



A Cost-Benefit Analysis of a New Safety Net Clinic in Petersburg, Virginia

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Executive Summary

In 2005, the College of William and Mary (henceforth “the College”) committed “to the Governor and the General Assembly to work meaningfully and visibly with an economically distressed region or local area of the Commonwealth, not smaller in size than a city or county, which lags the Commonwealth in education, income, employment, and other factors. The College commits to establish a formal partnership with that area to develop jointly a specific action plan that builds on the College’s programmatic strengths and uses the College’s faculty, staff, and where appropriate, student expertise to stimulate the economic development in the area to make the area more economically viable...” At the behest of the Office of Economic Development of the College and Community Oriented Medical Partnerships and Sustainable Solutions (COMPASS), this report was conducted to analyze the costs and benefits of opening a new safety net clinic in Petersburg, Virginia, to fulfill this commitment.

Safety net providers are providers that deliver a significant level of health care to vulnerable populations, such as uninsured individuals and Medicaid beneficiaries. Hospitals, private physician offices, and safety net clinics are all considered safety net providers. This report focuses specifically on safety net clinics. Safety net clinics serve multiple purposes, including helping to improve access to health services for residents in underserved communities, providing consistent and quality health care, and helping to reduce the use of and consequent costs stemming from utilizing the local Emergency Department for preventive care. In addition to these health benefits, they also increase worker productivity and spur economic development in the communities in which they are located. There are four different types of safety net clinics: Federally Qualified Health Centers, Rural Health Clinics, Free Clinics, and Private Clinics. Regardless of the different guidelines under which each type of safety net clinic operates, they each strive to provide quality primary and preventive care services to their patients.

Before beginning a cost-benefit analysis, it is necessary to document the need for additional primary care services in Petersburg. To understand whether there is some unmet need in primary care services, analyses were conducted by looking at different reports discussing Petersburg health indicators and other relevant statistics; The Cameron Foundation’s 2008 Health Needs Assessment; and the current supply of health care providers (including safety net) in Petersburg. From these findings, the most critical statistic for this report was found in a Community Needs Assessment survey, in which **8%** of people in Petersburg reported having problems receiving medical care.

Socioeconomic and health care service trends were mapped using Geographic Information Systems (GIS) to locate a region that would be suitable for a new clinic.

For the sake of this analysis, the proposed clinic is assumed to be a safety net clinic that assists those who are not currently being served by existing providers. The clinic provides primary care which includes check-ups, physicals, influenza screenings and vaccinations, streptococcus (strep) testing, childhood immunizations and mononucleosis (mono) and urine testing. In addition to these services, chronic care is provided at the clinic, specifically services to address diabetes, hypertension, high cholesterol, and asthma.

The clinic is assumed to run on a full-time, year-round basis though the specific hours of operations were not defined in the analysis. It is assumed that the new clinic would not compete with the existent providers, particularly the safety net clinics, for new patients. Instead, the location, services, and hours of operations would be designed to serve unmet need and would not divert services from other primary care providers. The clinic is designed, however, to divert Emergency Room visits from Southside Regional Medical Center as a cost-saving measure for the whole health system in Petersburg.

Extensive calculations have been conducted to estimate the number of visits per year the clinic could expect to schedule as well as the staffing that would be needed to carry such a patient load. These calculations estimate that the clinic would provide about twenty visits per day at fifteen minutes per visit.¹ To serve this patient load, calculations suggest that the following full-time staff members are necessary:

- one executive (non-medical) director
- one medical doctor (MD/DO)
- one physician assistant (PA)
- one registered nurse (RN)
- one licensed practical nurse (LPN)
- two administrative assistants

Additionally, one part-time registered nurse will be necessary to supplement the full-time staff members' work.

For the sake of the cost-benefit analysis, a full-cost model is used, meaning that federal funding, grants, or donations are not being used to mitigate private costs.

Cost-benefit analysis is a technique designed to determine the feasibility of a project or plan by quantifying its costs and benefits. When net benefits are positive, it may make sense to move forward with the project. The costs described for this clinic are employee salaries and benefits, payroll taxes, facility costs, insurance costs, and administrative costs. The benefits described are revenues from the clinic, savings from reallocating patients from emergency care to primary care, savings from preventing hospitalizations due to increased access to appropriate primary care, increased health and productivity of patients, and the increased economic development in Petersburg from the creation of this clinic. Once all costs and benefits have been quantified, appropriately inflated, and discounted over time, the net benefits can be calculated.

The discounted benefits for this project over a ten-year time horizon are calculated to be \$21,667,370.78 with a 4.20% discount rate and medical costs growing at a constant rate over time. The discounted costs for this project over a ten-year time horizon are calculated to be \$8,268,219.17. Net benefits are calculated by subtracting costs from benefits, which equals \$13,399,151.61 with a 4.20% discount rate and constant medical cost growth. Other states of the world were simulated as well, including a world where medical costs flatten over time and a world where medical costs increase over time. A sensitivity analysis was also conducted allowing the discount rate to vary both below and above 4.20% at 1.20% and 7.20%. Each state of the world at each discount rate has positive net benefits at the system-wide level. Thus, it is

clear that the analysis is not particularly vulnerable to changes in the discount rate. However, at the clinic stand-alone level net benefits are negative, revealing the clinic is not a viable entity without including system-wide benefits such as emergency department diversions and preventable hospitalizations. The positive net benefits at the system-wide level certainly make a very strong case for increasing access to primary care in Petersburg through the addition of a new safety net clinic.

Policy recommendations for the Office of Economic Development at the College of William and Mary include: securing more patient level data about Petersburg; continuing to build a relationship with Petersburg; investigating the existing providers already at work in Petersburg and possibilities of partnerships; more thoroughly planning the attributes of the clinic; and attaining funds to decrease private clinic costs such as partnerships with Southside Regional Hospital, the National Health Service Corps, volunteers, foundations, and private investors.

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Introduction and Background

The Virginia Higher Education Restructuring Act of 2005

In 2005, Governor Mark Warner approved the Management Agreement of the College of William and Mary (the College henceforth) for adhering to the Virginia Higher Education Restructuring Act (Restructuring Act henceforth) which called for a reorganization of the Commonwealth's relationship with the public universities in Virginia. The impetus for the new relational infrastructure was a desire by the Commonwealth and the public universities to grant more authority to the universities' boards in return for greater community involvement by the universities.

One of the provisions of the College's Management Agreement was that the College would partner with an area of Virginia to foster economic development. Specifically, the College committed "to the Governor and the General Assembly to work meaningfully and visibly with an economically distressed region or local area of the Commonwealth, not smaller in size than a city or county, which lags the Commonwealth in education, income, employment, and other factors. The College commits to establish a formal partnership with that area to develop jointly a specific action plan that builds on the College's programmatic strengths and uses the College's faculty, staff, and where appropriate, student expertise to stimulate the economic development in the area to make the area more economically viable..."ⁱⁱ

Through internal processes at the College, Petersburg, Virginia, was identified as a qualified city for a partnership as described in the Management Agreement. The College has undertaken a number of initiatives to partner with Petersburg and continues to look for meaningful ways to further uphold its responsibilities and commitments to learn from and with Petersburg.

Community Oriented Medical Partnerships and Sustainable Solutions (COMPASS)

Over the past several years, a new research and pedagogy interest has developed among faculty, staff, and students at the College. In 2004, a group of students from the College partnered with an alumnus, Dr. Mark Ryan, to participate in a spring break medical outreach clinic. Upon their reflection on the trip, the students began to question the value and sustainability of such a short-term intervention. In an effort to learn more about sustainable

community development, the students approached Dr. David Aday, a professor of sociology who was actively involved in community development work in the area of criminology. Out of this partnership of students and faculty, a model of community health development has been emerging at the College which will be referred to as Community Oriented Medical Partnerships and Sustainable Solutions (COMPASS) for the purpose of this paper. The credo of COMPASS outlines several premises which are still being developed, but are listed as follows to give a sense of the organization's ideals. COMPASS believes that:

- Communities and community members desire to control their own health and health care.
- Community members, health professionals, governmental officials and researchers want to increase the health of communities.
- Interventions that grow out of local knowledge and resources have the greatest chance of sustainability and efficacy.
- Partnerships between communities and outsider organizations must be recognized as reciprocal, meaning that both parties must be aware of what they stand to gain and lose in the partnership.
- Bottom-up approaches (as opposed to top-down) should be utilized as much as possible in an attempt to include the interests of the most marginalized members of community.
- Good intentions are dangerous things. Knowledge obtained through medical and sociological research with a community makes it far more likely that sustainable change will be created in the health of the community.
- Researchers and students can play a role in community development, but their learning experience should never come at the expense of the community.

Operating under these ideals, two student teams currently exist under the umbrella model of COMPASS: Student Organization for Medical Outreach and Sustainability (SOMOS) and Medical Aid Nicaragua: Outreach Scholarship (MANOS).ⁱⁱⁱ These organizations center on partnerships with specific communities. The students participate in a class each semester as well as trips to the community. The students are actively involved in community research with community leaders, members, and health professionals to identify and address underlying health

needs in the community. In addition, they organize outreach clinics several times a year in the communities.

In summary, COMPASS seeks to partner with communities to increase the quality and availability of health care for individuals and communities, especially those who are unserved or underserved.

Petersburg Proposal

Based on experience with implementing the COMPASS model in several communities previously, Dr. David Aday approached Mr. Leonard Sledge, Director of the Office of Economic Development for the College, during the summer of 2009 to inquire about the possibility of conducting a similar partnership with community members in Petersburg. The goals of the project are:

- To build a partnership with Petersburg as envisioned by the Management Agreement to engage community members, health professionals and community leaders and researchers in efforts understand the health conditions, needs and resources of the community;
- To engage in research in and with Petersburg, mainly through direct observation and interviews of community members and leaders to gain systematic information about the health-relevant behaviors, beliefs, and understandings in Petersburg;
- To provide a one-week summer clinic in 2010 in a neighborhood selected jointly by Petersburg and COMPASS project leaders to demonstrate tangible commitment to the primary care needs of Petersburg;
- To investigate the possibility of starting a year-round clinic operating with strong input, buy-in, and ownership by the community of Petersburg; and
- To include faculty, staff, alumni, and students of the College in engaged scholarship, research, and hands-on outreach.

With these goals in mind, Mr. Sledge and Dr. Aday made a proposal in June of 2009 to Petersburg City officials Mr. David Canada (City Manager of Petersburg) and Ms. Kimberly Willis (Director of Social Services). While interest was expressed in such a project, it was clear that more research needed to be conducted on the existent needs and resources in Petersburg before a partnership could move forward.

The Thomas Jefferson Program in Public Policy's Research Seminar

In the fall of 2009, Mr. Sledge and Dr. Aday requested that students in the Thomas Jefferson Program in Public Policy conduct a cost-benefit analysis of implementing a full-time medical outreach clinic in Petersburg to better understand the feasibilities of the long-term goals of COMPASS.

Project Methodology

In order to provide the College's Office of Economic Development with an analysis of the costs and benefits of opening a new medical clinic in Petersburg, Virginia, it was evident that there were several key components needed to be understood and captured in the course of the research.

- The first component was to understand the role of safety net clinics in improving access to primary care and how they affect their surrounding communities. This was achieved by looking to relevant literature for specific outcomes and models that could be used to structure an analysis.
- The second component was to look for a need for primary care services in Petersburg – is there even one? Does Petersburg face a gap in providing primary care services? To better understand this need, analyses were conducted by looking at reports discussing Petersburg health indicators and other relevant statistics, The Cameron Foundation's 2008 Health Needs Assessment, and the current supply of health care providers (including safety net) in Petersburg.

- The third component required looking at geographic patterns and maps of Petersburg to determine a location for a potential clinic to understand how it would fit in with the current health care system in Petersburg. This was accomplished by using GIS (Geographic Information System) to account for current safety net providers, private providers, and the locations of local parks and major highways before looking at socioeconomic trends from the 2000 Census Bureau across the different census tracts found in Petersburg. Based on different socioeconomic patterns and the locations of current providers, it was possible to pinpoint an approximate location for a potential new medical clinic.
- The final component of the project was the actual cost-benefit analysis of opening a new safety net clinic in Petersburg. Data from credible health sources, journal articles, and safety net providers' local to the Hampton Roads' area were employed to quantify costs and benefits to determine the net benefits of a new clinic to Petersburg over the period of 10 years.

This report is the culmination of the above methodology and will proceed as follows: Section 1 discusses the findings from the literature; Section 2 discusses the types of safety net clinics and the benefits they provide unserved and underserved individuals in general; Section 3 provides a description of the health needs specific to Petersburg; Section 4 describes the existent services in Petersburg; Section 5 displays geographic trends based on socioeconomic conditions in Petersburg and proposes a clinic region; Section 6 details the proposed raw structure of a new safety net clinic in Petersburg; Section 7 reviews the cost-benefit analysis of the proposed new clinic; and Section 8 makes policy recommendations based on the analysis.

Section 1: Findings from the Literature Review

Safety net providers are providers that deliver a significant level of health care to vulnerable populations, such as uninsured individuals and Medicaid beneficiaries. Hospitals, private physician offices, and safety net clinics are all considered safety net providers. This report focuses specifically on safety net clinics. Safety net clinics serve multiple purposes, including helping to improve access to health services for residents in underserved communities; providing consistent and quality health care; and helping to reduce the use of and consequent costs stemming from using the local Emergency Department for preventive care. Looking at literature regarding safety net clinics further validates these assumptions and indicates a great need for safety net clinics in underserved communities.

Safety Net Clinics Offer Quality Care to Patients

In deciding whether or not to begin a safety net clinic, it is important to assess the quality of care that the clinic can expect to deliver to its patients. Given that there are different types of safety net providers such as Community Health Centers (CHCs), outpatient clinics, and local physicians' offices, Grossman et al. (2008) researched whether or not the actual type of safety net provider affects the quality of care patients receive.^{iv} In this study, they specifically compared the quality of care delivered at CHCs¹ (since CHCs are considered a fundamental part of the safety net and are expected to serve a greater portion of the underserved in coming years through federal and state initiatives) with hospital outpatient clinics and local physicians' offices or HMOs. Using data from the National Health Interview Survey (NHIS), Grossman et al. analyzed different types of low-income adults seeking primary care at the different safety net sites and their subsequent access to and quality of preventive care. The NHIS respondents surveyed were of families with income less than 200% of the federal poverty threshold.² Data delineating which safety net sites were utilized was attained through a series of questions

¹ In this study, the researchers are specifically looking at Community Health Centers, a specific type of safety net clinic. Community health centers are local, non-profit, community-owned and federally supported clinics.

² For individuals lacking any income, Grossman et al. used NHIS-derived imputed income values. Imputed income values were derived from neighborhoods' average incomes; sociodemographic characteristics; and the health status of the respondents and their families. The values were then adjusted to reflect the likelihood that the respondents' incomes truly fell below the 200% FPL threshold.

regarding where respondents' went for primary care. To measure the quality of the preventive care, adult immunization and cancer-screening practices were examined. Access to care and subsequent emergency room visits were examined by looking at respondents' reports of delay in care due to office or clinic administrative problems and by looking at the occurrence of emergency room visits.

Statistical analysis of these topics was conducted using logistic regression models, and Grossman et al. found that there were no significant differences in immunization rates between physicians' offices, HMOs, or Community Health Centers. There were also no significant differences in cancer screening rates across the sites. Further, except for office-related delays in care, there were not significant differences in quality between community health centers, HMOs, and physicians' offices for rates of emergency room visits. Hence, it appears that CHCs offer quality care similar to that of other health care providers in the community, and thus the low-income population benefits from having these safety net clinics in their communities.

Economic Benefits for Communities with Safety Net Clinics

Knowing that quality of care does not vary significantly across different types of safety net providers is significant looking ahead to the creation of a new clinic in a given locality. However, also of importance is understanding the payoffs such a clinic would accrue for its community. This very issue was addressed in a report published by the National Association of Community Health Centers in conjunction with the Robert Graham Center and Capital Link in 2007.^v Their study was conducted by analyzing data from the 2004 Medical Expenditure Panel Survey (MEPS), in which they identified survey respondents who reported visiting a Community Health Center (CHC) or a neighborhood/family health center during that year. It was estimated that of the 213 million individuals who had an office visit in 2004, approximately 6.84 million had at least one visit to a CHC. The researchers then examined the number of individuals who utilized CHCs for the majority of their care, which was about 3.21 million. This statistic was then used to estimate the average and median expenditures for people who used CHCs versus non-CHCs. The differences between the expenditures of CHCs and non-CHCs are statistically significant ($p < .05$). Savings to the health care system were then quantified from these

differences. Economic benefits were derived from using IMPLAN³ with the 2002 state level multipliers.

Overall, their findings show that investing in CHCs yields significant savings to the health care system (including payers, patients, and communities) and economic benefits for the communities they serve. These savings stem from lower medical expenses (by 41%, or \$1,080) for CHC patients and payers annually, thus saving the health care system \$9.9 and \$17.6 billion a year. Further, it is estimated that if the federal government continues to invest in CHCs, about 30 million⁴ Americans would have access to their services by 2015 which would result in future health care savings between \$22.6 and \$40.4 billion annually. Economic benefits for communities were \$12.6 billion from direct employment of local residents, goods and services purchased from local businesses, and capital development projects. Approximately 143,000 jobs were generated nationally in some of the country's most economically distressed areas. If CHCs reached the projected 30 million patients by 2015 as estimated based on increased federal funding, then these economic benefits would translate into \$40.7 billion and over 460,000 jobs. With these findings and projections, NACHC et al. (2007) demonstrate that in addition to the health benefits local communities amass from CHCs, the health centers also serve as economic drivers for the localities and their residents.

Continuing to demonstrate the economic benefits that safety net clinics have on communities, the New York State Office of the Comptroller produced a report that examines the economic impact of Hudson Headwaters Health Network (HHHN) on the Warrensburg/Warren County, NY regional economy (2005).^{vi} The town of Warrensburg is in a rural area of the state, and Hudson Headwaters plays a critical role in meeting the challenges that accompany rural health care services. Such challenges include shortage of physicians' practices; difficulties recruiting and maintaining health care professionals; and the shortage of health coverage among rural residents. The Warren County Economic Development Corporation consequently wanted to better understand the role the 6 HHHN⁵ Community Health Centers play in the town of

³ IMPLAN (Impact analysis for PLANning) is an economic impact assessment modeling system.

⁴ Approximately 16 million patients currently utilize CHCs for health care needs.

⁵ In total, there are 11 community health centers that are part of the larger Hudson Headwaters Health Network. The HHHN is a not-for-profit corporation that provides primary, specialty, and ancillary medical care to residents within

Warrensburg and Warren County. To estimate its economic impacts the New York report, like the NACHC et al. (2007), utilizes multipliers specific to the health care industry from IMPLAN software. Using these multipliers makes it possible to estimate how many times dollars circulate through the local economy. The New York State Comptroller's office applied local IMPLAN multipliers to the total payroll and non-salary spending in Warren County.

In their analysis, the researchers found that the combined direct spending was \$9.1 million for the 6 health centers in the county. In addition to these benefits from direct spending, purchases of goods and service by the health centers benefitted suppliers and workers within the area. Based off the subsequent chain of purchases accompanying this spending, IMPLAN estimated that each direct dollar spent circulated through the economy 1.55 times. Taking this multiplier effect into account, the indirect impact of HHHN spending in Warren County was \$5 million, thereby resulting in a total economic impact of \$14.1 million for the county. Further, the employment impact in addition to the economic impact of HHHN was estimated in Warren County. IMPLAN in this case estimated that for every health care job directly attributable to HHHN an additional 1.064 jobs were indirectly created, resulting in an employment multiplier of 2.064. Applying this multiplier to the number of HHHN employees, HHHN accounts for a total of 481 jobs in Warren County. Thus, this study demonstrates that health centers can not only provide extremely valuable services to patients of communities but can also provide positive impacts to communities through economic and employment benefits.

Declines in Rates of Preventable Hospitalizations and Emergency Department Utilization

Improved economic development is not the sole community-wide benefit reaped from safety net clinics. Safety net clinics also provide health care system savings by helping to decrease Emergency Department utilization for primary care needs and decrease the rates of preventable hospitalizations. Epstein (2001) is one of many researchers that looked at the effect health clinics have on preventable hospitalizations in communities.^{vii} Specifically, his study looks to determine if the availability of public ambulatory clinics in any way affects preventable

its region. Within Warren County, there are Community Health Centers in 6 towns, including Warrensburg, Bolton, Hamlet of North Creek, Chester, Queensbury, and the City of Glens Falls.

hospitalization⁶ rates of low-income and elderly populations. Using elderly and low-income Virginia discharge data from 1995-1997 and additional resources, Epstein employed multiple linear regression to evaluate the relationship between ambulatory clinic availability and preventable hospitalization rates. Data was based off of clusters of 2,000 persons delineated by zip codes across Virginia's counties and provider characteristics and population size was controlled in a cross-section of the zip code clusters.

In the end and critical to the significance of this report, Epstein found that Virginia clusters located in Medically Underserved Areas⁷ and served by a Federally Qualified Health Center (FQHC) had on average 5.8 fewer preventable hospitalizations per 1,000 population than those clusters not served by a FQHC ($p < .05$). In addition, preventable hospitalization rates associated with clusters served by free clinics was slightly less but still significant, with an average of 2.3 fewer preventable hospitalizations per 1,000 population ($p < .10$). Thus, it is evident from this study that the presence of public ambulatory clinics in Medically Underserved Areas in Virginia is associated with better access to primary care among low-income and elderly populations. Given that the Petersburg city area is designated by the U.S. Department of Health and Human Services as a Medically Underserved Population, Epstein's results add credence to looking at the benefits of the current FQHCs currently in the city and the potential benefits from a new clinic.

Preventable hospitalizations are important for communities to work towards decreasing given that they are such costly consequences for the health care system. Likewise, another financial strain on the health care system is the use of hospitals and their Emergency Departments (ED) for primary and preventive care purposes. Medicaid individuals are one population that frequently uses EDs for health care needs. To investigate ways by which to save Medicaid costs that are oftentimes spent on such hospital care, Wang, et al. (2005) conducted a study that compared ED costs and utilization by members who were enrolled in a pilot program designed to reduce the use of hospital EDs with the costs and utilization incurred by a controlled

⁶ Preventable hospitalizations are hospitalizations for conditions that do not require inpatient admission if the condition was treated properly on an outpatient basis, and are often used as an indicator of access to care.

⁷ The Department of Health and Human Services defines Medically Underserved Areas/Populations as having too few primary care providers, high infant mortality, high poverty and/or high elderly population.

group.^{viii} The ED diversion pilot program provided increased access to primary care with extended office hours and care coordination for individuals in the pilot program. Regression analysis and *t*-tests were employed to look at different variables used to measure ED costs and utilization and then compare the intervention group with the control group.

Wang, et al. found that after a 12-month period, the average cost of ED utilization of the intervention group was \$1.36 less than that of the control group. The savings stemmed from a reduction in the number of ED visits by the intervention group, rather than from a decrease in cost per visit to the ED. Members in the intervention group visited the ED approximately 8 times fewer than members of the control group on average. This result is significant for many reasons. First, it highlights the savings to the hospitals stemming from fewer non-urgent visits to the EDs. Second, it demonstrates the positive effect of coordinated primary care; by enhancing and coordinating office hours and care across several providers, patients benefitted from increased access to health care services to meet their primary care needs.

In addition to pilot programs, other attempts are constantly underway to divert primary care patients away from the EDs and toward local primary care providers. One of the goals behind safety net clinics is to help with this diversion process. Many studies have examined the relationship between safety net clinics and ED diversions. Given that Community Health Centers (CHCs) provide crucial access to primary care for the uninsured population, it is logical that such centers could reduce uninsured ED visits. Rust et al. (2009) examines this hypothesis more closely in a rural setting.^{ix} In their research, Rust et al. compared uninsured ED visit rates between rural counties in Georgia that have a CHC and those counties without a CHC presence. Data from 100% of ED visits occurring in 117 rural counties in Georgia was analyzed between 2003 and 2005. A CHC ‘presence’ was demonstrated by a county having a federally funded (Section 330) CHC with a primary care delivery site. The primary outcome measurement for analysis was uninsured ED visit rates among the total uninsured population. Using Poisson regression models to examine the relationship between ED uninsured rates and the presence of a CHC, the findings indicate that counties without a CHC primary care clinic had 33% higher rates of uninsured ED visits per 10,000 uninsured population (95% confidence interval for ratio rate 1.33%). Higher uninsured ED rates still remained significant after adjusting for people below the poverty level, number of hospitals in the counties, and minority population. Rust et al. concluded

that the absence of a CHC is hence associated with a significant excess in uninsured ED visits in rural counties. Although these results are for rural counties and this analysis is on Petersburg, an urban environment, the study's findings suggests it would be beneficial to replicate the study except compare the presence of CHCs in urban instead of rural counties.

As it was demonstrated that uninsured Emergency Department visits are fewer in counties containing a CHC, it has also been shown that hospitalizations and emergency room visits for ambulatory care sensitive conditions (ACSC)⁸ were fewer for Medicaid beneficiaries who receive their health care at Federally Qualified Health Centers (FQHCs)⁹ than in instances when care came from other primary care providers. In their study, by employing a quasi-experimental design, Falik et al. (2001) compared hospital admissions and emergency room visits among Medicaid beneficiaries relying on FQHCs for primary care to other Medicaid beneficiaries who utilized alternate sources of primary care.^{10x} This comparison was done through retrospective analysis of 1992 Medicaid claims data from State Medicaid Research Files for 48,783 Medicaid patients in 24 service areas across 5 states. The Research Files provide individual-level demographic and utilization data, with primary diagnosis for in- and out-patient care. The claims were for hospital admissions from, ED visits for, or other outpatient visits for ACSCs. The findings from the comparison demonstrate that Medicaid beneficiaries receiving care from FQHCs were less likely to be hospitalized (1.5% vs. 1.9%, $p=.007$) or seek emergency room care (14.9% vs. 15.7%, $p=.02$) for ACSCs than the comparison group. Falik et al. concluded that having a regular source for primary care such as FQHCs can significantly reduce the chance of hospitalizations and ED visits for ACSCs. Clinically, fewer admissions and fewer ED visits may indicate that patients are getting timely and appropriate primary care for ACSCs in clinical settings. Furthermore, if more Medicaid beneficiaries utilized FQHCs for their health care, then substantial savings could be realized to the entire health care system. Medicaid savings

⁸ Ambulatory Care Sensitive Conditions are conditions, such as diabetes, asthma, and hypertension, that with proper primary care can prevent or reduce the likelihood of preventable hospitalizations or ED visits.

