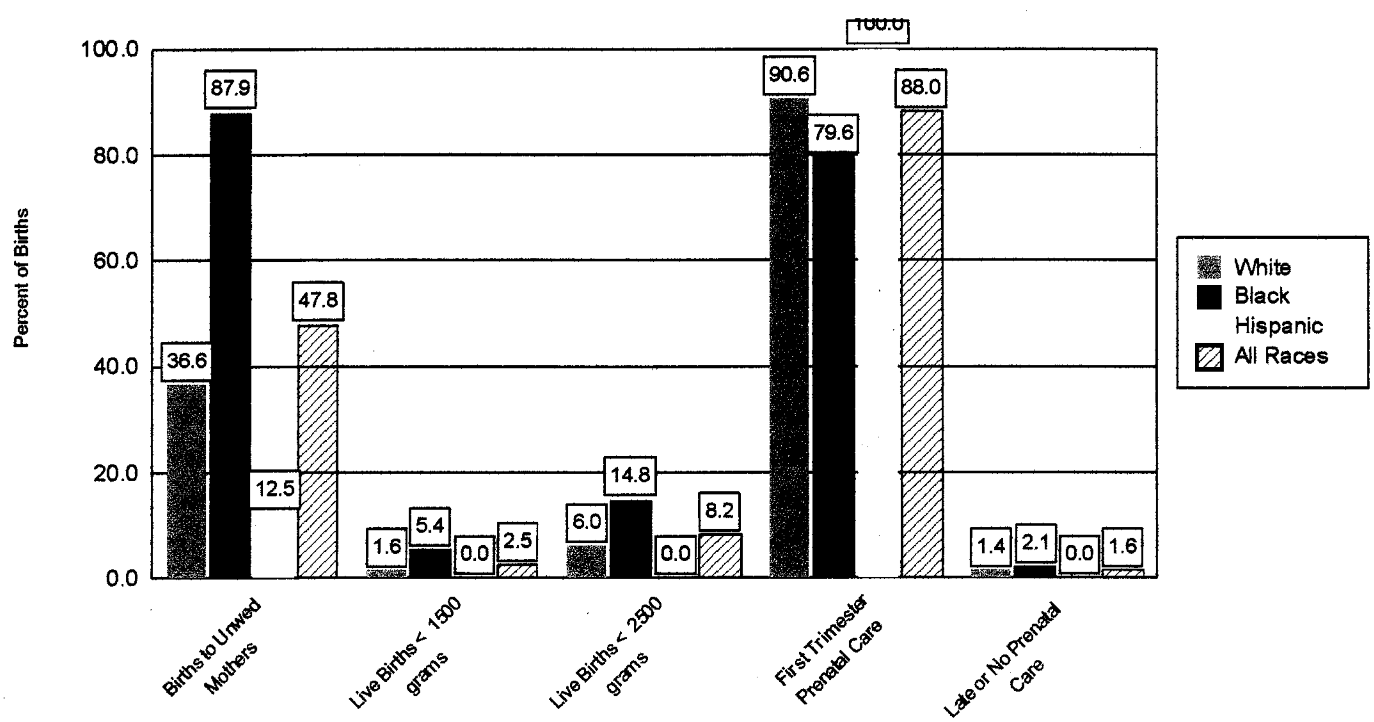
Data Source: Florida Department of Health
*Hispanic data not available after 1999
**Non-Hispanic

Important note regarding prenatal care data
Starting in 2004, trimester prenatal care began is calculated as the time elasped from the date of the last menstrual period to the date of the first prenatal care visit. Prior to 2004, these data were obtained by direct question that noted the trimester the mother began prental care. Consequently, these data are not comparable to that from prior years. Births with unknown information as to when prenatal care began are excluded from the denominator.

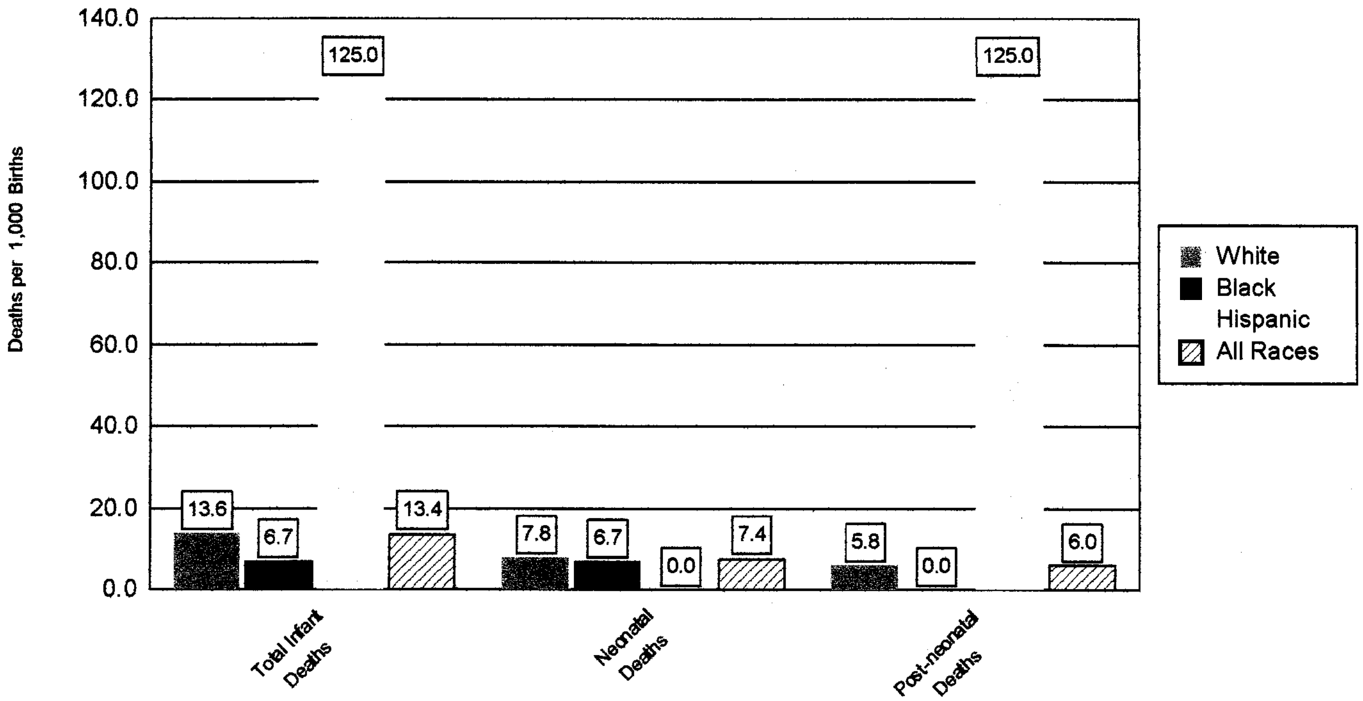
Births Per 1,000 Women By Age and Race of Mother, County, 2002-2004



Percent of Births by Marital Status, Birth Weight and Prenatal Care, County, 2002-2004



Infant Deaths per 1,000 Live Births, County, 2002-2004



Behavioral Risk Factors

	COUNTY 2002			STATE 2002	
	Percent	95% CI (+/-)	Quartile	State Percent	95% CI (+/-)
Alcohol and Tobacco Use					
Adults who currently smoke	31.2	5.1	4	22.2	1.1
Adults who engage in heavy or binge drinking	10.6	3.1	2	14.1	1.0
Adults who have ever quit smoking in last 12 months	56.6	10.6	3	55.3	2.6
Asthma	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have ever been told by a doctor or health professional that they have asthma	10.8	3.1	2	10.7	0.8
Adults who still have asthma (of those who have ever had asthma)	78.8	11.9	4	60.4	4.0
Colorectal Cancer Screening	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults over 50 who have ever had a blood stool test	42.8	6.8	2	44.4	1.7
Adults over 50 who have ever had a sigmoidoscopy	47.7	6.8	1	52.6	1.8
Adults over 50 who have had a blood stool test in past 2 years	29.3	6.2	2	33.5	1.6
Diabetes	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been told by a doctor that they have diabetes	7.8	2.5	2	8.2	0.6
Health Care Coverage & Access	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who were unable to get medical care in last 12 months	11.8	3.3	4	8.7	1.0
Adults with no health care coverage	28.0	5.3	4	18.7	1.0
Adults with no personal health care providers	24.6	5.0	3	23.9	1.2
Health Status	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults mostly sitting/standing at job	51.5	8.8	1	62.8	1.7
Adults with health status "Fair" or "Poor"	23.6	4.2	3	16.7	1.0
High Cholesterol	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been told by a doctor or other health professional that their blood cholesterol is high	39.7	5.8	4	35.2	1.3
Adults who have ever had their blood cholesterol checked	77.8	4.9	1	83.1	1.1
Adults who have had their cholesterol checked in last 2 years (if they have ever been checked)	89.7	3.6	2	91.8	0.7
HIV/AIDS	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults under 65 who have ever been tested for HIV	43.5	6.4	2	47.7	1.6
Adults under 65 who have had HIV test within past year (for those who have been tested)	89.5	3.8	4	86.7	1.0
Adults whose doctor has talked to them about preventing STDs through condom use.	16.1	4.3	3	16.3	1.6

Hypertension	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults now taking HBP medicine (if they have HBP)	81.3	6.7	3	76.0	2.0
Adults who have been told by a doctor or other health professional that they have high blood pressure	29.7	4.6	2	27.7	1.1
Mammogram & Pap Smears	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adult women who have ever had a pap smear test	96.1	3.2	3	93.5	1.0
Adult women who have had a pap smear test in past 2 years	72.3	10.6	1	82.2	1.5
Women over 40 who have had a mammogram within past 2 years (for those who have had a mammogram)	70.7	6.9	1	79.0	1.5
Nutrition	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who consume < 5 fruits and vegetables a day	77.2	4.7	3	74.3	1.2
Adults who have been advised by a doctor, nurse, or other health professional to eat fewer high fat or cholesterol foods	18.6	3.9	2	21.0	1.1
Adults who have been advised by a doctor, nurse, or other health professional to eat more fruits and vegetables	25.1	4.4	2	27.9	1.2
Oral Health	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have had their teeth cleaned within past year	56.0	5.9	1	70.5	1.3
Adults who visited a dentist within past year	56.1	5.4	1	70.2	1.4
Adults with no teeth removed	32.0	5.3	1	46.7	1.3
Physical Activity	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been advised by a doctor, nurse, or other health professional to be more physically active	25.2	4.5	2	28.0	1.3
Adults with no leisure time physical activity	36.8	5.5	4	26.4	1.2
Adults with no regular moderate physical activity	54.2	5.5	2	55.1	1.3
Adults with no regular vigorous physical activity	80.6	4.1	4	75.6	1.2
Pneumonia/Influenza	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have ever had a pneumonia shot	21.5	4.3	2	22.7	0.9
Adults who have received a flu shot at CHD	5.9	2.4	4	1.2	0.2
Adults who have received a flu shot within last 12 months	24.0	4.3	2	26.2	1.0
Overweight/Obesity	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who are obese (BMI >= 30)	30.4	4.7	4	22.3	1.0
Adults who are overweight (BMI >= 25 to < 30)	35.0	5.7	3	35.1	1.2
Adults who have received advice from a doctor or other health professional about their weight in past 12 months	23.5	5.2	4	21.1	1.1

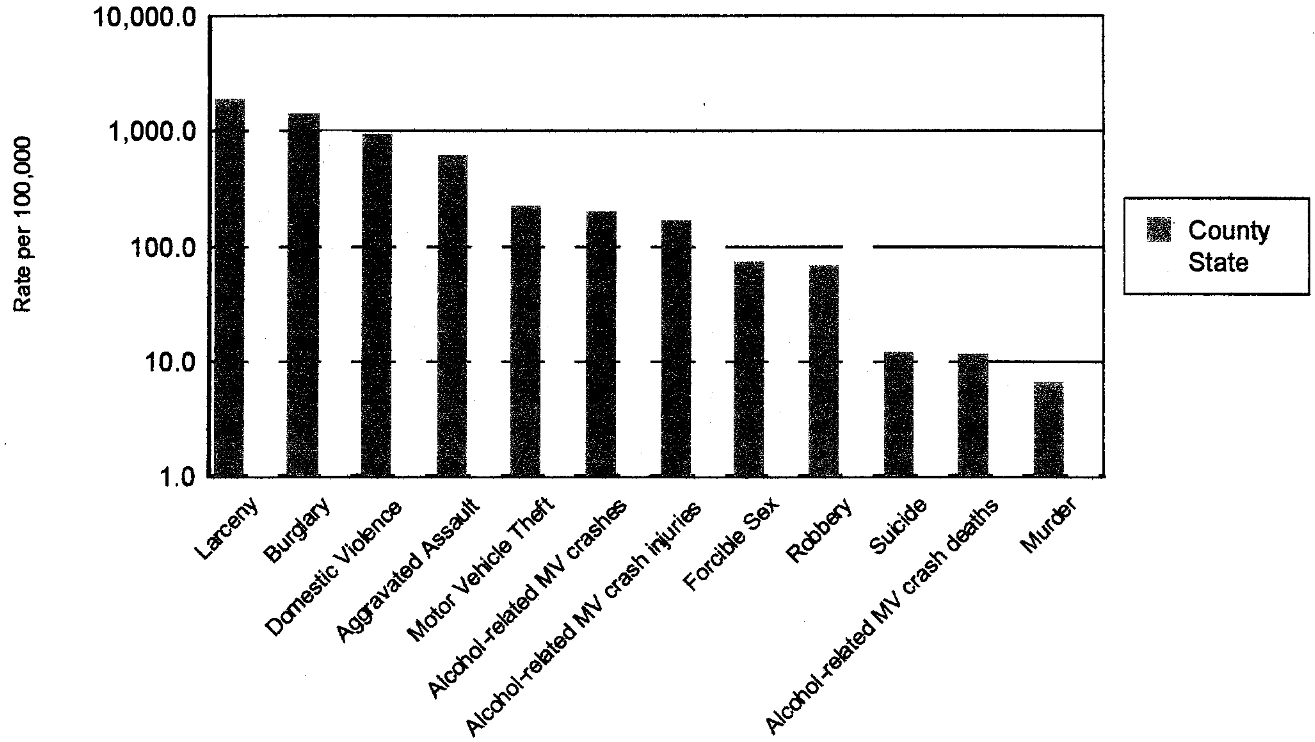
Data source: 2002 Behavioral Risk Factors Surveillance Telephone Survey conducted by the Florida Department of Health, Bureau of Epidemiology.
Overall, 34,551 adults were randomly selected and interviewed for the survey; about 500 adults were surveyed in each county.
95% CI = 95% Confidence Interval

Social & Mental Health

	COUNTY			STATE
	3-Yr Average Number of Events 2002-04	3-Yr Rate Per 100,000 2002-04	County Quartile	3-Yr Rate Per 100,000 2002-04
Crime and Domestic Violence				
Larceny	387.0	1,883.2	2	2,901.5
Burglary	293.3	1,427.4	4	994.9
Total Domestic Violence Offenses	190.7	927.8	4	702.8
Aggravated Assault	129.7	631.0	4	467.8
Motor Vehicle Theft	46.3	225.5	3	469.1
Forcible Sex Offenses	15.0	73.0	3	73.7
Robbery	14.0	68.1	2	182.2
Murder	1.3	6.5	4	5.4
Alcohol-related Motor Vehicle Crashes				
Alcohol-related Motor Vehicle Traffic Crashes	40.7	197.9	4	130.5
Alcohol-related Motor Vehicle Traffic Crash Injuries	34.3	167.1	4	100.5
Alcohol-related Motor Vehicle Traffic Crash Deaths	2.3	11.4	3	6.2
Suicide				
Age-Adjusted Suicide 3-Year Death Rate	2.7	12.2	2	12.9

Data sources: FDLE Uniform Crime Report, DHSMV "Traffic Crash Facts", Florida Office of Vital Statistics.

Social & Mental Health Indicators, 2002-2004



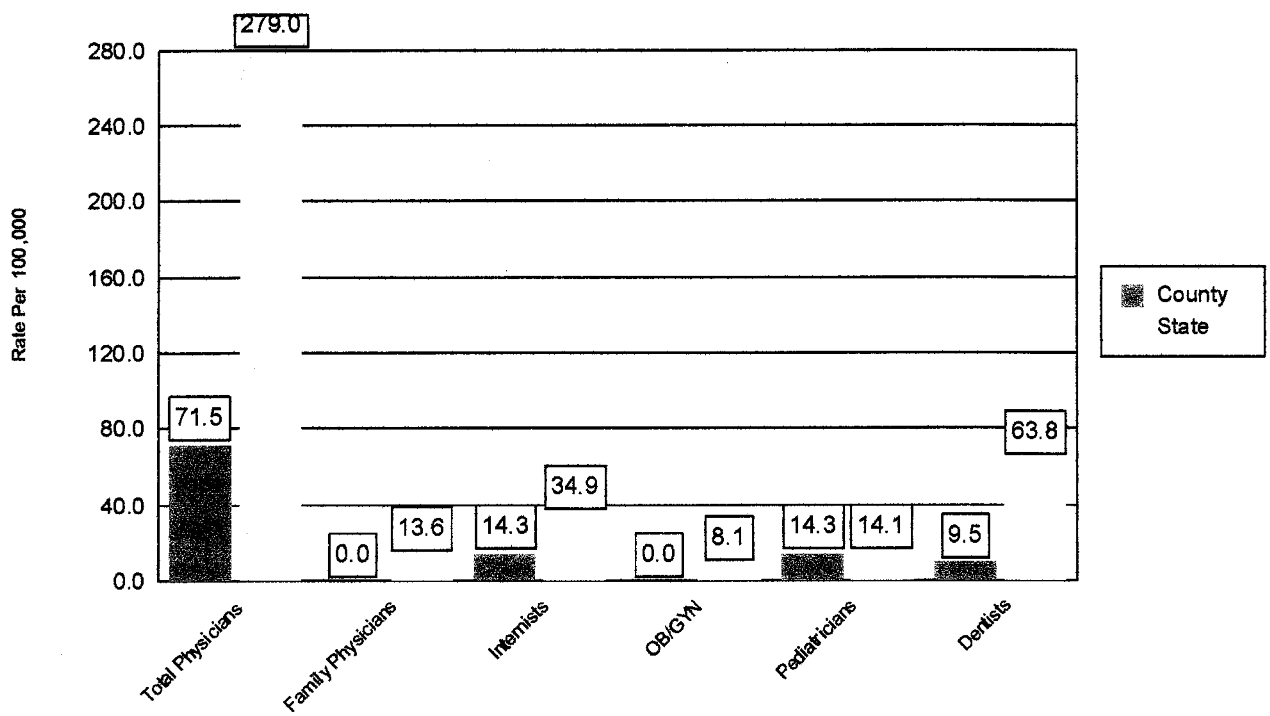
Health Resources Availability

	COUNTY			STATE
	Number 2004	Rate per 100,000 2004	Quartile 2004	Rate per 100,000 2004
Providers*				
Total Licensed Dentists	2	9.5	1	63.8
Total Licensed Physicians	15	71.5	2	279.0
Total Licensed Family Physicians	0	0.0	1	13.6
Total Licensed Internists	3	14.3	2	34.9
Total Licensed OB/GYN	0	0.0	1	8.1
Total Licensed Pediatricians	3	14.3	4	14.1
Facilities				
Total Hospital Beds	48	228.8	2	323.5
Total Acute Care Beds	48	228.8	3	269.0
Total Specialty Beds	0	0.0	1	54.5
Total Nursing Home Beds	120	572.1	3	472.9
County Health Department				
County Public Health Department Full-Time Employees	35	168.0	4	60.8
County Public Health Department Expenditures	1,841,695	8,779,594.0	4	3,646,778.9

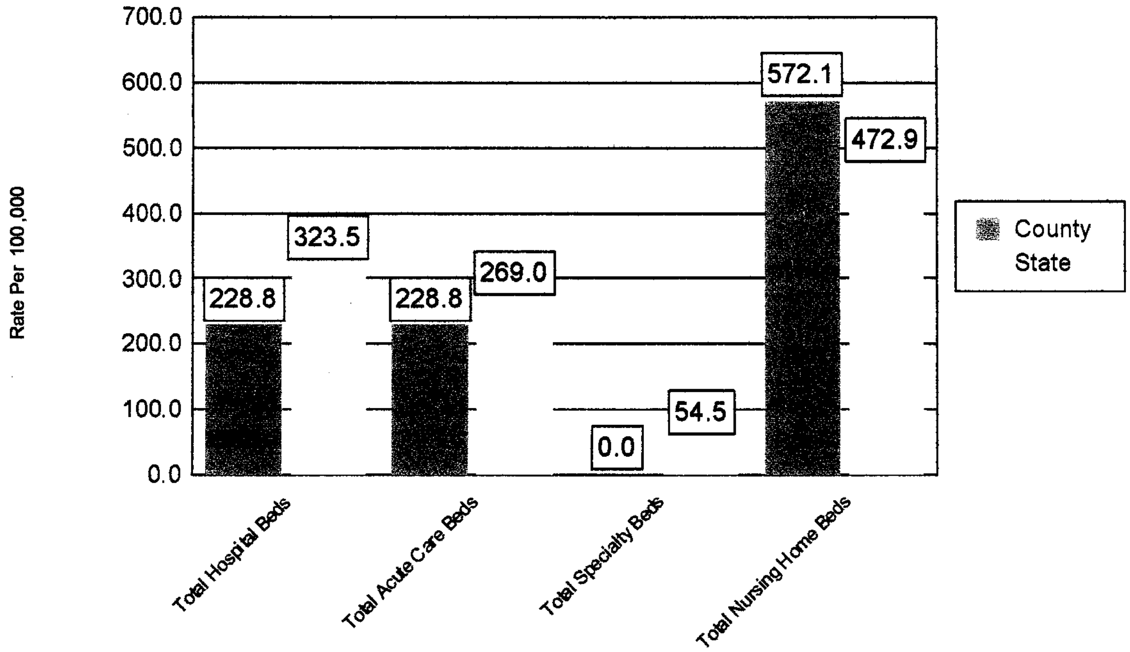
Data Sources: Division of Medical Quality Assurance and Office of Planning, Evaluation and Data Analysis, Florida Dept. of Health; Florida Agency for Health Care Administration

*Data for providers are for a fiscal year, not a calendar year

Health Providers per 100,000, County and State, 2004



Health Care Facilities per 100,000, County and State, 2004



Statistical Information

Quartiles
Quartiles allow you to compare data from one county to data from all other counties in the state. Quartiles are calculated by ordering an indicator from lowest to highest value by county and then dividing it into 4 equal-size groups. Ones (1) always represent lower numbers while fours (4) always represent higher numbers.

It is important when analyzing this data that you consider each indicator and quartile number separately. In some cases a high quartile number (4) may be a positive indicator (i.e. median income) and in others it may be a negative indicator (i.e. infant mortality).

Confidence Intervals
A confidence interval is a range around a measurement that conveys how precise the measurement is. For most chronic disease and injury programs, the measurement in question is a proportion or a rate (the percent of Floridians who exercise regularly or the lung cancer incidence rate). Confidence intervals are often seen on the news when the results of polls are released. This is an example from the Associate Press in October 1996:

"The latest ABC News-Washington Post poll showed 56 percent favored Clinton while 39 percent would vote for Dole. The ABC News-Washington Post telephone poll of 1,014 adults was conducted March 8-10 and had a margin of error of plus or minus 3.5 percentage points. (Emphasis added)."

Although it is not stated, the margin of error presented here was probably the 95 percent confidence interval. In the simplest terms, this means that there is a 95 percent chance that between 35.5 percent and 42.5 percent of voters would vote for Bob Dole (39 percent plus or minus 3.5 percent). Conversely, there is a 5 percent chance that fewer than 35.5 percent of voters or more than 42.5 percent of voters would vote for Bob Dole.

The precise statistical definition of the 95 percent confidence interval is that if the telephone poll were conducted 100 times, 95 times the percent of respondents favoring Bob Dole would be within the calculated confidence intervals and five times the percent favoring Dole would be either higher or lower than the range of the confidence intervals.

What Does a Confidence Interval Tell You?
The confidence interval tells you more than just the possible range around the estimate. It also tells you about how stable the estimate is. A stable estimate is one that would be close to the same value if the survey were repeated. An unstable estimate is one that would vary from one sample to another. Wider confidence intervals in relation to the estimate itself indicate instability. For example, if 5 percent of voters are undecided, but the margin of error of your survey is plus or minus 3.5 percent, then the estimate is relatively unstable. In one sample of voters, you might have 2 percent say they are undecided, and in the next sample, 8 percent are undecided. This is four times more undecided voters, but both values are still within the margin of error of the initial survey sample.

Age-adjusted Death Rates (AADR)
An AADR is a mortality or death rate that has been adjusted for age distribution. AADRs are calculated using the U. S. standard million population for 2000 with age groups under 1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85 plus.

Crude Rates (Rates per population)
These indicators will provide the rate of an indicator per total population. The most common of these is the rate per 100,000 population. this is calculated by using the following formula:

number of events / (total population/100,000)

where total population is the population of a given area (i.e. a county). You can also calculate rates per 10,000 or per 1,000 using this formula.

3-Year Rates
In this document all rates are 3-year rates unless otherwise noted. These are calculated using the above formula but using the three-year average number of events and average total population. This allows for analysis of counties with small populations and highly unstable single-year rates.

Appendix Two:
Prevalence of Major Behavioral Risk Factors in Taylor County

Prevalence of Major Behavioral Risk Factors in

Taylor County

A Report from the 2002 County Behavior Risk Factor Surveillance System (BRFSS) Survey

Bureau of Epidemiology
Florida Department of Health

The 2002 County BRFSS survey was conducted in September 2002 through January 2003. In Taylor County, 507 adults were randomly selected and interviewed for the survey. The purpose of this survey was to estimate the prevalence of personal health behaviors that contribute to morbidity and mortality among adults in Florida. This report presents the survey data on a variety of issues related to health status, health care access, life style, chronic illnesses, and disease prevention practice in the Taylor County. These data can be used to: (1) determine priority health issues and identify populations at highest risk for illness, disability, and death; (2) plan and evaluate prevention programs; (3) educate the community and policy makers about disease prevention; and (4) support community policies that promote health and prevent disease. The data listed in this report include the prevalence for all adults and for subpopulations as well.

Because the BRFSS is a random survey and all estimates of prevalence are subject to random sample errors, we include 95% confidence intervals (CI) with each prevalence (%) in the tables. Prevalence is excluded from the tables for any subpopulation with a sample size less than 30, which would yield statistically unreliable estimates.

Population Size and Health Status

		Population Size*		Health Status is Fair or Poor			Mostly sitting/standing at job		
		County	State	%	CI		%	CI	
All		19,256	15,982,378	23.6	19.4	27.8	51.5	42.7	60.2
Sex	Men	51.1%	48.8%	22.5	16.3	28.7	43.9	31.7	56.1
	Women	48.9%	51.2%	24.8	19.1	30.5	62.9	48.7	77.2
Race/ethnicity	NH White	76.9%	65.4%	20.9	16.5	25.3	48.8	39.7	57.8
	NH Black	18.9%	14.2%	32.3	16.0	48.6	.	.	.
	Hispanic	1.5%	16.8%	.	.	.	.	.	.
Race/ethnicity-Sex	NH White men	38.6%	31.9%	18.7	12.3	25.2	39.1	27.7	50.4
	NH White women	38.4%	33.6%	23.0	17.0	29.0	61.3	45.0	77.7
	NH Black men	10.2%	6.8%	.	.	.	.	.	.
	NH Black women	8.7%	7.4%	.	.	.	.	.	.
	Hispanic men	1.0%	8.4%	.	.	.	.	.	.
	Hispanic women	0.6%	8.4%	.	.	.	.	.	.
Age	18-44	36.6%	36.9%	14.1	8.2	19.9	47.3	34.2	60.4
	45-64	24.8%	22.7%	29.2	22.3	36.1	56.6	46.0	67.1
	65 and older	14.1%	17.6%	35.2	25.3	45.0	.	.	.
Marital Status	Never married	22.3%	22.5%	12.2	2.9	21.6	.	.	.
	Married/ living together as a couple	53.4%	53.7%	22.1	16.6	27.6	57.3	46.9	67.7
	Divorced/ widowed/separated	24.3%	23.8%	31.9	23.2	40.7	41.2	23.3	59.1
Education	0-11 years	30.0%	20.1%	54.5	42.7	66.2	.	.	.
	HS Grad/GED	40.9%	28.7%	16.7	11.2	22.2	49.6	35.8	63.3
	1 or more years of college	29.1%	51.1%	12.5	7.1	17.8	60.9	50.0	71.8
Employment	Employed for wages	49.1%	54.9%	10.3	6.0	14.5	51.5	42.7	60.2
Household Income	$24,999 or less	41.9%	30.8%	32.2	23.9	40.5	47.7	27.4	68.0
	$25,000 – 49,999	32.3%	31.6%	15.7	8.8	22.7	45.4	32.9	58.0
	$50,000 or more	25.8%	37.6%	11.5	4.1	18.8	66.1	52.6	79.5

*Per Census Bureau calculations, the following demographic categories are limited to specific age groups: Marital Status, >=15 years old; Education, >=25 years old; Employment, >=16 years old.