⁹ FQHCs were created to exclusively provide primary and preventive care to low-income and uninsured individuals.

¹⁰ Medicaid beneficiaries were said to use FQHCs as their main source of primary and preventive care if they received more than 50% of their services from those clinics. The comparison Medicaid group utilized alternate sources of care in the same communities as the FQHCs but were said to have had at least one office visit for primary and preventive services during the study timeframe so as to demonstrate some attachment to the health care system.

would stem from fewer hospital admissions and ED visits. Once again, the benefits of safety net clinics are realized by more than just the patients receiving their quality care; entire health care systems gain from their presence in communities.

Example of a Health Care Cost-Benefit Analysis

In addition to looking at the literature surrounding safety net clinics and the benefits' associated with their presence in communities, it is also important to consider literature containing health studies with cost-benefit analysis as the chosen methodology to provide validity for conducting a cost-benefit analysis in this report. Although many health studies favor cost-effectiveness analyses because researchers often find it difficult to monetize health effects, cost-benefit analyses can still be applied to the field of health services. One such example is a cost-benefit analysis Warburton (2005) conducted about a community hospital Emergency Department screening and referral program for patients 75 years or older.^{xi} The Elder-Friendly Hospital Initiative, as the program is called, was implemented in 1998 by the Vancouver Island Health Authority in Canada. In 2003, the "Elder Alert"¹¹ screening program was piloted at Saanich Peninsula Hospital's Emergency Department. The article reports preliminary outcome and cost-benefit results for this Elder Alert patient safety quality improvement program. Outcomes were measured by comparing patient sub-groups based on risk status and interventions received during the program. These interventions include hospital admissions, returns to the ED, subsequent hospital admissions, and multiple encounters. Costs and benefits were estimated based on estimated program outcomes and average costs, and then sensitivity analysis was performed to test different assumptions. Costs for the Elder Alert program were staff time to plan and monitor interventions; staff time to conduct process audits; and implementation costs. Benefits were derived from the difference between high-risk patients with and without complete referral programs.

Preliminary data shows that the program appears to have improved quality and safety of care for the targeted elderly population. From the cost-benefit analysis, Warburton found that the

¹¹ 'Elder Alert' is intended to detect patients at elevated risk of adverse outcomes of hospitalization; design a care plan for appropriate intervention; and provide targeted, coordinated, preventive services for Emergency Department patients 75 years and older. Without such a screening and referral program, this elderly population might not be recognized as high risk.

screening tool program appears accurate and that screening and referral appears to have a positive impact on patients and the ED by reducing patient lengths of stays and potential follow up hospital admissions. Because of these positive impacts, the value of avoided ED and hospital care exceeds the program's costs under different states of the world. At best, the program stands to create large net benefits. After sensitivity analysis with different assumptions, the program still produced benefits at least equal to costs. The saved days and visits from the Elder Alert screening tool would result not in budgetary savings, but would decrease delays in care for other patients and thus create system-wide health benefits. Further, average costs of care use assume that the value of this gain in health status to members of society equals or exceeds average costs of care. Societal benefits and hospital savings found in this study are similar to those quantified in the cost-benefit analysis demonstrated in a later section of this report.

Section 2: Safety Net Clinics – Why Are They Needed?

Exploring the safety clinic literature provides many insights into their purposes and benefits. Taking those insights, it is worth taking a step back and offering a general understanding of what determines how patients choose primary care providers; the different types of safety net clinics; and revisiting the benefits of safety net clinics derived from the literature before delving into Petersburg specific statistics and analysis.

Determinants of Primary Care

Access, quality, and cost of health care are three key themes currently capturing much of the nation's attention as the federal government debates the advantages and disadvantages to national health care reform. However, long before health care reform assumed the center stage of political debate as it does today, health policy analysts, medical professionals, and state and local politicians have looked into improving access to primary and preventive health care services, particularly for the underserved population. There are many components that affect whether an individual seeks and receives primary care services, including access, quality, and cost of care.

Access

Access is factored into the equation in several ways, as it includes both access to health coverage and health care. For example, does a person have access to employer sponsored health insurance? Is he or she eligible for public health insurance programs such as Medicare or Medicaid? The fact is the number of low-income individuals that rely on government-financed health care programs has grown over the past decade. It is this low-income population that is oftentimes on public insurance but faces great difficulties in accessing health care services and subsequently is likely to carry a greater burden of illness than populations with higher income.^{xii} Regardless of whether or not a person has any type of health insurance, though, it is still crucial to ensure he or she has access to health care. People who have a usual source of care – meaning a consistent location for health services – but no health insurance actually receive more primary and preventive care than those who have coverage but no constant source of care.^{xiii} Consistent access to health care ensures appropriate and timely utilization of primary and preventive care services that improve an individual's health and overall quality of life.

Cost

Cost is also a critical component for attaining primary care – are health services affordable? It is well documented that health care costs continue to rise at an unsustainable rate, and that reforms to constrain spending growth are essential for the nation’s fiscal stability and economic well-being.^{xiv} As politicians and analysts work to find sustainable and revolutionary ways in which to bend the cost curve, patients are concerned with the day-to-day costs of rendered primary care services. For individuals who struggle with paying for health-related expenses regardless of whether or not they are covered by some type of insurance, safety net providers are cost-effective sources of quality health care. At one particular type of safety net clinic, Community Health Centers, it has been estimated that the medical expenses for its patients are 41% lower compared to patients elsewhere.^{xv} Thus, for individuals for whom costs are a deciding reason of whether or not to seek out primary care, safety net providers are affordable sources of health services.

Quality

Additionally, quality is critical to a person’s pursuit of primary care services – do individuals feel they are receiving quality care from their primary and preventive care providers? Does the primary care received actually provide a substantive improvement to an individual’s quality of living? As the literature demonstrates, quality of care across different types of safety net providers is fairly consistent.^{xvi} High quality primary care is particularly essential for populations utilizing safety net providers who are at greater risk for adverse health outcomes. Quality primary and preventive care services help narrow health disparities between these high-risk populations and other specific populations. These disparities are narrowed by quality health care services that as a result of their excellence encourage patients to become established patients and achieve continuing care.^{xvii} The quality of services a patient receives from a given provider is paramount in influencing whether that patient continues to seek primary care services and ultimately achieve better health outcomes from continual care.

Patient Preferences

The three aforementioned components of health care – access, cost, and quality – are not the sole determinants of how an individual chooses his or her provider or whether or not he or she seeks out primary care services. Personal preference is an important consideration – does the individual feel a connection with the provider? Does the patient prefer a male versus female physician? A small or large practice? A provider that his or her family has gone to for years? Patient preferences can also be linked to anticipated treatments or health outcomes. Overall, patient preferences result from cognition, experience, and reflection, and exist as the relatively enduring consequences of values.^{xviii} Although these might seem inconsequential when compared to some of the other determining factors such as costs, personal preferences do contribute to a person’s choice of primary care provider.

Ability to Pay

In conjunction with the ‘cost’ and ‘access to coverage’ determinants of a person’s choice to obtain primary care is the factor of whether or not a person has the ability to pay for services. Not only do the numbers coming from the provider’s side matter, but so do the finances of the patient and likely unaffordable out-of-pocket expenses. Does an individual have health insurance? Does he or she qualify for public assistance? Is a person between jobs at the moment and so inclined to defer primary and preventive care until he or she begins a new job that hopefully entails employer sponsored health insurance? Is an individual a recent college graduate who feels financially unstable and thus defers medical care based on the assumption that he or she is young and healthy and does not need to factor in the expense of health care into his or her budget? Again, safety net clinics are sources of affordable health care so individuals do not have to forego care due to constraints from their monthly bank statements. Different safety net providers offer different types of payment options, including sliding scales and free services to eligible patients, in order to make certain that individuals needing primary care can achieve it without going financially broke as a result.

Proximity

A final, though certainly not last, determinant of how a person chooses his or her primary care provider can also be associated with the ‘access’ factor described previously. A person’s proximity to health care services is significant to his or her choice of provider or whether he or she even chooses to receive medical care. Is there a primary care provider close to an individual’s residence? Can he or she travel by foot, or is a car necessary? What type of public transportation infrastructure – bus, train, etc. – is in place, if any? Oftentimes individuals forego primary care due to proximity constraints; other times, they choose to utilize the local Emergency Department for their primary care needs which is a costly choice to the individual and health care system overall. Hence, the location of the clinic in relation to the transportation infrastructure and proximity to the most underserved areas should be considered when opening a safety net clinic.

Types of Safety Net Clinics

As indicated by discussing the different determinants affecting a person’s ability or choice to get primary services, the primary care safety net plays an integral role in helping to overcome barriers to health care for many individuals and narrow health disparities faced by underserved communities. As mentioned earlier, the safety net system is composed of clinics, local physicians’ offices, and hospital outpatient departments.^{xix} It also includes area hospitals due to the federal Emergency Medical Treatment and Labor Act (EMTALA). This act requires hospitals to screen and provide needed stabilizing treatment for all individuals entering the Emergency Department for an emergency medical condition, regardless of their insurance coverage or ability to pay.^{xx} As demonstrated by the findings in the literature review, safety net clinics provide quality care services; reduce the use of costlier health care providers such as Emergency Departments and hospitals; and spur economic development in economically distressed regions. Focusing in on safety net clinics in particular, in all areas of the country there are many different types of safety net clinics that, although vary by their administrative structuring and sources of funding, work similarly to achieve the aforementioned goals of improving access to primary care services for unserved and underserved communities.

For the purpose of this report, there are four different types of clinics whose compositions should be understood before proceeding further. These four clinics can be separated into private versus public clinics – public clinics receive some sort of government funding while private clinics do not. The three types of public clinics that will be discussed are Federally Qualified Health Centers, Rural Health Clinics, and Free Clinics. Privately funded clinics for this discussion will be referred to as Private Clinics. For a quick comprehensive understanding of the primary differences between the four types of clinics, please refer to Appendix A.

Federally Qualified Health Centers

Federally Qualified Health Centers (FQHCs), perhaps the most widely known of the public clinics, are also referred to as community health clinics/centers in corresponding literature. However, FQHCs actually encompass three types of clinics: Health Centers (which can be broken down into Community Health Centers, Migrant Health Centers, Health Care for the Homeless Health Centers, and Public Housing Primary Care Centers), FQHC Look-Alikes,¹² and outpatient health programs operated by tribal organizations.^{xxi} FQHCs include all organizations receiving grants under Section 330 of the Public Health Service Act. Section 330 defines federal grant funding opportunities for organizations to provide care to underserved populations. All FQHCs must be either public entities or private non-profits and, if a Community Health Center, located in Medically Underserved Area/Population. FQHCs may be located in rural and urban areas and provide primary and preventive care services to patients who are uninsured or who have private insurance, Medicare, or Medicaid. Their funding and revenues come from reimbursements paid to providers through insurance, local/state/federal grants, and donations. Any FQHC receiving Section 330 grants must be governed by a board of directors, of which the majority must be active, registered clients of the health center who are representative of the different patient populations served by the clinic.^{xxii} FQHCs continue to expand in number around the country and receive increased funding from the federal government.

¹² An FQHC Look-Alike is an organization that meets all of the eligibility requirements of an organization that receives a Public Health Service Act Section 330 grant, but does not receive grant funding.

Rural Health Clinics

Rural Health Clinics (RHCs) must be located in non-urbanized¹³ locations, which is one of the first requirements that differentiate them from FQHCs. An RHC has an unincorporated, public or private, nonprofit or for-profit corporate structure and must operate in a Medically Underserved Area or Health Professional shortage Area. RHCs serve patients who are uninsured or have private insurance, Medicare, or Medicaid. These clinics require that a mid-level professional – such as nurse practitioners, physician assistants, and certified nurse midwives – be on-site 50% of the time the clinic is open. Like FQHCs, their funding and revenues come from reimbursements from insurance providers for services rendered, local/state/federal grants, and donations. Services offered include primary care services as well as at minimum 6 kinds of basic laboratory services on site.^{xxiii} RHCs are crucial sources of primary care for underserved populations in rural areas.

Free Clinics

Free Clinics are locally run private, non-profit community- or faith-based clinics that provide primary care services at little to no charge to qualified low-income, uninsured individuals. Free clinics are 501(c)(3) tax-exempt organizations or operate as an affiliate of one. Patients with private insurance, Medicare, or Medicaid are not accepted. The clinics heavily utilize volunteer health professionals and partnerships with other health-related organizations to provide quality care to financially struggling patients.^{xxiv} Patients receiving care have to demonstrate their continual need for free services at certain points throughout the year. Funding for these clinics also comes from governments, grants from local foundations, and private donations. The private sector is a significant benefactor to Free Clinics – more than 75% of funding comes from sources such as The United Way, local businesses, foundations, religious organizations, civic organizations, and individuals.^{xxv} Free Clinics have no sources of revenue coming from services rendered except for the occasional small donation requested if a patient can afford it at the time of service; entities that still ask for nominal fees from patients are still considered Free Clinics. These donations can be as low as a \$1 or \$2, but these requests are more

¹³ According to the U.S. Census Bureau, a non-urbanized area is one that is outside of an urbanized area. An urbanized area is defined as a “densely settled territory that contains 50,000 or more people.”

so patients feel that they are contributing to their care rather than accepting handouts.^{xxvi} Free Clinics are predominantly volunteer-based organizations, although a clinic may have a full time nurse or additional health worker on staff. Free Clinics act as gateways to primary care for individuals ineligible for public insurance and cannot afford the sliding fee scale payments required at RHC and FQHC clinics.

Private Clinics

As stated before, in the context of this report Private Clinics are clinics that do not receive any kind of governmental (whether it is federal, state, or local) financial support for their operations unlike the aforementioned three clinics. Although this places a heavier burden on the clinics to find adequate sources of funding, Private Clinics are not restricted to certain guidelines or uses for governmental grants as the other three clinics are. Many Private Clinics receive start-up funds from Angel Investors.¹⁴ Given that Private Clinics are each unique entities that can design their own clinical structures, it is difficult to make general assertions about them. Private Clinics can select what kind of patients they wish to serve (uninsured, insured, etc.); decide what insurance they will accept; select the services they will offer; and determine their staffing and administrative compositions. Because of their ability to exercise creativity, Private Clinics can transform themselves more readily to meet the needs of underserved communities than public clinics can.

These four types of safety net clinics are all paramount to improving access to primary care services for unserved or underserved communities. There is no stipulation regarding how many of a type of clinic can serve a given community. For example, Petersburg currently has 2 FQHCs serving its population. Regardless of the different guidelines under which each type of safety net clinic operates, they each strive to provide quality primary and preventive care services to their patients and in doing so directly and indirectly spur additional system- and community-wide benefits.

¹⁴ Angel Investors are individuals who provide capital for a business start-up. This is usually provided in exchange for convertible debt or ownership equity.

Benefits of Safety Net Clinics

Logically, when people think about benefits from safety net clinics they immediately conclude that their main benefit is the improved access to continual and quality primary and preventive health care services for underserved communities. While this is certainly true and arguably the most important benefit safety net clinics provide, they also accrue additional benefits for their wider communities and health care systems. These benefits range in benefiting individual patients with improved access to primary care and greater worker productivity, to benefitting community health care systems in diverting non-urgent cases from the local Emergency Departments and helping to lower preventable hospitalization rates.

Increased Worker Productivity

As indicated already, the primary benefit of safety net clinics is they help narrow health disparities faced by underserved communities by increasing access to affordable and quality primary and preventive care services. However, as a consequence of improved health patients can also achieve increased worker productivity. Individuals who seek out primary care services from safety net clinics are likely healthier workers as a result in comparison to those who do not receive primary care. Healthy workers are likely to miss fewer days of work due to health issues and thus have greater work productivity than sick employees. Further, even if sick individuals do go to work because they cannot afford to take the time off to recover, their levels of productivity while at work are likely less than if they were healthy while at work. Health literature is just beginning to explore this issue – how preventive interventions affect changes in presenteeism,¹⁵ absenteeism, and the productivity loss that results from each. Studies are beginning to estimate the dollar returns on dollars invested in health promotion programs and preventive care interventions.^{xxvii} Hence, not only do primary care and preventive care interventions reap benefits of improved health for patients, but they also are likely to increase productivity of patients which ultimately benefits not only workers but their employers as well.

¹⁵ Presenteeism is defined as a person present at work but whose functioning is impaired; absenteeism is lost time, productivity loss, and continuity loss.

Economic Development

Beyond individually accrued benefits from increased worker health and productivity, safety net clinics provide system-wide benefits. The first to consider is spurred economic development within the community of the clinic and its surrounding localities. Economic development spurred by the creation of a clinic is primarily estimated in two ways – first, by the number of jobs created from the inception of the clinic; and second, by the number of dollars circulated through the economy as a result of the clinic’s expenditures. Both effects can be measured by their direct, indirect, and induced effects. The direct effects are most readily quantified – they are the initial change in revenue, earnings, and employment from the safety net clinic. Indirect effects are changes in inter-industry transactions as supplying industries respond to the direct effect of the safety net clinic. Induced effects are the changes in downstream household spending caused by the direct and indirect effects on household income.^{xxviii} To measure these effects, there are economic development software programs available that can determine the health care multiplier for a specific locality to assess the economic benefits reaped from a clinic.

Decline in Emergency Department Utilization and Preventable Hospitalizations

Further system-wide benefits accrued from safety net clinics include diverting non-emergent patients from local Emergency Departments (EDs) and helping to lower preventable hospitalization rates. With regard to EDs, EDs are frequently used by people for reasons such as having poor finances, geographic barriers to primary care services, no health insurance, and fewer primary care options available. Because of these obstacles, patients instead often turn to the EDs for their primary care purposes that could have been avoided through timely use of primary care. ED visits are rising faster than the population despite the fact that the number of EDs are actually declining.^{xxix} Utilizing the EDs in non-emergent capacities is extremely costly for the health care system. It is estimated that at least one-third of all ED visits are ‘avoidable’ and could have been treatable in primary care settings. This excess use of the ED for primary care purposes amounts to over \$18 billion dollars wasted annually.^{xxx} However, patients with consistent health care providers such as safety net clinics are more likely to receive continual treatments and thus less likely to suffer costly illnesses requiring ED usage for treatment of

serious or non-serious concerns. For patients who do not receive regular primary care from a provider, not only do they utilize EDs for treatment but many times the illness has escalated in severity to an extent requiring hospital admission. Again, oftentimes these hospitalizations could have been prevented with appropriate primary and preventive care. High rates of preventable hospitalizations are often indicators of inequities in access to primary care services. The establishment of safety net clinics in needy areas benefits hospitals by helping to decrease the rate of this type of hospitalization.

Overall, safety net clinics benefit more than just individual patient health. They are sources behind improved worker productivity that benefits workers and employers; are drivers of economic development; and are sources of huge cost savings to hospitals and entire health care systems.

Section 3: Documenting Petersburg's Need

The first step to analyzing the costs and benefits of opening a new medical clinic in Petersburg is to first determine if there is even a need for additional primary care services. The first possible way for documenting need is by looking at Petersburg health indicators. Health indicators are reasonable assumptions for determining whether there might be some area of unmet need in the community or gap in access to primary care. Socioeconomic indicators such as median income, poverty levels, and unemployment rates are also often indicative of different levels of health in a community.

Health Profile 2005: Petersburg, Virginia

The Crater Health District¹⁶ of the Virginia Department of Health prepared a report on Community Health Indicators that paint a health profile for Petersburg in 2005^{xxxii}. Although this report is almost 5 years old, it still demonstrates how Petersburg lags behind the state in several economic and health capacities. The report offers comparisons for how Petersburg compares with Virginia in areas such as economic indicators, infant mortality, low weight births, teen pregnancy, teen pregnancy, incidents of HIV/AIDS, leading causes of death, and environmental health indicators. For a quick comparison between Virginia and Petersburg in these areas, please see Appendix B.

In 2005 Petersburg had a population of approximately 32,000 compared to Virginia's 7,364,600. The median income in Petersburg was \$33,955, markedly lower than Virginia's median income of \$54,169. In accordance with such a low median income, 16.7% of families in Petersburg were below poverty level compared to only 7.0% across Virginia. About 8.7% of individuals were unemployed versus the state unemployment rate of 3.0%.^{xxxii} Understanding these vast differences in economic parameters between Petersburg and Virginia helps understand the subsequent differences in health parameters, given that socioeconomic and health indicators are closely connected and indicative of health conditions in a community.

¹⁶ In 1968, Virginia was divided into planning districts. These planning districts were based on the community of interest among its counties, cities, and town. Each planning district has a Planning District Commission, which is a political subdivision of the Commonwealth chartered under the Regional Cooperation Act by the local governments of each planning district. The City of Petersburg falls under Planning District 19, also known as the Crater Planning District Commission.

Looking more closely at some of the health indicators provided in the Petersburg Health Profile, in 2003 Petersburg had a rate of 14.7 infant deaths per 1,000 live births in comparison to Virginia's overall rate of 7.6; Petersburg was almost double the state rate. Infant mortality is the death of a child before his or her first birthday, and can be associated with a variety of factors such as the mother's health and access to medical care.^{xxxiii} Another indicator, teenage pregnancy, once again places Petersburg at almost 2.5 to 3 times higher than Virginia's rate. In 2003, Petersburg's teen pregnancy rate was 87.1 (cases per 1,000 females age 10-19) compared to Virginia's rate of 27.4. In fact, in 2003 Petersburg had the highest rate teen pregnancy rate in the state, along with its HIV rate. That year, there were 87.6 cases of HIV per 100,000 in the City compared to Virginia's rate of 10.8.^{xxxiv} Again, although these rates are from 2003, the numbers are illustrative of the differences between Petersburg and Virginia.

Virginia's Healthiest Communities

A more updated comparison of how Petersburg compares to Virginia in different risk factors and outcomes is a study on the healthiest communities conducted by the Schroeder Center for Health Care Policy at The College of William and Mary (2007).^{xxxv} In order to rank the different counties and cities of Virginia by their health status, an index score was derived from a composite of health indicators. The chosen methodology was a modified version of one adopted by the United Health Foundation in its 2006 edition of "America's Health Rankings."^{xxxvi} The resulting rankings from the study are intended to prompt further analysis into what affects the varying health measures of particular communities – is it certain public policies? In the final rankings, Petersburg was ranked second from the bottom – it was 133 out of 134 possible rankings. For a comparison of how Petersburg scored for different indicators compared to the rest of Virginia in this study, please see Appendix C.

Prevention Quality Indicators

Another source of information for comparing specific health conditions in Petersburg with Virginia-wide trends is Virginia Health Information. Virginia Health Information acquires and distributes health statistics regarding utilization data, long term care, patient level data, and quality indicators. For the purpose of this report, quality indicators (specifically prevention

quality indicators or PQIs) are of the greatest interest. PQIs are used to identify ambulatory care sensitive conditions; in other words, conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. Although the indicators are based on inpatient hospital data, they offer insight into the quality of access to primary and preventive care outside of the hospital setting and in the surrounding communities.^{xxxvii} Thus, these PQIs are crucial for understanding the need for additional primary care services in Petersburg and whether the potential benefits of Emergency Department diversions and decreasing preventable hospitalization rates are attainable in Petersburg.

Looking at a sampling of PQIs for Petersburg does suggest there is great room for improvement in these indicators. For example, looking at patients with hypertension,¹⁷ there were 47 individuals in Petersburg discharged from the hospital in 2007 with this condition (this is known as the ‘numerator’). The total number of individuals at risk¹⁸ for hypertension in Petersburg is 24,592 (the ‘denominator’). From these numbers, the overall Petersburg rate for the hypertension PQI is calculated based on the number of hospital discharges in Petersburg in a given year for hypertension per 100,000 individuals at risk for that year. Hence, Petersburg’s PQI rate for hypertension is a high 191.10 in comparison to Virginia’s state hypertension rate of 49.10.^{xxxviii} Looking at other PQIs demonstrates a similar pattern of Petersburg’s rate significantly higher than Virginia’s state rate. Petersburg’s rate for complications from diabetes (short term) is 309.00 compared to Virginia’s state rate of 57.80; its rate for adult asthma is 313.10 compared to Virginia’s state rate of 104.60. For further comparisons of Petersburg PQI rates versus Virginia’s state rates, please see Appendix D. The types of conditions listed in Table 2 as well as other chronic conditions such as cholesterol are the very types of conditions the new clinic in Petersburg would look to target and improve.

¹⁷ Hypertension is a chronic condition that can frequently be controlled with treatment in an outpatient setting. Proper outpatient treatment may reduce hospital admissions, and lower rates represent better quality care.

¹⁸ Most PQIs use the adult population (individuals 18 years or older) in their estimates.

The Cameron Foundation's 2008 Health Needs Assessment

A final way to document need for additional primary care services in Petersburg is to conduct a health needs assessment of the city. According to the National Institute for Health and Clinical Excellence, a health needs assessment is a systematic method for reviewing the health issues facing a population that can ultimately lead to agreed priorities and resource allocation that will improve health in the specified population and reduce inequalities.^{xxxix} To the benefit of this project, it was discovered that at the request of The Cameron Foundation,¹⁹ Central Virginia Health Planning Agency²⁰ in 2008 updated its 2005 Health Needs Assessment that it had previously prepared for The Cameron Foundation.^{xlxi} The purpose of the 2008 Health Needs Assessment is to:

1. Develop a useful, objective report that illustrates The Cameron Foundation's service area's current health status (which includes Petersburg) and can be used in the future to track progress or declines in specific areas;
2. Inform and support resource investment choices by The Cameron Foundation;
3. Provide research and statistical support for future grant proposals and other project development; and
4. Assist in community-based planning, development of health services, and planning for a future health meeting in order to develop continual solutions for The Cameron Foundation's service area.^{xlii}

¹⁹ The Cameron Foundation is a not-for-profit organization that promotes and provides support for programs and activities (which include health-related endeavors) that benefit the residents of Petersburg and the surrounding cities and counties, which include the cities of Colonial Heights and Hopewell and the counties of Dinwiddie, Prince George, Sussex, and part of Chesterfield.

²⁰ Central Virginia Health Planning Agency is one of Virginia's five Health Planning Agencies that, under the Virginia Code, assists the Virginia Board of Health and the Virginia Department of Health in numerous capacities, including conducting data collection, research, and analyses; preparing reports and studies; conducting needs assessments; identifying gaps in services and inappropriate use of services or resources; reviewing applications for a certificate of public need; and additional other functions.

The 2008 Health Needs Assessment includes Petersburg demographic data, socioeconomic indicators, education indicators, inpatient utilization data, other health indicators, vital statistics, and qualitative information such as types of health insurance coverage and prominent chronic conditions found in the city.

In addition to containing important health indicators, the 2008 Health Needs Assessment also includes a Community Needs Assessment. The Community Needs Assessment is a study conducted in Health Planning Region IV (HPR IV),²¹ which includes the Crater Planning District 19 (PD 19), that surveyed a total of 3,000 households.^{xliii,xliv} Each locality in HPR IV had 100 households surveyed (with the exception of Chesterfield, Henrico, and Richmond, which each had 200 households surveyed). The survey consisted of questions regarding health coverage, health access, health conditions, and community needs.^{xlv}

From this Community Needs Assessment Survey is the key statistic that rests at the foundation of the forthcoming cost-benefit analysis:

- In the survey, **8%** of people in Petersburg reported having problems receiving medical care.

Petersburg's response was slightly less than the average for PD 19, in which 9% of people overall reported problems receiving medical care. However, it was slightly higher than the rate for HPR IV, in which 6% of individuals reported problems receiving medical care. To put Petersburg in context with some of the other localities within these designated regions, Chesterfield reported 2% of individuals reporting problems receiving medical care; Dinwiddie 10%; Prince George 11%; and Sussex reported 15%.^{xlvi}

For the purposes of this report, the 8% of people in Petersburg reporting difficulty receiving medical care is how the demand for additional primary care services in Petersburg was estimated, in addition to insight offered by looking at Petersburg health and socioeconomic

²¹ Health Planning Region IV (HPR IV) is another name for the region falling under the auspices of Central Virginia Health Planning Agency. 'Regional health planning agency' means the regional agency (health systems agency), including the regional health planning board, its staff and any additional components, designated by the Virginia Health Planning Board to perform the health planning activities set forth within a health planning region.

indicators. The 8% statistic will be used to calculate key estimates for the cost-benefit analysis, including the number of primary care visits a new clinic could expect to see; the number of non-urgent patients diverted from the emergency department; and the reduction in the number of preventable hospitalizations for Petersburg.

Section 4: Existing Health Services in Petersburg

While it is outside the scope of this project to fully detail the current health services in Petersburg, it is important to note that there are health resources available of various types. Of particular interest are government programs, hospitals, safety net clinics, and private providers. Examining the services currently available to Petersburg residents, particularly underserved, is critical in understanding how a new safety net clinic will engage with the present providers.

Government Services

Petersburg provides health services through the City's Department of Social Services; however, these services are mostly related to the administration of entitlement programs such as Medicaid. Clinical services are not offered by the Department of Social Services.^{xlvii}

The Petersburg Health Department does provide clinical services to qualified individuals including childhood immunizations, vaccinations, case management for children including developmental and lead screenings, tuberculosis screening and treatment, sexually transmitted disease testing and treatment, HIV testing, family planning, pregnancy testing, and prenatal care including nutrition counseling. The Health Department also provides counseling and education services to qualified individuals related to specific conditions.^{xlviii}

Hospitals

Hospitals provide many valuable health services to patients but the most relevant service they provide in regards to unserved and underserved populations is emergency care; for uninsured individuals who are less likely to have ready access to primary care, the Emergency Room often serves as a safety net health provider.

The major hospital that services Petersburg is Southside Regional Medical Center. Southside is a fully equipped hospital and is the only trauma designated hospital in the Tri-Cities (Petersburg, Hopewell, and Colonial Heights) and Southern Virginia.^{xlix} Southside has 408 beds, over 1,400 employees, and a medical staff consisting of 250+ physicians encompassing over 30+ specialties. According to the Cameron Foundation Needs Assessment, 63.1% of Petersburg's hospital discharges are from Southside. In the cost-benefit analysis included in this report,

Southside is considered to be the major provider of Emergency Department services to Petersburg.

There are a few other hospitals that serve Petersburg residents that are outside of the City's boundaries. John Randolph Medical Center in Hopewell and the Medical Center of Virginia in Richmond provide Emergency Care services.^{1,li} Despite being outside of the area of consideration, these sites do provide services to Petersburg residents although at a lesser rate of frequency than Southside Regional Medical Center. These hospitals are not included in the analysis because they are not located in Petersburg.

Popular Springs Hospital and Central State Hospital provide mental health services to some Petersburg residents.^{lii,liii} These hospitals are not included in this analysis because they do not provide primary care services.

Safety Net Clinics

From the research, it appears as if Petersburg residents are currently served by three safety net clinics: the Petersburg Health Care Alliance, the Appomattox Health and Wellness Center, and Pathways Free Clinic. The first two are FQHCs currently serving the city; the third is a free clinic that services Petersburg and its surrounding counties.^{22liv} Below are a few more details describing each clinic:

- **Petersburg Health Care Alliance (PHCA)**: Currently shares building space with Petersburg's Department of Health. Opened in 1998, was the first FQHC to serve Petersburg. One of the thirteen sites operated by Central Virginia Health Services. In 2008, it serviced 52% of uninsured patients; 12% of patients with private insurance; and 36% of patients with either Medicare or Medicaid.^{lv}

²² Pathways Free Clinic recently received membership as the first free clinic to service the Tri-Cities area from the Virginia Association of Free Clinics.

- Appomattox Health and Wellness Center (AAHWC): Due to heavy patient demand at the PHCA, this FQHC opened in 2007 to help meet the City's demand for care. One of the thirteen sites operated by Central Virginia Health Services, AAHWC is the fourth largest currently in patient volume. In 2008, it saw 3,360 unduplicated medical and dental patients at its center. Of its patients, 64% are uninsured; 13% have private insurance; and 23% have either Medicaid or Medicare.^{lvi}
- Pathways Free Clinic: According to Lou Markwith^{lvii}, Executive Director of the Virginia Association of Free Clinics, Pathways just received its membership as the first free clinic in the Tri-Cities area. Furthermore, Pathways is southside Virginia's only free clinic specializing in cardiac attention for uninsured patients. The clinic also hosts an annual free dental clinic in partnership with the Virginia Dental Association.^{lviii}

Private Providers

According to the Virginia Department of Health Professionals, there are 19 private physician practices in Family/General, Obstetrics/Gynecology, or Pediatric medicine in Petersburg. Private physicians are also considered safety net providers, although it is impossible to know how many Medicaid or uninsured patients they see without contacting each office for that information. Still, it is reasonable to conclude that some of these offices provide key primary care services to Petersburg's underserved population.

From this brief look at Petersburg's current primary care providers, it is evident that there are multiple venues for health care services in the community. However, based on the 8% of people reporting problems receiving medical care, it appears there might still be a need for additional primary care providers to help close this gap.

Section 5: Geographic Trends in Socioeconomic Indicators and Health Care Provision in Petersburg

In order to further understand the health needs and resources of Petersburg, Geographic Information Systems (GIS) was used to visually display Petersburg health and socioeconomic data.^{lix} The goal of this part of the analysis was to determine whether there is an area in Petersburg that is particularly marginalized or underserved, known as a ‘hotspot.’ If a hotspot could be located, it would be prudent to locate the clinic in this area

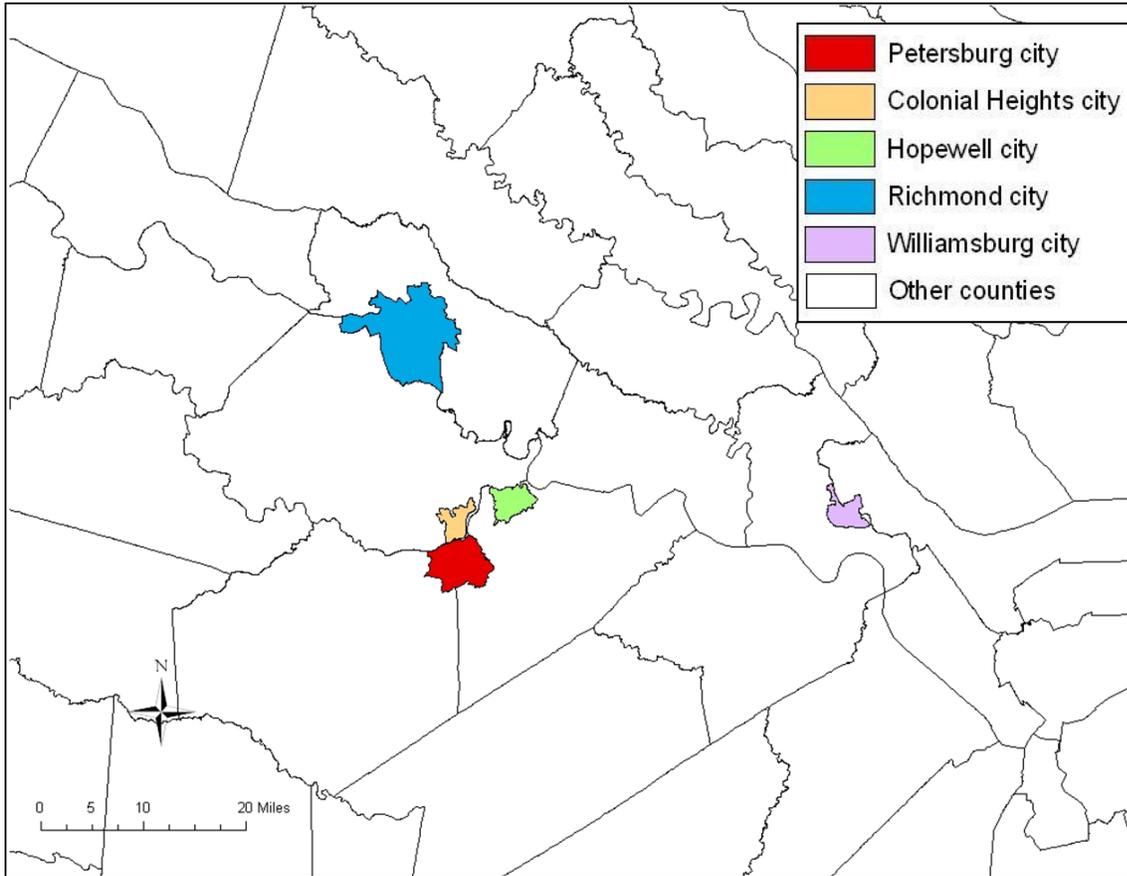
Ideally, patient-level discharge data from Southside Regional Hospital would have been accessed and mapped to pinpoint the home addresses of individuals using unnecessary and divertible Emergency Room services. If a number of these individuals live in close proximity to each other, the cluster could constitute a hotspot. A clinic located in such an area would have a greater probability of diverting costly Emergency Room visits while serving the health needs of these individuals.

However, patient-level data was not available for this analysis. In its absence, more general data was used to estimate the most likely areas of concentration of individuals without primary care services. The following procedure was used in the geographic analysis. First, socioeconomic data from the United States 1999 Census of Petersburg was mapped to visualize whether there are geographic concentrations of need indicators by census tract, such as population density, median income, unemployment, and public assistance use.^{lx} It is assumed that individuals who fall at the neediest ends of these indicators are the most likely to be uninsured and lacking sufficient access to primary and chronic care services. Second, the location of primary care physicians who practice in Petersburg (attained from the Virginia Department of Health Professionals) was mapped to visualize the network of existing providers.^{lxi} Finally, a region was recommended for the location of the new safety net clinic.

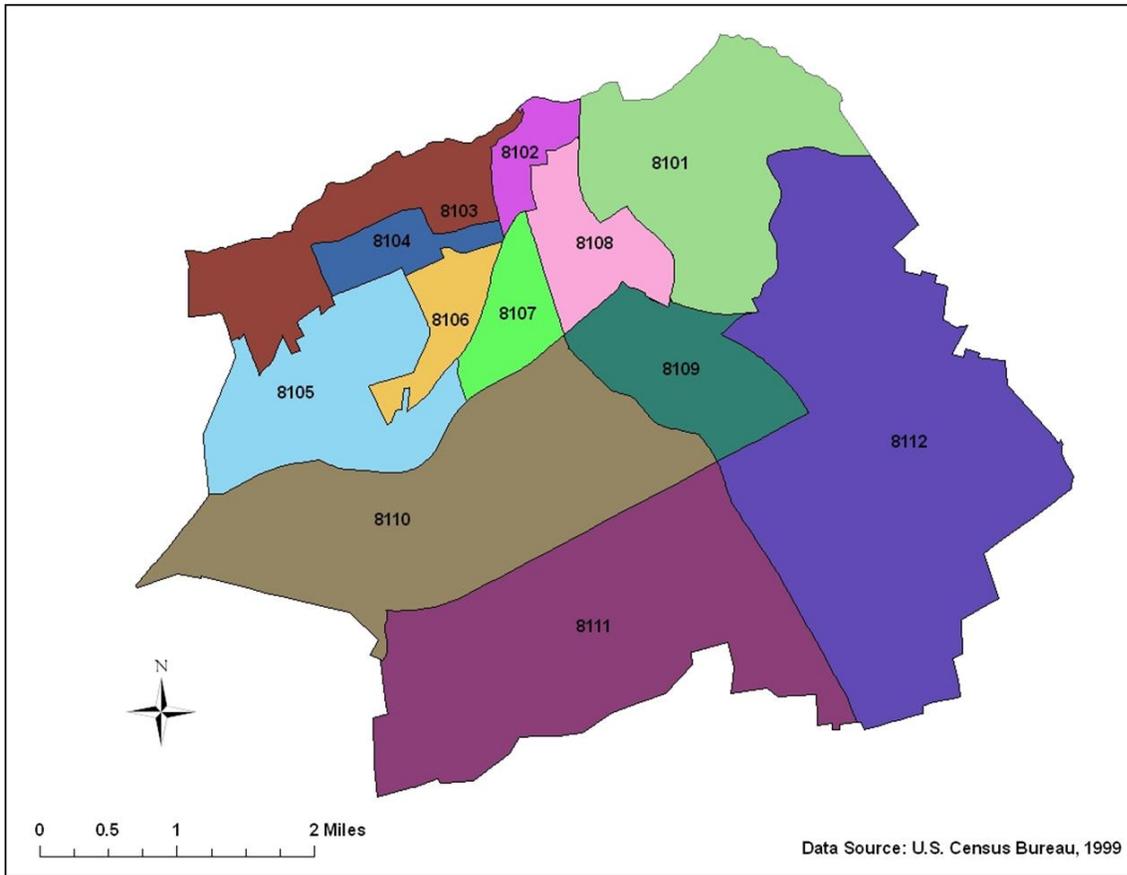
Petersburg city is located approximately thirty minutes south of Richmond in the heart of southeastern Virginia. It is considered part of the Tri-City region which also includes the cities of Hopewell and Colonial Heights. It is important to note all of the Tri-Cities as well as other cities of sufficient size such as Richmond and Williamsburg function as independent counties in the Commonwealth.

For the analysis of Petersburg, 1999 Census tract divisions were used to group land areas as shown in Map B.

Map A: Southeastern Virginia Counties and Cities



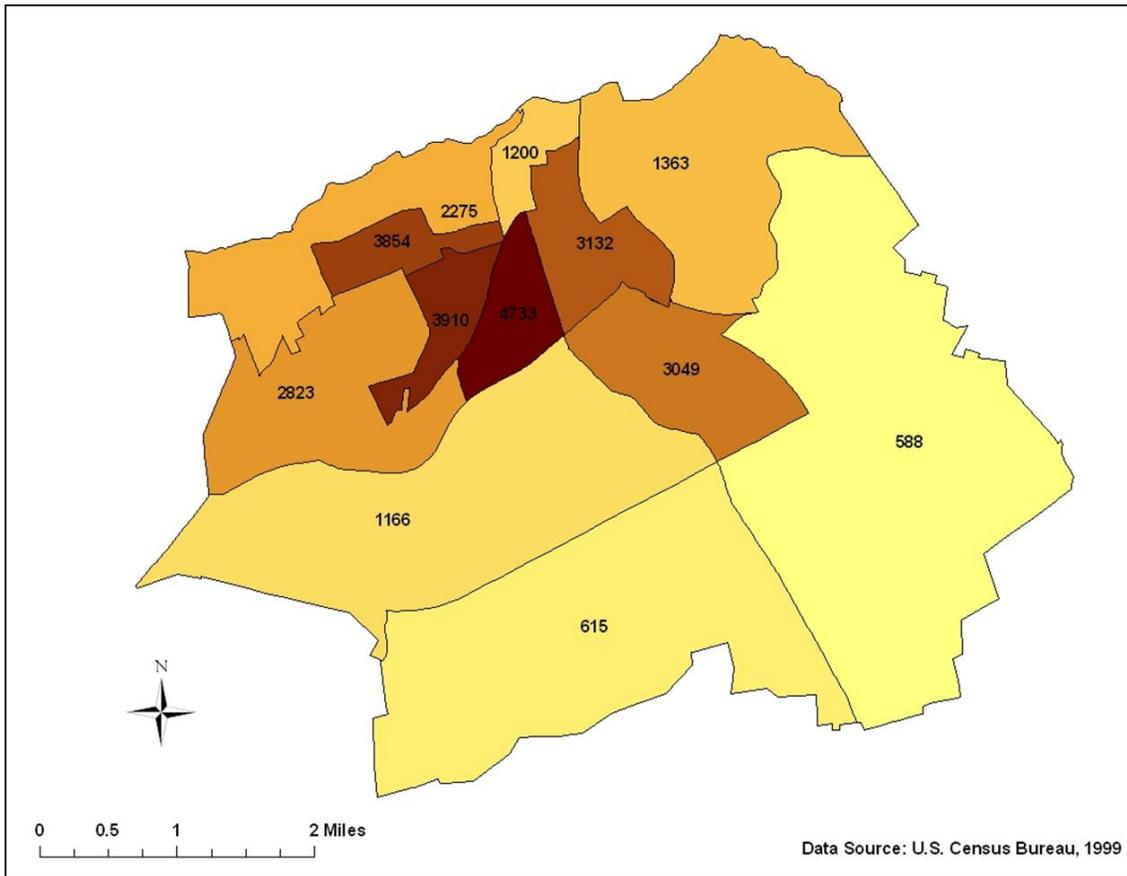
Map B: Petersburg Census Tracts



For this sake of this discussion, two types of maps will be displayed: socioeconomic maps (population density, median income, working population and poverty levels) and infrastructure maps (major transportation networks and existent provider locations). For a full range of maps displaying other trends, please see the Appendix E.

Map C displays the population density in people per square mile in Petersburg by Census tract. It is assumed that locating a safety net clinic in a densely populated area will make the clinic most available to many people. The densest Census tract is tract 8107 with 4733 people per square mile as indicated by the darkest color of brown. In addition, there appears to be a concentration of the populous in the surrounding Census tracts as well.

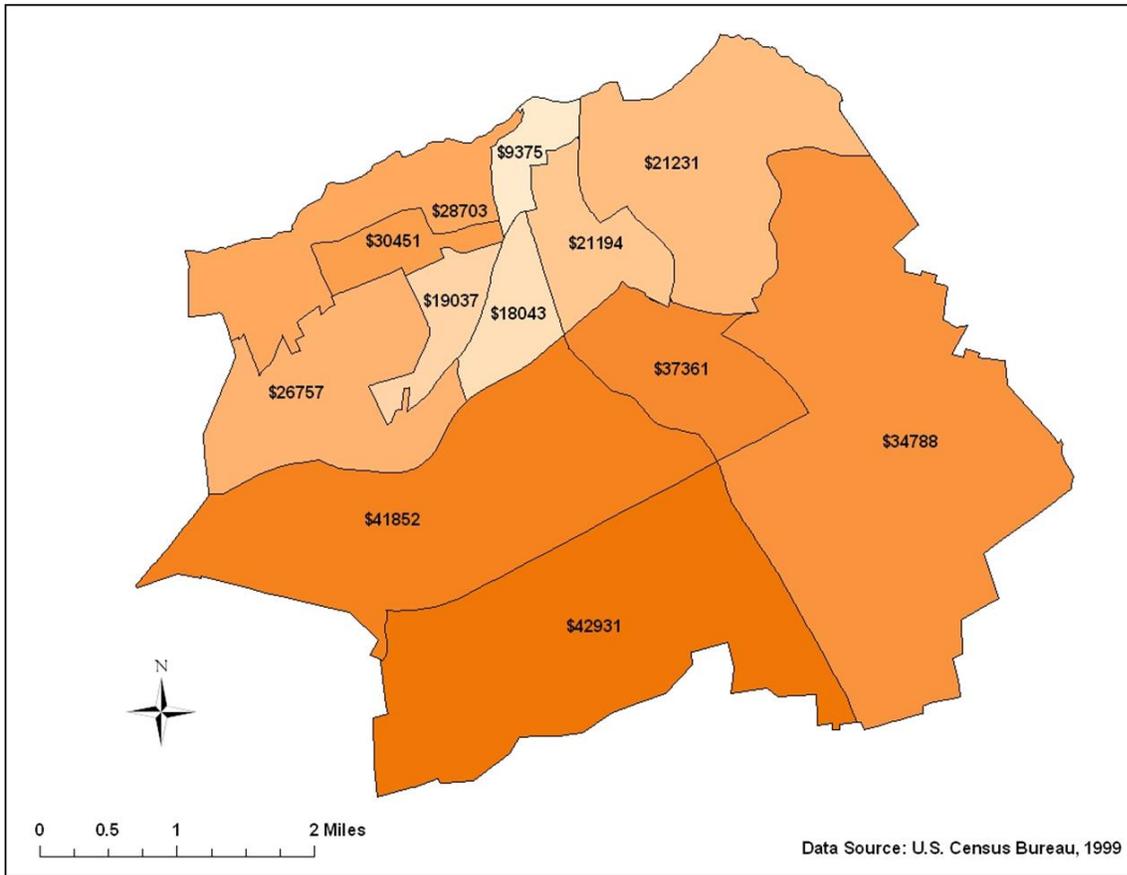
Map C: Population Density by Census Tract (People per Square Mile)



Another important consideration for a safety net clinic’s location is the per capita median income of the people in the surrounding area. Since individuals with low incomes are more likely have difficulty paying for health care, a relatively less affluent area is desirable for the clinic’s location. Map D illustrates that Census tract with the lowest median income in 1999 (as indicated by the lightest orange) was Census tract 8102 at \$9,375 per year. Similar to population density trend, there appears to be some clustering in the northwestern side part of Petersburg for individuals with low incomes.

It is also important to note that the median per capita income in Virginia in 1999 was \$23,975.^{lxiii} Taking this into consideration, five out of twelve Census tracts in Petersburg fell below the median per capita income of Virginia in 1999. All five of these counties are located in the top half of the city.

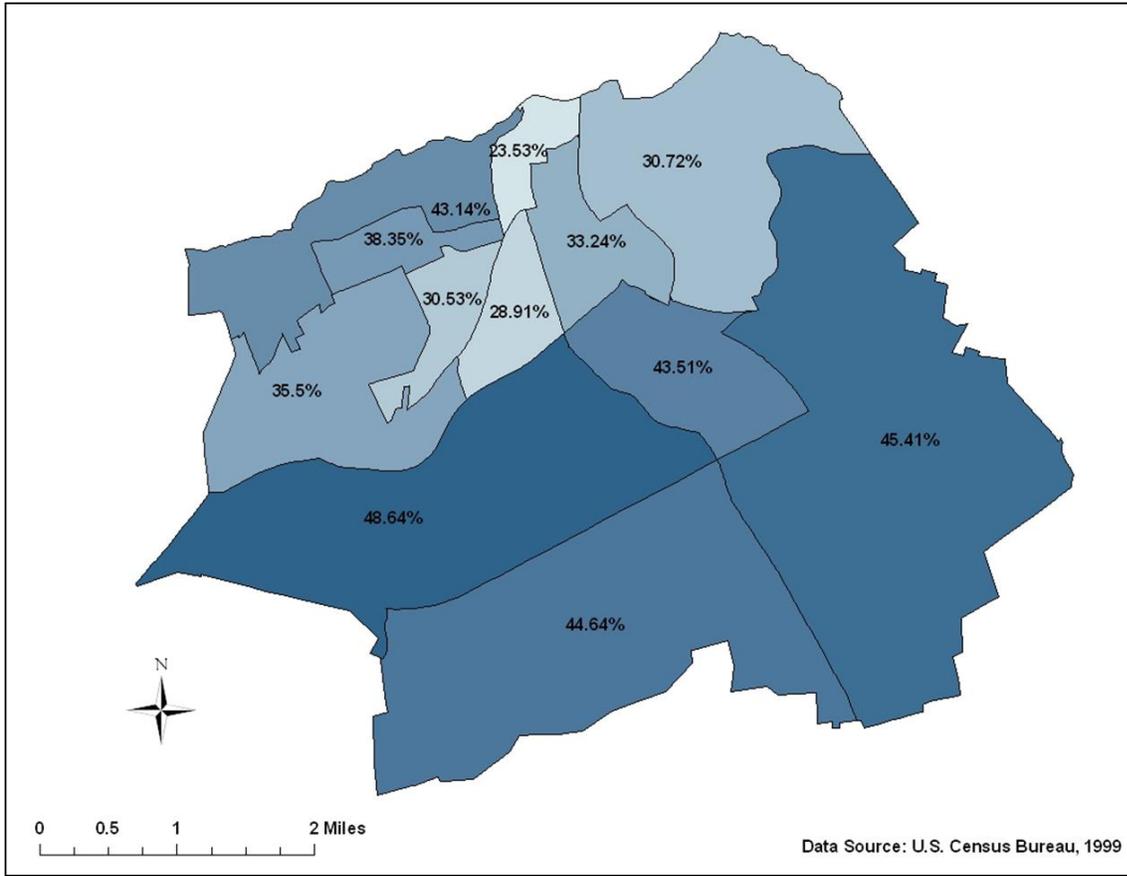
Map D: Median Per Capita Income



Another profound factor in access to health care is employment status since a majority of insured individuals in the United States are insured through employer-sponsored insurance plans. Ideally, rates of unemployment would have been mapped to visualize this trend; however, this data was not located on a Census tract level. Instead, Map E illustrates the concentration of working individuals sixteen years and up as a percentage of the tract's total population. This is not a perfect measure of unemployment in the tract; however, it does illustrate trends in the employment of the population in the given tract.