Risk Factors: Physical Activity

Related Healthy People 2010 Objective(s) 22-1, 22-2, 22-3		No leisure time physical activity			No regular moderate physical activity [1]			No regular vigorous physical activity [2]		
		%	CI		%	CI		%	CI	
All		36.8	31.3	42.3	54.2	48.7	59.7	80.6	76.5	84.6
Sex	Men	41.3	32.8	49.7	47.6	39.5	55.8	75.8	69.3	82.2
	Women	31.9	25.6	38.2	61.5	54.7	68.2	85.9	81.3	90.4
Race/ethnicity	NH White	34.2	28.7	39.6	53.6	47.9	59.4	78.3	73.7	82.9
	NH Black	55.1	35.6	74.5	57.8	35.1	80.5	90.8	81.8	99.8
	Hispanic	.			.			.		
Race/ethnicity-Sex	NH White men	39.3	30.8	47.7	46.6	38.2	55.0	72.7	65.2	80.1
	NH White women	29.2	22.6	35.9	60.5	53.1	68.0	83.8	78.5	89.1
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	36.3	26.5	46.0	47.6	37.9	57.3	77.2	70.1	84.4
	45-64	34.9	27.5	42.4	58.1	50.4	65.7	83.7	78.1	89.4
	65 and older	39.5	29.1	49.9	60.7	50.5	71.0	81.5	73.3	89.8
Marital Status	Never married	25.3	13.0	37.6	48.8	32.3	65.3	77.6	63.0	92.3
	Married/ living together as a couple	39.0	31.7	46.4	49.9	42.8	57.0	77.8	72.4	83.2
	Divorced/ widowed/separated	36.3	26.6	45.9	66.8	57.8	75.8	88.1	82.6	93.7
Education	0-11 years	42.4	31.0	53.9	59.9	48.1	71.6	84.0	74.9	93.0
	HS Grad/GED	42.9	34.0	51.8	55.5	46.5	64.4	80.4	74.3	86.6
	1 or more years of college	22.3	15.4	29.2	48.1	39.9	56.3	77.7	70.9	84.4
Employment	Employed for wages	33.7	25.1	42.3	51.2	42.6	59.8	77.3	71.0	83.6
Household Income	$24,999 or less	49.2	39.1	59.3	59.7	49.3	70.0	88.9	83.7	94.1
	$25,000 – 49,999	28.2	19.6	36.9	53.4	43.8	62.9	77.2	68.9	85.6
	$50,000 or more	19.4	10.2	28.6	41.0	29.8	52.1	71.3	61.1	81.6

Risk Factors: Overweight and Nutrition

Related Healthy People 2010 Objective(s) 19-1, 19-2, 19-5, 19-6		Overweight [3]			Obese [4]			Less than 5-A-Day [5]		
		%	CI		%	CI		%	CI	
All		35.0	29.3	40.6	30.4	25.7	35.2	77.2	72.5	82.0
Sex	Men	39.3	31.0	47.7	30.6	23.5	37.6	83.0	77.4	88.6
	Women	30.2	22.7	37.6	30.3	24.1	36.5	70.9	63.4	78.3
Race/ethnicity	NH White	34.1	28.3	39.9	31.8	26.6	37.1	76.3	70.8	81.8
	NH Black	43.0	20.9	65.0	25.7	12.0	39.5	83.8	73.0	94.7
	Hispanic	.			.			.	.	
Race/ethnicity-Sex	NH White men	38.6	30.3	46.8	32.5	24.5	40.5	81.6	75.0	88.2
	NH White women	29.8	21.4	38.1	31.2	24.2	38.1	71.1	62.6	79.5
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	33.7	23.3	44.2	28.1	20.2	36.0	79.8	71.1	88.5
	45-64	33.0	25.7	40.2	38.2	30.7	45.7	76.3	69.8	82.9
	65 and older	39.3	28.9	49.7	23.0	14.8	31.2	72.4	63.6	81.3
Marital Status	Never married	18.1	6.3	29.9	20.1	8.7	31.5	73.5	59.6	87.5
	Married/ living together as a couple	36.0	28.8	43.3	34.5	28.0	40.9	79.8	74.6	84.9
	Divorced/ widowed/separated	39.7	28.3	51.0	25.5	17.6	33.4	71.8	59.9	83.7
Education	0-11 years	19.8	11.5	28.0	35.4	24.2	46.6	75.4	65.9	84.8
	HS Grad/GED	43.7	34.5	52.9	29.0	21.8	36.1	82.6	74.8	90.4
	1 or more years of college	31.3	23.5	39.1	29.3	22.0	36.7	68.9	61.2	76.5
Employment	Employed for wages	41.3	32.3	50.3	27.5	20.7	34.3	79.6	71.9	87.2
Household Income	$24,999 or less	30.2	18.8	41.6	37.3	28.3	46.3	76.3	66.8	85.7
	$25,000 – 49,999	42.5	33.0	52.1	23.0	15.0	31.0	80.9	73.7	88.1
	$50,000 or more	36.7	25.9	47.5	27.6	17.4	37.9	74.5	64.6	84.4

[illegible] 27-1b, 27-4, 26-11c		Current smoker [illegible]			[illegible] past 12 months			[illegible] drinking		
		%	CI		%	CI		%	CI	
All		31.2	26.1	36.4	56.6	46.0	67.3	12.2	8.8	15.6
Sex	Men	29.3	22.3	36.4	62.4	49.1	75.7	16.9	11.2	22.7
	Women	33.3	25.8	40.9	51.1	35.3	66.9	6.9	3.6	10.3
Race/ethnicity	NH White	30.2	24.4	35.9	56.6	43.9	69.4	11.9	8.1	15.7
	NH Black	27.8	11.9	43.6	.	.		13.1	2.5	23.7
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	26.8	19.3	34.3	62.6	46.4	78.8	17.6	10.9	24.4
	NH White women	33.5	24.9	42.0	52.0	33.8	70.1	6.3	3.0	9.6
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	40.8	31.3	50.3	54.9	39.0	70.9	19.0	12.3	25.6
	45-64	29.8	22.6	37.0	59.1	44.9	73.3	7.5	3.9	11.1
	65 and older	14.0	5.9	22.0	.	.		2.8	0.0	5.6
Marital Status	Never married	45.0	29.0	61.0	.	.		32.4	17.0	47.8
	Married/ living together as a couple	27.0	21.2	32.9	58.9	46.6	71.3	7.6	3.7	11.4
	Divorced/ widowed/separated	35.0	23.1	46.8	56.4	29.9	82.8	14.4	8.1	20.7
Education	0-11 years	47.0	35.3	58.6	61.4	44.5	78.4	11.4	3.7	19.1
	HS Grad/GED	27.7	19.4	36.0	50.2	31.3	69.2	13.3	7.8	18.8
	1 or more years of college	28.1	20.8	35.4	61.5	46.1	77.0	11.5	6.3	16.6
Employment	Employed for wages	36.0	27.8	44.3	54.3	39.1	69.5	16.1	10.5	21.8
Household Income	$24,999 or less	38.2	28.3	48.2	58.6	40.4	76.8	13.4	7.5	19.3
	$25,000 – 49,999	33.0	24.1	41.9	62.3	46.0	78.6	12.4	6.0	18.9
	$50,000 or more	20.2	11.2	29.1	.	.		10.1	3.3	16.9

[illegible] 1-4, 1-5		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		28.0	22.7	33.4	24.6	19.6	29.6	11.8	8.5	15.1
Sex	Men	32.0	23.3	40.6	29.7	22.6	36.8	12.0	7.0	17.1
	Women	23.8	18.1	29.4	19.0	11.5	26.4	11.6	7.2	15.9
Race/ethnicity	NH White	24.9	20.0	29.8	23.9	18.2	29.6	11.3	7.7	14.9
	NH Black	45.3	23.0	67.6	27.3	12.7	41.8	13.1	2.5	23.7
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	26.0	18.3	33.8	28.8	21.0	36.6	10.3	4.9	15.7
	NH White women	23.8	17.7	30.0	19.2	10.6	27.7	12.2	7.4	17.0
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	42.3	32.5	52.1	33.5	24.0	43.0	17.0	10.7	23.3
	45-64	23.5	17.1	29.8	20.8	14.7	27.0	10.5	5.6	15.4
	65 and older	4.9	0.7	9.1	12.6	5.8	19.4	3.2	0.0	7.4
Marital Status	Never married	62.8	47.9	77.8	49.6	33.4	65.8	22.5	7.9	37.1
	Married/ living together as a couple	23.9	16.7	31.1	19.1	13.9	24.3	9.9	5.9	13.9
	Divorced/ widowed/separated	22.1	14.6	29.6	28.0	15.9	40.1	12.5	6.6	18.4
Education	0-11 years	32.2	20.9	43.6	25.9	15.4	36.5	19.8	9.9	29.6
	HS Grad/GED	31.9	23.0	40.8	26.0	17.7	34.3	9.6	5.3	13.8
	1 or more years of college	18.5	12.2	24.7	20.0	13.5	26.6	8.7	3.8	13.5
Employment	Employed for wages	31.8	23.1	40.4	28.2	20.0	36.4	10.0	5.7	14.3
Household Income	$24,999 or less	40.4	30.1	50.7	29.4	19.7	39.2	20.8	13.8	27.8
	$25,000 – 49,999	18.7	11.4	26.0	18.9	11.6	26.2	8.3	2.7	13.9
	$50,000 or more	10.6	2.7	18.5	12.8	4.5	21.1	.	.	

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		56.1	50.7	61.4	32.0	26.7	37.4	56.0	50.1	61.9
Sex	Men	53.0	44.9	61.2	35.0	27.3	42.6	54.8	45.9	63.6
	Women	59.4	52.5	66.2	28.7	21.0	36.3	57.4	49.6	65.1
Race/ethnicity	NH White	55.5	49.7	61.2	35.3	29.3	41.3	54.5	48.3	60.8
	NH Black	56.7	37.5	75.9	15.6	3.1	28.1	60.9	39.4	82.4
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	52.5	43.9	61.1	39.3	30.8	47.7	51.2	42.0	60.3
	NH White women	58.4	50.8	66.0	31.4	22.6	40.1	58.0	49.5	66.4
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	56.5	47.1	65.8	47.8	38.1	57.6	52.8	42.9	62.7
	45-64	58.0	50.3	65.6	21.4	14.7	28.1	58.3	50.0	66.6
	65 and older	50.2	39.7	60.7	12.4	6.2	18.7	58.4	45.4	71.5
Marital Status	Never married	49.7	33.2	66.2	52.0	35.8	68.2	39.5	22.8	56.3
	Married/ living together as a couple	59.8	53.0	66.6	30.7	24.5	37.0	59.0	51.7	66.4
	Divorced/ widowed/separated	48.5	37.6	59.4	26.5	13.5	39.4	54.4	42.0	66.8
Education	0-11 years	40.9	29.1	52.7	18.0	7.9	28.0	48.5	33.6	63.3
	HS Grad/GED	53.9	45.2	62.5	32.3	23.6	41.0	51.1	41.4	60.7
	1 or more years of college	70.3	62.8	77.7	40.2	32.0	48.4	67.0	58.9	75.1
Employment	Employed for wages	59.9	52.0	67.8	41.5	33.0	50.1	58.0	49.6	66.4
Household Income	$24,999 or less	46.3	35.7	56.9	28.8	18.7	38.9	46.1	33.7	58.4
	$25,000 – 49,999	56.1	46.6	65.6	26.0	17.6	34.5	56.6	46.4	66.9
	$50,000 or more	77.6	68.0	87.2	51.4	39.8	63.0	74.8	64.9	84.8

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		29.7	25.1	34.3	81.3	74.6	88.0	23.5	18.3	28.7
Sex	Men	27.0	20.4	33.6	75.8	64.4	87.1	24.5	16.0	32.9
	Women	32.7	26.4	39.0	86.3	78.6	94.0	22.4	16.7	28.1
Race/ethnicity	NH White	26.8	22.0	31.5	82.0	74.3	89.7	21.7	17.1	26.3
	NH Black	39.9	21.7	58.1	.	.		38.8	15.4	62.2
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	25.1	18.0	32.2	78.9	65.9	91.9	21.1	14.1	28.0
	NH White women	28.4	22.0	34.8	84.7	75.3	94.0	22.3	16.1	28.5
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	11.7	6.7	16.6	.	.		21.8	12.2	31.5
	45-64	37.4	29.9	44.8	85.6	77.1	94.2	26.1	18.9	33.3
	65 and older	56.8	46.7	67.0	94.1	87.2	100.0	22.6	13.9	31.3
Marital Status	Never married	17.0	5.5	28.4	.	.		13.4	4.0	22.8
	Married/ living together as a couple	28.5	22.6	34.4	87.5	80.2	94.9	25.8	18.7	33.0
	Divorced/ widowed/separated	38.9	29.4	48.3	78.1	66.8	89.5	22.4	13.8	31.0
Education	0-11 years	36.8	26.0	47.6	80.2	65.1	95.3	30.9	19.6	42.2
	HS Grad/GED	27.1	20.3	33.9	85.7	77.0	94.4	25.7	16.7	34.6
	1 or more years of college	28.5	21.2	35.8	74.2	60.2	88.2	15.5	10.1	20.9
Employment	Employed for wages	18.8	13.2	24.3	70.6	56.7	84.5	21.0	12.6	29.5
Household Income	$24,999 or less	28.3	20.7	35.9	81.0	70.0	91.9	28.5	18.0	39.0
	$25,000 – 49,999	27.7	19.1	36.3	81.7	67.4	95.9	19.9	12.0	27.7
	$50,000 or more	30.0	19.8	40.1	89.7	78.2	100.0	25.3	15.5	35.0

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		77.8	72.9	82.7	89.7	86.1	93.2	39.7	33.9	45.4
Sex	Men	79.6	73.4	85.9	88.4	83.0	93.9	42.2	33.1	51.2
	Women	75.8	68.2	83.4	91.1	86.8	95.5	36.8	29.8	43.7
Race/ethnicity	NH White	77.9	72.4	83.5	88.7	84.6	92.8	38.4	32.5	44.4
	NH Black	85.9	75.6	96.2	95.1	89.7	100.0	41.7	20.3	63.2
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	82.0	75.4	88.6	87.6	81.3	93.9	42.5	33.2	51.8
	NH White women	74.0	65.3	82.6	89.9	84.7	95.2	34.1	26.7	41.4
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	65.5	55.9	75.1	84.2	76.5	92.0	25.0	15.8	34.3
	45-64	85.8	80.8	90.8	94.1	90.4	97.7	45.2	36.7	53.8
	65 and older	88.8	81.7	95.9	90.2	82.8	97.5	54.0	43.3	64.8
Marital Status	Never married	62.6	46.8	78.5	76.2	56.3	96.0	27.3	9.7	44.8
	Married/ living together as a couple	81.3	76.0	86.6	90.5	86.2	94.7	38.6	31.1	46.0
	Divorced/ widowed/separated	75.5	63.4	87.6	92.6	87.5	97.7	47.8	38.0	57.7
Education	0-11 years	82.8	75.1	90.5	90.8	82.8	98.8	49.4	36.2	62.6
	HS Grad/GED	75.3	66.9	83.7	89.3	83.8	94.7	35.8	27.1	44.4
	1 or more years of college	80.0	73.2	86.7	89.4	83.6	95.2	37.2	28.3	46.0
Employment	Employed for wages	72.5	64.3	80.8	89.5	84.4	94.6	31.9	23.4	40.4
Household Income	$24,999 or less	72.0	62.4	81.6	90.1	83.9	96.2	41.3	30.5	52.2
	$25,000 – 49,999	87.4	81.0	93.7	89.4	82.7	96.1	36.0	25.9	46.1
	$50,000 or more	84.9	76.1	93.7	90.5	83.7	97.3	38.3	26.4	50.3

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		10.8	7.7	13.9	78.8	66.9	90.6	7.8	5.3	10.3
Sex	Men	9.3	4.8	13.8	.	.	.	7.8	4.2	11.5
	Women	12.5	8.2	16.7	78.3	62.9	93.7	7.7	4.3	11.1
Race/ethnicity	NH White	9.8	6.6	13.1	80.6	67.2	94.0	7.0	4.4	9.6
	NH Black	7.1	0.1	14.0	.	.	.	11.2	1.3	21.1
	Hispanic	.	.		.	.		.	.	
Race/ethnicity-Sex	NH White men	7.2	2.7	11.8	.	.	.	7.2	3.3	11.1
	NH White women	12.3	7.7	17.0	81.8	66.1	97.4	6.9	3.5	10.3
	NH Black men	.	.		.	.		.	.	
	NH Black women	.	.		.	.		.	.	
	Hispanic men	.	.		.	.		.	.	
	Hispanic women	.	.		.	.		.	.	
Age	18-44	9.3	4.3	14.3	.	.	.	2.1	0.0	4.3
	45-64	14.7	9.2	20.2	77.1	59.9	94.4	11.0	6.2	15.8
	65 and older	7.8	2.7	12.8	.	.	.	14.8	7.5	22.1
Marital Status	Never married	11.1	0.0	22.6	.	.	.	1.2	0.0	3.8
	Married/ living together as a couple	11.1	7.0	15.1	84.0	69.7	98.4	8.2	4.8	11.6
	Divorced/ widowed/separated	10.2	5.2	15.3	.	.	.	9.7	4.8	14.6
Education	0-11 years	16.9	8.1	25.6	.	.	.	10.5	4.6	16.4
	HS Grad/GED	8.9	4.7	13.0	.	.	.	7.7	3.8	11.5
	1 or more years of college	8.7	4.4	13.1	.	.	.	5.2	1.9	8.6
Employment	Employed for wages	8.7	4.4	12.9	.	.	.	4.4	1.5	7.2
Household Income	$24,999 or less	15.6	9.7	21.4	76.4	60.5	92.3	7.4	3.6	11.3
	$25,000 – 49,999	4.9	0.4	9.4	.	.	.	8.7	3.6	13.8
	$50,000 or more	11.1	3.1	19.1	.	.	.	5.9	0.8	11.1

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		18.6	14.7	22.5	25.1	20.7	29.6	25.2	20.7	29.6
Sex	Men	19.2	13.3	25.2	23.9	17.4	30.4	23.5	16.9	30.1
	Women	17.9	12.8	23.0	26.5	20.5	32.4	27.0	21.1	32.8
Race/ethnicity	NH White	19.6	15.2	24.0	24.1	19.4	28.9	23.5	18.9	28.2
	NH Black	15.3	3.2	27.3	32.5	15.0	49.9	33.9	15.8	51.9
	Hispanic	.	.	.	.	.	.	.	.	.
Race/ethnicity-Sex	NH White men	21.8	14.8	28.8	24.8	17.5	32.0	22.5	15.4	29.6
	NH White women	17.5	12.0	23.1	23.5	17.3	29.7	24.5	18.4	30.7
	NH Black men	.	.	.	.	.	.	.	.	.
	NH Black women	.	.	.	.	.	.	.	.	.
	Hispanic men	.	.	.	.	.	.	.	.	.
	Hispanic women	.	.	.	.	.	.	.	.	.
Age	18-44	13.7	8.0	19.4	22.2	15.2	29.3	19.4	12.8	26.0
	45-64	24.2	17.3	31.0	30.5	23.0	37.9	30.4	22.9	37.8
	65 and older	19.4	11.1	27.6	22.1	14.3	29.9	28.8	19.8	37.7
Marital Status	Never married	6.2	0.0	12.9	21.4	7.9	35.0	12.5	2.2	22.7
	Married/ living together as a couple	20.9	15.5	26.3	23.9	18.4	29.5	25.5	19.8	31.2
	Divorced/ widowed/separated	18.2	11.2	25.3	29.0	20.0	38.0	30.1	21.0	39.1
Education	0-11 years	20.4	11.1	29.6	33.5	22.1	44.9	28.9	17.7	40.1
	HS Grad/GED	19.9	13.7	26.2	23.6	17.0	30.1	22.9	16.6	29.3
	1 or more years of college	15.3	9.6	21.1	22.5	15.9	29.0	27.5	20.2	34.8
Employment	Employed for wages	18.7	12.9	24.5	21.7	15.6	27.7	22.2	16.0	28.3
Household Income	$24,999 or less	18.7	12.2	25.1	27.9	19.8	36.0	23.4	16.0	30.8
	$25,000 – 49,999	17.2	9.6	24.8	25.6	17.0	34.2	27.8	19.0	36.5
	$50,000 or more	26.1	16.1	36.1	24.1	14.9	33.3	27.3	17.4	37.2

[illegible]		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		24.0	19.7	28.2	5.9	3.5	8.4	21.5	17.2	25.8
Sex	Men	22.6	16.1	29.0	5.2	1.2	9.1	21.8	15.2	28.5
	Women	25.5	19.9	31.1	6.8	3.9	9.7	21.1	15.8	26.4
Race/ethnicity	NH White	24.1	19.4	28.7	5.9	3.4	8.5	20.3	15.8	24.8
	NH Black	29.3	13.1	45.4	5.0	0.0	15.0	24.7	9.0	40.5
	Hispanic	.	.	.	.	.	.	.	.	.
Race/ethnicity-Sex	NH White men	22.9	15.7	30.0	4.6	0.5	8.6	20.0	12.8	27.2
	NH White women	25.3	19.2	31.4	7.3	4.1	10.4	20.6	15.0	26.1
	NH Black men	.	.	.	.	.	.	.	.	.
	NH Black women	.	.	.	.	.	.	.	.	.
	Hispanic men	.	.	.	.	.	.	.	.	.
	Hispanic women	.	.	.	.	.	.	.	.	.
Age	18-44	10.2	5.3	15.2	1.3	0.0	3.5	13.3	7.2	19.3
	45-64	23.9	17.2	30.5	7.5	2.8	12.3	18.4	12.2	24.6
	65 and older	51.9	41.7	62.2	13.4	6.2	20.6	42.9	32.5	53.3
Marital Status	Never married	11.0	0.9	21.1	.	.	.	26.4	11.9	41.0
	Married/ living together as a couple	22.1	16.7	27.5	.	.	.	18.1	12.8	23.3
	Divorced/ widowed/separated	33.5	24.3	42.7	.	.	.	28.8	19.7	37.9
Education	0-11 years	34.4	23.2	45.5	9.6	1.2	18.0	30.9	20.2	41.6
	HS Grad/GED	19.2	13.3	25.2	4.9	1.8	8.1	20.4	13.7	27.0
	1 or more years of college	24.6	17.9	31.3	5.4	2.0	8.8	18.1	11.9	24.3
Employment	Employed for wages	15.2	10.0	20.4	1.5	0.1	2.9	14.8	9.1	20.5
Household Income	$24,999 or less	22.4	15.2	29.6	7.9	2.7	13.0	25.6	17.6	33.5
	$25,000 – 49,999	29.6	20.8	38.5	3.7	0.0	7.4	20.4	12.1	28.7
	$50,000 or more	16.2	8.4	24.1	5.4	0.7	10.2	13.5	6.1	20.9

[illegible]		[illegible]			[illegible]					
		[illegible]			Ever had Pap smear test			[illegible]		
		%	CI		%	CI		%	CI	
All		70.7	63.8	77.6	96.1	92.9	99.2	72.3	61.7	82.9
Sex	Men	.	.	.	.	.	.	.	.	.
	Women	70.7	63.8	77.6	96.1	92.9	99.2	72.3	61.7	82.9
Race/ethnicity	NH White	72.3	65.0	79.6	96.5	93.4	99.5	74.5	62.8	86.2
	NH Black	.	.	.	.	.	.	.	.	.
	Hispanic	.	.	.	.	.	.	.	.	.
Race/ethnicity-Sex	NH White men	.	.	.	.	.	.	.	.	.
	NH White women	72.3	65.0	79.6	96.5	93.4	99.5	74.5	62.8	86.2
	NH Black men	.	.	.	.	.	.	.	.	.
	NH Black women	.	.	.	.	.	.	.	.	.
	Hispanic men	.	.	.	.	.	.	.	.	.
	Hispanic women	.	.	.	.	.	.	.	.	.
Age	18-44	.	.	.	96.6	92.4	100.0	76.3	57.8	94.8
	45-64	71.8	62.7	81.0	99.1	97.2	100.0	69.4	56.2	82.5
	65 and older	72.8	61.4	84.1	88.5	74.9	100.0	63.7	45.6	81.8
Marital Status	Never married	.	.	.	.	.	.	.	.	.
	Married/ living together as a couple	70.2	60.6	79.8	97.6	94.3	100.0	79.2	70.3	88.0
	Divorced/ widowed/separated	72.2	62.5	81.9	95.0	88.1	100.0	55.7	30.0	81.4
Education	0-11 years	69.0	53.2	84.7	.	.	.	.	.	.
	HS Grad/GED	72.6	61.7	83.6	97.4	93.6	100.0	70.1	52.4	87.8
	1 or more years of college	69.5	58.1	80.8	95.6	90.8	100.0	78.1	66.8	89.4
Employment	Employed for wages	70.1	58.3	82.0	97.5	93.8	100.0	71.2	50.5	92.0
Household Income	$24,999 or less	64.8	53.0	76.6	96.6	92.1	100.0	61.4	39.8	83.1
	$25,000 – 49,999	76.8	64.0	89.6	94.7	86.6	100.0	79.9	66.7	93.2
	$50,000 or more	76.3	60.6	92.1	.	.	.	.	.	.

[illegible]		[illegible]								
		[illegible]			[illegible]			[illegible]		
		%	CI		%	CI		%	CI	
All		42.8	36.0	49.5	29.3	23.1	35.5	47.7	40.9	54.6
Sex	Men	40.0	29.1	50.9	28.2	18.2	38.1	47.7	36.5	58.9
	Women	45.3	36.9	53.7	30.3	22.5	38.1	47.8	39.3	56.2
Race/ethnicity	NH White	41.7	34.3	49.0	28.4	21.7	35.2	47.8	40.3	55.2
	NH Black	.	.	.	.	.	.	.	.	.
	Hispanic	.	.	.	.	.	.	.	.	.
Race/ethnicity-Sex	NH White men	42.1	30.1	54.2	29.1	18.0	40.3	48.8	36.7	60.9
	NH White women	41.3	32.3	50.2	27.8	19.7	35.9	46.8	37.7	56.0
	NH Black men	.	.	.	.	.	.	.	.	.
	NH Black women	.	.	.	.	.	.	.	.	.
	Hispanic men	.	.	.	.	.	.	.	.	.
	Hispanic women	.	.	.	.	.	.	.	.	.
Age	18-44	.	.	.	.	.	.	.	.	.
	45-64	40.4	31.4	49.3	26.3	18.4	34.2	43.5	34.3	52.8
	65 and older	45.8	35.5	56.2	33.1	23.1	43.1	53.1	42.6	63.5
Marital Status	Never married	.	.	.	.	.	.	.	.	.
	Married/ living together as a couple	46.0	36.6	55.4	30.3	21.6	39.1	47.3	37.9	56.7
	Divorced/ widowed/separated	39.9	30.1	49.7	29.8	20.8	38.7	51.8	41.6	62.0
Education	0-11 years	32.5	18.5	46.4	22.7	9.9	35.4	44.7	29.5	59.9
	HS Grad/GED	47.3	36.7	57.8	28.7	19.0	38.4	48.2	37.6	58.9
	1 or more years of college	45.8	34.4	57.2	35.9	24.9	46.8	50.7	39.3	62.1
Employment	Employed for wages	42.0	29.3	54.6	25.7	14.5	37.0	34.1	22.0	46.3
Household Income	$24,999 or less	35.4	25.2	45.6	26.3	17.0	35.7	42.2	31.1	53.2
	$25,000 – 49,999	51.1	37.6	64.5	35.9	22.7	49.1	52.6	39.1	66.0
	$50,000 or more	45.6	26.6	64.7	33.0	15.2	50.8	64.8	46.3	83.2

[illegible]									
	Ever been tested for HIV			If yes, the test was done in the past 2 years			In past 12 months, health professional talked to you about preventing sexually transmitted diseases through condom use.		
	%	CI		%	CI		%	CI	
All	43.5	37.1	49.9	70.6	60.7	80.6	16.1	11.8	20.4
Sex Men	36.0	27.5	44.5	62.2	45.2	79.2	16.0	9.7	22.4
Women	52.5	43.8	61.2	76.5	65.1	87.9	16.2	10.4	22.0
Race/ethnicity NH White	43.5	36.7	50.3	68.8	57.6	79.9	13.5	9.1	18.0
NH Black	44.0	19.7	68.2	.	.	.	32.9	13.0	52.7
Hispanic	.	.	.	.	.	.	.	.	.
Race/ethnicity-Sex NH White men	34.1	25.2	42.9	59.8	39.8	79.7	13.2	6.5	19.9
NH White women	53.2	43.8	62.6	73.5	60.5	86.6	13.8	7.9	19.7
NH Black men	.	.	.	.	.	.	.	.	.
NH Black women	.	.	.	.	.	.	.	.	.
Hispanic men	.	.	.	.	.	.	.	.	.
Hispanic women	.	.	.	.	.	.	.	.	.
Age 18-44	53.9	44.0	63.8	73.0	61.8	84.2	21.2	14.3	28.2
45-64	30.4	23.1	37.8	63.0	42.2	83.9	9.7	5.1	14.3
65 and older	.	.	.	.	.	.	.	.	.
Marital Status Never married	44.0	27.2	60.8	.	.	.	34.5	18.6	50.4
Married/ living together as a couple	36.9	29.5	44.2	65.1	52.0	78.3	11.4	6.6	16.2
Divorced/ widowed/A80separated	63.5	50.6	76.4	77.7	58.2	97.2	18.3	9.1	27.4
Education 0-11 years	49.9	35.2	64.7	.	.	.	34.5	20.5	48.5
HS Grad/GED	42.1	31.8	52.5	81.7	69.5	93.9	11.1	5.9	16.3
1 or more years of college	42.8	33.7	51.8	61.5	45.8	77.3	13.0	6.6	19.4
Employment Employed for wages	43.7	35.0	52.5	72.9	61.1	84.7	16.6	10.9	22.3
Household Income $24,999 or less	51.5	39.1	64.0	65.6	47.7	83.5	19.1	11.4	26.8
$25,000 – 49,999	41.8	31.3	52.4	81.0	67.3	94.6	15.9	7.6	24.1
$50,000 or more	35.9	24.3	47.6	.	.	.	5.8	0.0	11.5

(1) People who do not engage in regular moderate physical activity (at least 30 minutes a day and 5 days a week) or regular vigorous physical activity (at least 20 minutes a day and 3 days a week).
(2) People who do not engage in regular vigorous physical activity (at least 20 minutes a day and 3 days a week).
(3) People with a Body Mass Index (BMI) between 25 and 30.
(4) People with a Body Mass Index (BMI) equal to or greater than 30.
(5) People who consume less than 5 servings of fruits and vegetables a day.
(6) People who have smoked at least 100 cigarettes in their lifetimes and who also smoked some days or every day in the past month.
(7) People who have consumed 5+ drinks at one occasion in the past month (binge drinker), or men who have 2+ drinks every day or women who have 1+ drink(s) every day (heavy drinker).

For more information about your County BRFSS data, please contact:
Marie A. Bailey, MA, MSW
Bureau of Epidemiology
Department of Health
4052 Bald Cypress Way, Bin #A-12
Tallahassee, FL 32399-1720
850-245-4444 Ext. 2434
marie_bailey@doh.state.fl.us

FLORIDA DEPARTMENT OF HEALTH

Appendix Three:
Florida Department of Health, Mortality Atlas

Florida Mortality Atlas

Located at: http://www.floridacharts.com/charts/MortAtlas.aspx

The Florida Mortality Atlas provides a visual display of leading causes of death in Florida. Causes of death are presented for the total population and then by race (white and non-white). For 1999-2003, the information is available by gender as well. All files are provided in .pdf format for convenient printing.

The Florida Mortality Atlas uses maps to depict causes of death by county. These maps are color coded to show which areas of the state have highest and lowest rates of selected causes of death. The color-coded maps provide a relative ranking among counties with the darkest color representing the highest age-adjusted death rates and the lightest color representing the lowest age-adjusted death rates.

Since the occurrence of many health conditions is related to age, the most common adjustment for public health data is age-adjustment. The Florida Mortality Atlas uses age-adjusted mortality rates so that differences in the age composition are removed, allowing for comparisons independent of age structure. The Florida Mortality Atlas has been age adjusted using the US 2000 Standard Population.

The sources of data for the Florida Mortality Atlas are the Florida Department of Health's Office of Vital Statistics, the US Census Bureau, and the Florida Legislature Office of Economic and Demographic Research.

Trends in Mortality

There has been an overall decline in age-adjusted death rates from 1970 to 2003. Though the gap between death rates of Nonwhites and Whites is diminishing, Nonwhites experienced significantly higher age-adjusted death rates during the period than did Whites.

The overall decline in age-adjusted death rates in the last 30 years can be largely attributed to a 43.7% decrease in the rate of deaths due to heart disease. Even with the drop in rates, heart disease continues to be the leading cause of death in Florida and the United States. Although there has been a slight reduction in rates, cancer deaths remain relatively the same and rank as the second leading cause of death. There have also been significant decreases in age-adjusted death rates for six other leading causes of death. For example, the age-adjusted death rates for stroke decreased by 65.2%, the largest reduction in rates for any of the leading causes of death.

Since 1970, increases in age-adjusted death rates have occurred for three of the leading causes of death: chronic lower respiratory disease, diabetes, and kidney disease. Chronic lower respiratory disease, which includes asthma deaths, increased by 109.4%. Diabetes deaths increased by 18.9% and deaths attributed to kidney disease increased by 106.5%. Since 1980, the first year for which data are available, deaths due to Alzheimer's disease have also increased steadily.

The total age-specific mortality rate for children under 1 year of age has decreased from 1970 to 2000. The age-specific rate of death caused by perinatal conditions—the leading cause of death in 1970 and 2000 for children less than 1 year of age—decreased by more than two-thirds over the 30-year period. Congenital anomalies ranks as the second leading cause of death for children less than 1 year of age.

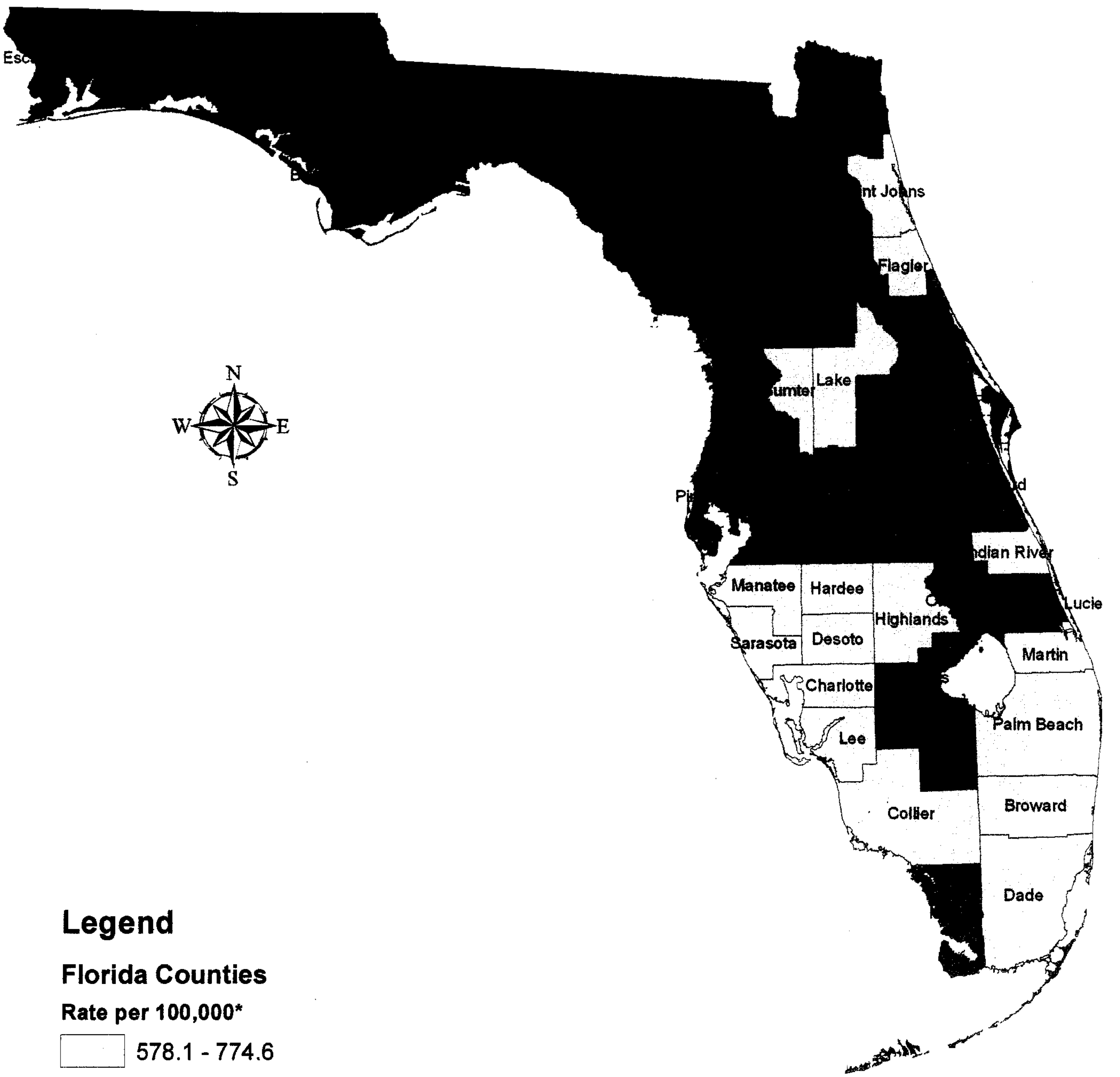
In 2000, unintentional injury was the leading cause of death in Florida for persons ages 1 to 44. The age-specific rate of death due to unintentional injuries decreased by more than 50%

for children ages 1 to 4 from 1970 to 2000. For residents ages 45-74, cancer is the leading cause of death. HIV/AIDS ranks as one of the top five causes of death for Florida residents ages 25 to 54.

1. Heart Disease
2. Cancer
3. Stroke
4. Chronic Lower Respiratory Disease
5. Unintentional Injury
6. Diabetes
7. Alzheimer's Disease
8. Influenza and Pneumonia
9. Suicide
10. Kidney Disease
11. Chronic Liver Disease and Cirrhosis
12. HIV/AIDS
13. Homicide

Total Mortality

Resident Total Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

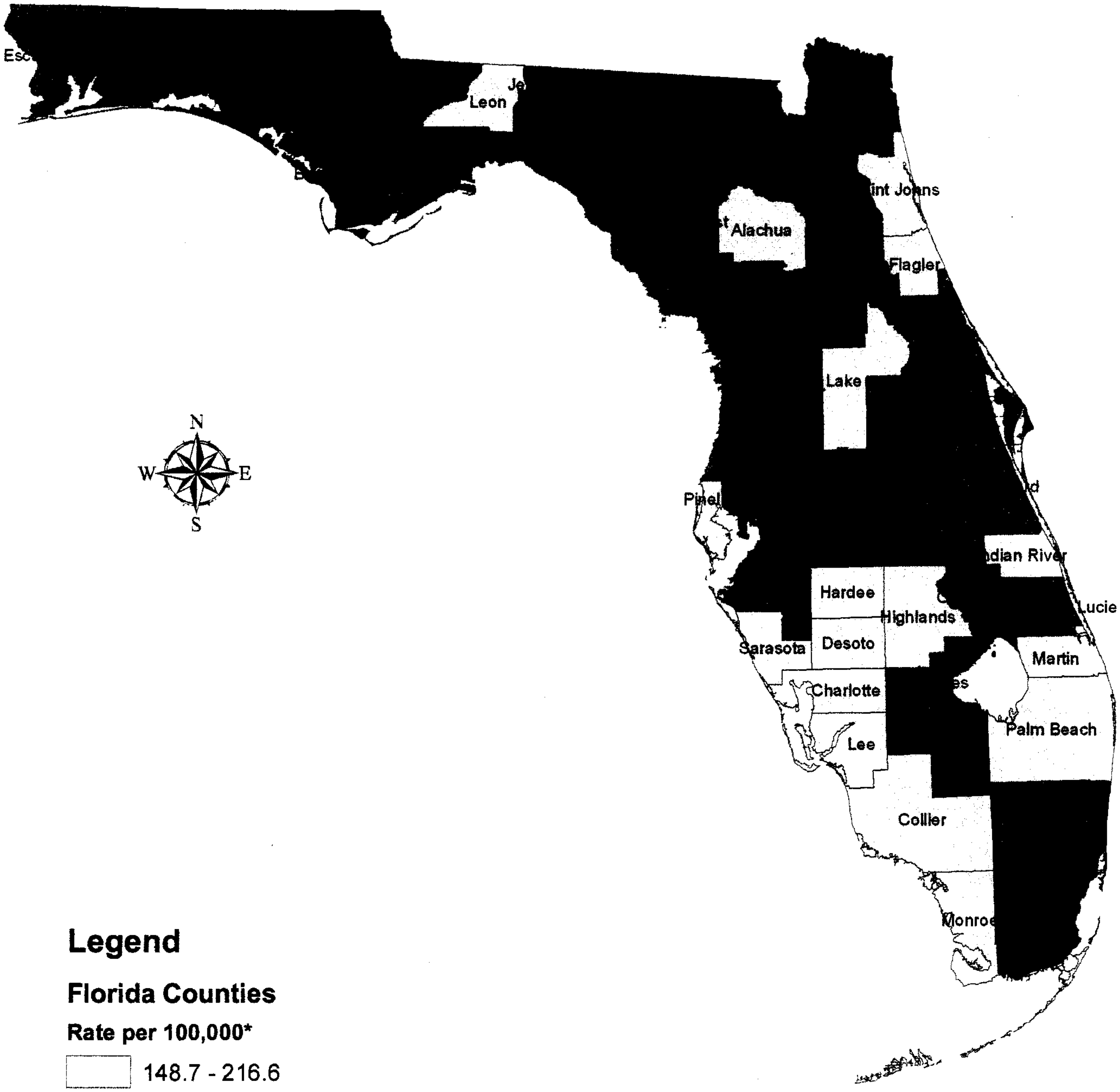
- 578.1 - 774.6
- 774.7 - 870.7
- 870.8 - 969.4
- 969.5 - 1526.1

Florida Total: 784.3

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Heart Disease Mortality

Resident Heart Disease Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

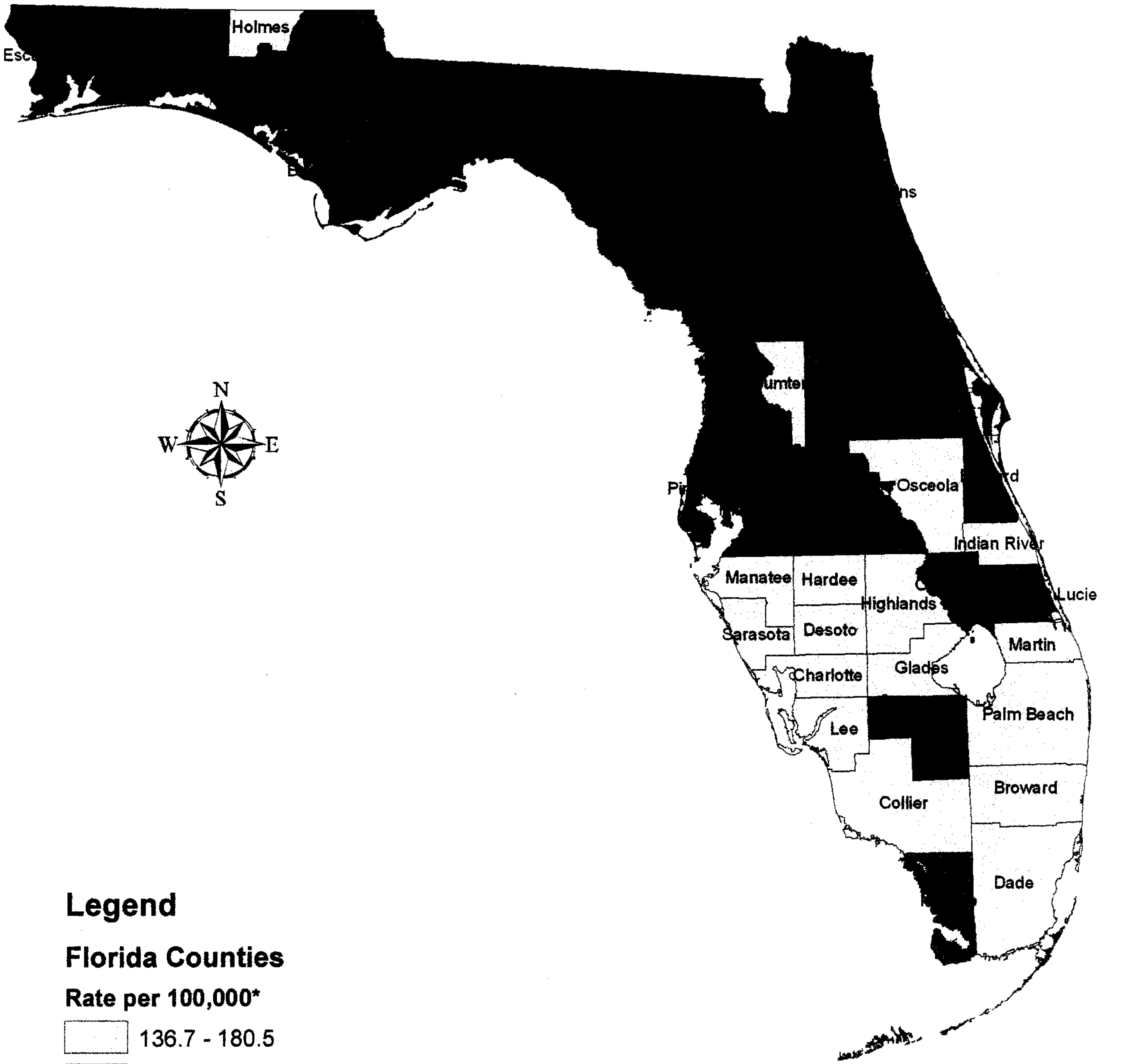
- 148.7 - 216.6
- 216.7 - 240.4
- 240.5 - 275.6
- 275.7 - 358.2

Florida Total: 226.9

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Cancer Mortality

Resident Cancer Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

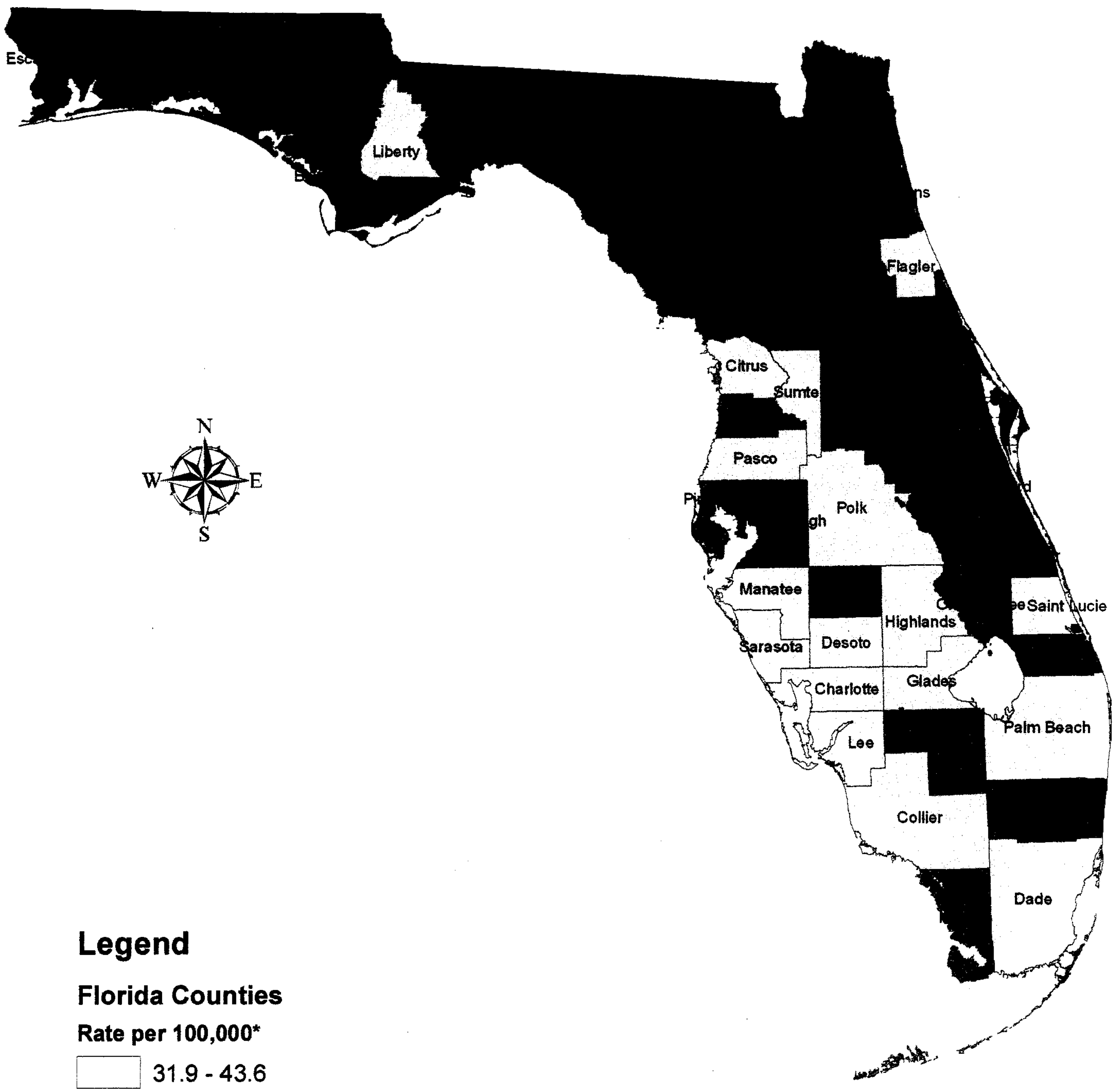
- 136.7 - 180.5
- 180.6 - 197.5
- 197.6 - 210.7
- 210.8 - 430.8

Florida Total: 182.6

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Stroke Mortality

Resident Stroke Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

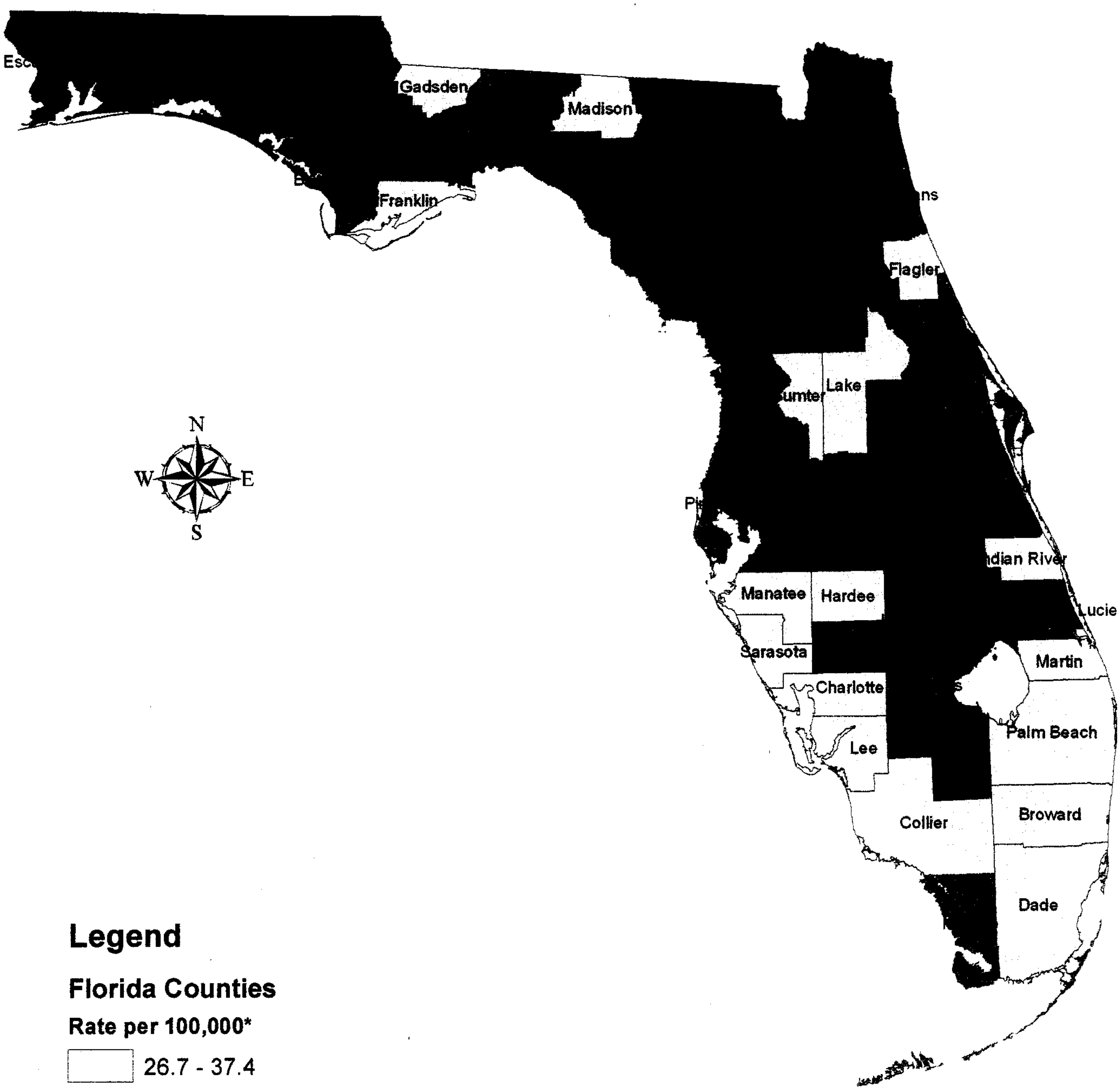
- 31.9 - 43.6
- 43.7 - 51.9
- 52.0 - 66.1
- 66.2 - 90.3

Florida Total: 46.6

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Chronic Lower Respiratory Disease Mortality

Resident Chronic Lower Respiratory Disease Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

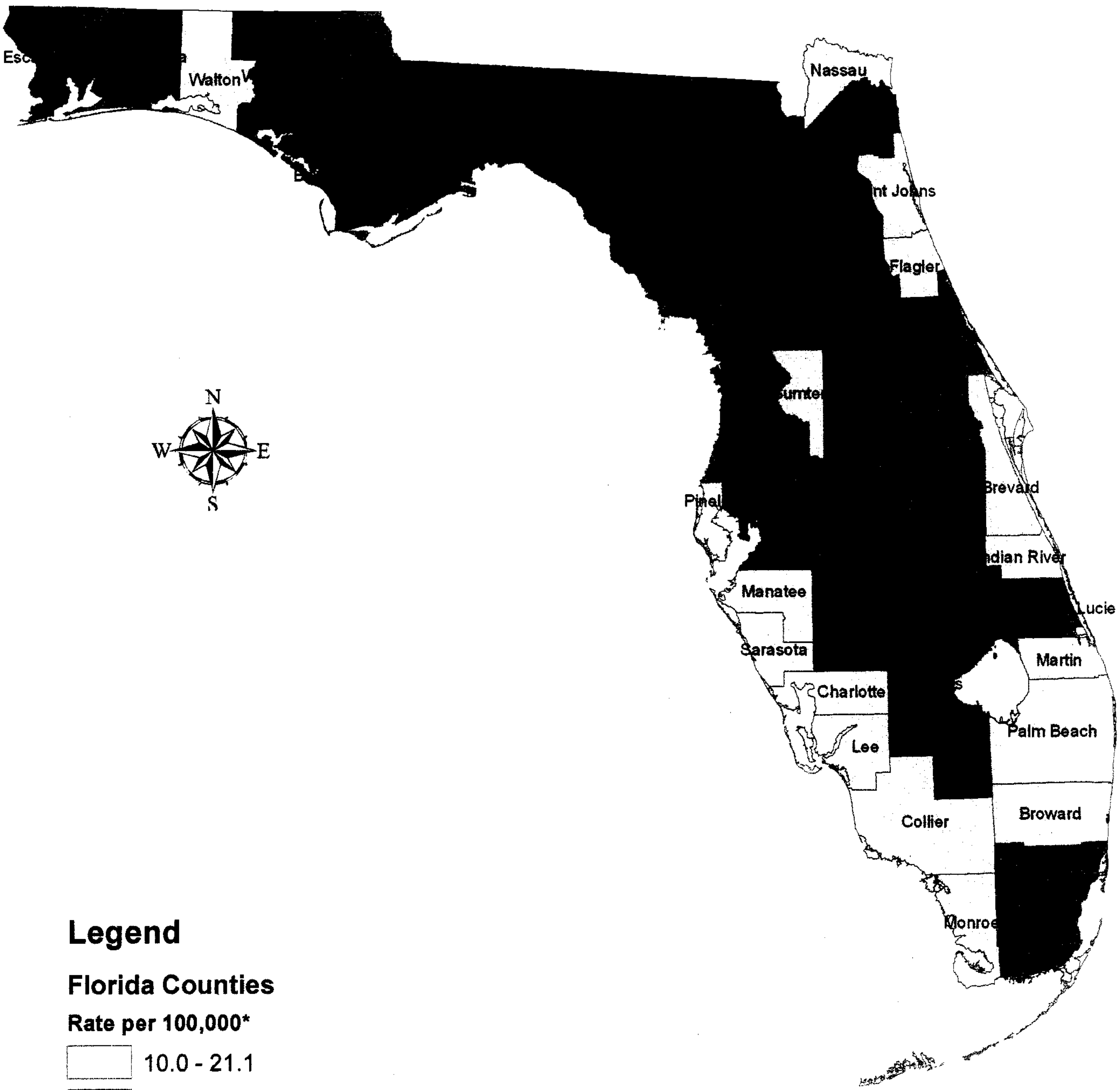
- 26.7 - 37.4
- 37.5 - 48.8
- 48.9 - 60.1
- 60.2 - 101.9

Florida Total: 40.2

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Diabetes Mortality

Resident Diabetes Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

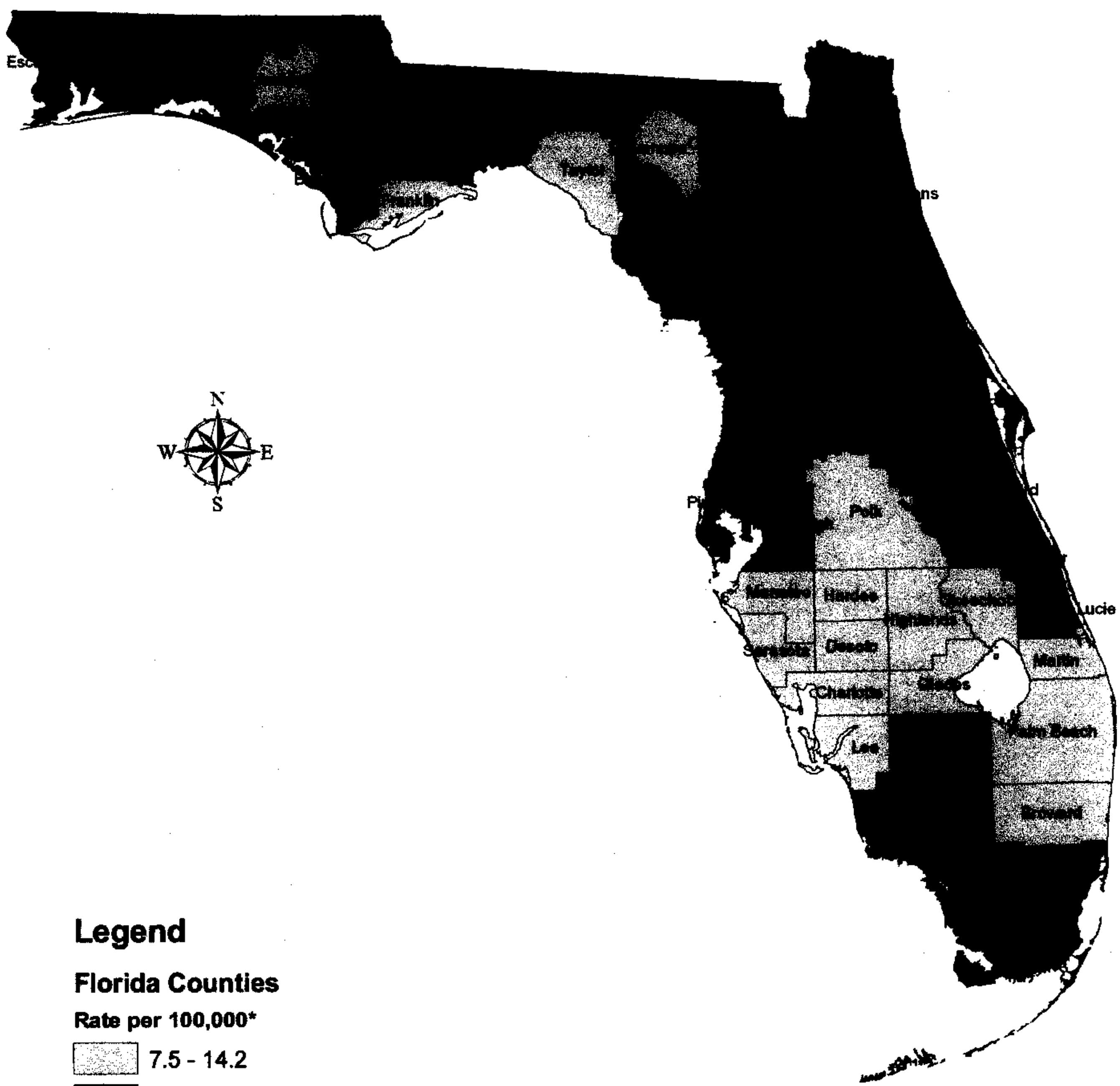
	10.0 - 21.1
	21.2 - 26.0
	26.1 - 30.7
	30.8 - 54.0