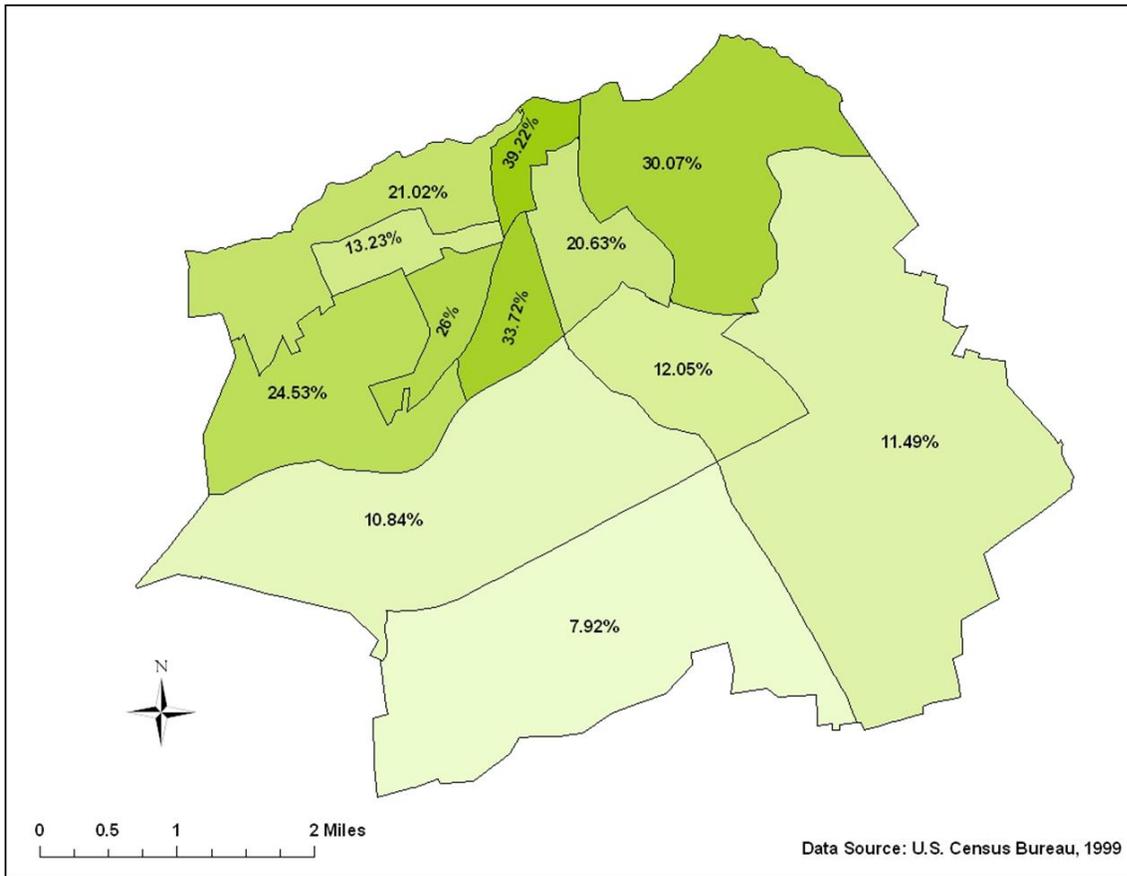
Combined with the previous maps, Map E reinforces an emerging trend as tract 8102 is again the most affected by a relative lack of working population with only 23.53% of its population being workers sixteen years and older (indicated by the lightest blue tract).

Map E: Working Individuals 16 Years Old and Up as a Percent of Tract Population



Building on these income and unemployment trends, another consideration for the location of a safety net clinic is the percentage of individuals living in poverty. Individuals living under the poverty level are eligible for public assistance and entitlement programs such as Medicare and Medicaid. These individuals are more likely to be in need of a medical provider as private health care providers are less likely to accept new patients with public insurance as opposed to private insurance. Map F displays the concentration by tract of individuals below 100% of the poverty line in 1999. Tracts 8102 and 8107 have the greatest rates of residents living under the poverty line at 39.22% and 33.72% respectively.

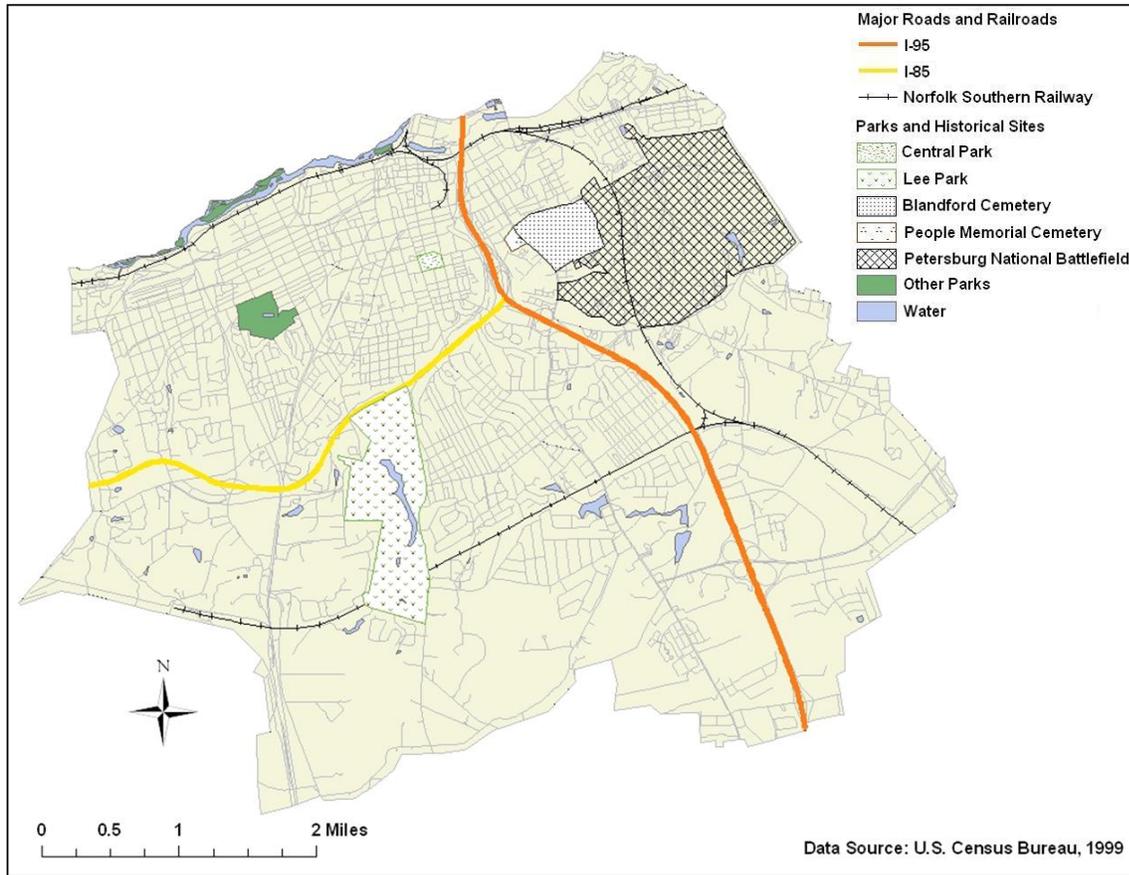
Map F: Residents Below the Poverty Level as a Percent of Tract Population



Considering these four trends combined with other trends displayed in the Map Appendix, it appears that Census tracts 8102 and 8107 are the most ideal for the location of a safety net clinic based on the available data.

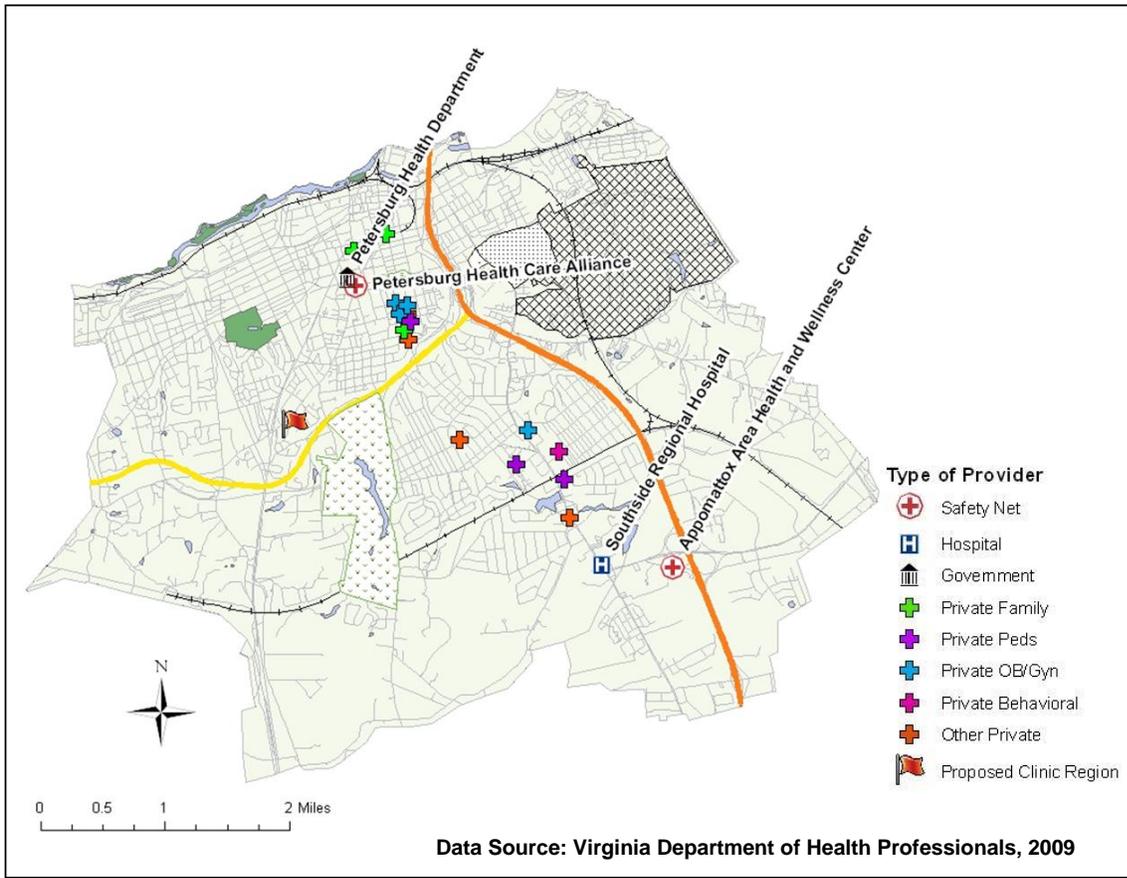
Before settling on one of these two tracks, it is crucial to examine the transportation networks in the area to ensure that there is sufficient infrastructure to allow people to travel to the clinic. Ideally, all transportation networks would be considered; however, in this case, data to map Amtrak and bus routes could not be located. Therefore, this analysis rests on the availability of roads. Additional considerations that would ideally be included are the zoning regulations, land use characteristics, and property availabilities and prices in each tract. However, only data including the existence of water bodies, historical sites, and parks could be located and mapped as demonstrated by Map G. The road networks in the areas of both tracts 8102 and 8107 appear to be developed, though tract 8107 is located closed to Interstate 85 which could make it more accessible.

Map G: Transportation, Historical Sites and Parks



Finally, Map H displays the locations of existent providers, highlighting the Petersburg Health Department, the two Federally Qualified Health Centers, and Southside Regional Hospital. It is clear from Map H that the Petersburg Health Department and Petersburg Health Care Alliance are optimally placed to service both tracts 8102 and 8107. Therefore, as demonstrated by the red flag on Map H, this analysis suggests that placing a clinic on the other side of tract 8107 may still help to meet the needs of unserved or underserved individuals in Petersburg while attempting to limit competition with existent provider. Finally, it is important to note that the scale of these maps is relatively small, and the proposed region for the new clinic is not actually a great distance from existent providers. However, the hours of operation of the new clinic could differentiate the clinic to lessen competition with existent providers.

Map H: Locations of Existent Health Providers and Proposed Clinic Region



Section 6: Proposed Structure of a New Safety Net Clinic in Petersburg

For the sake of this analysis, the proposed clinic is assumed to be a safety net clinic that assists those who are not currently being served by existing safety net clinics. The clinic provides primary care which includes check-ups, physicals, influenza screenings and vaccinations, streptococcus (strep) testing, childhood immunizations and mononucleosis (mono) and urine testing. In addition to these services, chronic care is provided at the clinic, specifically services to address diabetes, hypertension, high cholesterol, and asthma.

The clinic is assumed to run on a full-time, year-round basis though the specific hours of operations were not defined in the analysis. It is assumed that the new clinic would not compete with the existent providers, particularly the safety net clinics, for new patients. Instead, the location, services, and hours of operations would be designed to serve unmet need and would not divert services from other primary care providers. The clinic is designed, however, to divert Emergency Room visits from Southside Regional as a cost-saving measure for the whole health system in Petersburg.

Extensive calculations have been conducted to estimate the number of visits per year the clinic could expect to schedule as well as the staffing that would be needed to carry such a patient load. These calculations estimate that the clinic would provide about twenty visits per day at fifteen minutes per visit.^{lxiii} To serve this patient load, calculations suggest that the following full-time staff members are necessary:

- one executive (non-medical) director
- one medical doctor (MD/DO)
- one physician assistant (PA)
- one registered nurse (RN)
- one licensed practical nurse (LPN)
- two administrative assistants

Additionally, one part-time registered nurse will be necessary to supplement the full-time staff members' work.

For the sake of the cost-benefit analysis, a full-cost model is used, meaning that federal funding, grants, or donations are not being used to mitigate private costs.^{lxiv} However, these

strategies and other similar options to decrease the private costs of the clinic will be discussed in Section 8.

Section 7: Cost-Benefit Analysis of a New Safety Net Clinic in Petersburg

Cost-benefit analysis is a technique designed to determine the feasibility of a project or plan by quantifying its costs and benefits. A cost-benefit ratio is determined by dividing the projected benefits of a program by the projected costs. Net benefits are calculated by subtracting the projected costs from the projected benefits. When net benefits are positive, it may make sense to move forward with the project. Costs may be one-time or ongoing, while benefits are most often received over time. There are many complexities involved in putting a financial value on intangible costs and benefits, such as the increased productivity of patients who have better health statuses due to access to primary care. However, all of the assumptions underlying how each cost and benefit was quantified are explained in depth in this section, and are based on appropriate literature and methodologies. Cost-benefit analysis also requires determining if the project is feasible by considering the financing costs of running the medical clinic. Thus, the net present value (NPV) of the difference between the costs and benefits over a particular time horizon at a particular discount factor must be examined. The length of time the project lasts as well as the discount factor for the capital used to operate the clinic need to be accurate. Cost-benefit analysis determines whether the benefits and costs of running the clinic are a good investment of funds today. Simply put, do the benefits outweigh the costs? Please note that the equation used for the cost-benefit analysis will be explained in depth later in this section.

Before estimating benefits and costs, it is important to understand the two assumptions that underlie the analysis. First, the benefits and costs of this safety net clinic are calculated from the viewpoint of the entire healthcare system in Petersburg, Virginia. It is imperative to look system-wide because capturing the benefits of increasing primary care in a community includes considering potential savings that accrue when patients are prevented from utilizing healthcare services in a hospital or Emergency Department setting. Second, the clinic is designed with the intention to close the entire primary care gap that exists in Petersburg, Virginia. In other words, the clinic will serve the 8% of Petersburg that expressed difficulties garnering access to primary care.^{lxv} This section will begin with the methodology for calculating the clinic's patient utilization rate, followed by estimating costs, estimating benefits, estimating net benefits over time, considering different states of the world, and finally a sensitivity analysis.

Estimating the Patient Utilization Rate

The first step of designing this safety net clinic and estimating its costs and benefits is to consider patient utilization rates. The patient load drives the calculations underlying each cost and benefit. For example, the only way to have an understanding of labor and operating costs is to forecast how many patient visits the clinic can expect to serve each year, as this determines how many doctors and nurses are needed. It is important to note that these calculations are based on a methodology obtained from a technical report from the University Center for Economic Development at the University of Nevada: Reno, called “Demand for Primary Care Physicians in Gabbs, Nevada.”^{lxvi} The Oklahoma Office of Rural Health at Oklahoma State University has also utilized this same methodology for assessing demand for primary care in several counties of Oklahoma.^{lxvii} The methodology involves calculating the number of visits based off of annual physician office visit rates and the service area population.

As already discussed, the service area population consists of the entire population in Petersburg, Virginia. Petersburg’s population estimates by age and gender were obtained from the 2000 Census. Total population in 2000 is estimated to be 33,740.^{lxviii} The estimated population amounts by age are shown in Table 1 for females and in Table 2 for males. The 2006 National Ambulatory Medical Care Survey reveals the number of annual physician office visits for each specified age and gender group.^{lxix} These visit rates are also shown in Tables 1 and 2 at the end of this particular section. For instance, females’ under 15 years of age average number of annual physician office visits is 2.57, according to the 2006 National Ambulatory Medical Care Survey. This average annual visit rate is applied to the populations for each gender and age group.²³ The total number of female office visits is estimated to be 67,586, and the total number of male office visits is estimated to be 40,893. Residents in the entire medical service area are estimated to make 108,480 total physician office visits. Of these total office visits only 58.3% or

²³ It is important to note that these visit rates may be lower than they should since there could be a national level of unmet need that is not reflected here. These numbers do not represent how often someone *should* visit a physician, but represents how often they *actually* visit a physician. These are national visit rates.

63,244²⁴ will be made to physicians involved in primary patient care, while the remainder will be made to specialists, according to the 2006 National Ambulatory Medical Care Survey.^{lxx}

Naturally, this clinic does not expect to serve 63,244 patients annually; instead, it must be determined what percentage of this total it can serve. This clinic is designed on the assumption that it will completely fill the primary care gap that exists in Petersburg. Thus, since 8% of the people in Petersburg expressed difficulty obtaining primary care, the clinic will serve 8% of the 63,244 annual primary care visits needed serving in Petersburg, or 5,059 patient visits annually.²⁵ This translates to about 20 visits per day based on 251 business days per year.²⁶ The clinic will serve about 1,573 patients annually. This calculation is obtained by dividing each gender and age group’s total annual visits by the visit rate. Please see Tables 1 and 2 for more information regarding these numbers.

Table 1: Annual Physician Office Visits by Females for Petersburg City County

Age	Population	Visit Rate	Total Visits	Primary Care Visits	8% Need in Petersburg
Under 15	3,428.00	2.57	8,809.96	5,136.21	410.90
15-24	2,140.00	2.42	5,178.80	3,019.24	241.54
25-44	5,064.00	2.96	14,989.44	8,738.84	699.11
45-64	4,244.00	3.92	16,636.48	9,699.07	775.93
65-74	1,597.00	6.00	9,582.00	5,586.31	446.90
75+	1,709.00	7.25	12,390.25	7,223.52	577.88
Total	18,182.00		67,586.93	39,403.18	3,152.25

Note: Primary Care Visits total 58.3% of all office visits
 Source: National Ambulatory Medical Care Survey, 2006; 2000 Census

²⁴ 108,480 x 58.3% = 63,244

²⁵ 63,224 x 8% = 5,059

²⁶ 5,059/251 = 20

Table 2: Annual Physician Office Visits by Males for Petersburg City County

Age	Population	Visit Rate	Total Visits	Primary Care Visits	8% Need in Petersburg
Under 15	3,614.00	2.63	9,504.82	5,541.31	443.30
15-24	2,269.00	1.09	2,473.21	1,441.88	115.35
25-44	4,272.00	1.55	6,621.60	3,860.39	308.83
45-64	3,430.00	2.96	10,152.80	5,919.08	473.53
65-74	1,184.00	5.53	6,547.52	3,817.20	305.38
75+	789.00	7.09	5,594.01	3,261.31	260.90
Total	15,558.00		40,893.96	23,841.18	1,907.29

Note: Primary Care Visits total 58.3% of all office visits

Sources: National Ambulatory Medical Care Survey, 2006; 2000 Census

Estimating Costs

Before costs are explained, it is important to note that the numbers mentioned in this section represent year zero of the cost-benefit analysis and are in 2009 dollars. If the source of the data indicates the dollar amount is from a year other than 2009, the amount has been inflated to reflect 2009 costs. The methodologies explaining discounting and inflating over time will be discussed later in the report. Thus, this section only describes how each cost of the safety net clinic was calculated for year zero, which is assumed to start in 2009. The costs described are employee salaries and benefits, payroll taxes, facility costs, insurance costs, and administrative costs.

Employee Salaries and Benefits

It is expected that one of the major drivers of costs are employee salaries and benefits, so this is an excellent place to start. The utilization calculations have determined that the clinic must have the ability to serve about 20 patient visits per day, so it is important to determine how many patient visits per day a physician can handle. Based on the 2006 National Ambulatory Medical Care Survey, physicians who specialize in general and family practice on average spend 19.5 minutes with each patient who visits their office.^{lxxi} However, physicians do not spend their entire day visiting with patients as there is paperwork to be completed, phone calls from patients to field, and lab work that must be interpreted. Thus, it is important to calculate how much time of each day a physician can realistically spend with visiting patients. A study in the *Annals of Family Medicine*²⁷ found that physicians spend about 55% of their day with visiting patients.^{lxxii} Based on an 8 hour workday, it can be determined that one physician can handle about 13 visits per day.²⁸ This leaves 7 visits per day that must still be met. A part-time physician or a full-time physician assistant can attend to these office visits. A full-time physician assistant was chosen because they have the skills and training allowing them to handle most care needed in a primary care office, and it was also decided that having another full-time employee that could support the physician would be extremely beneficial to the operations of the clinic. Furthermore, it is expected that it may be easier to recruit a full-time physician assistant rather than a part-time physician. According to the Bureau of Labor Statistics' data on wages,^{lxxiii} the median wage rate of a physician specializing in family and general practice in Virginia is \$162,013.²⁹ The median wage rate of a physician assistant working in Virginia is \$65,975.

²⁷ This study used time-motion study techniques for 11 physicians. Two patient care days were randomly selected and documented by direct observation. Physician time spent on 54 activities outside the examination was documented. Data represent 12,180 minutes of work and 611 outpatient visits.

²⁸ 8 hour workday = 480 minutes; 480 x 55% = 264 minutes available to spend with patients; 264 minutes / 19.5 minutes per patient = 13.53 visits per day

²⁹ The median Virginia wage was chosen for each position to help account for any potential skewing of the data that can affect the mean. It is suspected that the mean would reflect a wage rate that is unnecessarily high due to the number of higher-paid positions existing in Northern Virginia.

Nurses are also vital to the success of a safety net clinic. Thus, it is also important to determine how many nurses are needed per physician. A study completed by the Robert Graham Center at the George Washington University School of Public Health and Health Services found that the physician to nurse ratio in Virginia is 1.71.^{lxxiv} Using this ratio, it was calculated that this clinic needs two full-time nurses and one part-time nurse.³⁰ A full-time registered nurse, a full-time licensed practical nurse, and a part-time registered nurse will be hired. According to the Bureau of Labor Statistics' data on nurses' wages,^{lxxv} the median wage of a full-time registered nurse in Virginia is \$61,744.56, the median wage of a full-time licensed practical nurse in Virginia is \$38,018.88, and the median wage of a part-time registered nurse is \$30,872.28.³¹

Administrative staff is also very important to a clinic. They help keep the office running smoothly and perform many vital tasks. It was decided that two full-time administrative assistants and one full-time executive director are necessary. This decision was based on discussions and observations from several local Hampton Roads, Virginia safety net clinics. According to the Bureau of Labor Statistics' data on non-profit wages, the median wage of an administrative assistant in Virginia is \$28,418.18 and the median wage of an executive director is \$62,250.24. These wages closely resemble how the safety net clinics in Hampton Roads compensate their staff.

Employee benefits are another major expense of a clinic. According to the Bureau of Labor Statistics' data on employer costs for employee benefits compensation, it was found that in the Healthcare and Social Assistance industry, employers spend an additional 28% of the employee's total salary on benefits.^{lxxvi} The costs of employees' benefits were calculated for each full-time employee. Part-time employees will not receive any benefits at this clinic, which is also how the Hampton Roads safety net clinics operate. Please see Table 3 below for further

³⁰ This was based on the earlier calculation that 1.5 physicians are needed.