Florida Total: 21.4

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Alzheimer's Disease Mortality

Resident Alzheimer's Disease Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

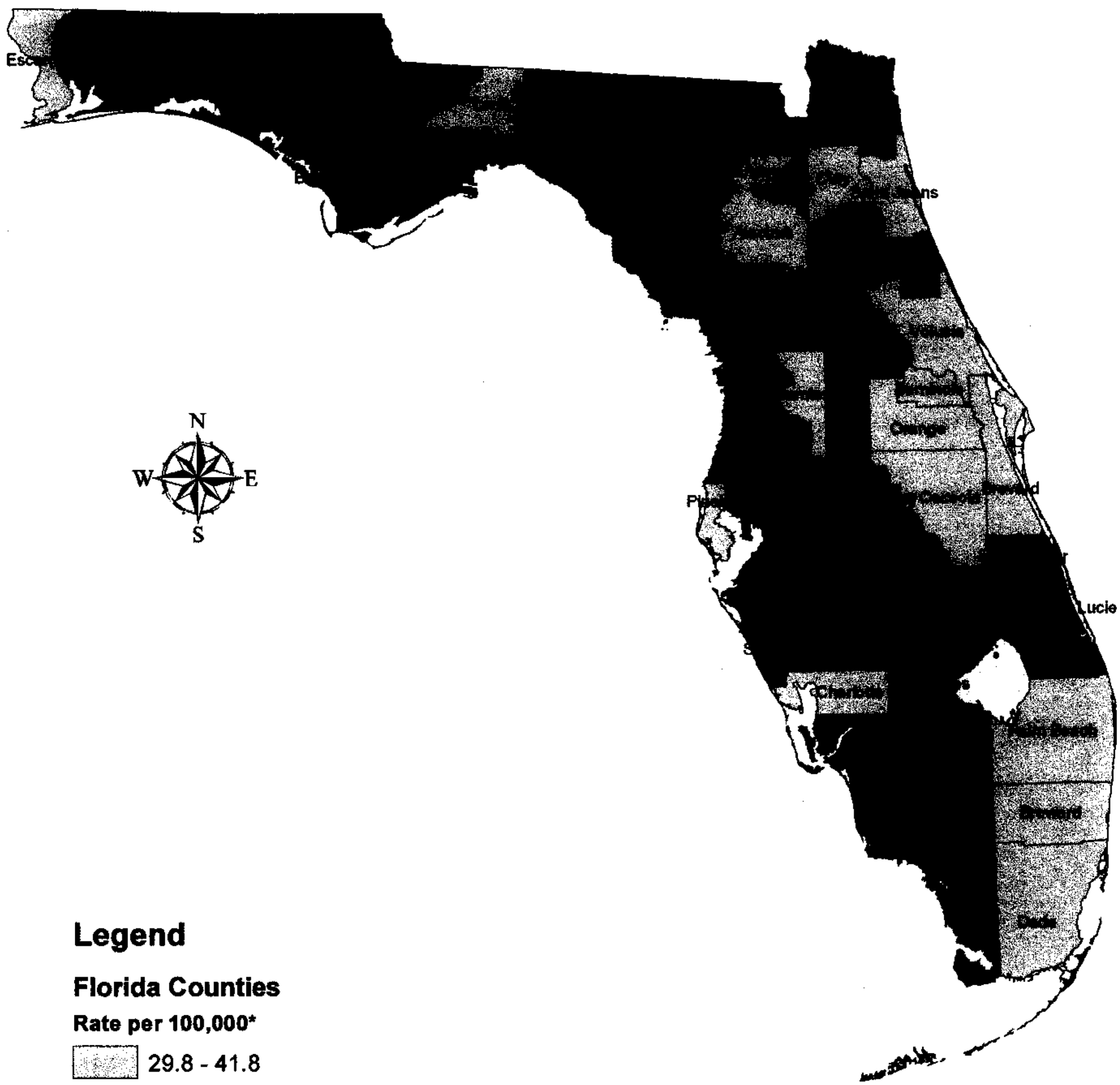
- 7.5 - 14.2
- 14.3 - 18.1
- 18.2 - 22.3
- 22.4 - 43.0

Florida Total: 16.1

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Unintentional Injury Mortality

Resident Resident Unintentional Injury Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

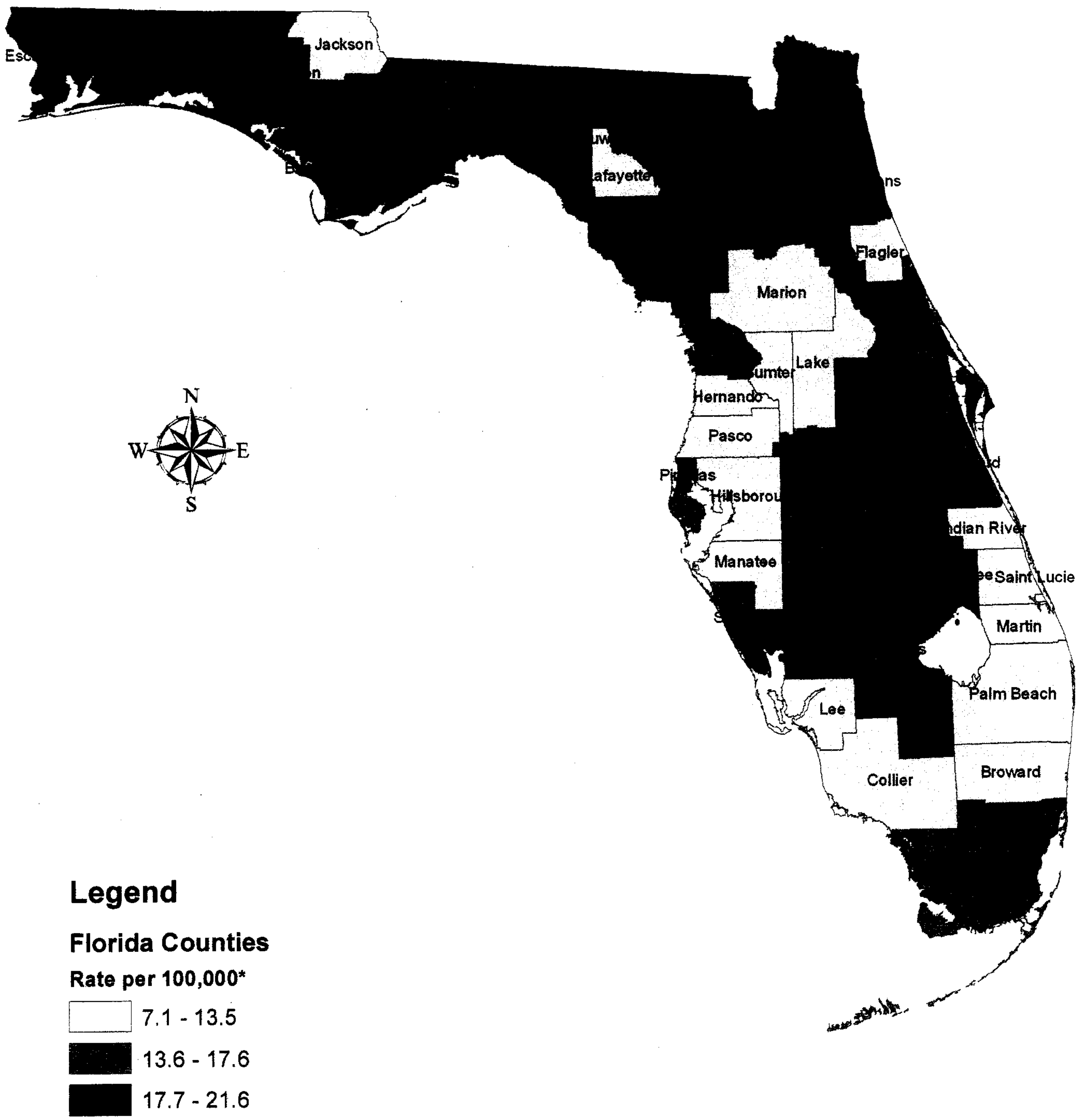
- 29.8 - 41.8
- 41.9 - 48.7
- 48.8 - 59.7
- 59.8 - 87.4

Florida Total: 39.8

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Influenza and Pneumonia Mortality

Resident Influenza and Pneumonia Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

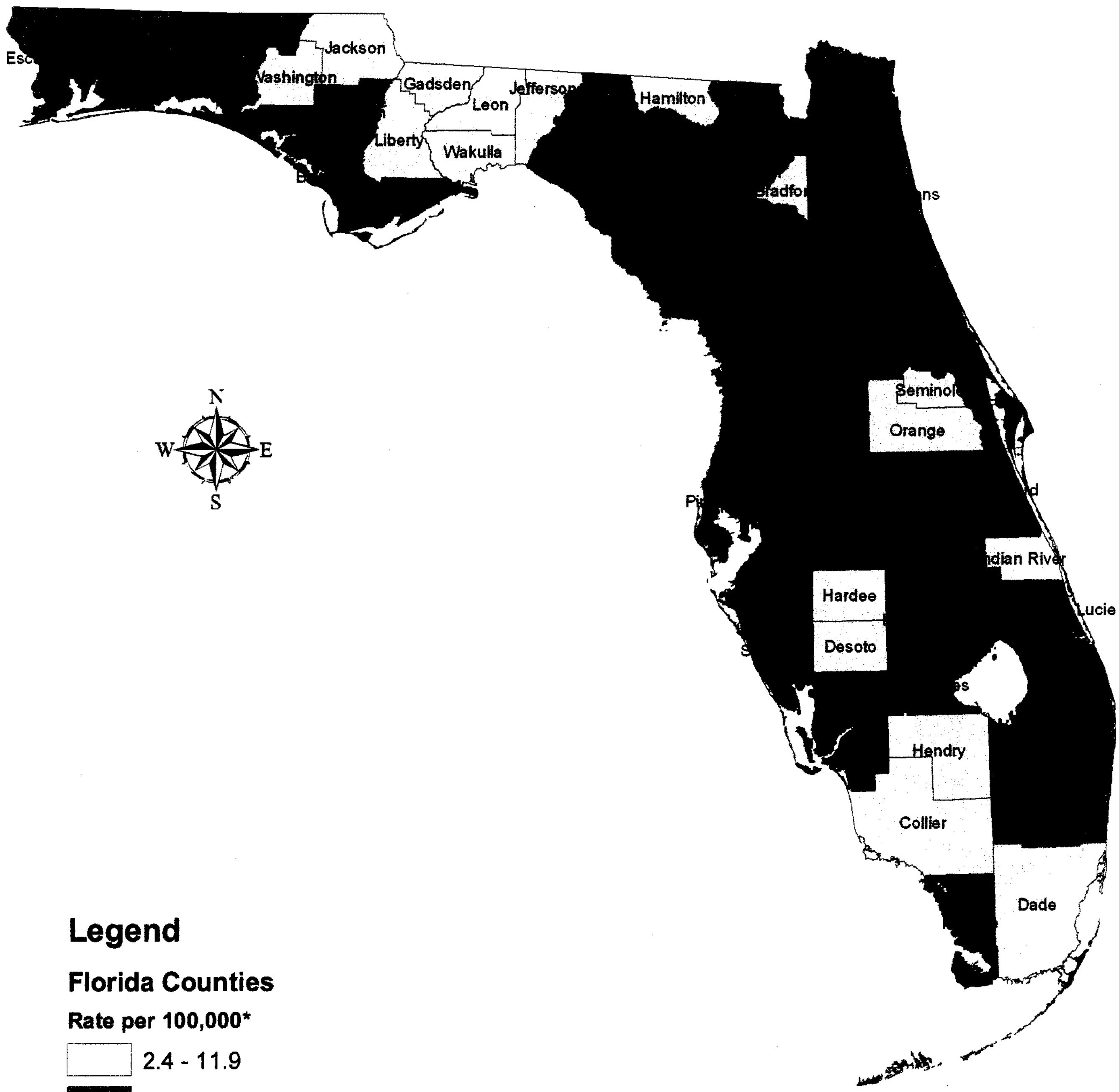
	7.1 - 13.5
	13.6 - 17.6
	17.7 - 21.6
	21.7 - 40.7

Florida Total: 14.8

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Suicide Mortality

Resident Suicide Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

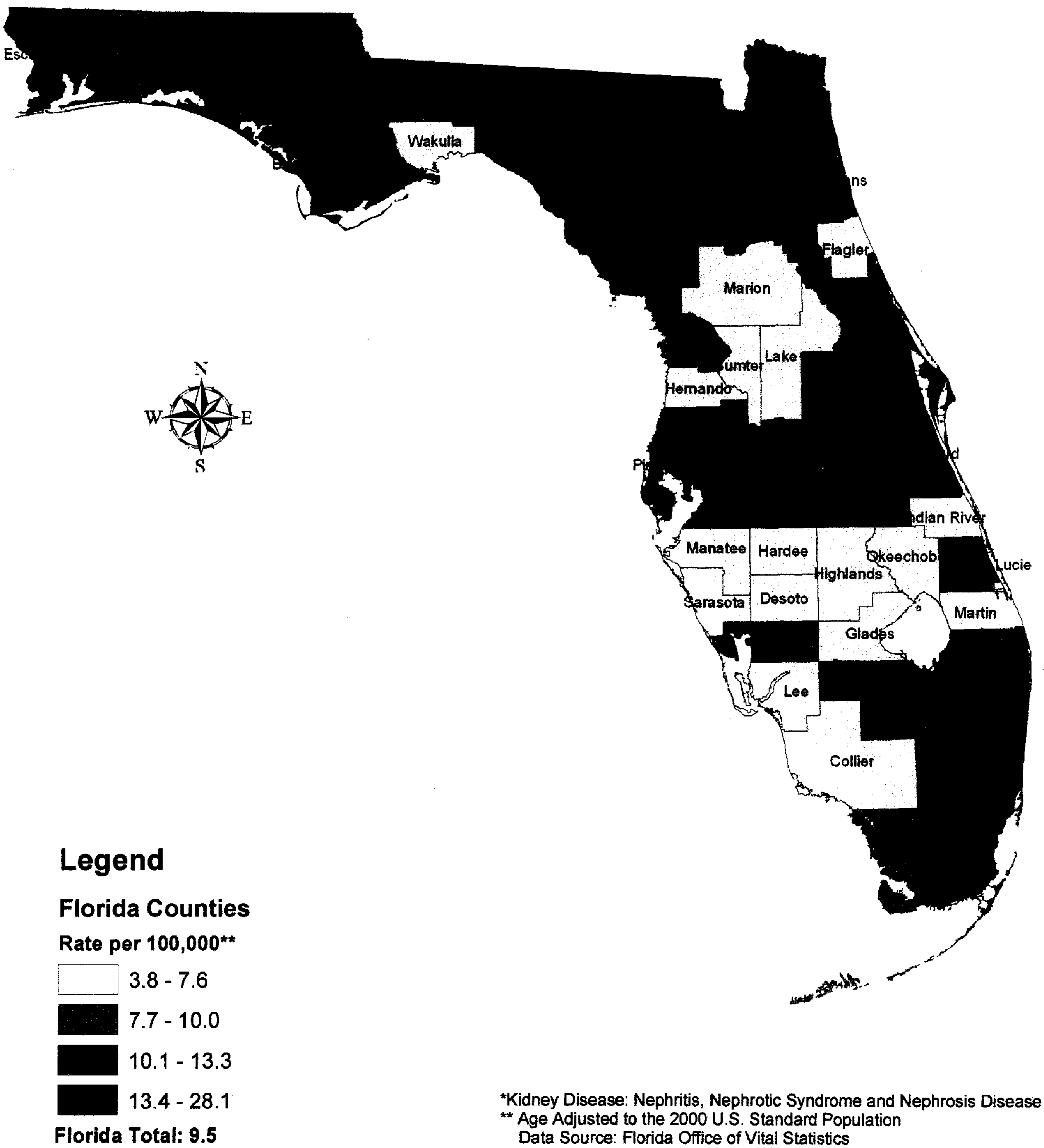
(white)	2.4 - 11.9
(light shade)	12.0 - 13.5
(medium shade)	13.6 - 16.0
(dark shade)	16.1 - 22.1

Florida Total: 12.9

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Kidney Disease* Mortality

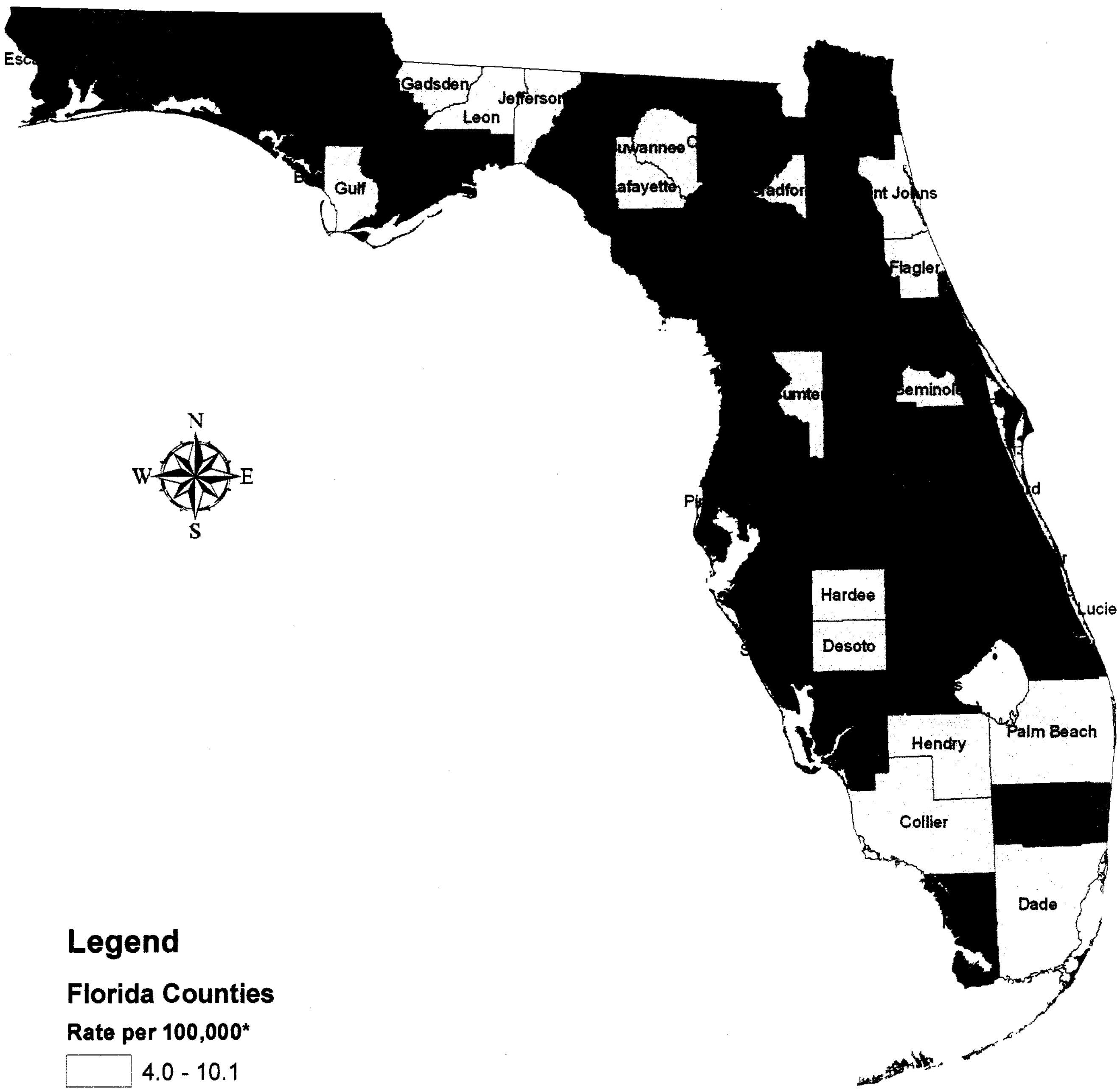
Resident Kidney Disease Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



*Kidney Disease: Nephritis, Nephrotic Syndrome and Nephrosis Disease
** Age Adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Chronic Liver Disease and Cirrhosis Mortality

Resident Chronic Liver Disease and Cirrhosis Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

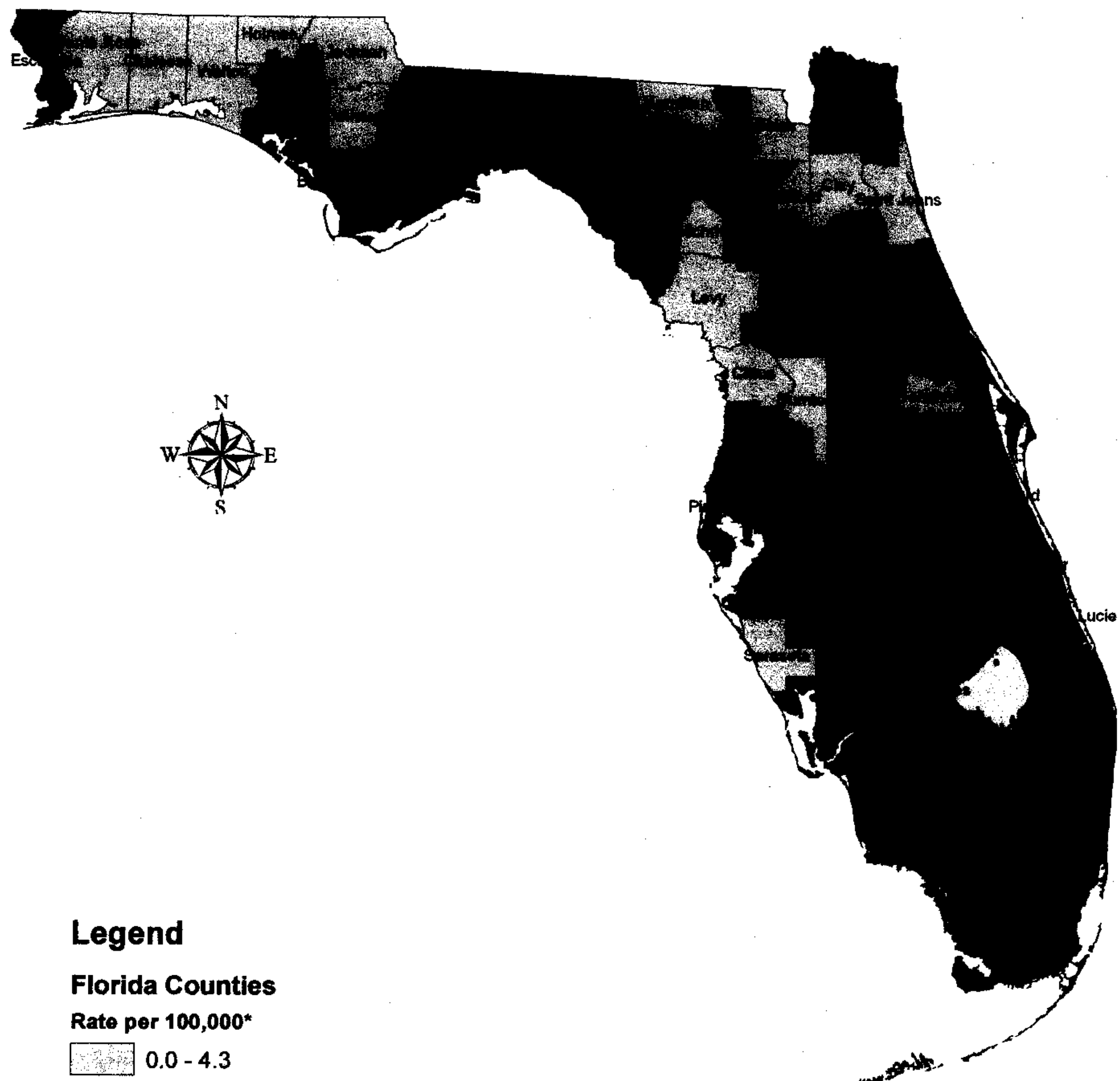
(white)	4.0 - 10.1
(dark grey)	10.2 - 11.9
(black)	12.0 - 13.8
(black)	13.9 - 54.4

Florida Total: 11.0

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

HIV/AIDS Mortality

Resident HIV/AIDS Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

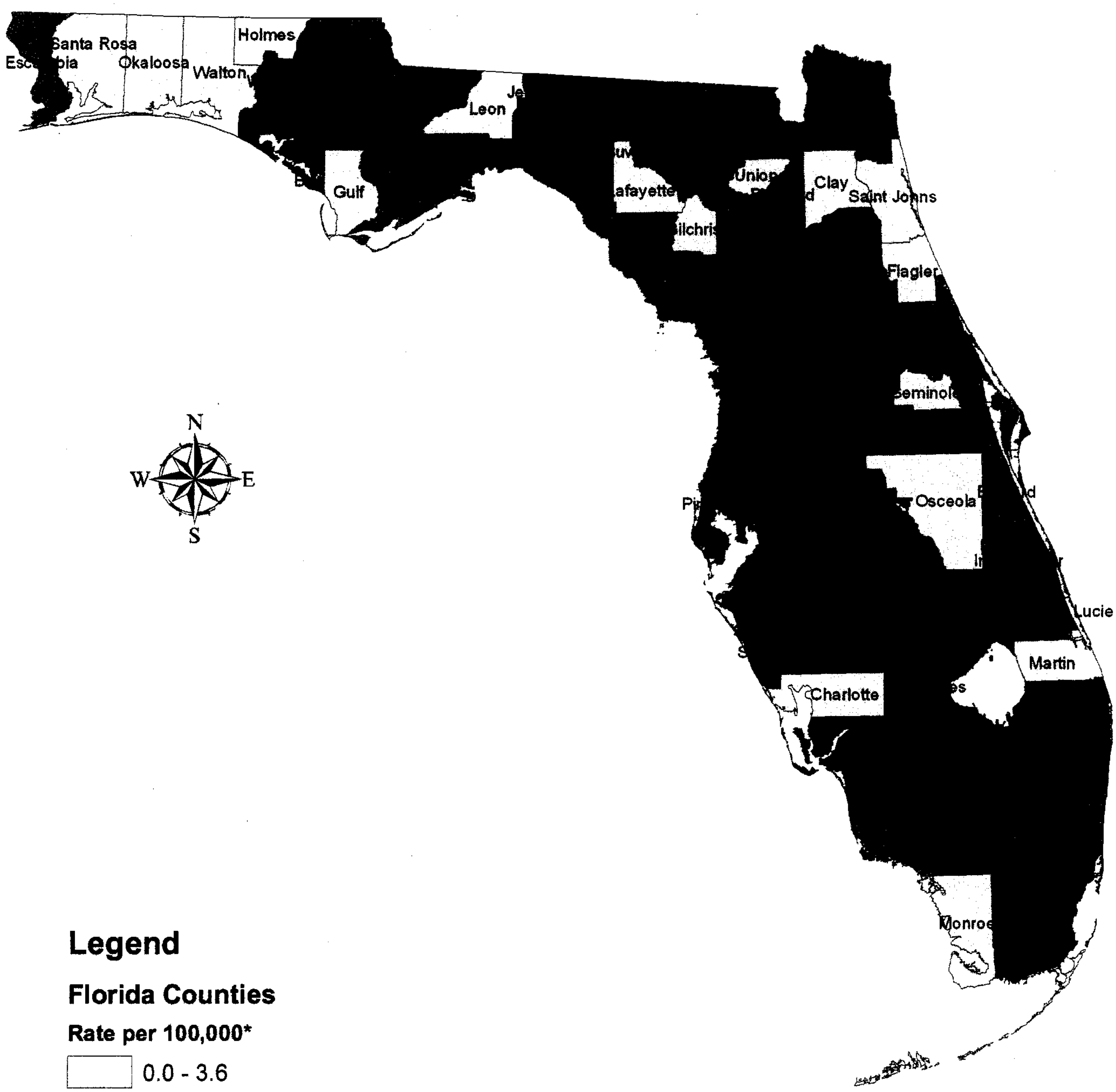
- 0.0 - 4.3
- 4.4 - 6.3
- 6.4 - 8.2
- 8.3 - 57.1

Florida Total: 10.6

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Homicide Mortality

Resident Homicide Mortality per 100,000 Population
5 year age-adjusted rates, 1999 - 2003, By County



Legend

Florida Counties

Rate per 100,000*

- 0.0 - 3.6
- 3.7 - 5.4
- 5.5 - 6.6
- 6.7 - 16.9

Florida Total: 6.2

* Age adjusted to the 2000 U.S. Standard Population
Data Source: Florida Office of Vital Statistics

Maps located at http://www.floridacharts.com/charts/MortAtlas.aspx

Definitions and Data Interpretation Notes

Health Indicators

A health indicator is a characteristic of an individual, population, or environment which is subject to measurement and can be used to describe one or more aspects of the health of an individual or population. Indicators are usually expressed as rates such as crude or age-adjusted rates. One of the most well known health indicators is the infant mortality rate, the number of infant deaths per 1,000 live births. Other familiar indicators are related to specific causes of death, for example, the diabetes death rate. Indicators in this Atlas are those with public health significance and therefore provide opportunities for focusing interventions that will improve the population's health status.

Leading Causes of Death

Ranking causes of death is a popular method of presenting mortality statistics. This method has been used for over 50 years to show the most frequently occurring causes of death and their relative impact. All states use a standard method used to classify causes of death, and periodically, the cause of death lists are updated based on the International Classification of Diseases (ICD).

This Atlas concentrates on thirteen of the most prevalent causes of death in Florida: heart disease, cancer, stroke, chronic lower respiratory disease, unintentional injury, diabetes, Alzheimer's disease, influenza and pneumonia, suicide, kidney disease, chronic liver disease and cirrhosis, HIV/AIDS, and homicide. The causes of death included in this atlas accounted for approximately 81 percent of all deaths in Florida in 2003.

International Classification of Diseases

The International Classification of Diseases (ICD) is the system used to code and classify mortality data from death certificates. The ICD is designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics. This includes providing a standardized format for reporting causes of death on death certificates. The reported conditions are translated into medical codes through use of this classification system, which is published by the World Health Organization (WHO). In order to keep abreast of changes in medical knowledge, the ICD is revised approximately every ten to twenty years. The ICD revisions and years each were used in Florida are:

Revision	Years Used	Revision	Years Used
Second	1917-1920	Seventh	1958-1967
Third	1921-1929	Eighth	1968-1978
Fourth	1930-1940	Ninth	1979-1998
Fifth	1941-1948	Tenth	1999-Present
Sixth	1949-1957		

Due to these revisions, some of which involve major changes, year-to-year comparisons of deaths by cause can be misleading unless such comparisons span a period of years in which only one revision was used or in which the changes from one revision to another were minor.

In this Atlas, the International Classification of Diseases Eighth Revision (ICD-8) was used for the coding of 1970 through 1974 underlying causes of death, the Ninth Revision for was used for years 1979-1989, and the Tenth Revision (ICD-10) was used for coding the 1999 through 2003 underlying causes of death. Two causes of death, Alzheimer's disease and HIV, were not yet classified at the time the ICD-8 was issued. Changes from the ICD-8 to ICD-9 were minor but differences between the ninth and tenth revisions are more apparent. ICD-10 contains major changes, so that a greater or fewer number of deaths are now assigned to certain causes than under ICD-9 rules. Causes that changed the most include Alzheimer's disease and pneumonia.

Quartiles

The maps in the Florida Mortality Atlas are colored using a quartile method. In this method, data (age-adjusted death rates) are calculated and then ranked from lowest to highest for all 67 counties. Next, the counties are divided into four groups. Each group is assigned a number from 1 to 4. The counties with the lowest ranking rates are assigned to the first quartile (1) and are shaded with the lightest color, while the counties with the highest-ranking rates are assigned to the fourth quartile (4) and are shaded with the darkest color. Because quartiles are calculated using data from all 67 counties, the color-coded map provides a relative ranking among counties.

Because mortality varies by county, the quartile limits are different for each map, and the range of values represented by a given quartile varies from map to map. Therefore, comparisons of the spatial patterns of mortality across maps should be limited to comparing relative differences between different groups (e.g. males to females or whites to nonwhites). To determine whether the mortality rates were absolutely higher or lower for one group than for another, the reader must study the relevant legends and compare the quartile limits.

Rates

Much of community health assessment involves describing the health status of a defined community by looking at changes in the community over time or by comparing health events in that community to events occurring in other communities or the state as a whole. In making these comparisons, we need to account for the fact that the number of health events depends in part on the number of people in the community. To account for growth in a community or to compare communities of different sizes, we usually develop rates to provide the number of events per population unit.

A rate consists of a numerator and a denominator. The two numbers are divided, then multiplied by a constant (such as 100,000) to provide the number per 100,000 population.

The numerator is the number of health events. This is often the same as the number of people who experience an event, but for some health conditions, one person may experience the event more than once. For example, one individual may have multiple hospitalizations for the same condition in a given year.

To measure incidence or prevalence of the condition, you usually want to count people. To measure the public health burden, you may want to count events. Actions based on the data may be different depending on whether the rate represents many individuals with only one event or a smaller number of individuals who have had many events. It is customary to count only events that occur among the population at risk.

The denominator is also known as the population at risk. Everyone in the population at risk must be eligible to be counted in the numerator if they have the event of interest. For example, in looking at female cervical cancer, we cannot include men in the population at risk.Once the numerator and denominator are established, a decision must be made as to the appropriate rate to use.

Crude and Age-Adjusted Death Rates *Crude Death Rates*

A crude rate is calculated by dividing the total number of events in a specified time period by the total number of individuals in the population who are at risk for these events and multiplying by a constant, such as 1,000 or 100,000 [e.g., (numerator/denominator) × constant].

Example: The total crude death rate in Orange County for 2002 is the number of total deaths in Orange County (numerator) divided by the population of Orange County in 2002 (denominator). The result of this calculation is multiplied by 100,000 (constant) to arrive at the 2002 crude death rate per 100,000 population for Orange County.

(6,469 (total deaths) / 962,531 (total population)) × 100,000 = 672.1 deaths per 100,000 population

Although useful for certain purposes, the crude death rate as a comparative measure has a major shortcoming: it is a function of the age distribution of the population at risk. For example, the population at risk in one county may be primarily elderly persons ages 65 and older while the population at risk in another county may be primarily of persons ages 40 to 50. Crude rates are recommended when a summary measure is needed and it is not necessary or desirable to adjust for other factors. For example, rates of infectious diseases, such as tuberculosis and hepatitis, are usually not age adjusted, because public health officials are interested in the overall burden of disease in the total population irrespective of age.

Age-Adjusted Death Rates

The frequency with which health events occur is almost always related to age. In fact, the relationship of age to risk often dwarfs other important risk factors. For example, acute respiratory infections are more common in children of school age because of their immunologic susceptibility and exposure to other children in schools. Chronic conditions, such as arthritis and atherosclerosis, occur more frequently in older adults because of a variety of physiologic consequences of aging. Mortality rates tend to increase after the age of 40.

Because the occurrence of many health conditions is related to age, the most common adjustment for public health data is age adjustment. The age-adjustment process removes differences in the age composition of two or more populations to allow comparisons between these populations independent of their age structure.

The age-adjusted death rate is a summary measure that eliminates the effect of the underlying age distribution of the population. The result is a figure that represents the theoretical risk of mortality for a population, if the population had an age distribution identical to that of a standard population. For example, a county's age-adjusted death rate is the weighted average of the age-specific death rates observed in that county, with the weights derived from the age distribution in an external population standard, such as the U.S. population.

In the past, the National Center for Health Statistics (NCHS) age-adjusted rates using the US 1940 standard population. Other agencies used the US 1970 Standard. Beginning with 1999 data, federal agencies began age-adjusting to the US 2000 Standard Million Population.

Example: To calculate the Age-Adjusted Death Rate, follow these steps:

1. Calculate death rates per 100,000 for each age group.

2. Multiply this rate by the 2000 US population proportion. This is the standard 2000 US population proportion, which FloridaCHARTS.com uses to calculate age-adjusted death rates.

Age	2000 Proportion
0-14 years	0.021470
15 - 24 years	0.138646
25 - 34 years	0.135573
35 - 44 years	0.162613
45 - 54 years	0.134834
55 - 64 years	0.087247
65 - 74 years	0.066037
75 - 84 years	0.044842
85 and over	0.015508
All ages	1.000000

3. Sum values for all age groups to arrive at the Age-Adjusted Death Rate.

Age Groups	Deaths	Population	Crude Rate Per 100,000	Population Proportion (2000)	Age-Specific Rate
0-14	62	1,950,000	3.2	0.021470	0.68704
15-24	82	1,210,000	6.8	0.138646	0.9427928
25-34	303	1,480,000	20.9	0.135573	2.8334757
35-44	686	1,400,000	49	0.162613	7.968037
45-54	1,630	1,020,000	159.8	0.134834	21.5464732
55-64	3,457	730,000	475.9	0.087247	41.5208473
65-74	6,352	580,000	1,093.4	0.066037	72.2048558
75-84	5,443	290,000	1,878.3	0.044842	84.2267286
85 +	2,050	70,000	2,841.5	0.015508	44.065982
All Ages	20,065	8,730,000	229.8	1.000000	276.0

Age-adjusted death rates enable health professionals to measure health conditions versus the distribution of persons by age. Age-adjusted death rates are more useful than crude death rates when comparing death trends from different populations. For instance, crude death rates may show a disease to be low in County A when compared to County B. But, is this the true picture of what is occurring in these counties? Since crude death rates are sensitive to the distribution of persons in the population, it could be that County A's rate is low because fewer people at-risk of dying live in County A than in County B. Age-adjusted death rates can also help to study death trends in a single county over time. Age-specific death rates within the county may remain stationary over time, but with an aging population the crude death rate may increase from the higher number of persons at greater risk of dying.

Age-adjusted rates are utilized throughout the Florida Mortality Atlas and the following should be kept in mind:

- Age-adjusted rates answer the question: "How does the rate in my county compare to the rate in another even though the distribution of persons by age may vary?"
- Age-adjusted rates are specialized measurements and therefore should not be compared with other types of rates or be used to calculate the actual number of

events.

- Age-adjusted rates can illuminate important trends by removing age-related differences.
- Age-adjusted rates using the same standard US populations (1940, 1970, or 2000) may be compared.Because of shifts in the distribution of persons by age in each year, rates calculated using the 1940 standard population, for example, should not be compared to rates calculated using the 2000 standard population.

Multi-Year Death Rates

Rates based on small numbers of events can fluctuate widely from year to year for reasons other than a true change in the underlying frequency of occurrence of the event. This is especially true in counties with small populations. To alleviate this problem, a multi-year has been used instead of a single-year rate.

A multi-year rate combines several years of data into one rate. The Florida Health Atlas uses age-adjusted rates from five consecutive years to calculate multi-year rates by using the average of five years of the total number of deaths and the average of five years of the population at risk to come up with a single rate per 100,000 population.

Example: 5-Year Rate

Total Deaths in Orange County			**Total Population in Orange County**	
Year	Number of Deaths		Year	Population
1999	6107		1999	864,197
2000	6282		2000	906,000
2001	6384		2001	936,749
2002	6469		2002	962,531
2003	6556		2003	989,962
5-Year Average: 31,798/ 5 = 6360			5-Year Average: 4,659,439/ 5=931,888 5-Year Rate: (6360 / 931,888) X 100,000 = 682.5 deaths per 100,000 population	

The five-year total age adjusted and crude mortality rates across Florida counties are chromatically depicted below. Note that the age-adjusted rates are significantly lower than the crude rate. Many counties that fall into the third and fourth quartiles using the crude rate are in lower quartiles when the age-adjusted rate is used. The reverse is true for some counties, while other counties remain in the same relative quartile when either rate is used. The age-adjusted mortality rates give a more accurate view of death rates in Florida because they control for the differences in age structure from county to county.

Healthy Development

Informed Decisions ~ Enhanced Development

Taylor Energy Center

Health Impact Assessment--Phase II of III
Fall 2006

Executive Summary
October 2006

Phase II will identify scientific evidence related to air pollution and the impact of jobs on health as defined in the original scope of this health impact assessment in phase I.

Explores and defines the impacts of:

- Mercury
- Carbon dioxide
- Criteria Pollutants
    - Sulfur
    - Nitrogen dioxide
    - Particulate Matter
    - Carbon monoxide
    - Ozone

National Ambient Air Quality Standards

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment.

Criteria Pollutants Specific to TEC

The Taylor Energy Center will report four of the six criteria pollutants to the Florida Department of Environmental Protection and the US Environmental Protection Agency. These include sulfur dioxide, nitrogen dioxide, particulate matter and carbon monoxide. Appendix One has an overview and discussion of

the modeling methodology for estimating the criteria pollutants from TEC. This model estimates the amount of ambient pollutants which are "on the ground, where they are breathed." Table 1 shows the TEC estimates of sulfur dioxide, oxides of nitrogen, particulate matter and carbon monoxide
The TEC will not report estimates of ambient ozone.

Refer to table 2 for expected emissions.

The Science of Air Pollution and Health

This section and the one following on science and income explain how scientific literature and subsequent analytical findings are interpreted and used in this HIA specifically.

The results of a review of scientific evidence used in this health impact assessment are presented. The information gathered will be used to calculate and investigate the impact of the TEC's pollutants on the health of Taylor County residents in phase III of the HIA. The information used for the pollution analysis comes from scientific papers that review or aggregate the results of scientific knowledge up to the time of this report's publishing. Before describing the findings, it is important that the terminology is clearly understood by all audiences.

Meta-analysis

Given the number of studies on the impact of pollution on health, there also is variation in the effects found by the different studies. It is possible to take the "average" impact of a pollutant from the great variety of different scientific studies. This is called a meta-analysis and was applied to the short-term studies. A meta-analysis takes all available scientific evidence published that meets certain quality criteria and recalculates the effects of the pollutant to compute a summary estimate of health effects. Using meta-analysis provides additional confidence in the impact due to the fact that extreme positive or negative research findings are narrowed to average impact.

Particulate Matter and Ozone Short-Term Health Effects

- Mortality
- Hospitalization
- Cough
- Medication Use

Each of these impacts is explored and explained in relationship to particulate matter exposure. Most of the studies were found to be statistically insignificant.

Particulate Matter and Ozone Long-Term Health Effects

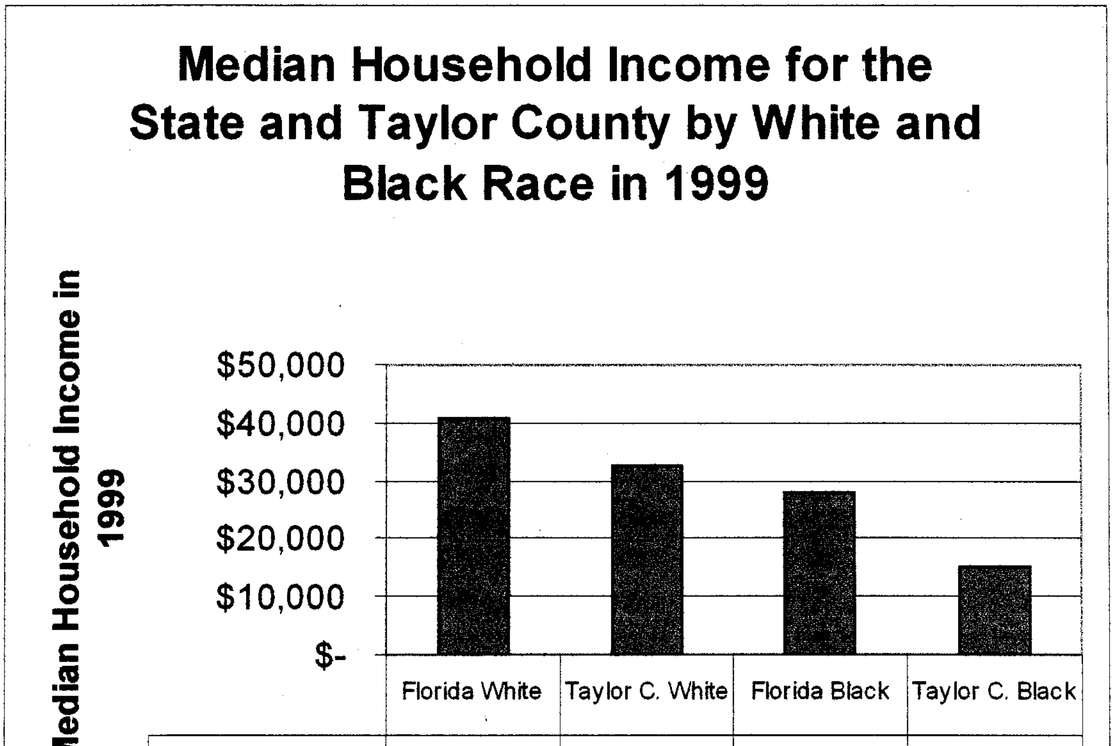
Long-term exposure (16 years) to combustion related fine-particles of air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality (Pope et al. 2002). Table 7 shows that fine particulate matter (PM2.5) is associated with all cause, lung cancer, and cardiopulmonary mortality.

The Science of Income and Health

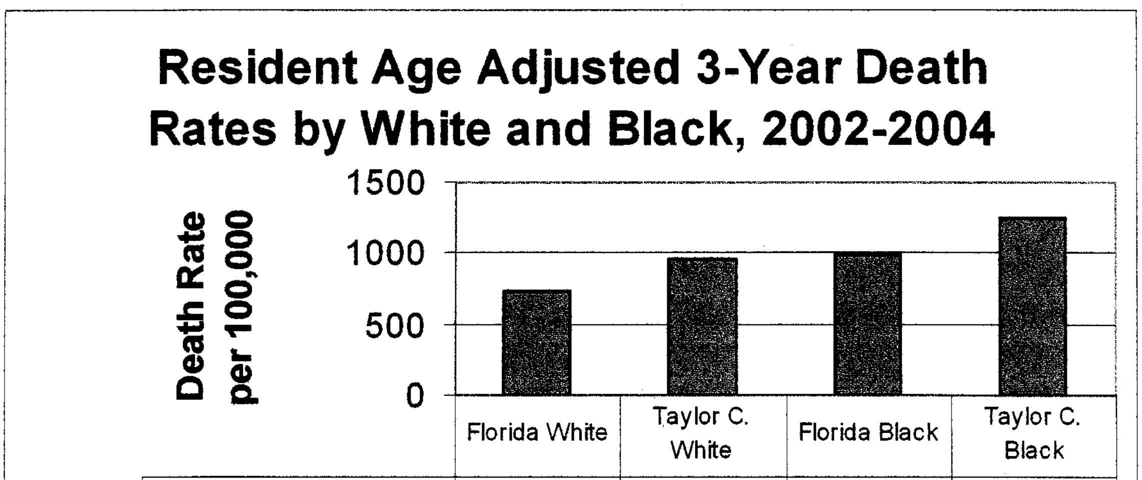
The scientific information available for the association between economic development, jobs and health is neither as specific nor plentiful as the research on pollution. The pollution studies use the same measurement and definitions of a certain pollutant and investigate defined populations. This uniformity is likely due to the influence of funding and regulations on the way pollutants are defined as well as to a large pool of international experts writing about and researching the same pollutants.

Nevertheless, the scientific evidence of the relationship between health and economic development is large. For this portion of the assessment, systematic review papers about the impacts of income on health will be used to guide the assessment. Unlike a meta-analysis which provides effects as risk ratios or odds ratios, the systematic literature reviews used for this health impact assessment provide information about the proper methodology to use to determine the impact of income on health. In phase III, *Healthy Development* will adapt the methodology identified in the review papers to calculate the impact of the jobs and income on health using actual data from Taylor and the rest of the counties in Florida.

Health and income inequality are largely found to be inversely related (Figure 1, Lynch et al. 2004). Extensive evidence strongly supports the notion that individual health is a concave function of individual income. In other words, health status increases as income increases. In Figures 2 and 3, the inverse relationship between income and mortality for whites and blacks in Florida and Taylor County is evident. See tables on next page.



	Florida White	Taylor C. White	Florida Black	Taylor C. Black
Median Household Income in 1999	$40,819	$32,587	$28,033	$15,149



	Florida White	Taylor C. White	Florida Black	Taylor C. Black
Resident Age Adjusted 3 year Death Rates by White and Black, 2002-2004	726.1	955.5	985.1	1243.6

Reducing income inequality by raising the incomes of more disadvantaged people will improve the health of poor individuals, help reduce health inequalities, and increase average population health.

Smoking Attributable Mortality Analysis

Tobacco use is one of the major avoidable causes of cancer and cardiovascular diseases. Taylor county residents have high smoking rates compared to the rest of the state. Heart disease, cancer and stroke are the top three causes of death in the county. *Healthy Development* will calculate the smoking attributable mortality for the county (CDC 2002). This calculation will show the number of deaths of Taylor County residents that can be attributed to smoking.

As with most health risk behaviors, smoking is greatest among the most economically disadvantaged groups. Despite the advice and assistance to quit smoking, many people continue to smoke. Research has shown that smoking can be enjoyable and relaxing for people with insecure jobs, poor housing and high stress.

Phase III

Phase III will calculate the impacts of the reportable criteria emissions and different levels of income on the health of Taylor County residents using the scientific literature surveyed above and local population data. In addition, recommendations will be made as to how best mitigate expected negative impacts of the coal plant and optimize forecasted positive impacts.

Informed Decisions ~ Enhanced Development

Taylor Energy Center

Health Impact Assessment--Phase II of III
Fall 2006

Table of Contents

Introduction and Review of Phase II Elements 1
Scope 1
Mercury 1
Carbon Dioxide 2
Criteria Pollutants Defined 2
Sulfur Dioxide 3
Nitrogen Dioxide 3
Particulate Matter 3
Carbon Monoxide 4
Ozone 4
National Ambient Air Quality Standards 5
TEC's Ambient Criteria Pollutant Estimates 6
The Science of Air Pollution and Health 8
Particulate Matter and Ozone Short-Term Health Effects 10
Mortality 10
Hospitalizations 11
Cough 11
Medication Use 13
Particulate Matter and Ozone Long-Term Health Effects 13
Health Impact Assessment and PM10 calculations 13
The Science of Income and Health 14
Health Impact Assessment and Calculations of Income and Individual Risk of Mortality 17
Smoking Attributable Mortality Analysis 17
Bibliography 18

Healthy Development Inc.
Tallahassee, Florida
850.591.6555 ~ 850.322.4629
www.healthydevelopment.us info@healthydevelopment.us

Phase Two

Introduction and Review of Phase II Elements

Phase two collects the scientific peer-reviewed evidence for the analysis and investigation of items listed in the scope of the HIA.

Scope

1. Human health aspects of emissions :
    a. investigate Taylor Energy Center (TEC) statements about and discuss mercury impacts
    b. analyze the impact of criteria pollutants on life expectancy or mortality rates
    c. investigate the impact of criteria pollutants on illness
    d. investigate impacts from carbon dioxide
    e. compare death rates of Taylor County with Madison, Dixie, Hamilton, Hendry, Washington and Suwannee Counties (completed in phase one)
2. Human health aspects of the economic impact :
    a. analyze economic issues related to employment and its relationship to death rates and life expectancy
        i. race
        ii. income
        iii. health insurance
        iv. In short, the study will predict impacts on life expectancy of TEC employees according to various employment levels and scenarios.
    b. investigate economic multiplier effects
    c. investigate issues of job training
3. Smoking Attributable Mortality Rate analysis

In short, phase two will identify scientific evidence related to air pollution and the impact of jobs on health as defined in the scope.

Mercury

Mercury is not a criteria pollutant, but the TEC will report mercury emissions to the Florida Department of Environmental Protection. Their estimates are not yet available. Therefore, Healthy Development will investigate and discuss the statements TEC has made about mercury impacts from their website[1].

[1] http://www.northfloridapowerproject.org/m_17.asp#19

Statement 1
Mercury Emissions Will Be Lower than the new federal standard:
...Taylor Energy Center mercury emissions will meet new EPA requirements, which are protective of human health and the environment and are based on a large body of knowledge developed in recent years in the U.S. and elsewhere.

Statement 2
....The Taylor Energy Center's emissions will be less than that allowed under the new federal mercury rule.

Carbon Dioxide

Carbon dioxide is a green house gas that will be emitted from the TEC. Green house gases raise global temperatures and, as a result, sea levels. Epidemiologists are just beginning to study the impact of rising global temperatures on human health. Research has pointed to a number of effects that have already occurred. For example, evidence of a link between climate and microbial foodborne, waterborne and mosquito-related illnesses has come from observed seasonality and latitudinal gradients and connections between weather disturbances (Hall et al. 2002).

The epidemiological research concerning the health effects of climate change is in its infancy. Thus far the studies that have identified a link between climate change and health have addressed single diseases and local populations. The type of epidemiological evidence that is needed should concern global scale impacts affecting human populations at large (Hampton 2006). Nevertheless, it is reasonable to assume that the carbon dioxide emitted from TEC will contribute to global climate change and human health will be impacted. At a minimum, Taylor County is likely to experience between a 3.5 and 34 inch sea level rise within the next century (United Nations Intergovernmental Panel on Climate Change 2001). Unfortunately, there is not enough scientific evidence on the impact of carbon dioxide emissions, climate change and human health impacts for use in this HIA. *Healthy Development* will explore the potential impact to TEC of the U.S. Supreme Court's review of the Clean Air Act and the U.S. Environmental Protection Agency's authority to regulate carbon dioxide emissions under that Act.

Criteria Pollutants Defined

EPA identifies six criteria pollutants as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. They include sulfur dioxide, nitrogen dioxide, particulate matter, carbon monoxide, ozone and lead. Five of the six

Based on studies of human populations exposed to high concentrations of particles (sometimes in the presence of sulfur dioxide) and laboratory studies of animals and humans, there are major effects of concern for human health. These include effects on breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular disease, alterations in the body's defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death. The major subgroups of the population that appear to be most sensitive to the effects of particulate matter include individuals with chronic obstructive pulmonary or cardiovascular disease or influenza, asthmatics, the elderly and children. Particulate matter also soils and damages materials, and is a major cause of visibility impairment in the United States.

Particulate matter is more harmful to human health the smaller it is. Fine particles are defined as less than 2.5 micrometers in diameter and are referred to as PM2.5. The coarse fractions of particles are considered to be those between 2.5 and 10 micrometers in diameter. Particles less than 10 micrometers in diameter include both fine and coarse particles and are referred to as PM10. Fine particles pose the greatest health concern because they can pass through the nose and throat and get into the lungs. The TEC has provided estimates of ambient PM10 for this health impact assessment. The proportion of PM2.5 within PM10 can range between 50 and 80 percent (Boldo et al. 2006)

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless and poisonous gas produced by incomplete burning of carbon in fuels. When carbon monoxide enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health threats are most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Exposure to elevated carbon monoxide levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.

77% of the nationwide carbon monoxide emissions are from transportation sources. The largest emissions contribution comes from highway motor vehicles. Thus, the focus of carbon monoxide monitoring has been on traffic oriented sites in urban areas where the main source of carbon monoxide is motor vehicle exhaust. Other major carbon monoxide sources are wood-burning stoves, incinerators and industrial sources.

Ozone

Ozone (O3) is a photochemical oxidant and the major component of smog. While ozone in the upper atmosphere is beneficial to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of ozone at ground level are a major health and environmental concern. Ozone is not emitted directly into the air but is formed through complex chemical reactions between precursor emissions of volatile organic compounds and oxides of nitrogen in the presence of sunlight. These reactions are stimulated by sunlight and temperature so that peak ozone levels occur typically during the warmer times of the year. Both volatile organic compounds and oxides of nitrogen are emitted by transportation and industrial sources. Volatile organic compounds are emitted from sources as diverse as autos, chemical manufacturing, dry cleaners, paint shops and other sources using solvents.

The reactivity of ozone causes health problems because it damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Scientific evidence indicates that ambient levels of ozone not only affect people with impaired respiratory systems, such as asthmatics, but healthy adults and children as well. Exposure to ozone for several hours at relatively low concentrations has been found to significantly reduce lung function and induce respiratory inflammation in normal, healthy people during exercise. This decrease in lung function generally is accompanied by symptoms including chest pain, coughing, sneezing and pulmonary congestion.

National Ambient Air Quality Standards

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards for pollutants considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu g/m^3$).

Table 1: National Ambient Air Quality Standards

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None
	35 ppm (40 mg/m^3)	1-hour(1)	None
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	Revoked(2)	Annual(2) (Arith. Mean)	
	150 µg/m^3	24-hour(1)	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual(3) (Arith. Mean)	Same as Primary
	35 µg/m^3	24-hour(4)	
Ozone	0.08 ppm	8-hour(5)	Same as Primary
	0.12 ppm	1-hour(6) (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-------
	0.14 ppm	24-hour(1)	-------
	-------	3-hour(1)	0.5 ppm (1300 µg/m^3)

Source: www.epa.gov/air/criteria.html

TEC's Ambient Criteria Pollutant Estimates

The Taylor Energy Center will report its emissions for five of the six criteria pollutants to the Florida Department of Environmental Protection and the US Environmental Protection Agency. These include sulfur dioxide, nitrogen dioxide, particulate matter, and carbon monoxide. Appendix One has an overview and discussion of the modeling methodology for estimating the criteria pollutants from TEC. This model estimates the amount of ambient pollutants which are "on the ground, where they are breathed." Taylor Energy Center (TEC) air quality impacts were estimated using five years of meteorological data. Table 1 shows the TEC air quality impact estimates for sulfur dioxide, oxides of nitrogen, particulate matter and carbon monoxide.