1.5 physicians x 1.71 ratio = 2.56 nurses

³¹ This is calculated by dividing the full-time registered nurse wage in half.

information regarding how the salary and benefit costs are broken out for each position at the clinic. The total cost for employee salary and benefits is \$602,826.82 for year zero.³²

Table 3: Breakdown of Employee Salary and Benefit Costs

Position Description	Salary Cost	Benefits Cost
Full-time Physician	\$162,013.68	\$45,363.83
Full-time Physician Assistant	\$65,975.76	\$18,473.21
Full-time Registered Nurse	\$61,744.56	\$17,288.48
Full-time Licensed Practical Nurse	\$38,018.88	\$10,645.29
Part-time Registered Nurse	\$30,872.28	\$0.00
Full-time Administrative Assistant	\$28,418.18	\$7,957.09
Full-time Administrative Assistant	\$28,418.18	\$7,957.09
Full-time Executive Director	\$62,250.24	\$17,430.07
Total	\$477,711.77	\$125,115.06

Source: U.S. Bureau of Labor Statistics

Payroll Taxes

Payroll taxes are another important cost this clinic must consider, regardless of whether it is private or public.. According to the Internal Revenue Service, businesses must match their employees’ social security and Medicare tax contributions. The IRS states that employers must pay 6.2% of their employees’ salaries towards FICA³³ taxes, and 1.45% of their employees’ salaries towards Medicare taxes. The FICA taxable base is only the first \$102,000 of wages each employee. The Medicare taxable base has no limit, and is based on each employee’s full salary amount.^{lxxvii} Since FUTA taxes, which are federal taxes for unemployment benefits have a credit attached to them, the net amount taxed is a negligible 0.8% so they are not included in the

³² This is calculated by summing total salary costs and benefits costs for all positions.

³³ FICA stands for the Federal Insurance Contributions Act; SUTA is the State Unemployment Tax Act; and FUTA is the Federal Unemployment Tax Act

calculations. SUTA taxes, which are state taxes for unemployment benefits were also not included. This is because Virginia's taxable base is only the first \$8,000 of each employee's salary, and the rate can vary between 0.10% and 6.20%. This rate is based upon how many employees a business has laid off in the past. This clinic has eight employees giving it a taxable base of only \$64,000. The authors determined this was a negligible amount and chose not to include it.

FICA taxes are based off the sum of the wage rates of each employee, (only up to \$102,000 for the physician), and is calculated to be \$417,698.09 for year zero. With the FICA tax rate of 6.20%, the clinic will owe \$25,897.28 to the federal government for year zero. The Medicare taxes are based off the sum of each wage of each employee, with no wage ceiling. It is calculated to be \$477,711.77 for year zero. With the Medicare tax rate of 1.45%, the clinic will owe \$6,926.82. Total payroll taxes for year zero are \$32,824.10.

Facility Costs

To operate, a clinic must have a building. The costs of using this facility are another major driver of the cost-benefit analysis. For the purpose of this analysis, one-time costs to renovate the space for a medical office have not been included. This was decided because the analysis is only looking at the net benefits that will accrue while the clinic is actually being operated, and it is assumed that the clinic cannot operate while undergoing renovations. Furthermore, there is a possibility that the decided location will already have all of the attributes that a medical clinic needs. If it is determined that renovations are needed, those costs will have to be added into the cost-benefit analysis at that time. The costs of facility rent, utilities, and medical equipment are discussed in this section.

The assumption underlying facility rent is that the building will not actually be owned by the clinic. Naturally, if it is decided the clinic will purchase a building, costs will change as property taxes and a monthly mortgage payment must be calculated among other things. According to a research report by Marcus & Millichap, a national office and industrial properties group, the rent cost of a medical building in the southeast region of the United States is \$22.95

per square foot per year.^{lxxviii} Based on the number of doctors and physician assistants this clinic will have, it was determined that a 3,500 square foot facility will suffice for this clinic's needs. This decision was also based on observations of space allocations currently existing at Hampton Roads, Virginia safety net clinics, while also taking into consideration their patient loads. Therefore, annual rental costs are \$80,325.26 for year zero.³⁴

The calculations for the costs of utilities and medical equipment are both based on costs obtained from Hampton Roads, Virginia safety net clinics. Since the Hampton Roads area is very close in proximity to the city of Petersburg, it is assumed that utility and medical equipment costs are extremely similar. The authors have ensured that the costs chosen are extremely conservative and thus will tend to be on the high side if there is found to be variation between costs in Petersburg and the Hampton Roads area. Utilities include costs such as Internet service, phone service, electricity, water, gas, renter's insurance for the building and trash pickup. These annual costs are \$8,362.71 for year zero.

Medical equipment includes the costs of having a medical computer with the correct software to accurately track patients as well as any medical supplies needed such as gauze, latex gloves, and face masks. The medical supplies also include equipment needed for drawing blood, performing vaccinations, testing for common ailments such as strep throat, mononucleosis, and flu, and for performing urine analysis. Medical equipment is calculated to cost \$10,577 for year zero.³⁵ Total year zero facility costs, which include the cost of facility rent, utilities and medical equipment is \$99,264.97.

Insurance Costs

Malpractice insurance is a necessity for any medical clinic. It is vital that the practicing physicians are protected from any professional liability claims. According to the Robert Wood Johnson Foundation, malpractice insurance costs can vary according to the particular background

³⁴ 3,500 sq ft x \$22.95/sq ft = \$80,325.26

³⁵ Please note this cost is also based on the budgets of similar safety net clinics in the Hampton Roads area.

of the policy-holder and each physician is typically evaluated separately by the insurer.^{lxxix} It is also important to note that this cost is based on the budgets of similar safety net clinics in Hampton Roads, Virginia. Malpractice insurance costs are calculated to be \$12,702 for year zero. This is an extremely conservative estimate since it is based on a clinic that employs more physicians and cares for more patients than the one in Petersburg will. Once a more accurate calculation can be achieved based on the specific physician that will be hired, this cost can be replaced.

Administrative Costs

Administrative costs are another important factor to consider. Administrative costs include such things as computers, (differing from medical computers as they may have different software), office supplies such as paper, printers, pens, file folders, etc. It also includes the cost of having tax-forms professionally prepared, advertising, and the cost of necessary licenses and permits. This calculation is also based on a similar safety net clinic in the Hampton Roads area. It is extremely conservative as it is based on a clinic with more employees and office space than this clinic will have. This cost is calculated to be \$36,498.02 for year zero.

Total Costs

When the salary and benefit costs, payroll taxes, facility costs, insurance costs, and administrative costs are summed across year zero, they are found to be \$784,116.

Estimating Benefits

Before benefits are explained, it is important to note that the numbers mentioned in this section also represent year zero of the cost-benefit analysis, and are in 2009 dollars. If the source of the data indicates the dollar amount is from a year other than 2009, the amount has been inflated to reflect 2009 costs. The methodologies explaining discounting and inflating over time

will be discussed later in the report. Thus, this section describes how each benefit of the safety net clinic was calculated for year zero, which is assumed to start in 2009. The benefits described are revenues from the clinic, savings from reallocating patients from emergency care to primary care, savings from preventing hospitalizations due to increased access to appropriate primary care, increased health and productivity of patients, and the increased economic development in Petersburg from the creation of this clinic.

Revenues

Revenues represent the monies the clinic will collect for its services from those patients that have private or public insurance, as well as any fees uninsured patients will pay according to a sliding scale that is based on income level. Naturally, the first step to calculating the clinic's revenues is to decipher how many patients of the clinic are expected to have private insurance, Medicaid, Medicare, or be uninsured. This patient mix was based on the patient profiles of similar safety net clinics that currently exist in Petersburg. Since the clientele of safety net clinics tend to disproportionately represent those who are uninsured or on public insurance, it would not necessarily be logical to base the patient profile on the characteristics of the general population in Petersburg. The existing safety net clinics in Petersburg have a patient profile consisting of 13% of patients who have private insurance, 15.5% who are covered by Medicare, 12% who are covered by Medicaid, and 59.5% who are uninsured. The assumption underlying this calculation is that this clinic will have the same mix of patients. This is an extremely conservative estimate as the 2007 Virginia Health Center Fact Sheet states that only 33% of people attending safety net clinics are uninsured, while 30%³⁶ of people have private insurance.^{lxxx} If the clinic's patient mix were based on those percentages, revenues would be significantly higher as the clinic could rely on more private insurance reimbursements.

Based on the calculations from the existing clinics, year zero will have 658 patient visits that are reimbursed through private insurance, 784 patient visits that are reimbursed through

³⁶ The breakdown from that study states the patient profile of those attending safety net clinics in Virginia is: 33% uninsured, 22% on Medicaid, 15% on Medicare, and 30% with private insurance.

Medicare, 607 visits that are reimbursed through Medicaid, and 3,010 visits with no insurance. These sum to the 5,059 annual visits that are expected in year zero. The next step for calculating revenues is to determine what the average reimbursements will be for those patients on private insurance, Medicare, Medicaid, or those uninsured. From the American Medical Association's website,^{lxxxii} it was determined that the most frequently used CPT code (current procedural terminology) for a safety net clinic is code 99213.³⁷ According to the 2007/08 Medicaid Reimbursement Survey for Virginia, CPT code 99213 has a reimbursement rate of \$57.45 for Medicare and \$47.70 for Medicaid.^{lxxxii}

For the patients that have private insurance, the reimbursement rate chosen is based on a similar safety net clinic and is assumed to be \$60. This is a very conservative estimate because many private plans also contain cost-sharing provisions, such as co-payments, which will result in higher reimbursements for the clinic. The uninsured patient visits that will be based on a sliding scale were a bit more difficult to model. It was decided to take the second bracket of a 5-bracket sliding scale from a Williamsburg clinic, which is \$10 and model the payments of the uninsured patients off that number. It was discovered from that same clinic that 26% of the uninsured simply do not pay at all regardless of income level. Therefore, \$7.40 was chosen as the average sliding scale payment in order to account for those patient visits that will not be reimbursed.³⁸

Therefore, with the number of visits per insurance type and reimbursement amounts, it is quite simple to calculate the revenues. Private insurance visits result in \$39,464.48, Medicare visits result in \$45,054.02, Medicaid visits result in \$28,960.86, and the uninsured sliding scale fees result in \$22,277.19. After summing these reimbursements, year zero revenues total \$135,756.55. Please see Table 4 for more information regarding these calculations.

³⁷ This CPT code is defined by the AMA as: Office or other outpatient visit for the evaluation and management of an established patient, which requires at least 2 of these 3 key components: An expanded problem focused history; An expanded problem focused examination; Medical decision making of low complexity. Counseling and coordination of care with other providers or agencies are provided consistent with the nature of the problem(s) and the patient's and/or family's needs. Usually, the presenting problem(s) are of low to moderate severity. Physicians typically spend 15 minutes face-to-face with the patient and/or family.

³⁸ 74% of uninsured patients pay x \$10 = \$7.40 payment

Table 4: Revenue Calculations

Insurance Type	Reimbursement Amount	Number of patient visits	Total
Private	\$60.00	657.74	\$39,464.48
Medicare	\$57.45	784.23	\$45,054.02
Medicaid	\$47.70	607.15	\$28,960.86
Uninsured	\$7.40	3,010.43	\$22,277.19
Total			\$135,756.55

Emergency Department Diversions

The Emergency Department is an expensive environment in which to obtain primary care. Unfortunately, when people do not have access to a primary care clinic, they often have no choice but to visit the Emergency Department for conditions that can be treated in a more cost effective manner in a clinical environment. Since 8% of the population in Petersburg expressed difficulty obtaining primary care, it is assumed that there are some people attending the local Emergency Department who could be treated in a primary care environment.^{lxxxiii} It is extremely important to note that this is a system-wide benefit. It accrues in the form of savings to the hospital and the healthcare system as whole when primary care visits are diverted away from the Emergency Department to the less expensive clinic, particularly if the majority of these visits are from the uninsured and thus are uncompensated. Health care costs are rising exponentially, and ensuring that people have access to primary care in a clinical setting is one way to help contain costs.

This benefit is a major driver of the cost-benefit analysis simply because it is so costly to attend the Emergency Department, even for relatively simple and easy-to-treat conditions. In order to calculate this benefit, the first step is to determine how many visits were made to the local hospital’s Emergency Department. This information was obtained from Virginia Health Information (VHI), an organization that works with private organizations and public bodies to

use health data to meet the varied needs of the citizens of the Commonwealth. It has contracts with all major hospitals in Virginia and receives data from these hospitals regarding patient load and diagnoses, among other things.^{lxxxiv} VHI was able to provide data regarding the Emergency Department from Southside Regional Hospital, the local hospital in Petersburg, Virginia. According to their data, 44,497 patients were attended to at Southside's Emergency Department in 2007.^{lxxxv} Naturally, many of these visits are necessary and appropriate. Thus, the next step is determining how many of those Emergency Department visits should have been treated in a primary care environment.

According to the 2004 National Ambulatory Medical Care Survey: 2004 Emergency Department Survey, 35% of all Emergency Department (ED) visits are "avoidable," meaning non-urgent or ambulatory care sensitive and therefore treatable in primary care settings.^{lxxxvi} Therefore, 15,573 of the 44,497 ED visits were avoidable and could have been treated in a primary care clinic.³⁹ This clinic obviously does not have the capacity to capture all of these avoidable ED visits. Furthermore, it is not logical to assume that all people will be dissuaded to visit the ED when a new clinic opens. There are some people who simply may not change their behavior. Since this clinic is designed with the intention to fill the entire primary care gap that currently exists in Petersburg, it is assumed that the clinic can successfully divert 8% of the 15,573 avoidable visits, which equals 1,245 visits.⁴⁰ The 8% was chosen since The Cameron Foundation Needs Assessment found that 8% of people reported having difficulty accessing primary care. It is assumed that those 8% will be the people whose behavior can be changed through the creation of this new clinic, and also who are most likely to obtain primary care at the ED.⁴¹

³⁹ 44,497 total ED visits x 35% = 15,573 avoidable visits

⁴⁰ 15,573 avoidable visits x 8% = 1,245 visits diverted to this clinic

⁴¹ It is important to note there are several other regional hospitals relatively close to Petersburg that residents may visit. Also, it is possible that residents from other cities may visit Southside Regional Hospital. Due to the lack of patient level data available, the authors were unable to identify which patients came from each locality. Therefore, it is assumed that by using only Southside's patient load the most accurate count was obtained. If more accurate data can be located, this benefit will need to be recalculated with that information.

Next, the cost of those ED visits must be quantified. According to the Medical Expenditure Panel Survey, the average payment for an ED visit where special services are performed is \$439.39.^{lxxxvii} Therefore, the savings that can be accrued for year zero from ED diversions is \$547,036.61.⁴²

Preventable Hospitalizations

Preventable hospitalizations are another major driver of the cost-benefit analysis. It is a benefit that is very similar in methodology and in concept to Emergency Department diversions. There are many hospitalizations that could be potentially avoided if a patient had access to appropriate primary care. For example, if a patient has diabetes and does not properly monitor it with a primary care physician, there is a possibility that by the time that patient arrives at the Emergency Department, his or her diabetes has spiraled so far out of control that he or she has to be hospitalized. Hospitalizations are extremely expensive, and it is obvious that if some hospitalizations can be avoided through widening primary care access major savings can accrue to the healthcare system in Petersburg. Clearly, this is another system-wide benefit as it saves money for the local hospital and the health care system as a whole.

Virginia Health Information (VHI) has data on prevention quality indicators that can be used to help assess the health of persons residing in Virginia cities and counties^{lxxxviii}. Prevention quality indicators are used to identify “ambulatory care sensitive conditions” which are conditions for which good primary care can prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease. Even though these indicators are based on hospital inpatient data, they provide insight into the quality of and access to the health care system outside the hospital setting. For the purposes of this analysis, the type of hospitalizations that this clinic could prevent include conditions related to adult diabetes, adult

⁴² \$439.3868 cost per ED visit x 1,245 avoidable visits = \$547,036.61

circulatory diseases, adult chronic respiratory diseases, adult acute diseases, pediatric diabetes complications, pediatric asthma, pediatric gastroenteritis, and urinary tract infections.⁴³

The first step of quantifying this benefit is to determine how many hospitalizations occurred in Petersburg that could be prevented with appropriate primary care. According to VHI's data, 1,289 hospitalizations in 2007 could have been prevented with primary care. However, this clinic cannot claim to be able to prevent all 1,289 hospitalizations. In order to determine what percentage of those hospitalizations the clinic can prevent, it was decided to again focus on the 8% of Petersburg that expressed difficulty obtaining primary care in The Cameron Foundation's Needs Assessment. Eight percent of each category of hospitalizations was calculated. Thus, this clinic will prevent 103 hospitalizations in total.⁴⁴ The Healthcare Cost and Utilization Project^{lxxxix} provided the cost per admission for each type of hospitalization.⁴⁵ The number of preventable hospitalizations for each category was then multiplied by its respective cost. This resulted in a total cost savings for year zero of \$896,548.92. Please see Table 1 in Appendix F for more information regarding the calculations for this benefit.

Increased Health and Productivity of Patients

When people are able to take care of their health and can access preventive care, they are able to lead more productive lives. This often results in fewer absences at the workplace, as productivity measures are concerned with how industrious people are in their place of employment. This is a difficult benefit to quantify, because most of the relevant literature revolves around a workplace that has decided to provide an in-house clinic to its employees. It would be extremely difficult to design a study that measures increased productivity of patients that attend a community safety net clinic, because each patient works in a different location, and it would be difficult to monitor the habits of every patient. Further, employers have the right

⁴³ Please see table 1 in Appendix 6 for more information regarding these hospitalizations.

⁴⁴ 1,289 total hospitalizations x 8% = 103 preventable hospitalizations

⁴⁵ Please see Table 1 in Appendix F for more information regarding these costs.

incentives to measure a return-on-investment (ROI) in this manner. Only if their employees are becoming more productive would the investment for an in-house clinic be justified. Safety net clinics are not always concerned with this particular measure.

While it is valuable to include this benefit, it is important to note this is a blunt measure of patient productivity increases since it is based on workplace literature. However, the services provided in an on-site clinic are extremely similar to the services that will be provided at this safety net clinic. Therefore, there is an implicit assumption that they will have similar effects on productivity. In order to ensure the calculations are extremely conservative, the ROI chosen to model this benefit from is the lowest that could be found in the literature. A study from the *American Journal of Public Health*^{xc} evaluated the impact of a comprehensive workplace health promotion program among full-time employees in a large, multi-location, diversified industrial company. A pretest-posttest control group design was used to study 41 intervention sites and 19 control sites with 29,315 and 14,573 hourly employees, respectively. The program costs include providing on-site medical care from nurses, physicians, and physician assistants who provide primary care. The study measured the ROI over two years and by program participation level. The ROI was based on how many fewer workdays were missed by blue-collar workers who participated in the program. The ROI chosen to apply to this analysis is the one from its first year in operation, and corresponds with the lowest level of participation, which is a return of \$0.96 for every \$1 invested.⁴⁶

The next step of calculating increased productivity is to determine which costs should be included in the formula. Since the workplace study mentioned earlier did not include the costs of a facility or any administrative costs, it was decided to only base the calculation off the investments in hiring medical staff and medical equipment. Therefore, it is only based on the cost of the physician and physician assistant (salary costs), and the cost of the medical equipment. This is also extremely conservative because the cost of the nurses was not included. The costs utilized for this calculation total \$238,567 for year zero.⁴⁷ However, it is important to

⁴⁶ It is extremely important to note that this is an extremely conservative estimate as most of the literature reported higher ROIs such as \$4.56 and \$2.05.

⁴⁷ Physician cost (\$162,014) + Physician assistant cost (\$65,976) + Medical equipment (\$10,577) = \$238,567

recognize that not all of the patients attending this clinic will have employment. There will be children, retirees, and the unemployed who all attend the clinic but do not have gainful employment. It is not logical to base the increased productivity benefit on those who do not have employment as their productivity will not increase. By subtracting the patients under age 15 and over age 65 from the patient load it is possible to estimate how many people are most likely able to work.⁴⁸ This totals 998 people for year zero.

The unemployed must also be accounted for when considering productivity gains. Petersburg has an unemployment rate of 8.9%. Therefore, 88 people should be subtracted from the group of people who are most likely to be employed.⁴⁹ This results in a final group of 910⁵⁰ patients who will experience productivity gains out of a total annual patient load of 1,573 patients.⁵¹ This is equivalent to 57.83% of the total patient load.⁵² Since only 57.83% of the patients will experience productivity increases, the investment base must also only be 57.83% of the total costs included in the calculation. As noted above, this includes the cost of the physician, physician assistant, and medical equipment totaling \$238,567. Since that reflects the costs for serving 100% of the patient load, 57.83% of those costs must be calculated and used for determining increased productivity of patients. Therefore, 57.83% of \$238,567 is \$137,969, which are the investments used to help patients become more productive.

To calculate the increase in productivity of the patients, the investment (\$137,969) must be multiplied by the ROI (\$0.96). This results in a patient productivity increase of \$132,450 for year zero.⁵³

⁴⁸ Please reference tables 1 and 2 for further information regarding these calculations.

⁴⁹ 998 people able to work x 8.9% = 88 people unemployed

⁵⁰ 998 people able to work – 88 people unemployed = 910 patients with increased productivity

⁵¹ Please see the section titled “Estimating Patient Utilization Rate” for more information on how this is calculated.

⁵² $910/1,573 = 57.83\%$

⁵³ $\$0.96 \times \$137,969 = \$132,450$

Economic Development

This clinic is assumed to capture patients that are not currently being served by the primary care services in Petersburg; however, if they are receiving medical care, this analysis assumes that they are receiving their care in the Emergency Room. Additionally, it is assumed that Southside Regional Hospital only receives reimbursement for 40% of the care to these patients because 60% of the clinic's patient load is uninsured. Based on these assumptions, this analysis functions as if the clinic increases the market for health care services, and therefore, will stimulate economic development in Petersburg and Virginia as a whole.

To estimate this benefit, a software program called Impact Analysis for Planning (IMPLAN) was employed, which models the economic stimulation created across many sectors of production when a new monetary input is made in the economic system under consideration. IMPLAN first models the indirect effects of this new monetary input in the form of new spending across sectors for new purchases such as medical supplies, furniture, or repairs to equipment. Additionally, IMPLAN estimates the induced effect of new employees' spending money on goods and services which they could not have previously purchased.^{xci} The version of IMPLAN used in this analysis provides estimates for effects that would accrue across the whole state of Virginia; however, it is argued that many of the effects would be concentrated in Petersburg. This is especially true for the induced effects if the staff of the clinic reside in Petersburg.

The sum of the private costs of the clinic, \$752,341.96, represents the financial value added to the economy of Virginia. These costs include the payment of salaries and the purchase of goods which would stimulate the indirect and induced economic effects of the clinic. However, the money that Southside Regional would lose from providing Emergency Room services to this population must also be considered. Southside Regional stands to lose a relatively small amount of financial reimbursement if the clinic is truly successful at diverting only unnecessary visits. To estimate this loss of revenue for Southside Regional, this analysis relies on the previously stated assumption that the hospital only receives reimbursement for 40% of the dollars it spends on this population, totaling \$577,434.21.

Combining the effects of the addition of \$752,341.96 into ambulatory health care services and subtracting \$577,434.21 from hospital services, IMPLAN estimates that there will be a loss of \$10,000 in indirect effects, meaning that fewer supplies are being purchased for the clinic than for the hospital. This interpretation matches intuition and despite the decrease, is a positive indication that the clinic is providing the same service at a lower cost.

The induced effects of the clinic are far more positive. IMPLAN estimates that the creation of the clinic will stimulate \$110,000 in economic groups across sectors as new employees buy goods and services they had not previously purchased.

Therefore, the net economic development impact of the creation of this new clinic would be \$100,000 for year zero. As stated previously, IMPLAN's estimates accrue for all of Virginia; however, if the staff of the clinic lives in Petersburg and if materials for the clinic are purchased as locally as possible, Petersburg stands to reap this increase in development for the purchase of economic stimulation and tax revenue.

Total Benefits

When revenues, Emergency Department diversions, preventable hospitalizations, increased patient productivity, and increased economic development benefits are summed across year zero, they are found to be \$1,811,792.64.

Estimating Net Benefits over Time

As described in the introduction of this section, cost-benefit analysis is designed to evaluate the present value of the net benefits of a project over a specified time period. In short, it determines whether the benefits outweigh the costs. This section will explain the formula used in the cost-benefit analysis, how benefits and costs are inflated and discounted over the specified time horizon, and finally how net benefits are calculated for this analysis.

The Cost-Benefit Analysis Formula

The present value of the net benefits is found through the fundamental benefit-cost formula:

$$NPV = \sum_{t=0}^T (1/1+r)^t (B_t - C_t)$$

where:

NPV = net present value

t = time, with now = 0 and T = time horizon of project

r = interest rate

$(1/1+r)^t$ = discount factor

B_t = Benefits

C_t = Costs

$(B_t - C_t)$ = net benefits

Essentially, the fundamental equation is used to evaluate whether the net benefits achieved from running the new medical clinic have a positive net present value. If the net present value is indeed positive then it may make sense to move forward with the new clinic. However, the equation takes into account profitability by also considering the financing costs of running the clinic. This is where the discount factor comes into play as it takes into account the time value of money. The discount rate should be equivalent to what the investments could earn if they were invested elsewhere in the market. A higher discount rate values benefits and costs more in the present, while a lower discount rate values benefits and costs more in the past. This can greatly affect the net benefits depending if costs and benefits are front-loaded, back-loaded, or constant.

The equation is essentially determining the net present value of the difference between the costs and benefits over a particular time horizon at a particular discount factor. Thus, it is essential that the correct time frame and discount factor be used as they both have an effect on the NPV. The discount rate chosen will either be a nominal or real rate, depending on how costs and benefits are calculated over time. For this particular instance a nominal rate was chosen, since it also includes inflation within the rate. Costs and benefits were inflated over the time horizon before discounted. Real rates do not include inflation, and thus benefits over time are

not inflated but remain in present value over time. Both methodologies should result in the same answer as long as they are followed correctly.

Inflating over Time

As stated above, costs and benefits were inflated over time for this analysis. This methodology was chosen to ensure different costs and benefits could be inflated according to its industry's particular Consumer Price Index (CPI). The CPI represents changes in prices of all goods and services purchased for consumption by urban households.^{xcii} The CPI is the most widely used measure of inflation. For the purposes of this analysis, the CPI-U was utilized as it includes expenditures by urban wage earners and clerical workers, professional, managerial, and technical workers, the self-employed, short-term workers, the unemployed, retirees, and others not in the labor force, which is the most comprehensive version available. Prices for the goods and services used to calculate the CPI are collected in 87 urban areas throughout the United States and from about 23,000 retail and service establishments.

At this point, it is important to note that the time horizon chosen for this project is 10 years. The safety net clinic is a small business and, because of the high failure rate for small businesses, it is important to ensure that net benefits can be realized over a relatively short time frame.

All costs and benefits calculated from data sources with dollar figures in past years were inflated to 2009 dollars with the CPI. The rate used depends on whether the cost or benefit is related to the healthcare industry or if it is a general cost or benefit, such as administrative costs. General costs and benefits were inflated based on CPI trends for the general inflation rates, which take into account all expenditures. In order to inflate costs to the present, the CPI was calculated based on the year in which the dollar figure calculations were based. For example, administrative costs that were inflated from 2008 to 2009 used the rate -1.29. The Bureau of Labor Statistics publishes the rate of inflation between 2008 and 2009. Thus, the administrative

costs in 2008 dollars are \$36,975, while administrative costs in 2009 dollars are \$36,498.02.⁵⁴ The calculation for determining future value of money is used to calculate this. This same methodology was used for each cost or benefit that needed to be inflated to current dollars. However, it is important to remember that the rate for inflating from 2008 to 2009 dollars is not the same rate used for inflating 2003 dollars into 2009 dollars. Thus, different rates were chosen depending on what year the dollars are originally based upon. Salary costs, medical equipment costs, and hospital costs were each inflated according to their own particular price index.^{xciii} Please see Appendix G for more information regarding these rates.

The CPI was also applied to project costs and benefits into the future ten year horizon. By averaging the appropriate CPI over the past ten years, and then applying it to the next ten years the, rates could be calculated.^{xciv} This assumes that growth rates remain constant. The average CPI for hospital services is 6.63%, for professional medical services (salaries) is 3.46%, for medical equipment is 2.82%, and the general rate average is also 2.82%.^{xcv} Salaries were projected to the future from the medical professional services CPI, medical equipment from the medical commodities CPI, and hospital and Emergency Department services from the hospital services CPI. The general CPI was used to project all other costs and benefits into the future. How preventable hospitalizations were inflated into the future is an excellent example. The 2009 benefits are calculated as \$896,548.92, while 2010 benefits are calculated as \$955,990.11. This is also calculated with the future value formula.⁵⁵ Please see Appendix G for further information regarding these rates.

Revenues are a unique benefit because they are ultimately based off the patient utilization rate of the clinic. According to The Cameron Foundation's Health Needs Assessment, Petersburg has been experiencing a 1.26% decline in population each year over the past 10 years.^{xcvi} In order to account for this in the analysis, a 1.26% decline in population was assumed for each year for the next 10 years for all age groups except for those aged 45 and older. During several conversations held with local Petersburg leaders in the healthcare sector, it was expressed that the elderly population is expected to increase over time. Thus, a 1% decline in population

⁵⁴ $FV = \$36,975(1+(-0.0129)) = \$36,498.02$

⁵⁵ $\$896,548.92 (1+0.0663) = \$955,990.11$

was assumed for those aged 45 and older. These decreases in population result in a decline in patient visits over time, which affects the benefits that are based upon number of visits, such as revenues.

Once all time horizon calculations are completed, and all costs and benefits are inflated correctly, they can then be discounted.

Discounting over Time

In order to compute net present value, it is necessary to discount future benefits and costs. This discounting reflects the time value of money. As described earlier, the choice of discount rate is extremely important to the accuracy of the analysis. The higher the discount rate, the lower is the present value of future cash flows. The lower the discount rate, the higher is the present value of future cash flows. In other words, high discount rates place more value on cash flows in the present, while low discount rates place more value on future cash flows. Depending on how costs and benefits are structured over the time horizon, the discount rate can have an enormous impact on net benefits and whether benefits exceed the costs. Benefits and costs are worth more if they are experienced sooner. For typical investments, with costs concentrated in early periods and benefits following in later periods, raising the discount rate tends to reduce the net present value.

Further, the discount rate must represent the market rate of what the money could have been invested in otherwise. It reflects the cost of capital being used to operate the clinic. Each year, the Office of Management and Budget (OMB) provides guidelines listing the discount rates to be used for cost-benefit analysis. On January 2, 2009, OMB released the rates to be used for 2009. For projects with a 10-year time horizon such as this one, 4.20% is the appropriate nominal discount rate to use.^{xcvii} This rate is based on Treasury notes and bonds with 10-year maturities. Thus, the rate chosen for this project is 4.20%.

Net Benefits

Once all costs and benefits have been quantified, appropriately inflated, and discounted over time, the net benefits can be calculated. The discounted benefits for this project over a ten-year time horizon are calculated to be \$21,667,370.78. The discounted costs for this project over a ten-year time horizon are calculated to be \$8,268,219.17. Net benefits are calculated by subtracting costs from benefits, which equals \$13,399,151.61.⁵⁶ Obviously, this reveals extremely high net benefits suggesting this project should indeed move forward. Another way of interpreting these results is to look at the benefit-cost ratio. This is calculated by dividing benefits by costs. The benefit-cost ratio for this project is 2.62, which is also extremely high.

At this point, it is crucial to note the difference between system-wide net benefits and the stand-alone clinic net benefits. The net benefits above take into account savings from preventable hospitalizations and emergency department diversions, which are the major drivers of this cost-benefit analysis. When only looking at the net benefits accruing within the clinic itself, the only benefits that can be included are revenues. Previously, revenues for year zero were calculated to be \$135,756.55. These clearly do not cover the costs for year zero, which are \$784,116. When the benefits and costs for the stand-alone clinic are discounted over the 10-year time horizon, net benefits are -\$6,902,078.41, which reveals the clinic is operating at a deficit. Benefits do not outweigh costs. The ratio of benefits to costs is 0.17, which reveals how few of the costs are covered by revenues. This is an important differentiation to make because it reveals that only when system-wide benefits are considered is this clinic a viable option. This is not surprising given the fact that most safety net clinics receive grants from foundations, individual donors, and even the government in order to cover their costs. However, when the system-wide benefits are considered, it is clear that this is worthwhile as there are huge savings that the healthcare system in Petersburg can accrue. The difference between the system-wide net benefits and the stand-alone clinic's net benefits is \$6,497,073.20.⁵⁷ Thus, it is clear that moving care to the less expensive clinical environment can allow a community to reap massive net

⁵⁶ Please see Appendix G for further information regarding how these numbers are calculated.

⁵⁷ Please note more on these numbers can be found in Appendix G.

benefits. This certainly makes a compelling case for expanding primary care in the Petersburg community.

States of the World

When designing a cost-benefit analysis, it is important to consider the different states of the world that can possibly occur in the future. The future is uncertain, so it can be extremely helpful to consider several different scenarios. Since this analysis examines the feasibility of operating a safety net clinic in Petersburg, Virginia, medical costs are obviously an important factor driving the calculations. Thus, three different states of the world were conceived and modeled. The first is a world in which medical costs grow at a constant rate over time. That is the world described in the previous section. The second is a world in which medical costs flatten over time. The third is a world in which medical costs' growth increase over time.

In order to simulate these two worlds with flattening and increasing costs, the CPI rates projecting medical costs into the future had to be manipulated. For example, to model flattening costs, years 6 through 10 of all medically related costs and benefits were changed to decrease by 50%. Thus, the inflation rate is decreased to 1.73% for salaries in years 6 through 10; the rate remains at 3.46% for years 1 through 5. The inflation rate for medical equipment is decreased to 1.41% for years 6 through ten; the rate remains at 2.82% for years 1 through 5. The inflation rate for hospital services is decreased to 3.32% for years 6 through 10; the rate remains at 6.63% for years 1 through 5. Only years 6 through 10 have changed inflation rates because any cost containment strategies that are implemented will most likely have a lag time occurring before any changes are felt throughout the system. In a study completed by the Chairman of the Social Security Advisory Board, Sylvester Schieber utilizes this methodology for simulating decreasing costs in a cost-benefit analysis.^{xcviii} Therefore, it seems to be a fairly reliable and standard way of modeling this state of the world. The system-wide net benefits for this state of the world, calculated with a 4.20% discount rate is \$14,742,525.73, with a benefit-cost ratio of 2.55. Please see Table 5 for a comparison among the different states of the world.

The state of the world with increasing medical costs was modeled in a very similar way as the world with flattening medical costs. The only difference is the inflation rates for projecting all medical costs into the future are increased by 50% instead of decreased for years 6 through 10. Thus, the inflation rate for salaries is increased to 5.19% from 3.46%. The inflation rate for medical equipment is increased to 4.23% from 2.82%. The inflation rate for hospital services is increased to 9.95% from 6.63%. Again, it is assumed that these changes would not occur until year six as there is often a lag before the system experiences the cost changes in a meaningful way. The system-wide net benefits for this state of the world, calculated with a 4.20% discount rate is \$14,004,181.19, with a benefit-cost ratio of 2.64. Please see Table 5 and below for a comparison among the three different states of the world.

Table 5: Comparing Net Benefits Across States of the World

State of the World	System-wide Net Benefits	Stand-alone Clinic Net Benefits
Constant Medical Costs	\$13,399,151.61	(\$6,902,078.41)
Flattening Medical Costs	\$12,642,873.89	(\$6,849,319.53)
Increasing Medical Costs	\$14,004,181.19	(\$7,154,817.86)

Please note that the discount rate used is 4.20%

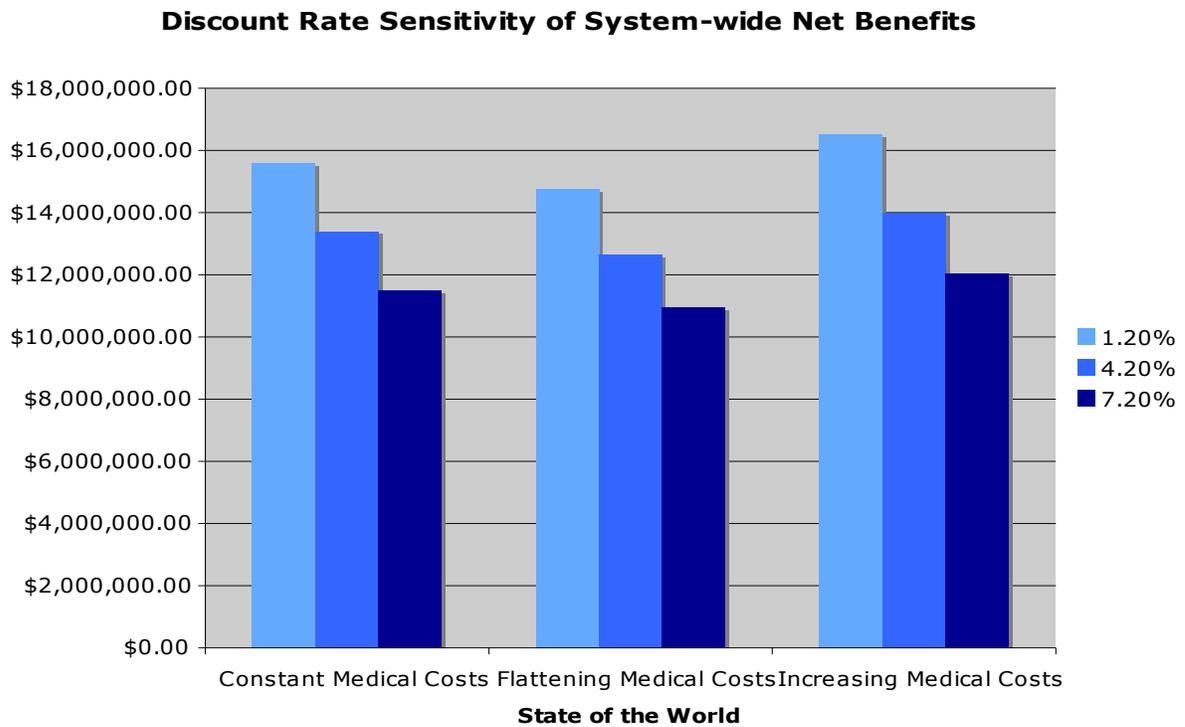
At first glance, the net benefits across the different states of the world seem to suggest that increasing medical costs is a good thing, since net benefits are largest in that state of the world. However, it is extremely important to remember that variables on both the cost and benefit side are affected by changing the medical cost CPIs. Also, the highest change occurs on the benefits side since hospital services increase to 9.95%. This rate is applied to both Emergency Department diversions and preventable hospitalizations. Therefore, the benefits side increases more than the cost side does, resulting in very high system-wide net benefits. This is logical because receiving care in a hospital environment is much more expensive than receiving care in a clinical environment, and it is expected those hospital costs will rise at a higher rate than the clinic's costs.

Sensitivity Analysis

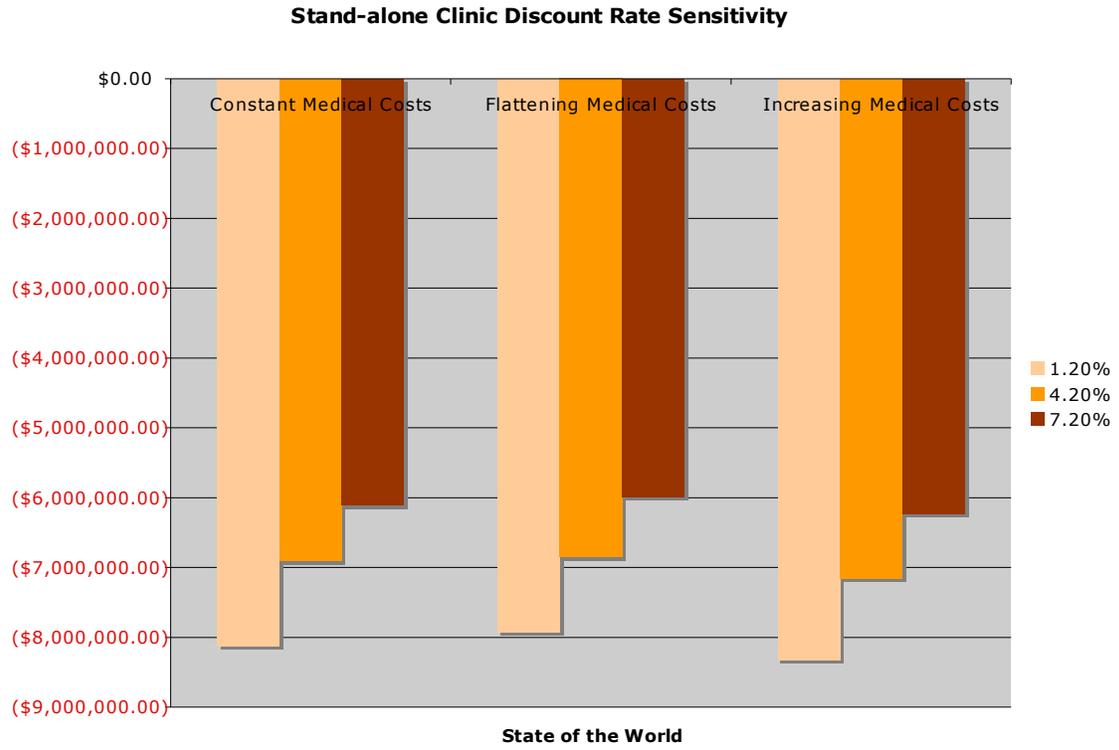
In order to determine how sensitive outcomes of the cost-benefit analysis are to changes in assumptions, a sensitivity analysis must be completed. The dependence of the net present value of each state of the world on the discount rate selection has been expressed numerous times. Thus far, the nominal discount rate chosen has been 4.20%. For this sensitivity analysis, the rate will vary both below and above that rate. Thus, each state of the world will be evaluated with a discount rate of 1.20%, 4.20%, and 7.20%. Graphs 1 and 2 illustrate the variation in net benefits when the discount rate is changed.

Each state of the world at each discount rate has positive net benefits at the system-wide level. Thus, it is clear that the analysis is not particularly vulnerable to changes in discount rate. This certainly makes a very strong case for increasing access to primary care in Petersburg.

Graph 1:



Graph 2:



Section 8: Policy Recommendations for a New Safety Net Clinic in Petersburg

Given the demonstrated need for more primary care services and the cost-benefit analysis of a new clinic in Petersburg, VA, the following recommendations are made:

1. Secure more patient-level data about Petersburg health care.

While the health needs and resources in Petersburg have been modeled in this report with the greatest accuracy possible given available data, this analysis could greatly benefit from patient-level discharge data from Southside Regional Hospital and other surrounding hospitals. If this data were available, estimates of patient loads, preventable Emergency Room visits and hospitalizations, and spatial trends could be more accurately assessed.

2. The College of William and Mary is advised to continue to pursue a partnership with the City of Petersburg to investigate opening a new safety-net clinic in the City.

Recognizing that there is a primary and chronic care shortage in Petersburg, the College may find it can be helpful to the City and its residents by opening a new clinic. The unique approach that Community Oriented Medical Partnerships and Sustainable Solutions (COMPASS) takes to medical development may bring new and different approaches to build community capacity and health services in Petersburg.

3. Further care should be taken by the College to investigate existing health services in Petersburg.

While COMPASS takes a unique approach to serving the needs of unserved and underserved individuals, Petersburg does already have a strong network of safety net providers. The Central Virginia Health Services Agency and the Petersburg Health Department as well as other health providers in Petersburg serve the needs of marginalized individuals in Petersburg. Because these organizations are already

established in the community with resources, it may be prudent for the College to investigate how it might partner with these existing services instead of starting a new clinic.

4. If a new clinic is opened, a Federally Qualified Health Center (FQHC) or a private clinic may be the most financially viable options for the structure of the clinic.

This analysis assumes that the new clinic is able to collect fees from patients on a sliding scale as well as accept private and public forms of insurance. Because a Free Clinic can only serve individuals without insurance, and therefore cannot receive these forms of payment, a Free Clinic would require a great level of fundraising.

A Federally Qualified Health Center can receive all forms of payment from a sliding scale and private and public insurance. In addition, FQHCs are eligible for federal funding to support their work. If the new clinic is an FQHC, the clinic will have to comply with legal obligations and documentation associated with this federal designation and funding. More work will need to be done to fully understand these responsibilities if the structure of an FQHC is chosen.

A private clinic may be another viable route as it could accept all forms of payment. A private clinic would not receive federal funding but could decrease the private costs of the clinic in other ways discussed in recommendations 5 and 6.

5. If a new clinic is opened, the College is advised to seek further advice from health clinicians and administrators to plan more fully the practical attributes of the clinic.

The findings of this analysis suggest how a new safety net clinic might be structured in the following areas: type of service provided, patient loads, staffing, and location.

- A new safety net clinic should be oriented toward primary and chronic care, catering to the needs of marginalized individuals who do not currently have access to consistent, low-cost options for health services.
- The clinic is expected to serve approximately 1,573 patients per year for a total of 5,059 patient visits annually.
- To serve the anticipated patient loads, full-time staff should include: one executive director, one doctor, one physician assistant, one registered nurse, one licensed practical nurse, and two administrative assistants. An additional part-time registered nurse will also be necessary.
- The clinic should be geographically located in close proximity to those who may be in need of its services for socioeconomic or transportation reasons. Additionally, the clinic should be located in an area that decreases the probability of competing with existing providers. This analysis suggests that Census tracts 8102 and 8107 are most affected by poor socioeconomic conditions. Given that the Petersburg Health Department and Petersburg Health Alliance are located near both tracts, this analysis suggests that the clinic could be located in tract 8105 to capture new individuals while still being in close proximity to the most marginalized individuals.
- The hours of operation of the clinic have not been specified for the sake of this analysis; however, the times the clinic is opened should be designed to complement the hours of operation of the existing providers instead of competing with them.

6. If a new clinic is opened, the College is advised to seek ways to decrease the private costs of the clinic to make it more financially viable.

The net benefits of opening a new safety net clinic under the assumptions of this analysis are \$13,399,151.61 over a ten-year time horizon. This translates to a benefit-cost ratio of 2.62, which suggests that the project is a worthwhile investment for continuing investigation.

However, these benefits include system-wide savings, which are not earnings for the clinic. This analysis suggests that the anticipated private costs of the clinic are likely to exceed the revenues it will receive from patients and their respective forms of insurance if applicable. In the first year of operation, expected costs are \$784,116.00 whereas expected revenues are only \$135,756.55. This deficit seems likely to persist over time under the assumptions of this analysis.

Therefore, options for decreasing the private costs of the clinic should be considered in order to ensure the sustainability of the clinic.

- **Partnership with Southside Regional Hospital**

Based on this analysis, a new safety net clinic may save Southside Regional up to \$866,151.32 in uncompensated care costs in the first year of operation.⁵⁸ Given that the operating deficit of the clinic is expected to be \$648,359.45⁵⁹, the Hospital could fund the clinic and still stand to save \$217,791.87 annually. Convincing Southside Regional Hospital to partner with a new clinic would rely heavily on being able to document the savings that the new clinic is creating and may not be possible from the outset of the clinic. However, if a new clinic is opened, information systems to track patients and Emergency Department use should be high prioritized to ensure that this type of data can be secured.

- **National Health Service Corps**

The National Health Service Corps (NHSC) appropriates funds for loan repayment to doctors who work in areas designated by the Department of Health and Human Services (DHHS) as Health Professional Shortage Area

⁵⁸ This is 60% of the total savings from Emergency Department diversions and preventable hospitalizations, based on the assumption that 60% of these services are uncompensated care. Please see “Estimating benefits-Economic Development” in Section 7 for more details.

⁵⁹ Total costs-Total revenues, year zero

(HPSA). For two years of service in such an area, DHHS will pay the doctor up to \$50,000 in loan repayment with additional support up to four years for continued service.^{xcix} Qualifying for this program could potentially decrease salary costs for the physician. Other similar programs exist for physician assistants and nurses as well.

To qualify for this program, Petersburg would have to be designated a HPSA. Currently, Petersburg is designated as a Medical Underserved Population (MUP), meaning that it includes “groups of persons who face economic, cultural or linguistic barriers to health care.”^c However, this designation does not qualify Petersburg for participation in the NHSC. It may be that Petersburg would qualify as a HPSA but has not yet completed the bureaucratic paperwork and process to receive the designation. If this is the case, interested individuals should work to see if Petersburg can qualify for the HPSA designation. If it does, the clinic could potentially recruit doctors and other medical professionals at a lower labor cost.

- **Volunteers**

Many safety net clinics employ the services of volunteers to complete medical and non-medical responsibilities. Involving these individuals saves on the costs of labor and employee benefits. In the case of this clinic, it might be possible to recruit volunteers to do office work and some of the administrative work that the executive director might do. In addition, medical personnel could be recruited to lessen the hours worked by the doctor, physician assistant, or nurses.

Involving volunteers in the daily functions of the clinic also provides opportunities for engagement by community members. Residents in Petersburg may experience a greater sense of ownership if there is an opportunity of this kind to influence the operations of the clinic.

- **Funding from the government, grants, and foundations**

To cover private costs of the clinic, outside funding should be sought. As an FQHC, federal funding is available for covering operational expenses. Other funding sources should be investigated including grants from health foundations, research organizations, and non-profit health organizations.

- **Angel investors or social entrepreneurs**

Particularly if the clinic is opened as a private entity, private funders should be investigated. Angel investors are individuals who are capable to donating a large sum of money to fund a project on a continual basis. Social entrepreneurs are similar individuals who invest money in causes in which they believe will have a good return of demonstrable social change. If any of these individuals can be found with large sums of money, it may be possible to set up an endowment that would accrue interest each year that would help to cover operating costs for the clinic.

It is important to note that under the assumptions of this analysis, it does not appear that a new safety net clinic in Petersburg stands to become a profitable private investment. Therefore, donations and other funding will have to be secured on a continual basis unless the clinic finds new and innovative ways to become sustainable.

Appendix A:

Table 1: Understanding Different Types of Safety Net Clinics

	FQHC	RHC	Free Clinic	Private Clinic
<i>Patients Served</i>	Medicare, Medicaid, Uninsured, Private Insurance	Medicare, Medicaid, Uninsured, Private Insurance	Uninsured	Varies by Clinic – can include uninsured, insured, Medicare, Medicaid
<i>Sources of Funding, Revenues, and additional benefits</i>	Sliding fee scale (required); Medicare and Medicaid reimbursements; grants; donations; medical malpractice coverage through Federal Tort Claims Act	Sliding fee scale (although not required); Medicare and Medicaid reimbursements; grants; and donations	Donations and grants; small patient fees	Donations, private investments
<i>Administrative Structure</i>	Tax-exempt nonprofit or public; Board of Directors (of which 51% must be active, registered patients of the health center who are representative of the populations served by the clinic)	Unincorporated, public or private, nonprofit or for profit	Private, nonprofit, community-based or faith-based organization	Private; otherwise varies
<i>Location</i>	Rural or Urban Areas	Non-urbanized Areas	N/A	N/A
<i>Shortage Area</i>	MUA or MUP	MUA, HPSA or Governor Designated Shortage Area	N/A	N/A
<i>Staffing</i>	No specific requirements – must have a core staff of full time providers, but there is no specific definition of core staff.	Physician – Mid-Level Professional venture; MLP required at least 50% of the time the clinic is open	Volunteer professionals	Varies
<i>Services Provided</i>	Primary care for all age groups; preventive health services on site or by arrangement. Other arrangements that must be provided by FQHC directly or from an arrangement include: dental, mental health and substance abuse services, transportation services for adequate care, and hospital and specialty care.	Outpatient primary care services and basic laboratory services	Medical care; free/low cost prescription medications; dental care; hospital/lab support; and mental health counseling	Typically primary services; after that, it varies

Source: FQHC FAQs: http://www.raconline.org/info_guides/clinics/fqhcfqa.php#whatis.