The TEC will not report estimates of ambient ozone. Ozone is formed by a complex series of chemical reactions involving primarily oxides of nitrogen and

Table 2: Taylor Energy Center- Preliminary PSD Class II Impacts

Taylor Energy Center–Preliminary PSD Class II Impacts - AERMOD Modeling Results

Pollutant	Averaging Period	Maximum Impacts (µg/m³)					
		[illegible]	2001	[illegible]	[illegible]	2004	Max.
SO_2	Annual	0.735	0.521	0.726	0.884	0.763	0.884
	24-Hour	5.8	4.3	5.5	5.3	5.0	5.8
	3-Hour	14.9	16.3	14.6	13.6	14.0	16.3
NO_2	Annual	0.386	0.274	0.381	0.464	0.401	0.464
PM_{10}	Annual	0.110	0.078	0.109	0.133	0.114	0.133
	24-Hour	0.87	0.64	0.83	0.80	0.76	0.87
CO	8-Hour	23.2	22.3	21.6	22.6	22.6	23.2
	1-Hour	63.9	71.6	53.7	62.7	59.5	71.6

Pollutant	Averaging Period	PSD Class II Standards				
		SIL (µg/m³)	% of SIL (%)	Exceed SIL (Y/N)	Increment (µg/m³)	% of Increment (%)
SO_2	Annual	1	88.4	N	20	4.4
	24-Hour	5	115.9	Y	91	6.4
	3-Hour	25	65.1	N	512	3.2
NO_2	Annual	1	46.4	N	25	1.9
PM_{10}	Annual	1	13.3	N	17	0.8
	24-Hour	5	17.4	N	30	2.9
CO	8-Hour	500	4.6	N	N/A	N/A
	1-Hour	2,000	3.6	N	N/A	N/A

Pollutant	Averaging Period	Florida AAQS		
		AAQS (µg/m³)	AAQS (ppm)	% of AAQS (%)
SO_2	Annual	60	0.02	1.5
	24-Hour	260	0.1	2.2
	3-Hour	1,300	0.5	1.3
NO_2	Annual	100	0.05	0.5
PM_{10}	Annual	50	N/A	0.3
	24-Hour	150	N/A	0.6
CO	8-Hour	10,000	9	0.2
	1-Hour	40,000	35	0.2

SIL = Significant Impact Level
AAQS = Ambient Air Quality Standards
Source: ECT, 2006.
This table was adapted to fit an 8 x 10 page.

volatile organic compounds during warm ambient air temperatures in the presence of sunlight. Since ozone is a secondary pollutant, assessment of ambient ozone impacts is typically conducted on a regional basis rather than for individual emission sources using resource-intensive models. For individual emission sources, such as the TEC, there are no generally accepted methods readily available to estimate ozone impacts.

Scientific evidence points mostly to the harmful health effects of ozone and particulate matter. The health impact assessment will use data reported in Table 2 for calculating the impact on mortality rates or life expectancy from particulate matter only. It is possible to calculate the impact of ozone on local mortality or life expectancy. However without an estimate of the increase in ozone as a result of TEC, these calculations cannot be made.

The Science of Air Pollution and Health

In this section, the results of a review of scientific evidence used in the air pollution section of the health impact assessment are presented. The information gathered will be used to calculate and investigate the impact of the TEC's pollutants on the health of Taylor County residents in phase III of the HIA. The information used for the pollution analysis comes from the latest scientific knowledge (Krzyzanowski et al. 2006). Before describing the findings, it is important that the terminology is clearly understood by all audiences.

There are numerous scientific journal articles published concerning criteria pollutants. Air pollutants are regulated and data are collected in the same way and for the same time periods in countries all over the world, especially in the North America and Europe. Funding has been provided for epidemiologists to use air quality and health outcome data to study effects on human populations. Toxicology and clinical science studies with animals have provided convincing support for the mechanisms of many of the epidemiological studies (Krzyzanowski et al. 2006).

Epidemiologists and others study the effects of the pollutants on people in different locations, among different age groups and sometimes during different seasons. There are two types of studies of humans and pollution, short and long term studies. Short-term studies concern daily (24 hour) fluctuations in air pollution and its effects on daily death rates. Long-term studies follow populations over years and determine the impact of air pollution on health. The World Health Organization and European countries have specialized in short-term studies whereas the United States has specialized in the long-term studies (for more information see Krzyzanowski et al. 2006).

For either short or long term studies, these scientists use statistics to compare, for example, the mortality rate of people exposed to pollutants to the mortality rate of people not exposed to the pollutants in natural settings (non-experimental situations). In simple terms, the average outcomes of people exposed is compared to the average outcomes of people not exposed. But within both the exposed and non-exposed group, there is a great deal of variation in mortality that the statistical methods take into account.

Given the number of studies on the impact of pollution on health, there also is variation in the effects found by the different studies. It is possible to take the "average" impact of a pollutant from the great variety of different scientific studies. This is called a meta-analysis. The short-term pollutant impact studies have been subject to meta-analyses. A meta-analysis takes all available scientific evidence published that meets certain quality criteria and recalculates the effects of the pollutant to compute a summary estimate of health effects. Using meta-analysis provides additional confidence in the impact due to the fact that extreme positive or negative research findings from the variety of scientific evidence are narrowed to average impact. The health impact assessment will use the results of two meta-analyses on short-term effects of criteria pollutants one from the World Health Organization (2004) and another from the journal Epidemiology (Anderson et al. 2005).

Both meta-analyses and individual scientific research efforts use tests of statistical significance to identify effects that are unlikely to have occurred by chance. Statistical significance means that the researchers used methods to determine with 95 percent confidence that the impact found is not due to chance. A statistically significant finding is not considered to be due to random fluctuation. The evidence presented next communicates the effect size as either risk ratios or odds ratios. A risk ratio is the ratio of the percentage of an event occurring in one group to the percentage of an event occurring in another group. Another way to say it is that it is the risk of developing a disease relative to exposure. Odds ratio is defined as the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. Both risk and odds ratios can be estimated from samples and can adjust for other influences. Risk ratios are the easiest to interpret. A risk ratio of 2.0 means the risk, for example, of dying in the year for one group is twice that of another group. A risk ratio of 1.20 would mean that the risk of dying in the year for the one group is 20% higher than the other group.

The latest scientific evidence points to ozone and particulate matter as being the most harmful to human health. Sulfur dioxide is monitored because it is harmful to humans as it attaches to particulate matter (this is a simplified version of the complex chemistry that occurs in the atmosphere, for more information see Schlesinger 2003). Likewise nitrogen oxides are an ingredient in particulate matter and ozone. Epidemiological studies of pollutant exposures concern mixtures of pollutants in outdoor air rather than individual pollutants (World Health Organization 2003). Toxicological research on animals can investigate a single pollutant at a time and this research has further informed epidemiologists.

Next, summary estimates of short-term (or daily) effects of particulate matter (PM10) and ozone are presented. The meta-analyses show that the relationship between PM10 and ozone are linear. For each increase in either pollutant there is an increase in the risk of a poor health outcome. The outcomes presented are mortality, hospitalizations, cough and medication use. In order to conclude that there are negative effects of either particulate matter or ozone, the findings must be statistically significant.

Particulate Matter and Ozone Short-Term Health Effects

Mortality

Table 3 shows the summary estimates for the three short-term mortality outcomes including all-cause, cardiovascular and respiratory mortality for 24-hour PM10 and 8-hour ozone. The increase in daily mortality for each 10 μg/m^3 increase in PM10 was 0.6%, 1.0%, and 0.5% for all-cause, respiratory, and cardiovascular respectively4. The increase in mortality for each 10 μg/m3 increase in 8-hour ozone was 0.2% and 0.4% for all-cause and cardiovascular mortality respectively. The estimate for respiratory mortality and ozone was not statistically significant.

Table 3: Summary of short-term risk ratios estimates (and 95% confidence intervals) for a 10 μg/m^3 increase in pollutant for all-cause and cause specific mortality ж

Mortality	Age	PM10 (24 hour)	Ozone (8-hour)
All-cause	All age	1.006* (1.004, 1.008) 10 studies	1.002* (1.000, 1.003) 8 studies
Respiratory	All age	1.010* (1.001, 1.018) 9 studies	0.999 ('0.995, 1.004) 8 studies
Cardiovascular	All age	1.005* (1.001, 1.010) 10 studies	1.004* (1.003, 1.005) 5 studies

* statistically significant

ж The source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

[4] μg/m^3 is spoken as "micrograms per cubic meter of air"

Hospitalizations

Table 4 shows the summary estimates for two respiratory hospitalization outcomes for a short-term 10 μg/m³ increase in 24-hour PM10 and 8-hour ozone. Neither of the ozone estimates was statistically significant. Three studies were summarized for respiratory hospitalizations for people 65 and older and the short-term summary estimated effect was a 0.7 percent increase in respiratory hospitalizations for a 10 μg/m³ in PM10. Only one study provided evidence for all ages of people with Chronic Obstructive Pulmonary Disease (COPD). Hospitalizations for people with COPD increased by 1.1 percent for each 10 μg/m³ increase in PM10 within a 24 hour period.

Table 4: Summary of short-term risk ratios estimates (and 95% confidence intervals) for a 10 μg/m³ increase in pollutant for respiratory hospital admissions ж

Hospital Admissions	Age	PM10 (24 hour)	Ozone (8-hour)
Respiratory	All ages	COPD 1.011* (1.007-1.015) 1 study (all ages) §	1.001 (0.991, 1.012) 2 studies
Respiratory	65+	1.007* (1.002, 1.013) 3 studies	1.005 (0.998, 1.012) 2 studies

* statistically significant

ж Unless otherwise noted the source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf
§ Anderson HR, Atkinson RW, Peacock JL, Sweeting MJ, and Marston L. 2006. Ambient particulate matter and health effects - Publication bias in studies of short-term associations. Epidemiology 16 (2): 155-163.

Cough

A variety of findings were summarized for cough for patients with chronic respiratory diseases including asthma. Table 5 shows the short-term summary estimates for cough from 24-hour PM10 and 8-hour ozone on children and people of all ages. The particulate matter analysis findings were not statistically significant. The ozone analysis findings were also not statistically significant.

Table 5: Summary of short-term odds ratios (95% confidence intervals) for a 10 µg/m³ increase in pollutant for cough ж			
Cough	Age in years	PM10 (24 hour)	Ozone (8-hour)
Children with asthma or chronic respiratory symptoms	5-15	0.999 (0.987, 1.011) 19 studies	1 study not statistically significant
Populations with asthma or chronic respiratory symptoms	All ages	1.008 § (0.998–1.017) 5 studies	2 studies not statistically significant

ж Unless otherwise noted the source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

§ Anderson HR, Atkinson RW, Peacock JL, Sweeting MJ, and Marston L. 2006. Ambient particulate matter and health effects - Publication bias in studies of short-term associations. Epidemiology 16 (2): 155-163.

Table 6: Summary odds ratios (95% confidence intervals) for a 10µg/m³ increase in pollutant for medication use ж			
Medication use	Age in years	PM10 (24 hour)	Ozone (8-hour)
Children with asthma or chronic respiratory symptoms	5-15	1.005 (0.981, 1.029) 17 studies	1.410* (1.052-1.890) 1 study
Adults with asthma or chronic respiratory symptoms	16-70	Mixed results: 1 out of 4 studies was statistically significant	Mixed results: 1 out of 2 studies was statistically significant

* statistically significant

ж The source is "Meta-analyses of time-series studies and panel studies of particulate matter and ozone," Report of a World Health Organization Task Force. www.euro.who.int/document/e82792.pdf

Medication Use

Table 6 shows the impact on short-term medication use from particles and ozone on children and adults with asthma or chronic respiratory symptoms. PM10 analysis findings for symptomatic children were not statistically significant. Particulate matter findings for symptomatic adults were mixed with one out of four studies finding a statistically significant impact. Only one study was cited for ozone and symptomatic children. It found that there was a 41.0 percent increase in medication use for each 10 µg/m^3 increase in an 8 hour ozone measurement. The confidence interval on this single study is large and suggests the need for more research to validate the findings. Mixed results were identified for symptomatic adults and 8-hour ozone increases with one out of two studies with statistically significant findings.

Particulate Matter and Ozone Long-Term Health Effects

Long-term exposure (16 years) to combustion related fine-particles of air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality (Pope et al. 2002). Table 7 shows that fine particulate matter (PM2.5) is associated with all cause, lung cancer, and cardiopulmonary mortality. Each 10µg/m^3 increase in PM2.5 is associated with approximately a 4%, 6% and 8% increase in risk of all-cause, lung cancer, and cardiopulmonary mortality, respectively. The risk of premature mortality is even higher for former and current smokers (Pope et al. 2004).

Table 7: Adjusted long-term risk ratios associated (and 95% confidence intervals) with a 10ug/m3 increase in PM2.5 pollutant for all-cause, lung cancer and cardiopulmonary mortality

Outcome/Disease	PM10
All-cause	1.04 (1.02, 1.08)
Cardiopulmonary	1.06 (1.02, 1.10)
Lung Cancer	1.08 (1.01, 1.05)

** not statistically significant
Source: Pope, et al. 2002

Health Impact Assessment and PM10 calculations

In the third and final phase of the health impact assessment, *Healthy Development* will calculate the short-term impact of the PM10 increase from TEC on all cause, respiratory and cardiovascular mortality rates for Taylor County residents. Additionally, *Healthy Development* will calculate the long-term impact of the TEC increase in PM10 (converted to PM2.5) on all cause, cardiopulmonary and lung cancer mortality rates. The risk ratios in for particulate matter from Table3 and Table 7 will be used in the calculations. The impact on short-term hospitalizations, cough and medication use will be explored with respect to the Taylor County populations and the findings from the mortality rate calculations.

The Science of Income and Health

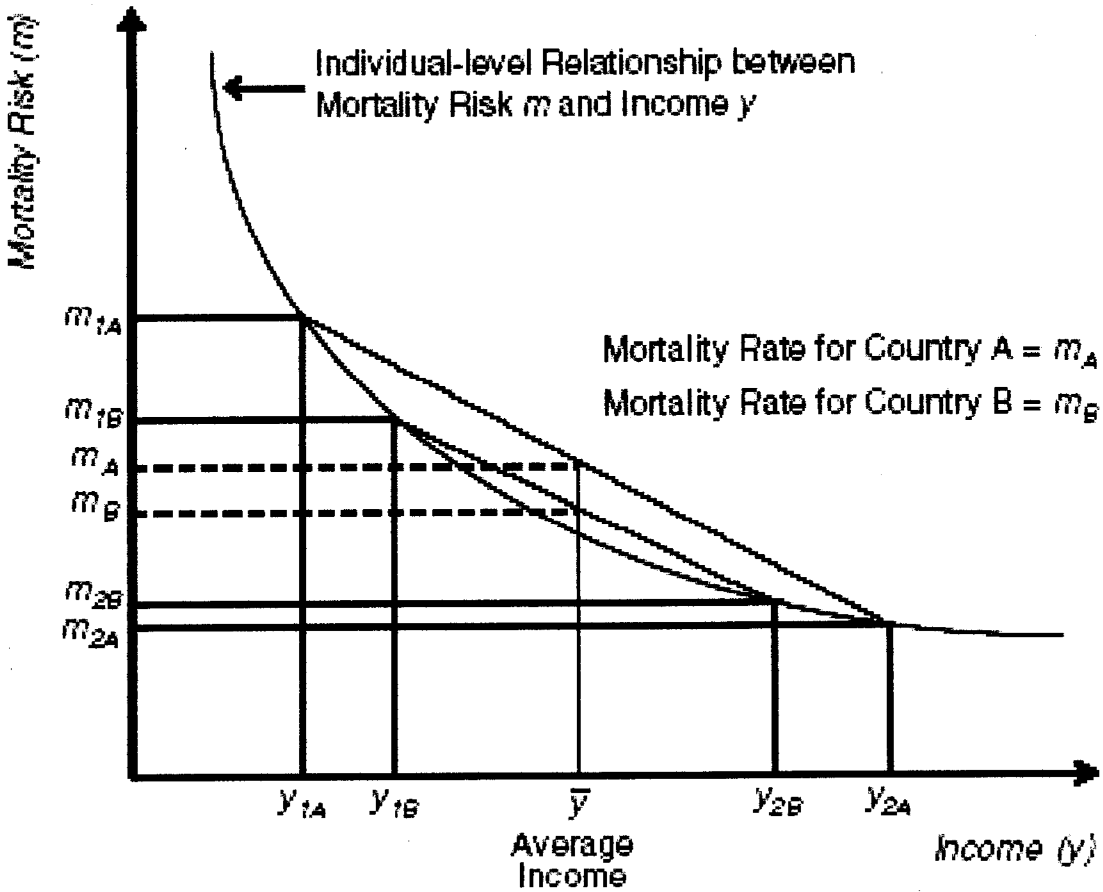
The scientific information available for the association between economic development, jobs and health is not as specific as the research on pollution. The pollution studies use the same measurement and definitions of a certain pollutant and investigate defined populations. This uniformity is likely due to the influence of funding and regulations on the way pollutants are defined as well as to a large pool of international experts writing about and researching the same pollutants.

Economic development is defined in a variety of ways and investigated at the micro, meso and macro-economic levels. Economic development is an ongoing practice at all levels of government, but is not regulated and differs in all political and economic contexts. Meta-analyses are not feasible because of the variety of ways of defining and investigating the relationship of economic development and health.

Nevertheless, the scientific evidence and number of studies on the relationship between health and economic development is large. For this portion of the assessment, systematic review papers about the impacts of income on health will be used to guide the assessment. Unlike a meta-analysis which provides effects as risk ratios or odds ratios, the systematic literature reviews used for this health impact assessment provide information about the proper methodology to use to determine the impact of income on health. In phase III, *Healthy Development* will adapt the methodology identified in the review papers to calculate the impact of the jobs and income on health using mortality data from Taylor County and the State of Florida.

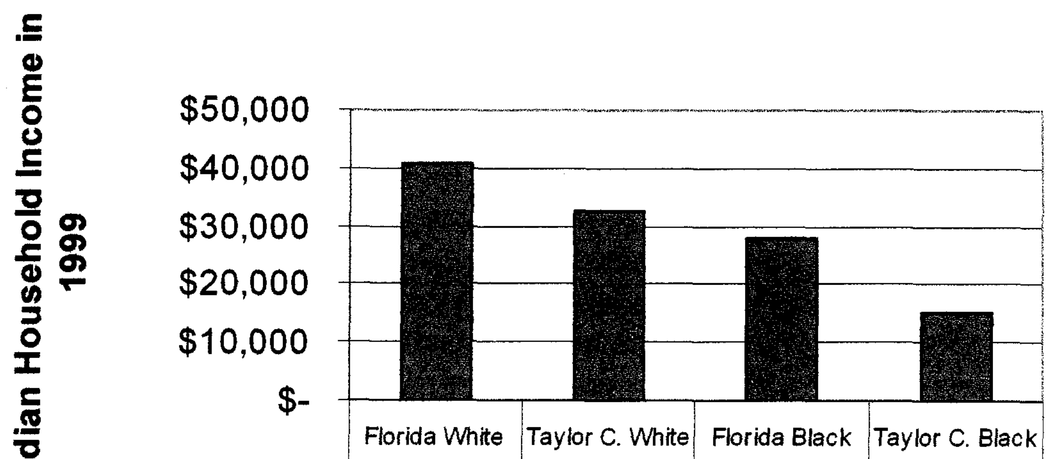
Health and income inequality are largely found to be inversely related (Figure 1, Lynch et al. 2004; Wagstaff and van Doorslaer 2000). Extensive evidence strongly supports the notion that individual health is a function of individual income. In other words, health status improves as income increases. In Figures 2 and 3, the inverse relationship between income and mortality for whites and blacks in Florida and Taylor County is evident.

Figure 1: Relationship between income and health



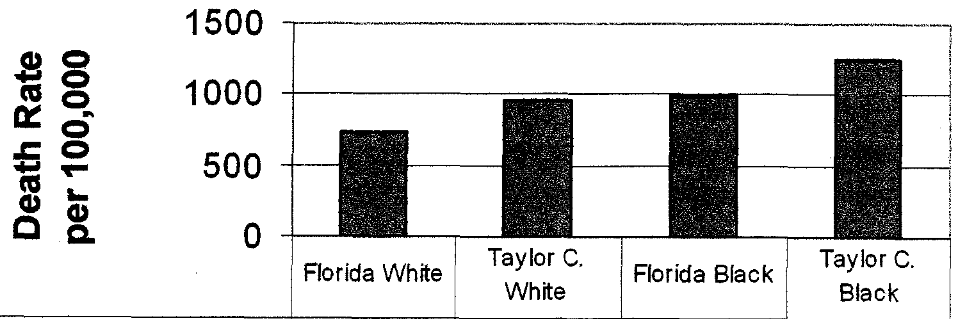
Source: Lynch et al. 2004

Median Household Income for the State and Taylor County by White and Black Race in 1999



	Florida White	Taylor C. White	Florida Black	Taylor C. Black
Median Household Income in 1999	$40,819	$32,587	$28,033	$15,149

Resident Age Adjusted 3-Year Death Rates by White and Black, 2002-2004



	Florida White	Taylor C. White	Florida Black	Taylor C. Black
Resident Age Adjusted 3 year Death Rates by White and Black, 2002-2004	726.1	955.5	985.1	1243.6

Reducing income inequality by raising the incomes of more disadvantaged people will improve the health of poor individuals, help reduce health inequalities, and increase average population health.

Health Impact Assessment and Calculations of Income and Individual Risk of Mortality

Because there are no summary estimates of the impact of income on health, *Healthy Development* with calculate the impact of income on the risk of mortality for individuals that work for TEC. This is an analysis of the direct jobs created by TEC. A number of indirect jobs will also be created for people who provide services to TEC and it's employees, such as office suppliers and restaurants respectively. *Healthy Development* will investigate the impact of indirect job creation and the health of Taylor county residence.

The data that will be used for this analysis is the US Census median individual income and mortality rates for Taylor County and the State of Florida for white and black races. The analysis will start from the assumption that 66 current Taylor County residents will be hired for permanent positions within the TEC by 2014.

Smoking Attributable Mortality Analysis

Tobacco use is one of the major avoidable causes of cancer and cardiovascular diseases. Taylor county residents have high smoking rates compared to the rest of the state. Heart disease, cancer and stroke are the top three causes of death in the county. *Healthy Development* will calculate the smoking attributable mortality for the county (CDC 2002). This calculation will show the number of deaths of Taylor County residents that can be attributed to smoking.

As with most health risk behaviors, smoking is greatest among the most economically disadvantaged groups. Despite the advice and assistance to quit smoking, many people continue to smoke. Research has shown that smoking can be enjoyable and relaxing for people with insecure jobs, poor housing and high stress (Lawlor et al. 2003).

Conclusion--Phase III

Phase III will calculate and explain the impacts of the TEC air pollution on the health of Taylor County residents using the scientific literature surveyed above with local population data. Additionally, Phase III will calculate and explain the impacts of TEC employment on the risk of death for employees of TEC using different scenarios of employment and demographic characteristics. Recommendations will be made as to how best mitigate expected negative impacts of TEC and optimize forecasted positive impacts.

Bibliography

Anderson, H.R., Atkinson, R.W., Peacock, J.L., Sweeting, M.J., and Marston, L. 2005. Ambient particulate matter and health effects: publication bias in studies of short-term associations. Epidemiology vol. 16, pp. 155-163.

Boldo E, Medina S, LeTertre A, Hurley F, Mucke HG, Ballester F, Aguilera I, and Eilstein D. 2006. Apheis: Health impact assessment of long-term exposure to PM2.5 in 23 European cities. European Journal of Epidemiology, 21, pp. 449-458.

Centers for Disease Control and Prevention. 2002. Annual Smoking-Attributable Mortality, Years of Potential Life Lost, and Economic Costs --- United States, 1995—1999 Morbidity and Mortality Weekly Review vol. 51, no. 14, pp. 300-303. http://www.cdc.gov/MMWR/preview/mmwrhtml/mm5114a2.htm 10/5/2006

Cohen AJ, Anderson HR, Ostro B, Dev Pandey K, Krzyzanowski M, Künzli N, Gutschmidt K, Pope CA, Romieu I, Samet JM and Smith KR. 2004. "Chapter 17: Urban Air Pollution" in Comparative Quantification of Health Risks Global and Regional Burden of Diseases Attributable to Selected Major Risk Factors, Volume 2, pp 1394.

Hall GV, D'Souza RM, and Kirk MD. 2002. Foodborne disease in the new millennium: out of the frying pan and into the fire? Medical Journal of Austrailia vol 177, no. 11/12, pp. 614-618.

Hampton T. 2006. Researchers study the health effects of environmental change. JAMA: Journal of the American Medical Association, vol. 296, no. 8, pp. 918-920.

Krzyzanowski M, Cohen A, Anderson R, and the WHO Working Group. 2006. Quantification of health effects of exposure to air pollution. Occupational and Environmental Medicine vol. 59, pp. 791-793.

Lawlor DA, Frankle S, Shaw M, Ebrahim S, and Smith GD. 2003. Smoking and ill health: Does lay epidemiology explain the failure of smoking cessation programs among deprived populations. Journal of Public Health vol. 93, pp. 266-270.

Lynch J, Smith GD, Harper S, Hillemeir M, Ross N, Kaplan GA, and Wolfson M. 2004. Is Income Inequality a Determinant of Population Health? Part 1. A Systematic Review. Milbank Quarterly vol. 82, pp. 5-99)

North Central Florida Regional Planning Council. 2005. Economic Impact Analysis of the North Florida Power Plant 2005 Taylor County Florida.

Pope CA, Burnett RT, Thun MJ, et al. 2002. Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate air pollution. JAMA: Journal of the American Medical Association vol. 287, pp. 1132-1141.

Pope CA. 2005. Personal Communication 9/17/2005

Pope CA, Burnett RT, Thurston GD, Thun MJ, Calle EE, Krewski D, and Godleskim JJ. 2004. Cardiovascular Mortality and Long-Term Exposure to Particulate Air Pollution: Epidemiological Evidence of General Pathophysiological Pathways of Disease. Circulation vol. 109, pp. 71-77.

Schlesinger RB. 2003. Atmospheric secondary inorganic particulate matter: the toxicological perspective as a basis for health effects risk assessment. Inhalation Toxicology, 15:197–235, 2003

Subramanian SV, Belli P, and Kawachi I. 2002. "The macroeconmic determinants of health" Annu. Rev. Public Health 23:287–302

United Nations Intergovernmental Panel on Climate Change, Houghton JT, and Ding Y, co-chairs. 2001. Climate Change 2001: The Scientific Basis. Cambridge, England: Cambridge University Press.

Wagstaff A, and van Doorslaer ED. 2000. Income inequality and health: What does the literature tell us? Annual Review of Public Health vol. 21, pp. 543-567.

World Health Organization Task Force. 2004. Meta-analyses of time-series studies and panel studies of particulate matter and ozone. www.euro.who.int/document/e82792.pdf 10/6/2006

United Nations Intergovernmental Panel on Climate Change. Edited by Houghton JT, Ding Y, Griggs DJ, Noguer M, van der Linden PJ and Xiaosu D. Climate Change 2001: the Scientific Basis. Cambridge University Press; Cambridge UK.