FQHC vs. RHC comparison (HRS?)

http://www.raconline.org/info_guides/clinics/rhcfqa.php#whatis

Virginia Association of Free Clinics <http://www.vafreeclinics.org/how-we-help.asp>

Appendix B:

Table 2: Petersburg Health Profile (2003)

	Petersburg	Crater Health District	Virginia
Infant Mortality Rate (Rate/1,000 Live Births)	14.7	9.6	7.6
Percent of Low Weight			
Live Births (Under 2500 Grams) of Total Live Births	12.3%	10.9%	8.2%
Teen Pregnancy Rates (Cases per 1,000 Females between 10 and 19 yrs)	87.1	45.0	7.4
HIV Rates (per 100,000 population)	87.6	26.5	10.8
Heart Disease as a Leading Cause of Death (age adjusted rates per 100,000)	341.5	**	198.9
Chronic Lower Respiratory Disease as a Leading Cause of Death (age adjusted rates per 100,000)	69.5	**	40.2
Diabetes as a Leading Cause of Death (age adjusted rates per 100,000)	45.3	**	21.4

Source: Crater Health District (Virginia Department of Health). *Health Profile 2005: Petersburg, Virginia*

Note: ** indicates no data available

Appendix C:

Table 3: Healthiest Community Rankings – Petersburg vs. Virginia Average

	Petersburg	Virginia
Heart Disease Deaths (per 100,000 individuals)*	406.0	256.1
% of Adults Overweight or Obese**	64.1%	21.9%
% Uninsured**	16.6%	14.1%
% At or Below Poverty Level*	18.0%	11.1%
Health Spending per Resident	\$54.23	\$32.31
% Adult Population with Limitations due to Health	18.1%	18.6%

Source: The Schroeder Center for Health Policy, “Virginia’s Top Ten Healthiest Communities.” (2007).

Note: *=2004, **=2005, ***=2006

Appendix D:

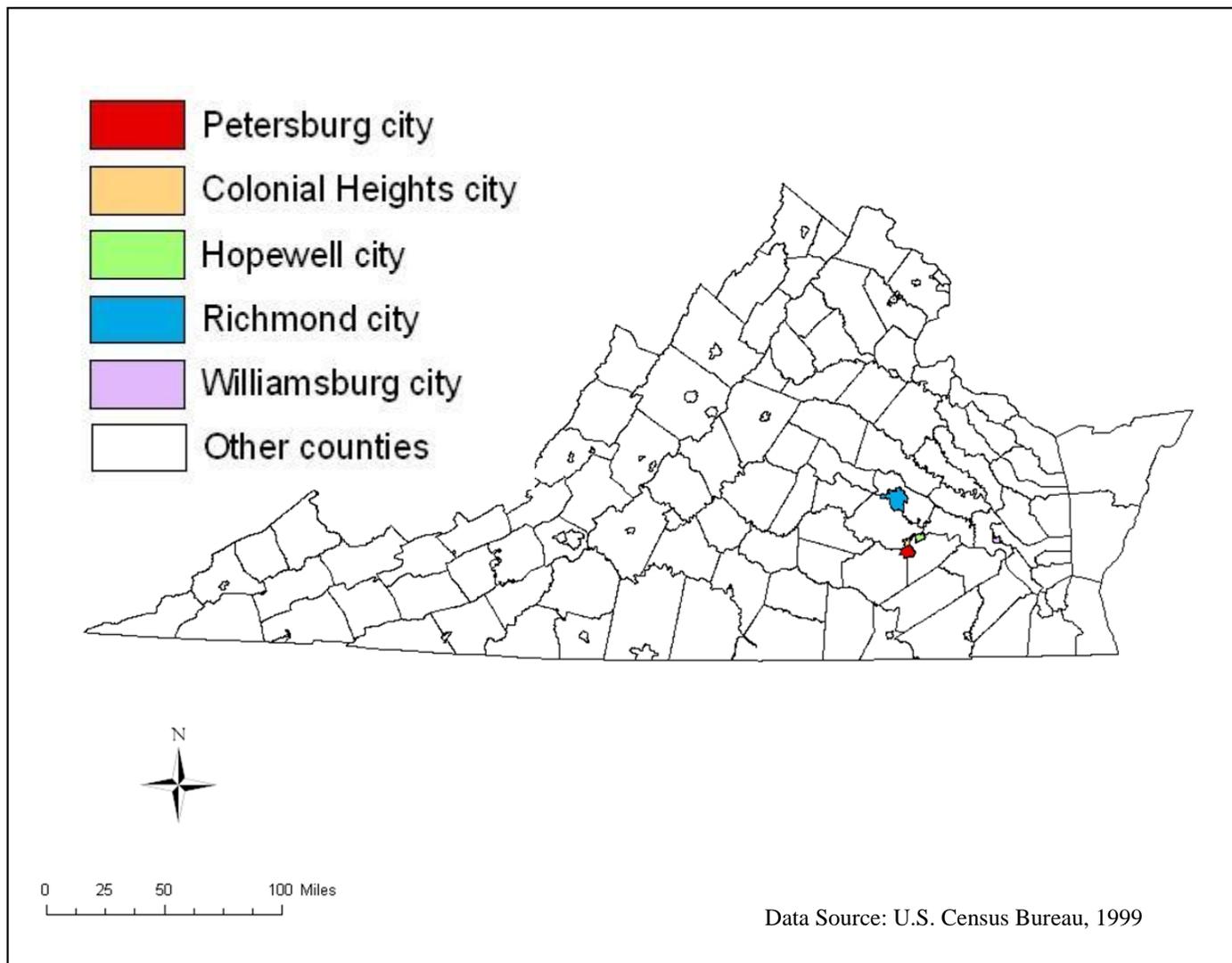
Table 4: 2007 Prevention Quality Indicators for Petersburg

Prevention Quality Indicators	Number of hospital discharges per year	Total Population at Risk for each Indicator	Petersburg Rate (# hospital discharges/100,00 people at risk)	Virginia Rate
Adult Asthma	77	24,592	313.10	104.60
Pediatric Asthma	24	7,231	331.90	93.60
Low Birth Weight	59	523	11.28	6.31
Complications from Diabetes – Short Term	76	24,592	309.00	57.80
Complications from Diabetes – Long Term	93	24,592	378.20	116.70
Chronic Obstructive Pulmonary Disease	130	24,592	528.6	157.60
Hypertension	47	24,592	191.10	49.10

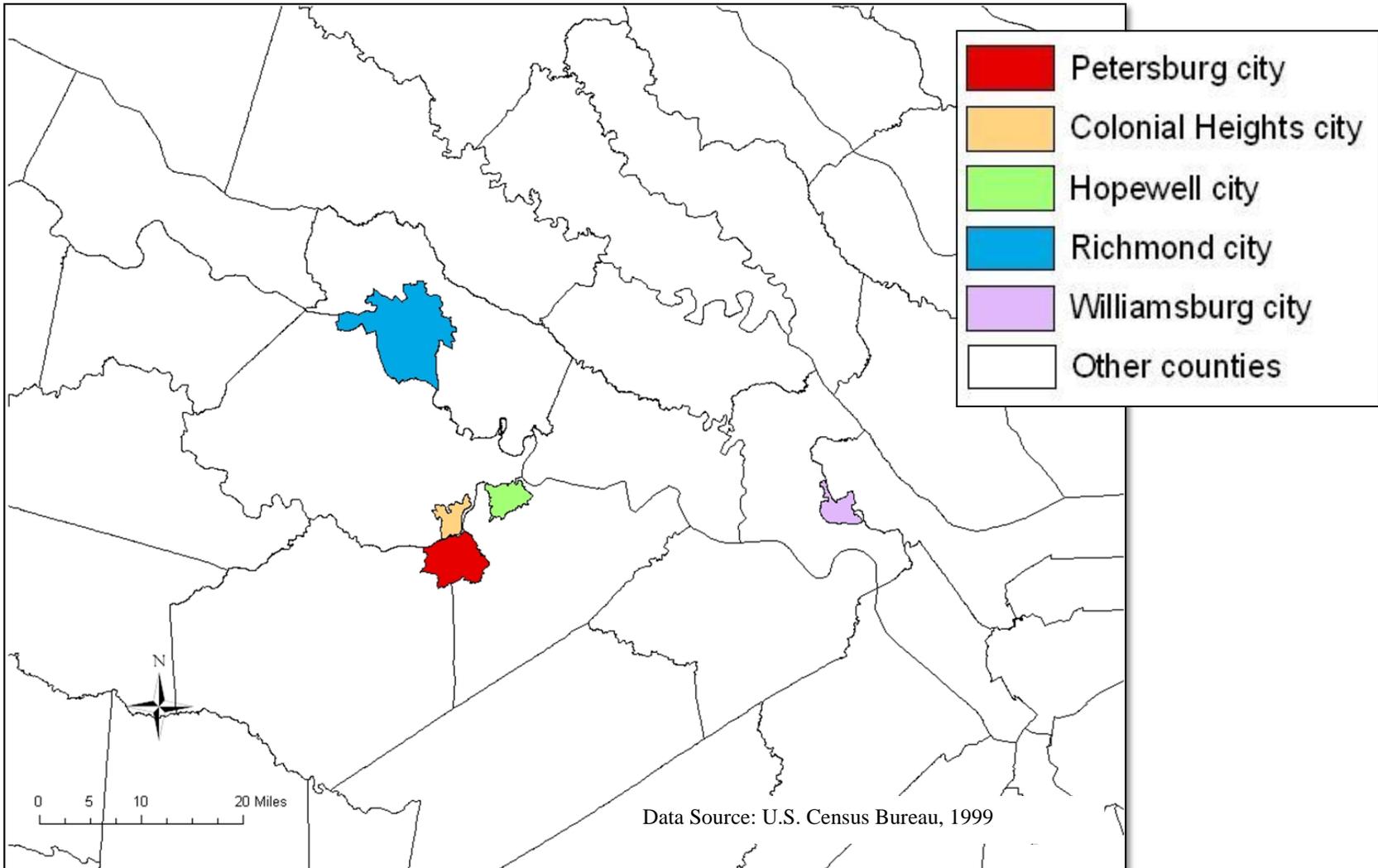
Source: *Virginia Health Information*, http://www.vhi.org/ahrq_county.asp.

Appendix E:

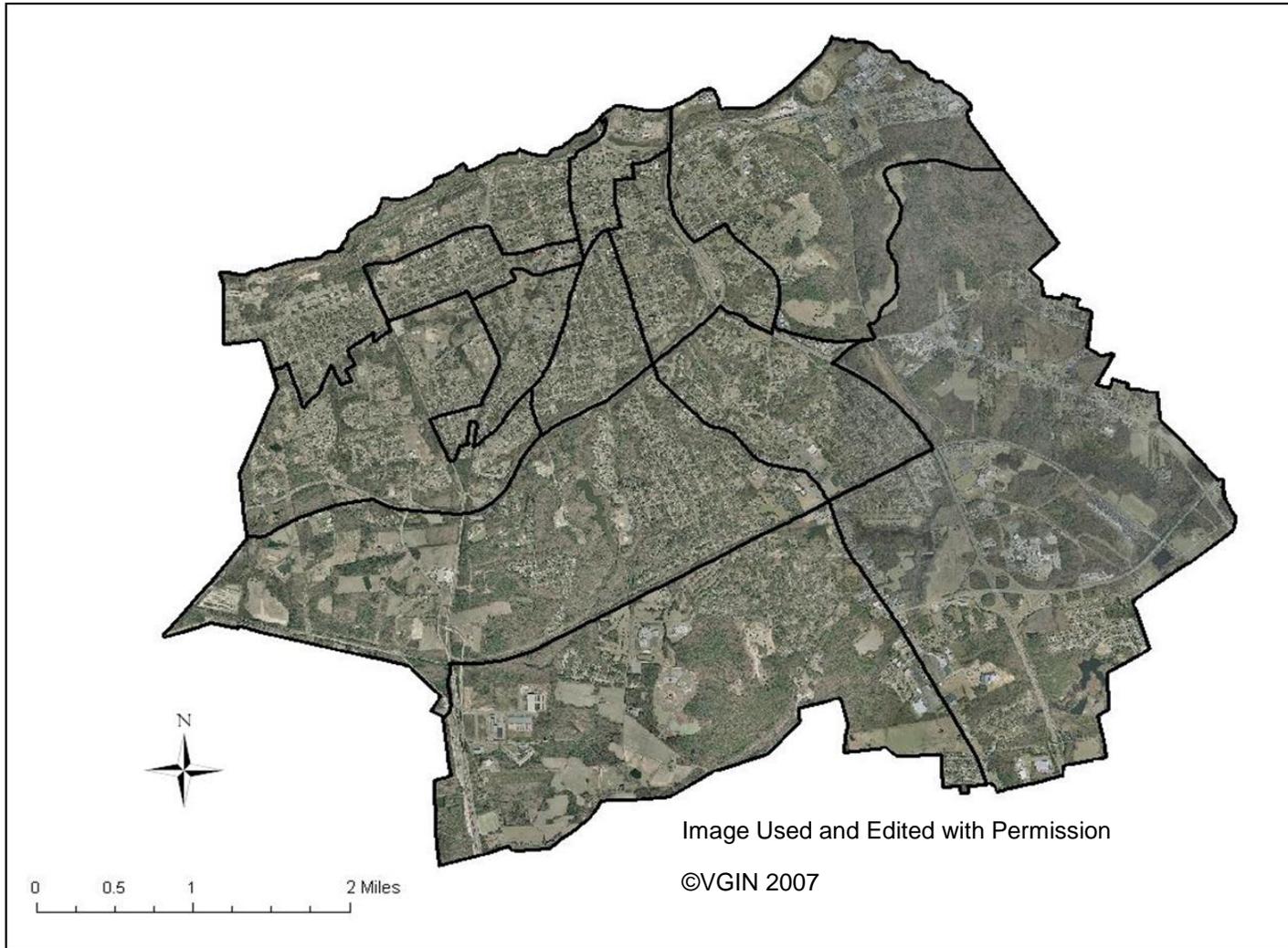
Map 1: Virginia Counties and Cities



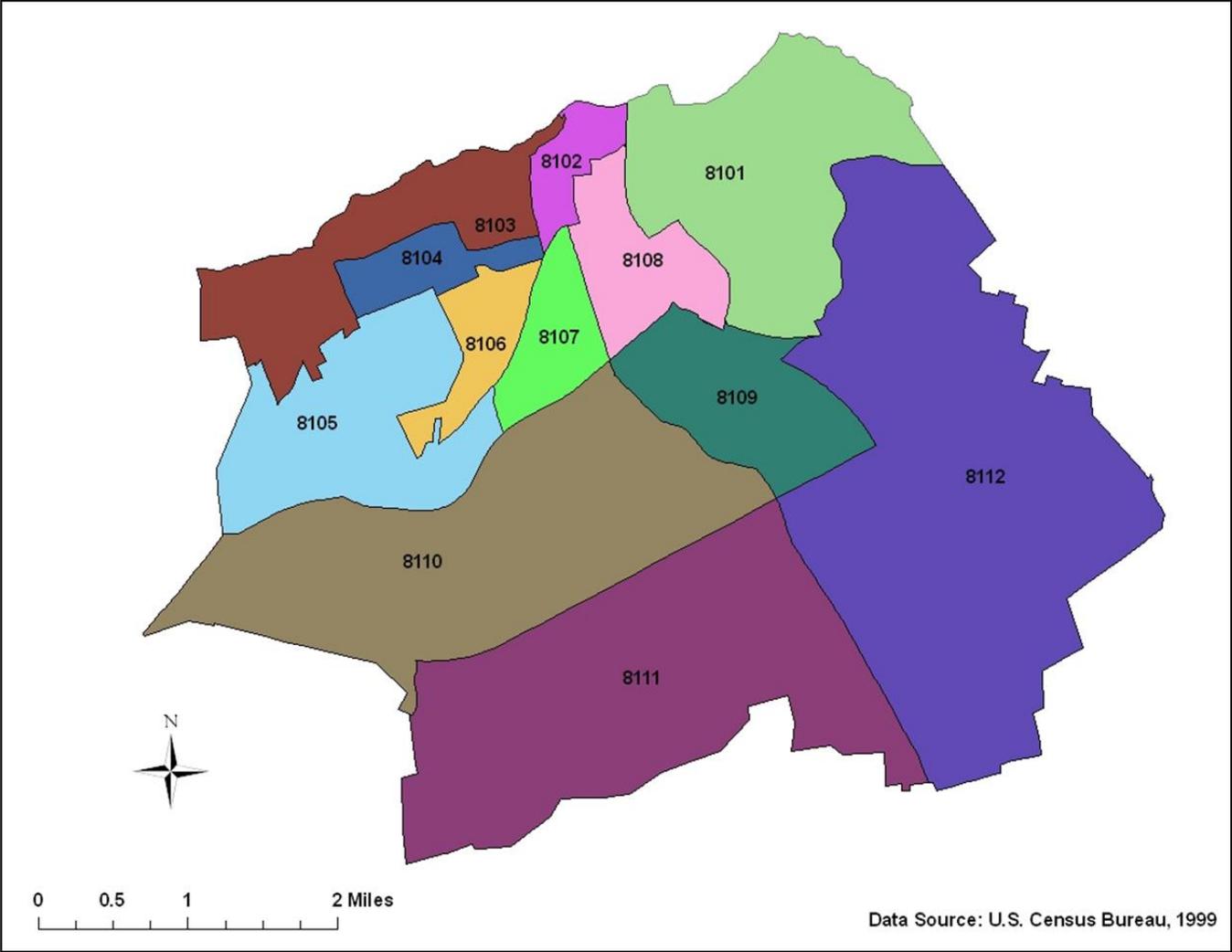
Map 2: Southeastern Virginia Counties and Cities



Map 3: Aerial Photograph of Petersburg with Census Tracts

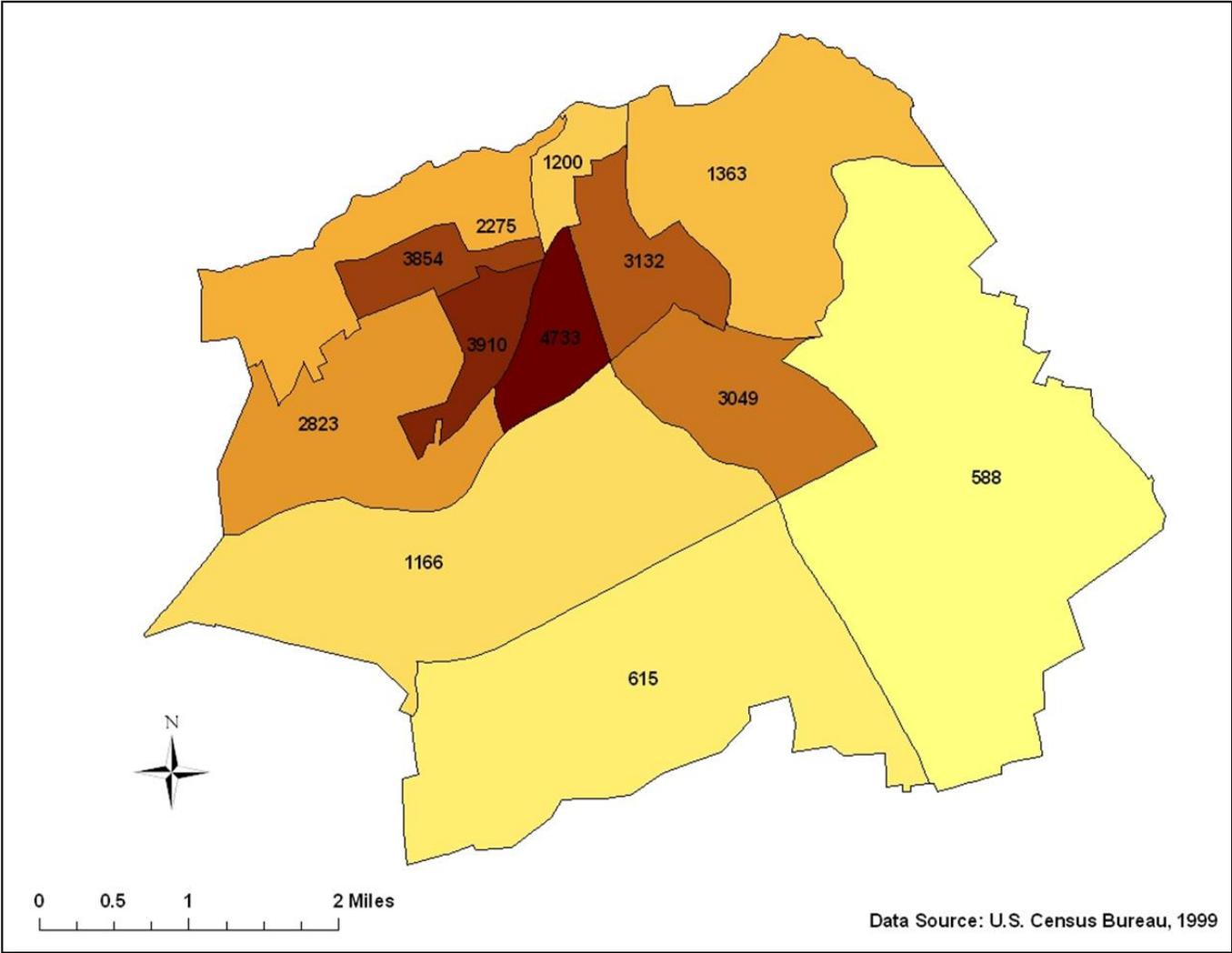


Map 4: Census Tracts

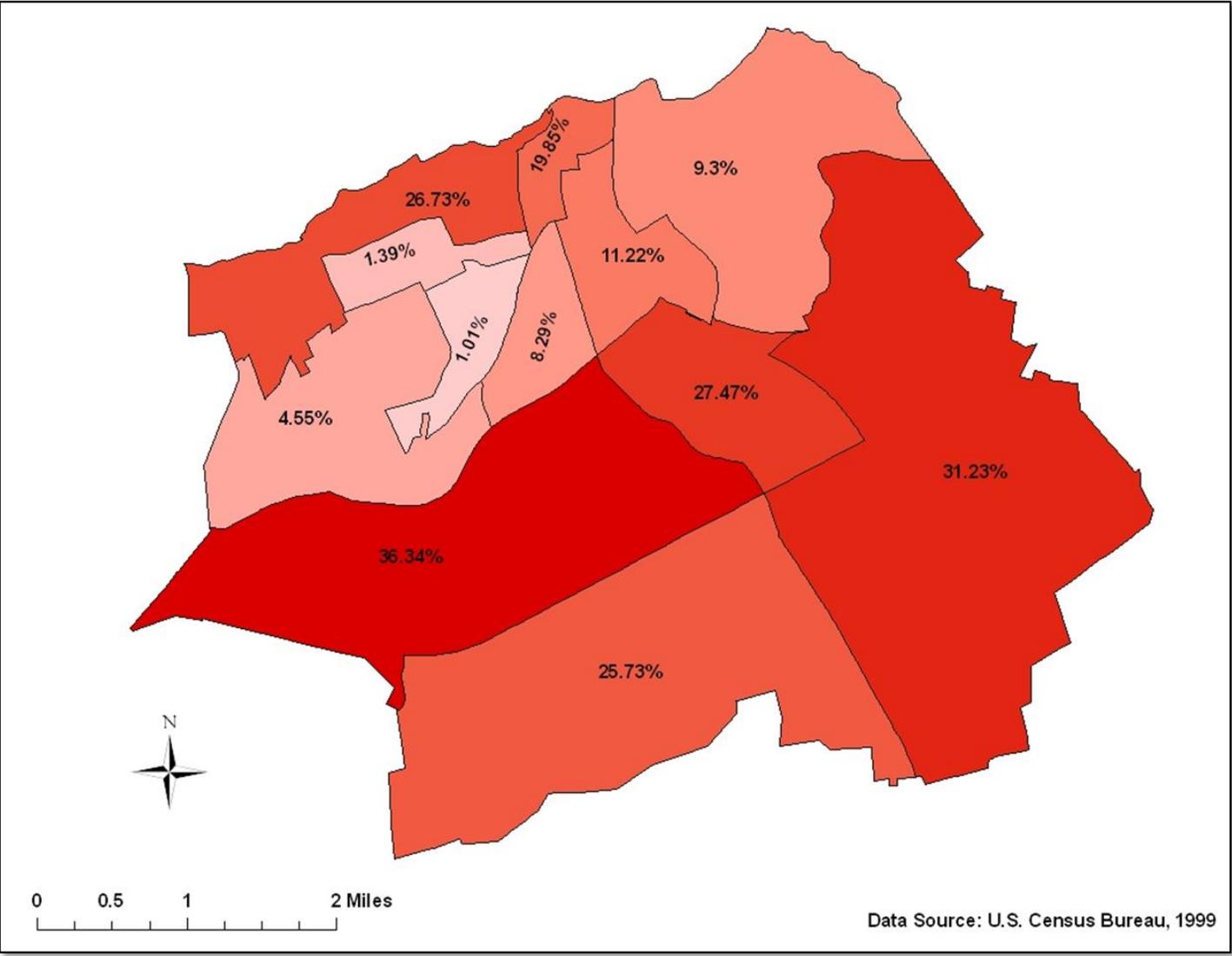


Map 5: Population Density

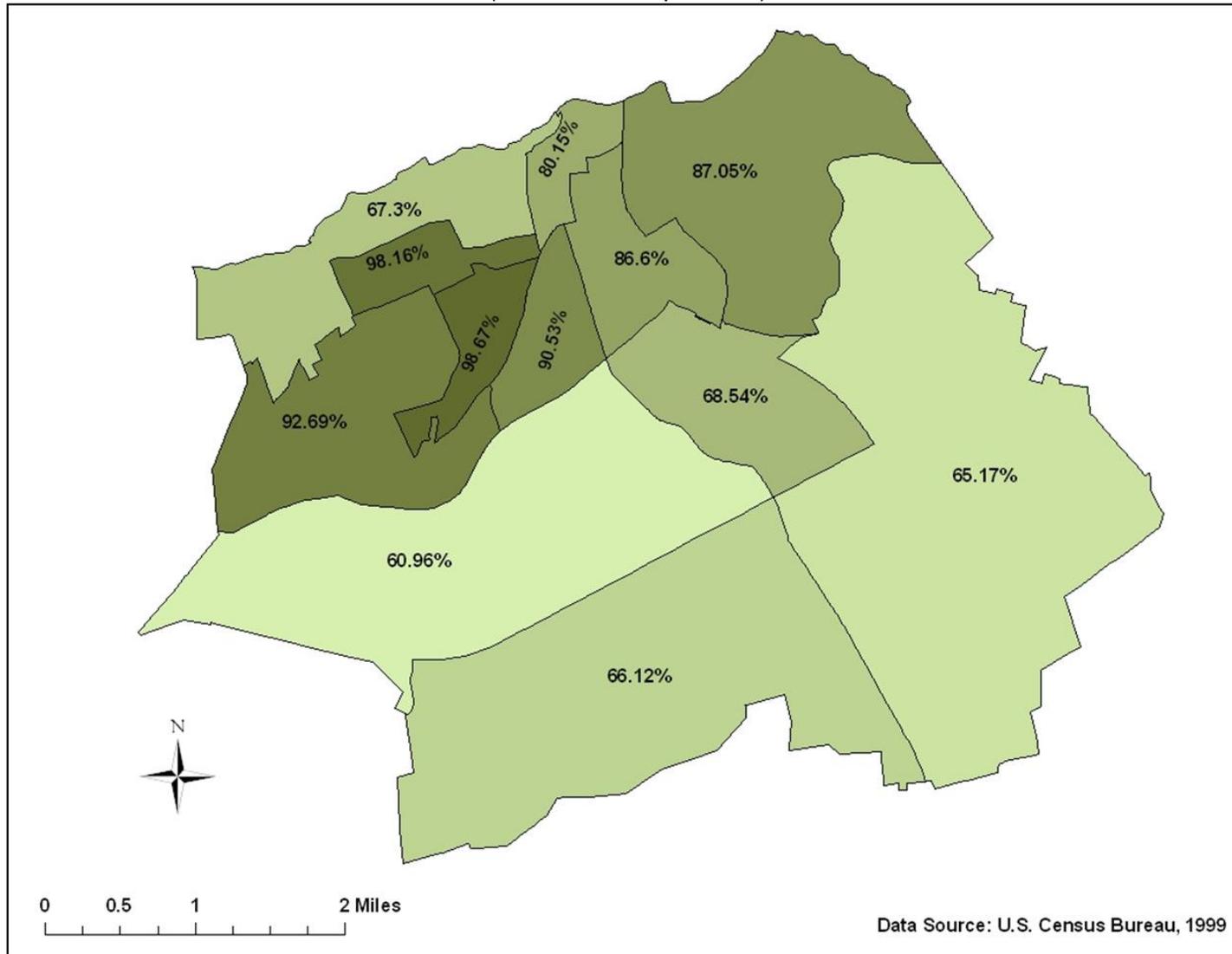
(People/Sq. Mile)