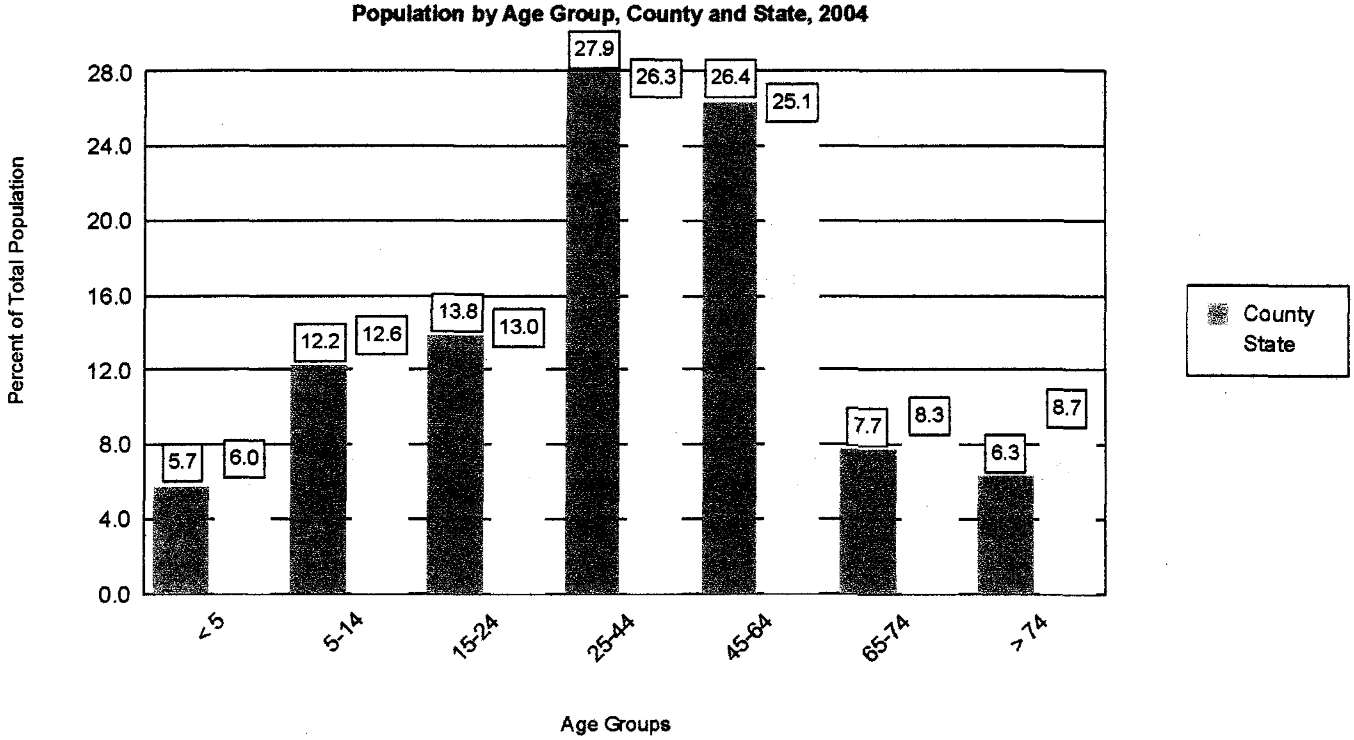
Appendix One: Taylor Energy Center Preliminary PSD Class II Modeling

Population by Age and Gender

Age group	County - 2004 Number Male	Number Female	Number Total	Percentage Male	Percentage Female	Percentage Total	State - 2004 Percentage Male	Percentage Female	Percentage Total
< 5	616	587	1,203	5.5	5.9	5.7	6.2	5.7	6.0
5-14	1,300	1,270	2,570	11.7	12.9	12.2	13.1	12.1	12.6
15-24	1,573	1,330	2,903	14.2	13.5	13.8	13.6	12.4	13.0
25-44	3,480	2,370	5,850	31.3	24.0	27.9	27.1	25.6	26.3
45-64	2,825	2,705	5,530	25.4	27.4	26.4	24.6	25.5	25.1
65-74	745	865	1,610	6.7	8.8	7.7	7.9	8.8	8.3
> 74	564	756	1,320	5.1	7.6	6.3	7.5	9.9	8.7
Total	11,103	9,883	20,986	100.0	100.0	100.0	100.0	100.0	100.0

Data Source: Population Estimates from the Executive Office of the Governor

Population by Age Group, County and State, 2004



Population Trends (1990-2000)

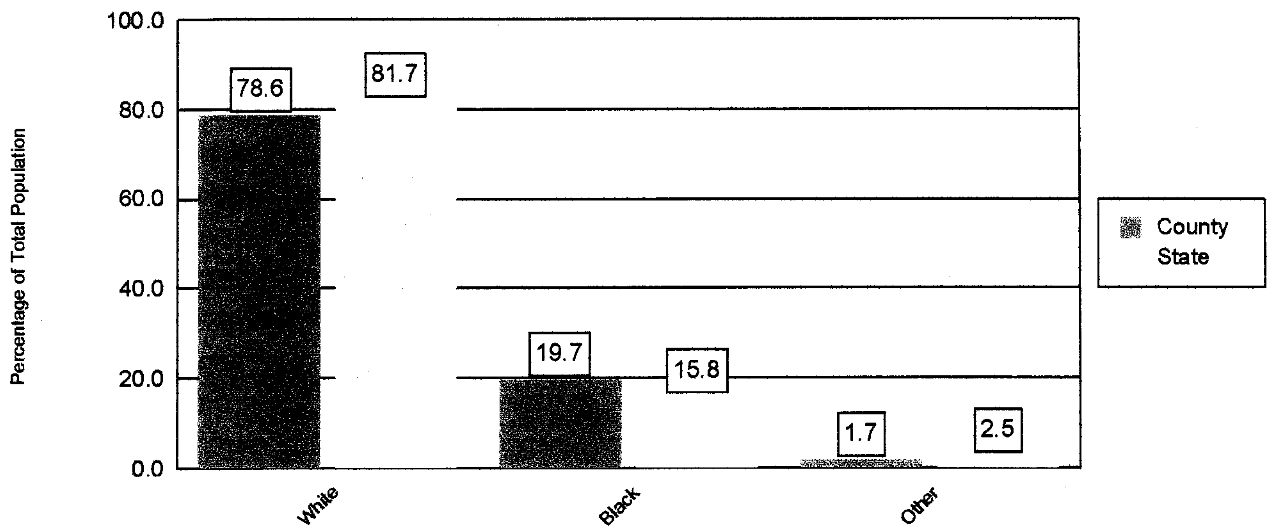
1990 Population	2000 Population	Net Change	Percent Change 1990-2000	Percent Change-State 1990-2000	Population Density - 2000 (persons/sq. mi.)	Population Density -State -2000 (persons/sq. mi.)
17,111	19,256	2,145	12.5	23.5	18.5	296.4

Population by Race

	COUNTY		STATE
Race	Population	Percentage	Percentage
White	16,487	78.6	81.7
Black	4,132	19.7	15.8
Other	358	1.7	2.5
TOTAL	20,977	100.0	100.0

Data Source: Population estimates from the Office of the Governor

Population Percentage by Race, County and State, 2004

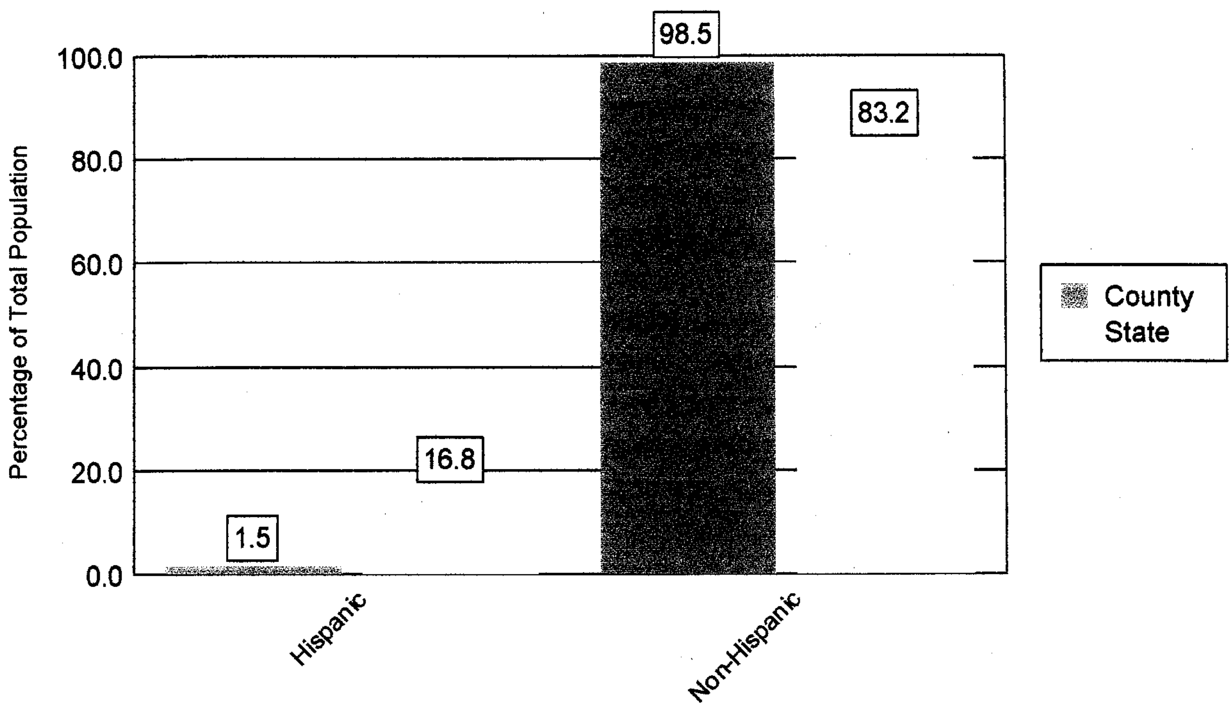


Hispanic Population

	COUNTY		STATE
Ethnicity	Number	Percentage	Percentage
Hispanic	295	1.5	16.8
Non-Hispanic	18,961	98.5	83.2
Total	19,256	100.0	100.0

Data Source: 2000 U.S. Census, Data includes all races

Hispanic Population Percentage, County and State, 2000

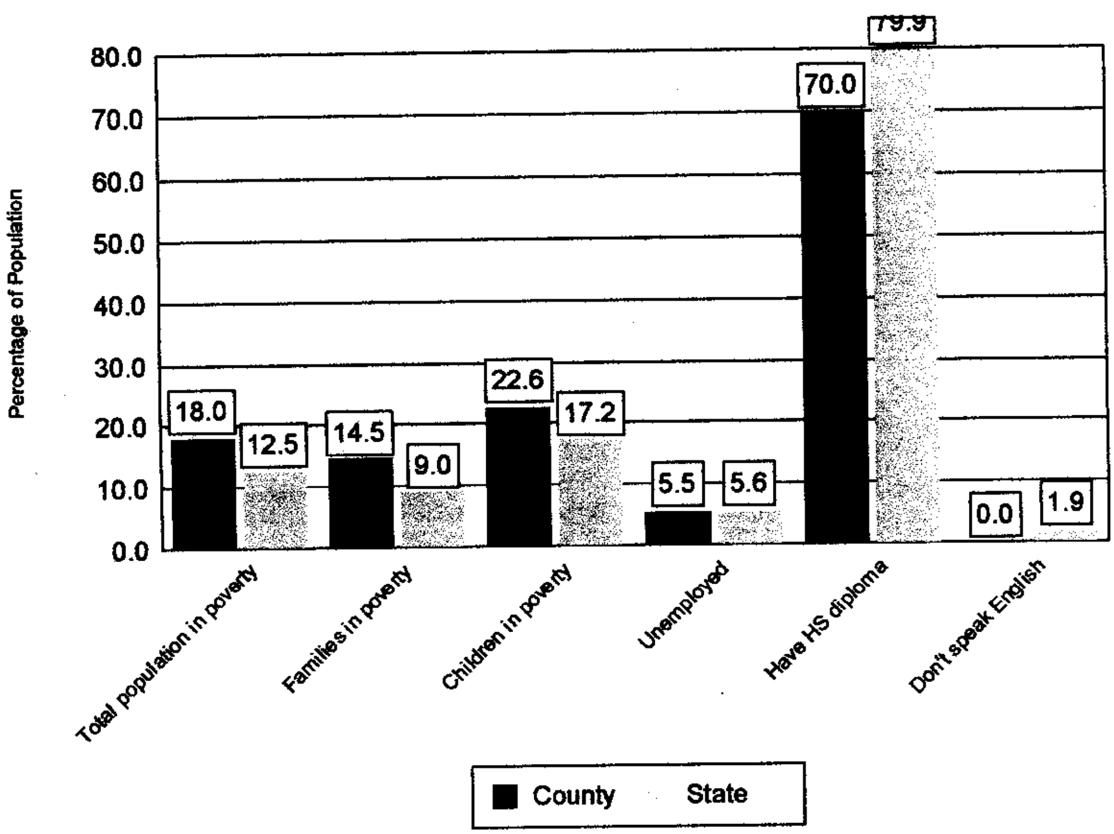


Socioeconomic Indicators

	COUNTY			STATE
	1990	2000	Quartile	2000
Percent of total population below poverty level	20.7	18.0	3	12.5
Percent of families below poverty level	16.1	14.5	4	9.0
Percent of population under 18 below poverty level	31.7	22.5	3	17.2
Percent of civilian labor force which is unemployed	7.5	5.5	3	5.6
Median household income	21,380	30,032	1	38,819
Percent of population > 25 with a high school diploma	62.0	70.0	1	79.9
Percent of population > 5 that doesn't speak English		0.0	1	1.9
Median age		37.8	2	38.7

Data Source: 2000 U.S. Census

Selected Socioeconomic Indicators, County and State, 2000

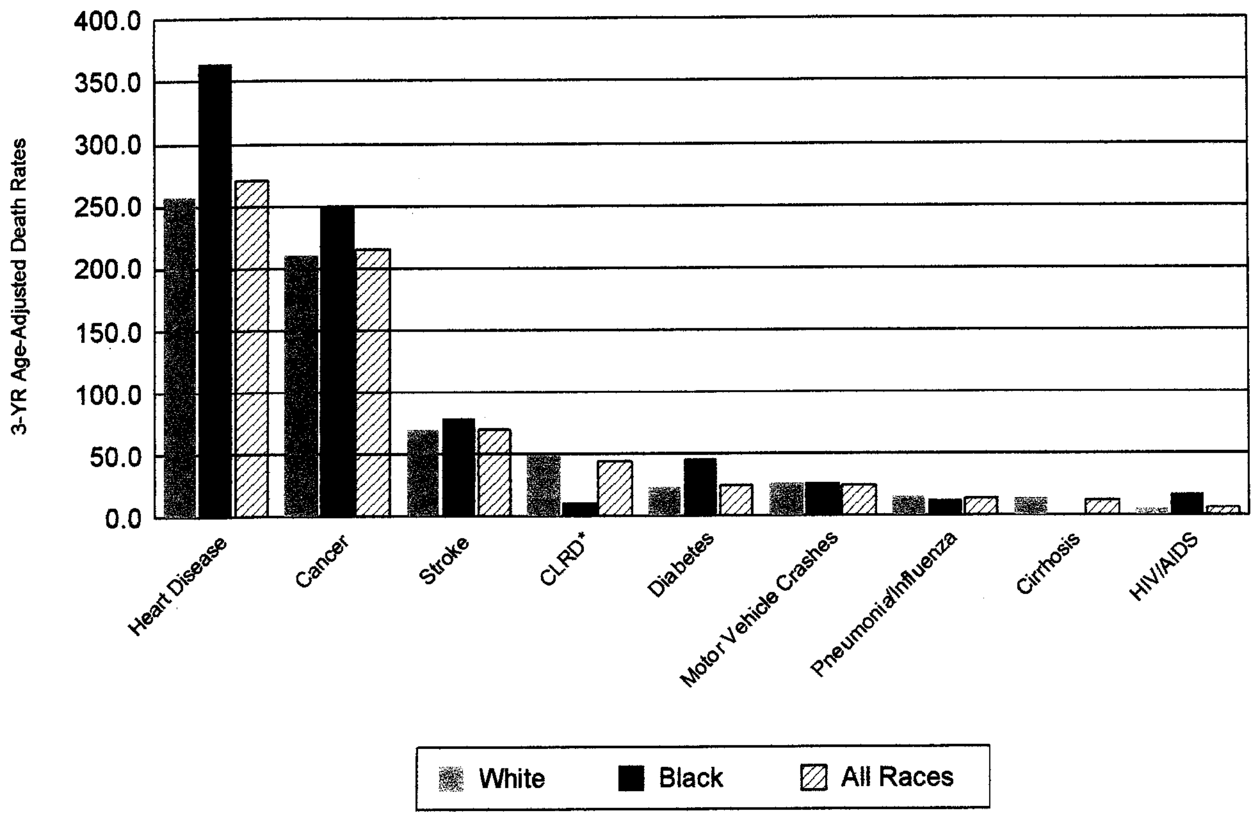


Major Causes of Death

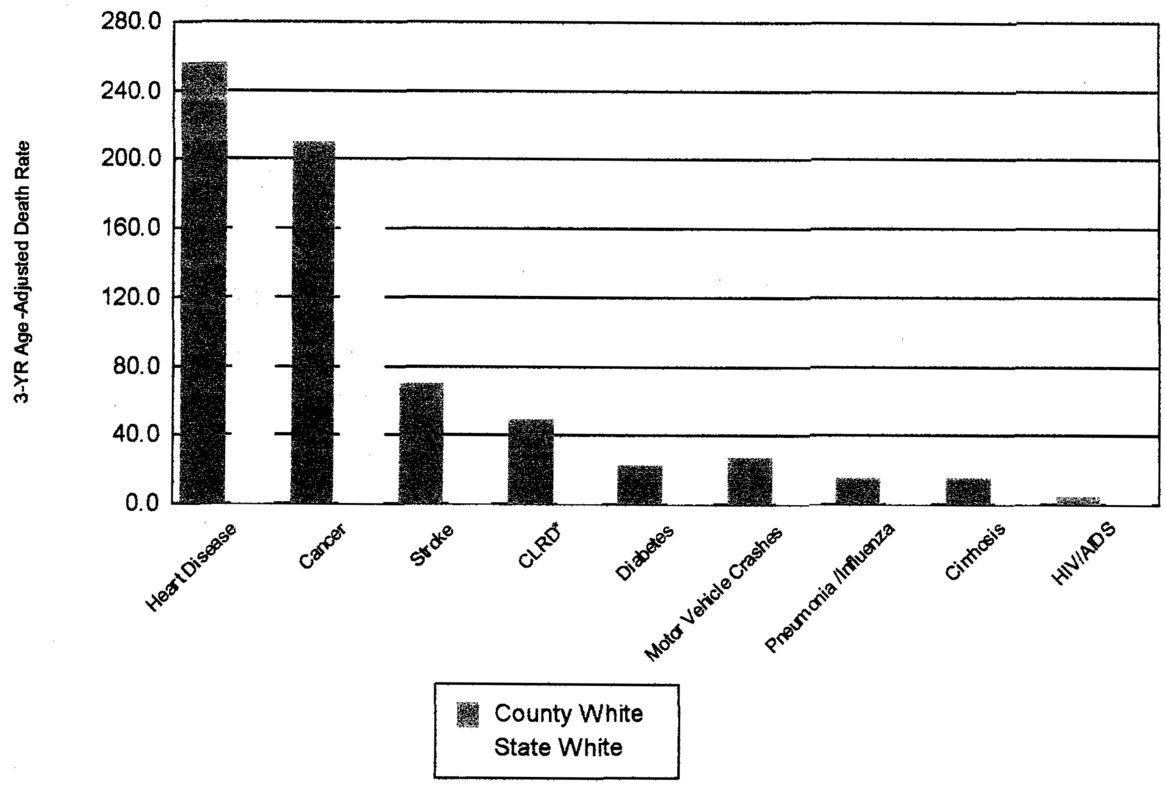
Resident 3-Year Age-Adjusted Death Rates 2002-04 by Cause	COUNTY						STATE		
	White	Quartile	Black	Quartile	All Races	Quartile	White	Black	All Races
Total Deaths	955.5	4	1,243.6	4	985.2	4	726.1	985.1	748.4
Heart Disease	256.4	4	363.8	4	269.9	4	199.2	266.9	204.3
Cancer	209.8	4	249.5	3	215.3	4	173.0	205.9	174.7
Stroke	69.2	4	79.4	2	70.3	4	39.0	75.2	42.0
CLRD*	49.2	3	10.9	1	43.9	2	39.1	26.6	38.1
Diabetes	22.6	3	46.5	2	25.3	3	18.4	50.3	20.8
Motor Vehicle Crashes	26.8	3	26.1	3	24.9	3	19.0	18.5	18.5
Pneumonia/Influenza	15.2	2	13.0	2	13.9	2	12.7	17.2	13.1
Cirrhosis	14.9	4	0.0	1	12.7	3	11.3	7.4	10.7
AIDS/HIV	4.7	4	16.7	2	6.5	3	4.6	43.6	10.2

Data Source: Florida Office of Vital Statistics
*Chronic Lower Respiratory Disease

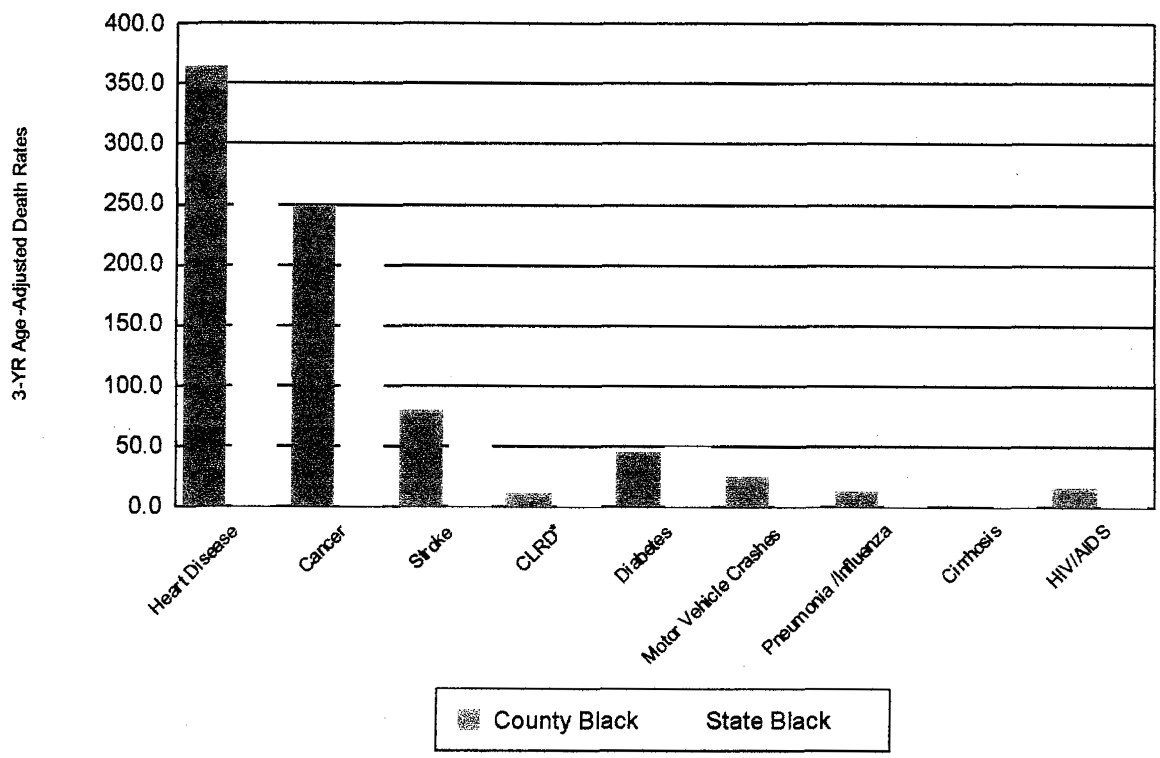
3-Year Age-Adjusted Death Rates for Major Causes of Death by Race, County, 2002-2004



3-Year Age-Adjusted Death Rates for Major Causes of Death, White, County and State, 2002-2004



3-Year Age-Adjusted Death Rates for Major Causes of Death, Black, County and State, 2002-2004

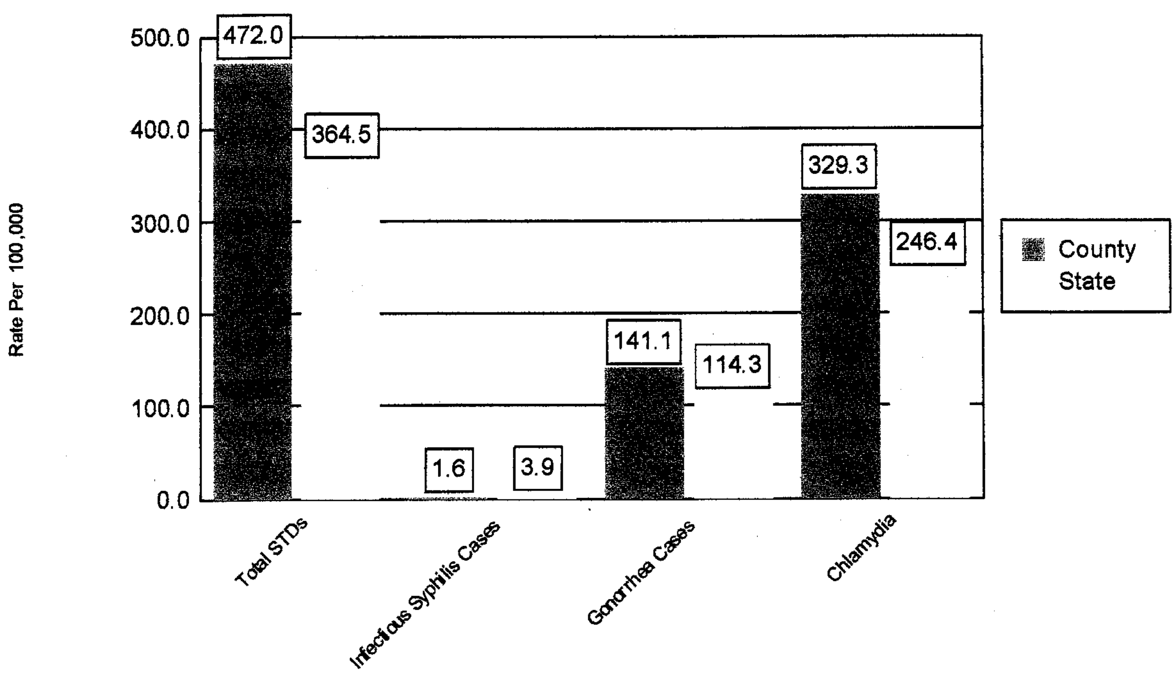


Communicable Diseases

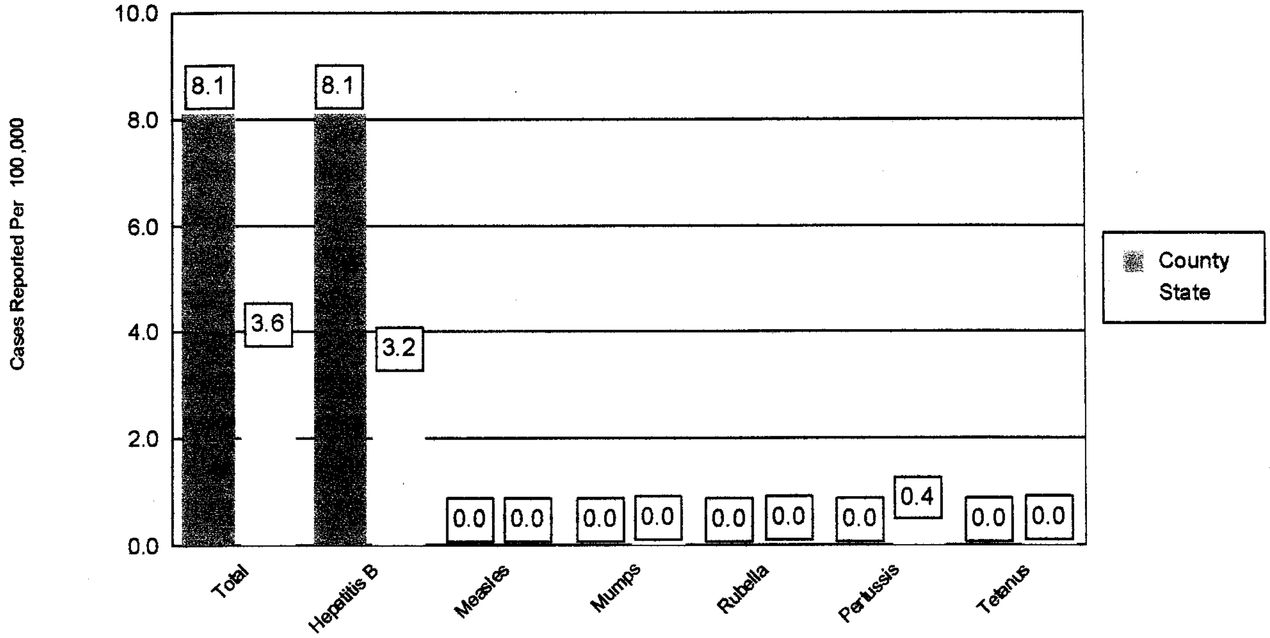
	COUNTY			STATE
	Number of Cases (annual avg.) 2002-2004	3-Yr Rate per 100,000 2002-2004	Quartile	3-Yr Rate per 100,000 2002-2004
Sexually Transmitted Diseases (STD)				
Total Gonorrhea, Chlamydia & Infectious Syphilis	97.0	472.0	4	364.5
Infectious Syphilis Cases	0.3	1.6	4	3.9
Gonorrhea Cases	29.0	141.1	4	114.3
Chlamydia	67.7	329.3	4	246.4
Vaccine Preventable Diseases				
Vaccine Preventable Diseases Total	1.7	8.1	4	3.6
Hepatitis B Cases	1.7	8.1	4	3.2
Measles	0.0	0.0	1	0.0
Mumps	0.0	0.0	1	0.0
Rubella	0.0	0.0	1	0.0
Pertussis	0.0	0.0	1	0.4
Tetanus	0.0	0.0	1	0.0
AIDS and Other Diseases				
AIDS Cases	1.7	8.1	1	29.9
Meningococcal Meningitis	0.0	0.0	1	0.2
Hepatitis A Cases	0.0	0.0	1	3.2
Tuberculosis Cases	0.0	0.0	1	6.2

Data Source: Division of Disease Control, Florida Department of Health

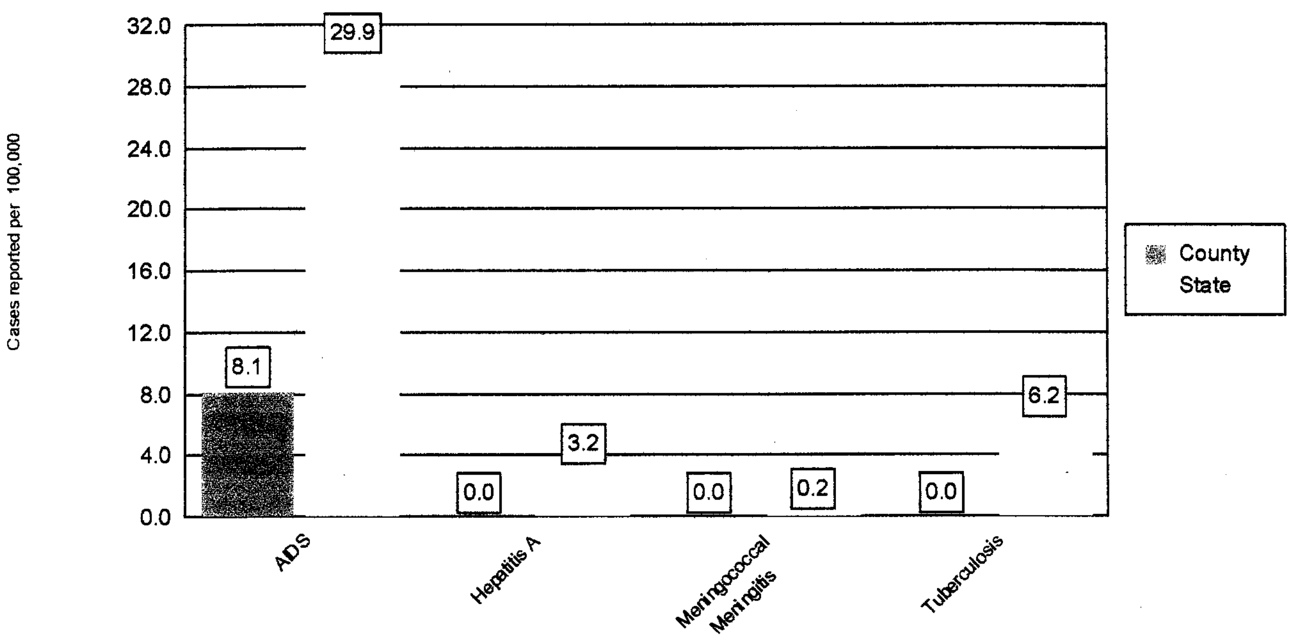
Reported Sexually Transimitted Disease Cases per 100,000, County and State, 2002-2004



Reported Vaccine Preventable Disease Cases per 100,000, County and State, 2002-2004



Reported Cases of AIDS, Hepatits A, Meningitis and TB per 100,000, County and State, 2002-2004



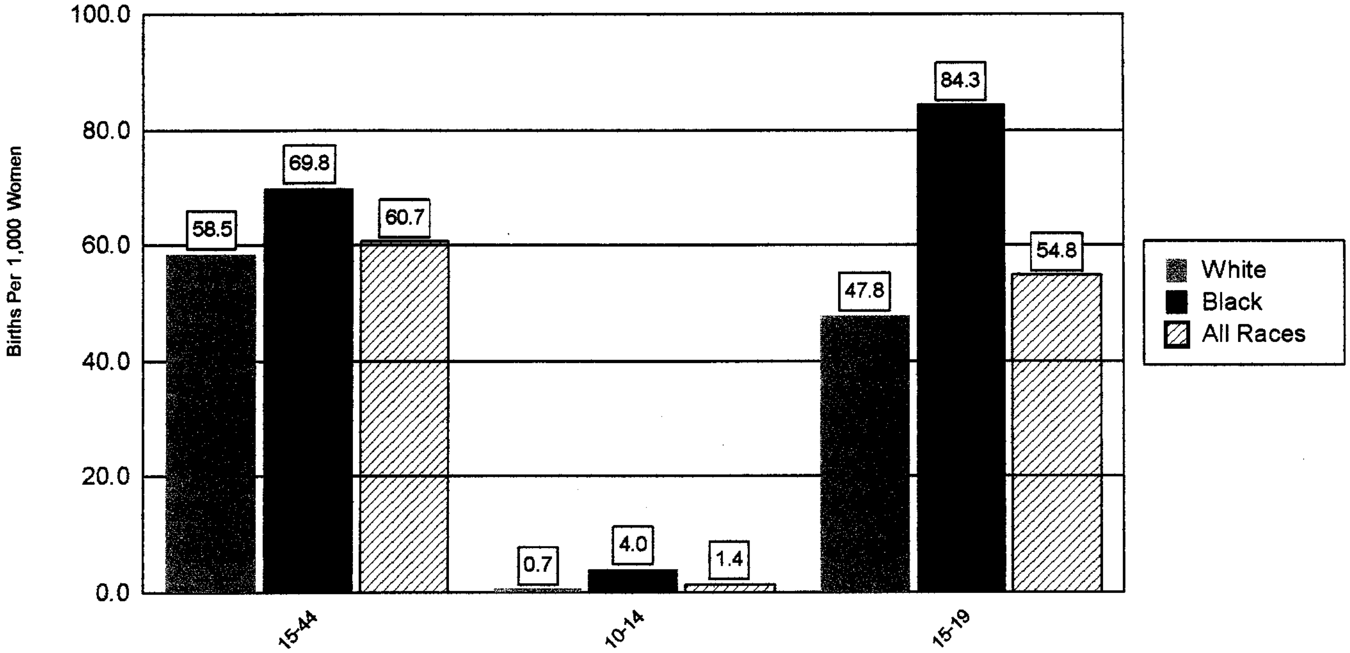
Maternal & Child Health

Indicator (3-YR Figures, 2002-04)	COUNTY White**	Quartile	Black**	Quartile	Hispanic	Quartile	All Races	Quartile	STATE
Births									
Total Births (3-yr annual avg.)	171.0	1	49.7	2	2.7	1	224.0	1	
Births to Mothers ages 15-44, per 1,000*	58.5	2	69.8	3			60.7	2	62.8
Births to Mothers ages 10-14, per 1,000*	0.7	3	4.0	4			1.4	4	0.7
Births to Mothers ages 15-19, per 1,000*	47.8	2	84.3	4			54.8	3	42.8
Percent of Births to Unwed Mothers	36.6	3	87.9	4	12.5	1	47.8	4	40.2
Infant Deaths									
Infant Deaths (0-364 days) per 1,000 Births	13.6	4	6.7	1	125.0	4	13.4	4	7.3
Neonatal Deaths (0-27 days) per 1,000 Births	7.8	4	6.7	2	0.0	1	7.4	4	4.8
Postneonatal Deaths (28-364 days) per 1,000 Births	5.8	4	0.0	1	125.0	4	6.0	4	2.6
Low Birth Weight									
Percent of Births < 1500 Grams	1.6	4	5.4	4	0.0	1	2.5	4	1.6
Percent of Births < 2500 Grams	6.0	1	14.8	3	0.0	1	8.2	3	8.5
Prenatal Care									
Percent of Births with 1st Trimester Prenatal Care	90.6	4	79.6	3	100.0	4	88.0	4	84.1
Percent of Births with Late or No Prenatal Care	1.4	1	2.1	1	0.0	1	1.6	1	3.3

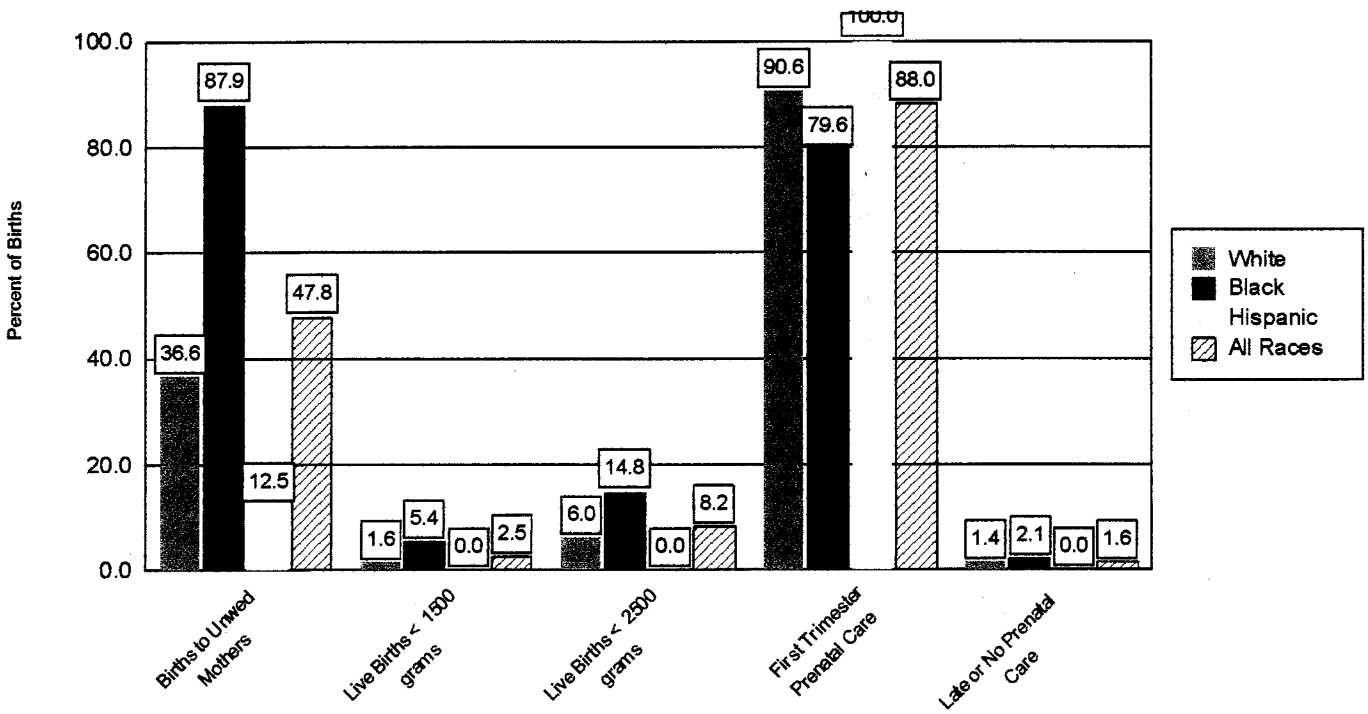
Data Source: Florida Department of Health
*Hispanic data not available after 1999
**Non-Hispanic

Important note regarding prenatal care data
Starting in 2004, trimester prenatal care began is calculated as the time elasped from the date of the last menstrual period to the date of the first prenatal care visit. Prior to 2004, these data were obtained by direct question that noted the trimester the mother began prental care. Consequently, these data are not comparable to that from prior years. Births with unknown information as to when prenatal care began are excluded from the denominator.

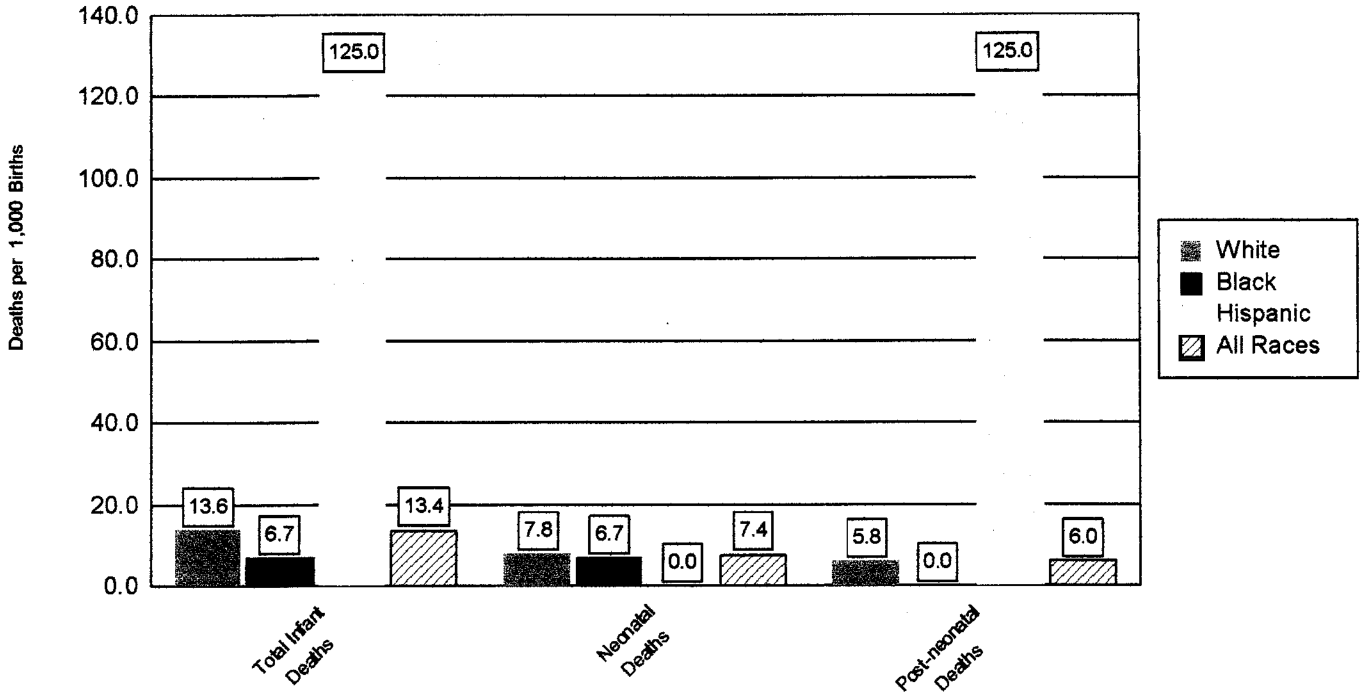
Births Per 1,000 Women By Age and Race of Mother, County, 2002-2004



Percent of Births by Marital Status, Birth Weight and Prenatal Care, County, 2002-2004



Infant Deaths per 1,000 Live Births, County, 2002-2004



Behavioral Risk Factors

	COUNTY 2002			STATE 2002	
	Percent	95% CI (+/-)	Quartile	State Percent	95% CI (+/-)
Alcohol and Tobacco Use					
Adults who currently smoke	31.2	5.1	4	22.2	1.1
Adults who engage in heavy or binge drinking	10.6	3.1	2	14.1	1.0
Adults who have ever quit smoking in last 12 months	56.6	10.6	3	55.3	2.6
Asthma	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have ever been told by a doctor or health professional that they have asthma	10.8	3.1	2	10.7	0.8
Adults who still have asthma (of those who have ever had asthma)	78.8	11.9	4	60.4	4.0
Colorectal Cancer Screening	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults over 50 who have ever had a blood stool test	42.8	6.8	2	44.4	1.7
Adults over 50 who have ever had a sigmoidoscopy	47.7	6.8	1	52.6	1.8
Adults over 50 who have had a blood stool test in past 2 years	29.3	6.2	2	33.5	1.6
Diabetes	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been told by a doctor that they have diabetes	7.8	2.5	2	8.2	0.6
Health Care Coverage & Access	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who were unable to get medical care in last 12 months	11.8	3.3	4	8.7	1.0
Adults with no health care coverage	28.0	5.3	4	18.7	1.0
Adults with no personal health care providers	24.6	5.0	3	23.9	1.2
Health Status	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults mostly sitting/standing at job	51.5	8.8	1	62.8	1.7
Adults with health status "Fair" or "Poor"	23.6	4.2	3	16.7	1.0
High Cholesterol	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been told by a doctor or other health professional that their blood cholesterol is high	39.7	5.8	4	35.2	1.3
Adults who have ever had their blood cholesterol checked	77.8	4.9	1	83.1	1.1
Adults who have had their cholesterol checked in last 2 years (if they have ever been checked)	89.7	3.6	2	91.8	0.7
HIV/AIDS	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults under 65 who have ever been tested for HIV	43.5	6.4	2	47.7	1.6
Adults under 65 who have had HIV test within past year (for those who have been tested)	89.5	3.8	4	86.7	1.0
Adults whose doctor has talked to them about preventing STDs through condom use.	16.1	4.3	3	16.3	1.6

Hypertension	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults now taking HBP medicine (if they have HBP)	81.3	6.7	3	76.0	2.0
Adults who have been told by a doctor or other health professional that they have high blood pressure	29.7	4.6	2	27.7	1.1

Mammogram & Pap Smears	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adult women who have ever had a pap smear test	96.1	3.2	3	93.5	1.0
Adult women who have had a pap smear test in past 2 years	72.3	10.6	1	82.2	1.5
Women over 40 who have had a mammogram within past 2 years (for those who have had a mammogram)	70.7	6.9	1	79.0	1.5

Nutrition	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who consume < 5 fruits and vegetables a day	77.2	4.7	3	74.3	1.2
Adults who have been advised by a doctor, nurse, or other health professional to eat fewer high fat or cholesterol foods	18.6	3.9	2	21.0	1.1
Adults who have been advised by a doctor, nurse, or other health professional to eat more fruits and vegetables	25.1	4.4	2	27.9	1.2

Oral Health	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have had their teeth cleaned within past year	56.0	5.9	1	70.5	1.3
Adults who visited a dentist within past year	56.1	5.4	1	70.2	1.4
Adults with no teeth removed	32.0	5.3	1	46.7	1.3

Physical Activity	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have been advised by a doctor, nurse, or other health professional to be more physically active	25.2	4.5	2	28.0	1.3
Adults with no leisure time physical activity	36.8	5.5	4	26.4	1.2
Adults with no regular moderate physical activity	54.2	5.5	2	55.1	1.3
Adults with no regular vigorous physical activity	80.6	4.1	4	75.6	1.2

Pneumonia/Influenza	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who have ever had a pneumonia shot	21.5	4.3	2	22.7	0.9
Adults who have received a flu shot at CHD	5.9	2.4	4	1.2	0.2
Adults who have received a flu shot within last 12 months	24.0	4.3	2	26.2	1.0

Overweight/Obesity	Percent	95% CI (+/-)	Quartile	State percent	95% CI (
Adults who are obese (BMI >= 30)	30.4	4.7	4	22.3	1.0
Adults who are overweight (BMI >= 25 to < 30)	35.0	5.7	3	35.1	1.2
Adults who have received advice from a doctor or other health professional about their weight in past 12 months	23.5	5.2	4	21.1	1.1

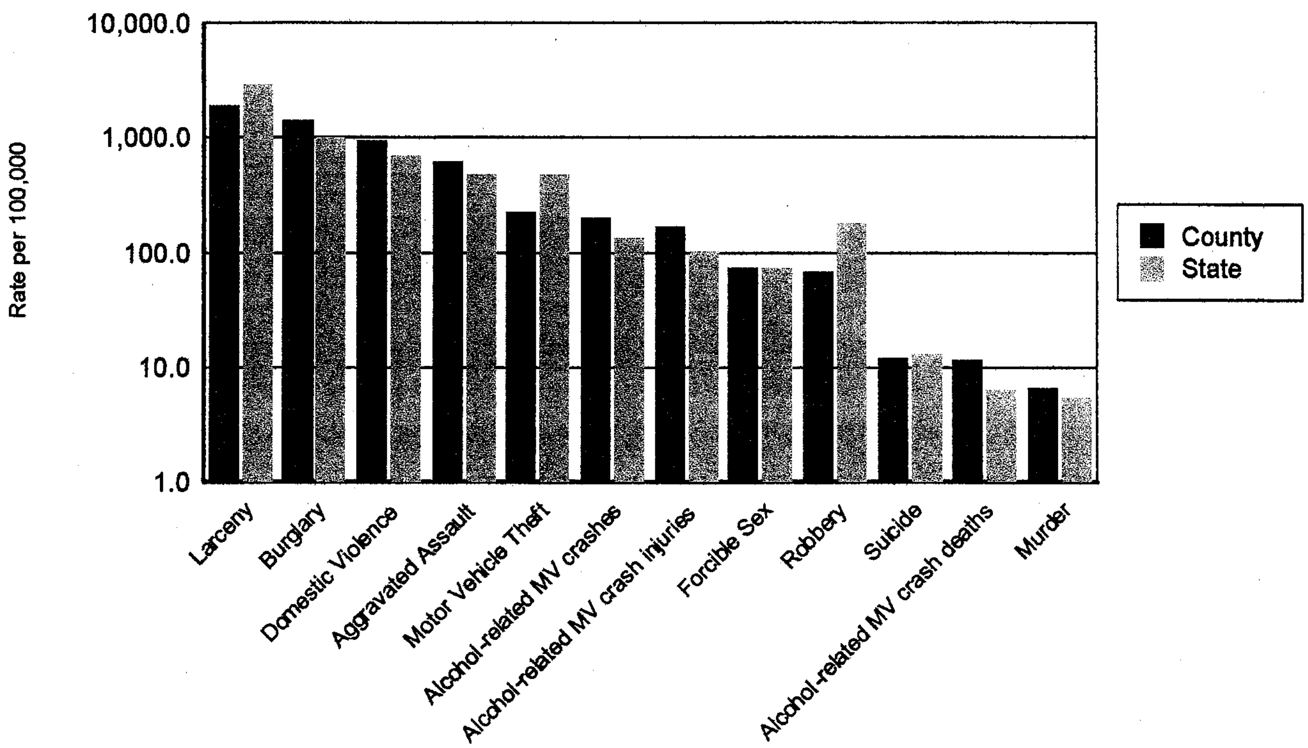
Data source: 2002 Behavioral Risk Factors Surveillance Telephone Survey conducted by the Florida Department of Health, Bureau of Epidemiology.
Overall, 34,551 adults were randomly selected and interviewed for the survey; about 500 adults were surveyed in each county.
95% CI = 95% Confidence Interval

Social & Mental Health

	COUNTY			STATE
	3-Yr Average Number of Events 2002-04	3-Yr Rate Per 100,000 2002-04	County Quartile	3-Yr Rate Per 100,000 2002-04
Crime and Domestic Violence				
Larceny	387.0	1,883.2	2	2,901.5
Burglary	293.3	1,427.4	4	994.9
Total Domestic Violence Offenses	190.7	927.8	4	702.8
Aggravated Assault	129.7	631.0	4	467.8
Motor Vehicle Theft	46.3	225.5	3	469.1
Forcible Sex Offenses	15.0	73.0	3	73.7
Robbery	14.0	68.1	2	182.2
Murder	1.3	6.5	4	5.4
Alcohol-related Motor Vehicle Crashes				
Alcohol-related Motor Vehicle Traffic Crashes	40.7	197.9	4	130.5
Alcohol-related Motor Vehicle Traffic Crash Injuries	34.3	167.1	4	100.5
Alcohol-related Motor Vehicle Traffic Crash Deaths	2.3	11.4	3	6.2
Suicide				
Age-Adjusted Suicide 3-Year Death Rate	2.7	12.2	2	12.9

Data sources: FDLE Uniform Crime Report, DHSMV "Traffic Crash Facts", Florida Office of Vital Statistics.

Social & Mental Health Indicators, 2002-2004



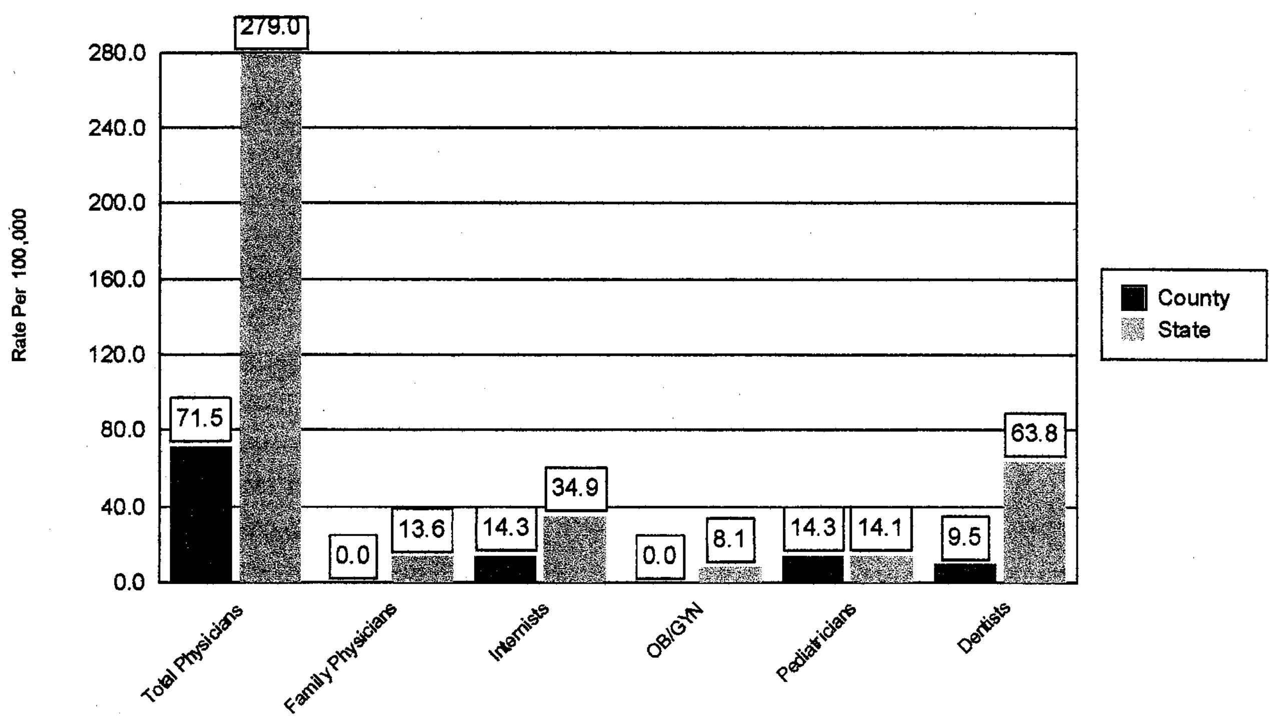
Health Resources Availability

	COUNTY			STATE
	Number 2004	Rate per 100,000 2004	Quartile 2004	Rate per 100,000 2004
Providers*				
Total Licensed Dentists	2	9.5	1	63.8
Total Licensed Physicians	15	71.5	2	279.0
Total Licensed Family Physicians	0	0.0	1	13.6
Total Licensed Internists	3	14.3	2	34.9
Total Licensed OB/GYN	0	0.0	1	8.1
Total Licensed Pediatricians	3	14.3	4	14.1
Facilities				
Total Hospital Beds	48	228.8	2	323.5
Total Acute Care Beds	48	228.8	3	269.0
Total Specialty Beds	0	0.0	1	54.5
Total Nursing Home Beds	120	572.1	3	472.9
County Health Department				
County Public Health Department Full-Time Employees	35	168.0	4	60.8
County Public Health Department Expenditures	1,841,695	8,779,594.0	4	3,646,778.9

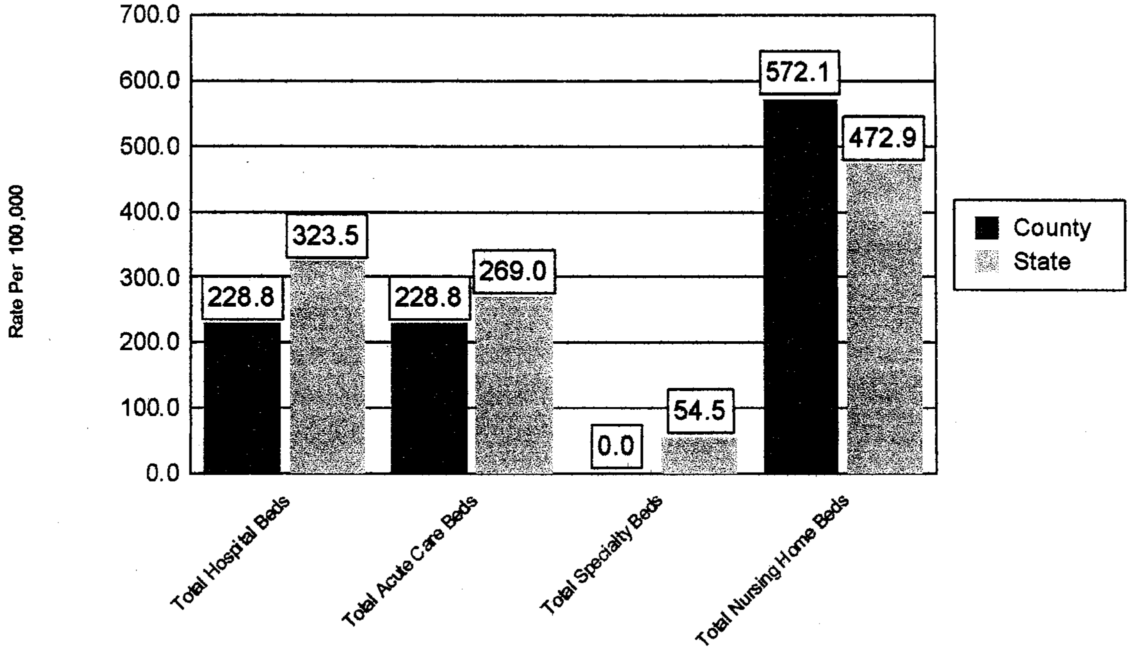
Data Sources: Division of Medical Quality Assurance and Office of Planning, Evaluation and Data Analysis, Florida Dept. of Health; Florida Agency for Health Care Administration

*Data for providers are for a fiscal year, not a calendar year

Health Providers per 100,000, County and State, 2004



Health Care Facilities per 100,000, County and State, 2004



Statistical Information

Quartiles
Quartiles allow you to compare data from one county to data from all other counties in the state. Quartiles are calculated by ordering an indicator from lowest to highest value by county and then dividing it into 4 equal-size groups. Ones (1) always represent lower numbers while fours (4) always represent higher numbers.

It is important when analyzing this data that you consider each indicator and quartile number separately. In some cases a high quartile number (4) may be a positive indicator (i.e. median income) and in others it may be a negative indicator (i.e. infant mortality).

Confidence Intervals
A confidence interval is a range around a measurement that conveys how precise the measurement is. For most chronic disease and injury programs, the measurement in question is a proportion or a rate (the percent of Floridians who exercise regularly or the lung cancer incidence rate). Confidence intervals are often seen on the news when the results of polls are released. This is an example from the Associate Press in October 1996:

"The latest ABC News-Washington Post poll showed 56 percent favored Clinton while 39 percent would vote for Dole. The ABC News-Washington Post telephone poll of 1,014 adults was conducted March 8-10 and had a margin of error of plus or minus 3.5 percentage points. (Emphasis added)."

Although it is not stated, the margin of error presented here was probably the 95 percent confidence interval. In the simplest terms, this means that there is a 95 percent chance that between 35.5 percent and 42.5 percent of voters would vote for Bob Dole (39 percent plus or minus 3.5 percent). Conversely, there is a 5 percent chance that fewer than 35.5 percent of voters or more than 42.5 percent of voters would vote for Bob Dole.

The precise statistical definition of the 95 percent confidence interval is that if the telephone poll were conducted 100 times, 95 times the percent of respondents favoring Bob Dole would be within the calculated confidence intervals and five times the percent favoring Dole would be either higher or lower than the range of the confidence intervals.

What Does a Confidence Interval Tell You?
The confidence interval tells you more than just the possible range around the estimate. It also tells you about how stable the estimate is. A stable estimate is one that would be close to the same value if the survey were repeated. An unstable estimate is one that would vary from one sample to another. Wider confidence intervals in relation to the estimate itself indicate instability. For example, if 5 percent of voters are undecided, but the margin of error of your survey is plus or minus 3.5 percent, then the estimate is relatively unstable. In one sample of voters, you might have 2 percent say they are undecided, and in the next sample, 8 percent are undecided. This is four times more undecided voters, but both values are still within the margin of error of the initial survey sample.

Age-adjusted Death Rates (AADR)
An AADR is a mortality or death rate that has been adjusted for age distribution. AADRs are calculated using the U. S. standard million population for 2000 with age groups under 1, 1-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85 plus.

Crude Rates (Rates per population)
These indicators will provide the rate of an indicator per total population. The most common of these is the rate per 100,000 population. this is calculated by using the following formula:

number of events / (total population/100,000)

where total population is the population of a given area (i.e. a county). You can also calculate rates per 10,000 or per 1,000 using this formula.

3-Year Rates
In this document all rates are 3-year rates unless otherwise noted. These are calculated using the above formula but using the three-year average number of events and average total population. This allows for analysis of counties with small populations and highly unstable single-year rates.