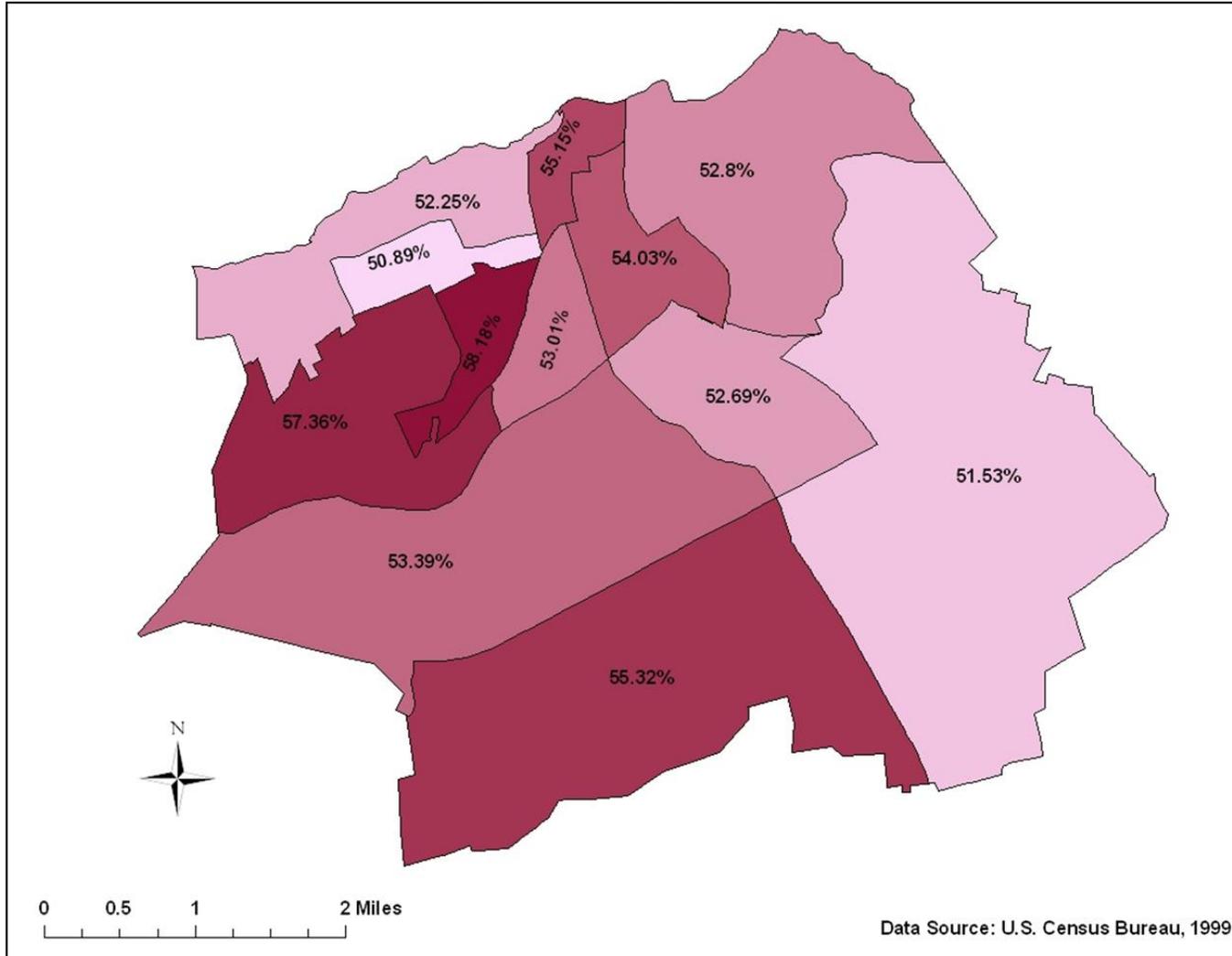
Map 6: White Residents
(% of Tract Population)



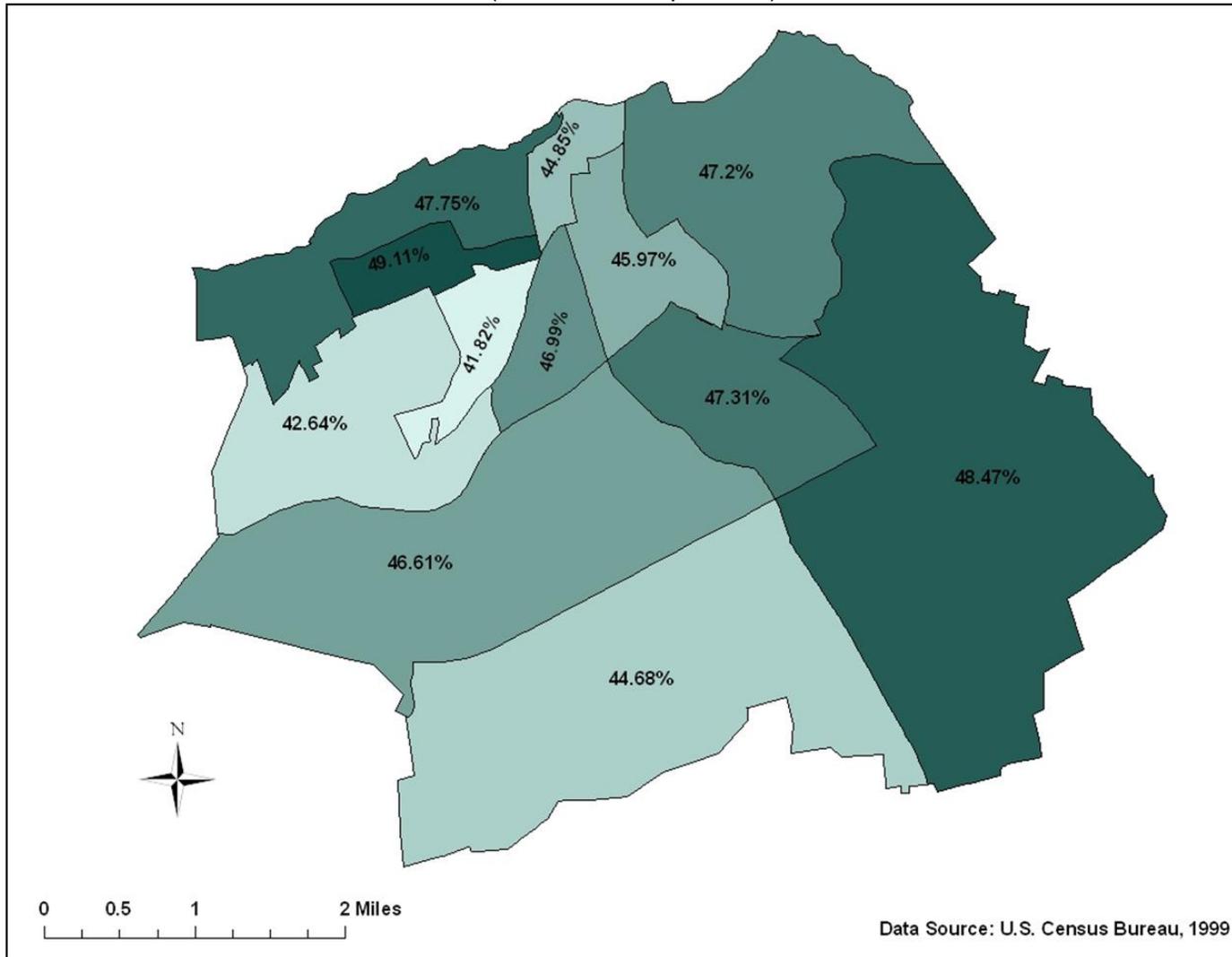
Map 7: Black Residents
(% of Tract Population)



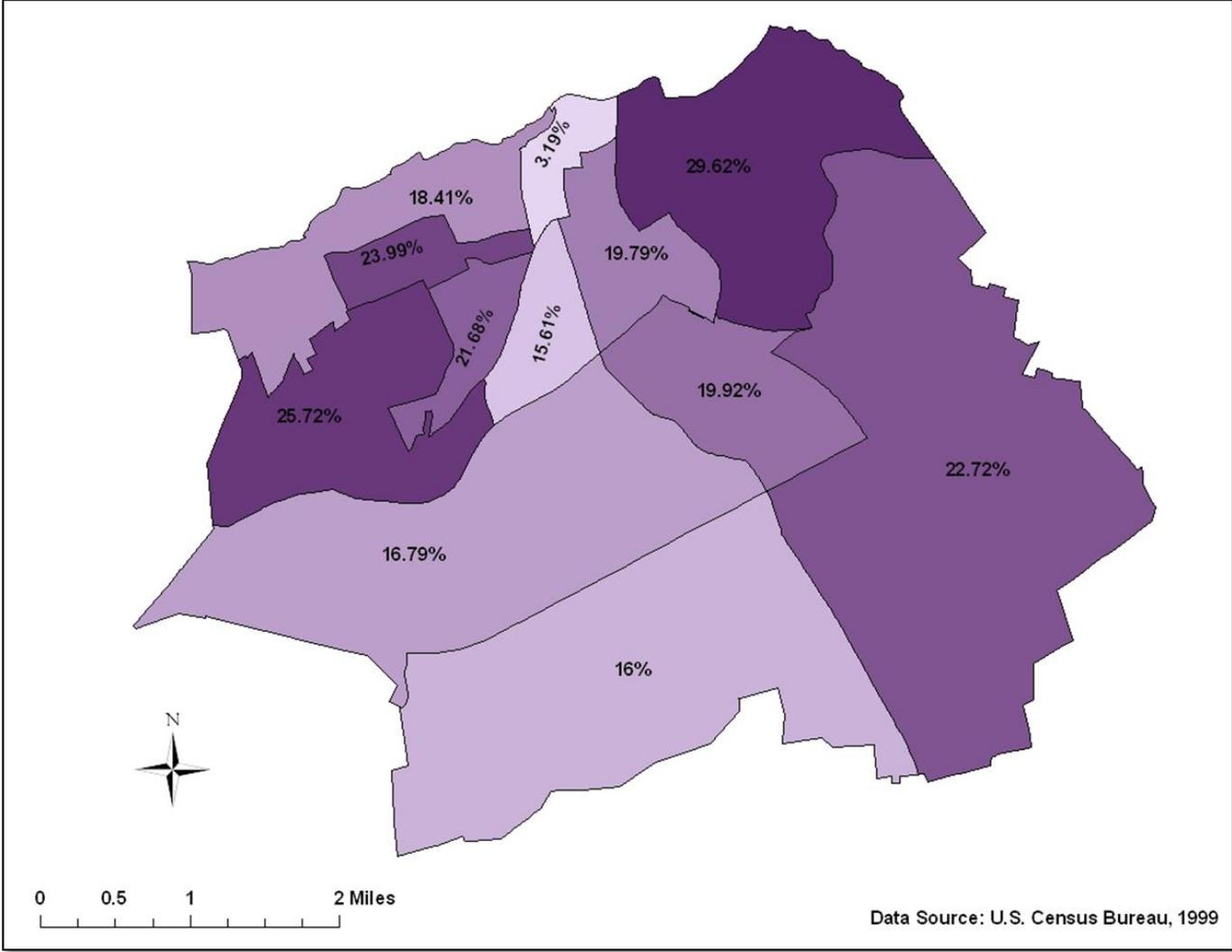
Map 8: Female Residents
(% of Tract Population)



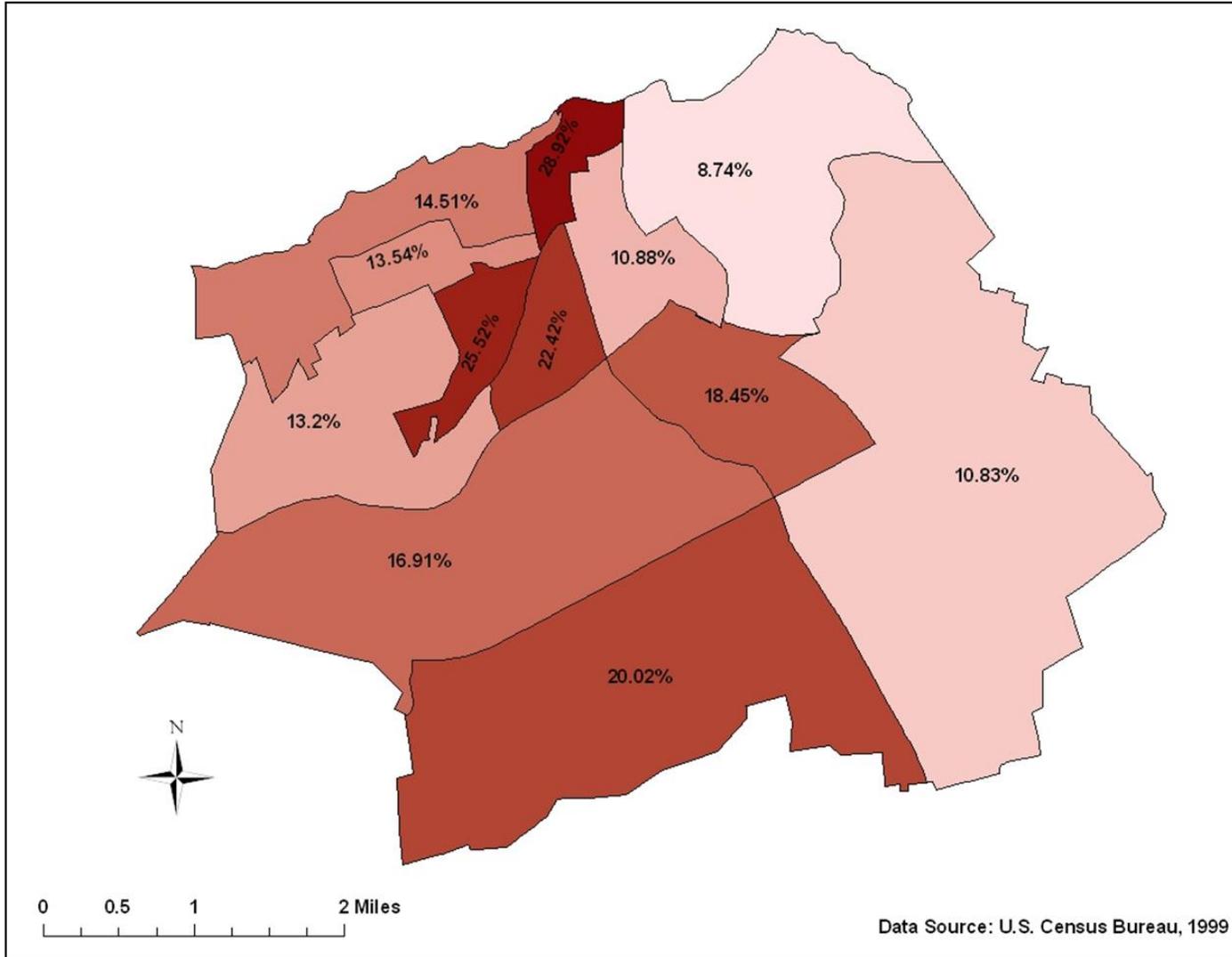
Map 9: Male Residents
(% of Tract Population)



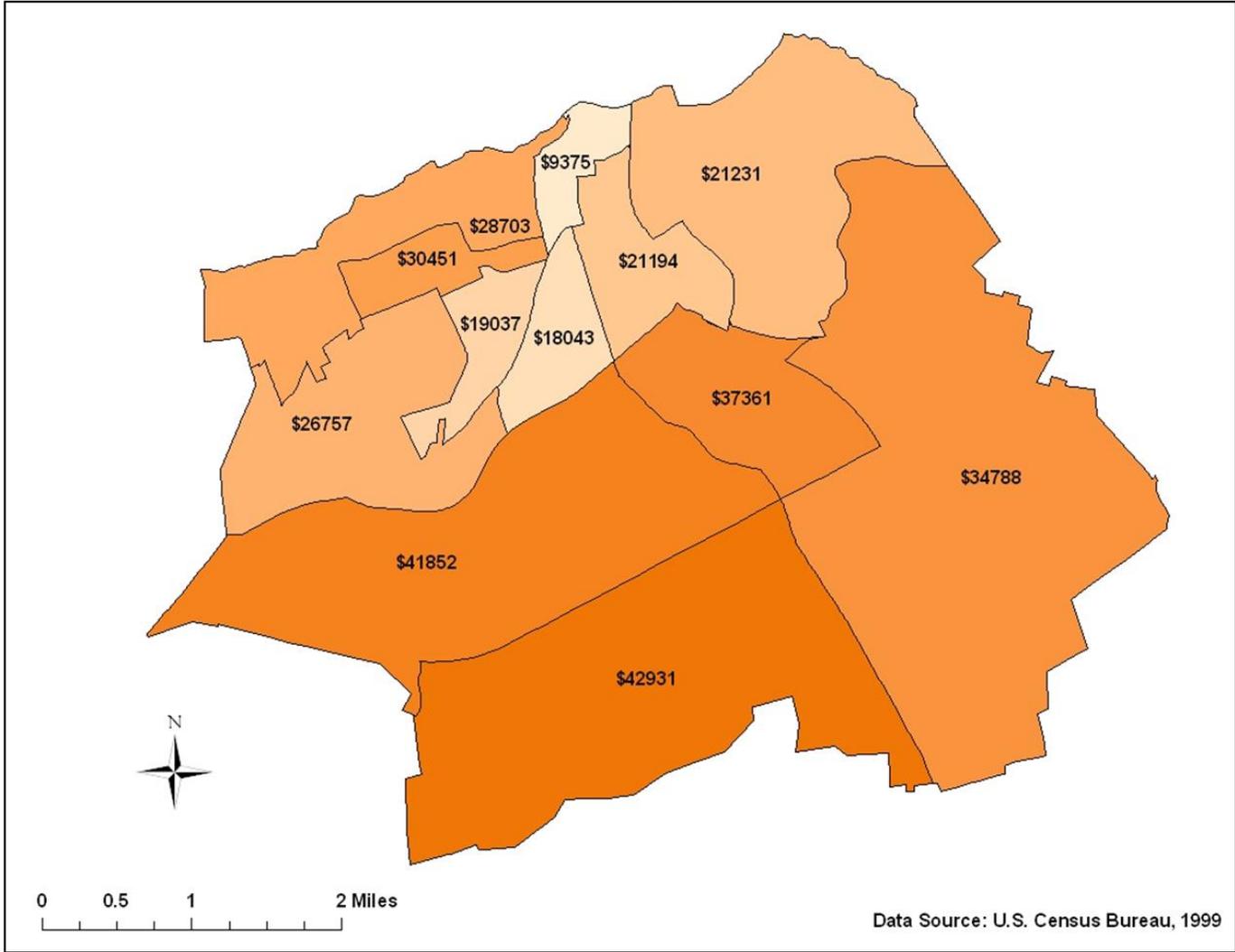
Map 10: Residents Under 15 Years
(% of Tract Population)



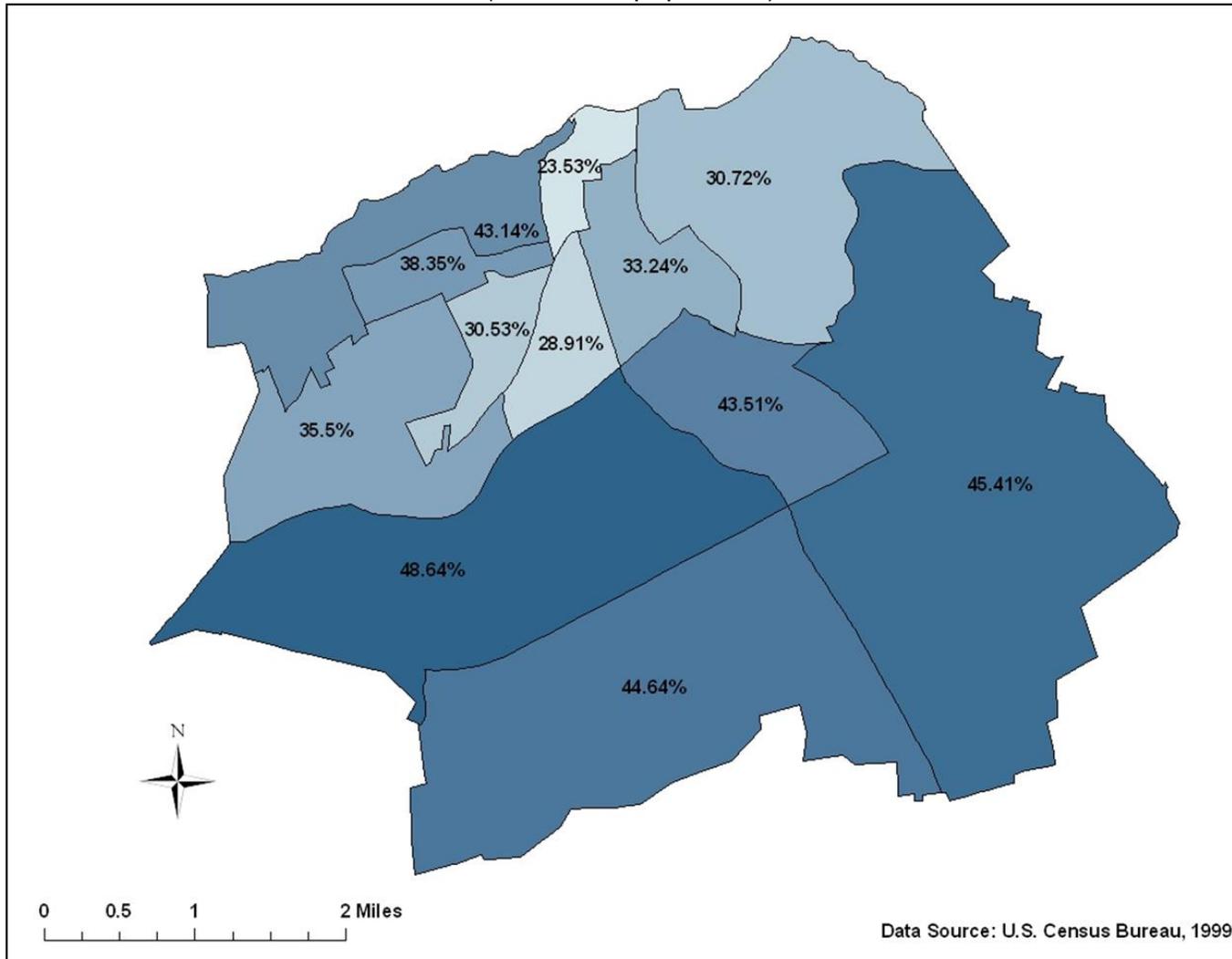
Map 11: Residents 65 Years and Older
(% of Tract population)



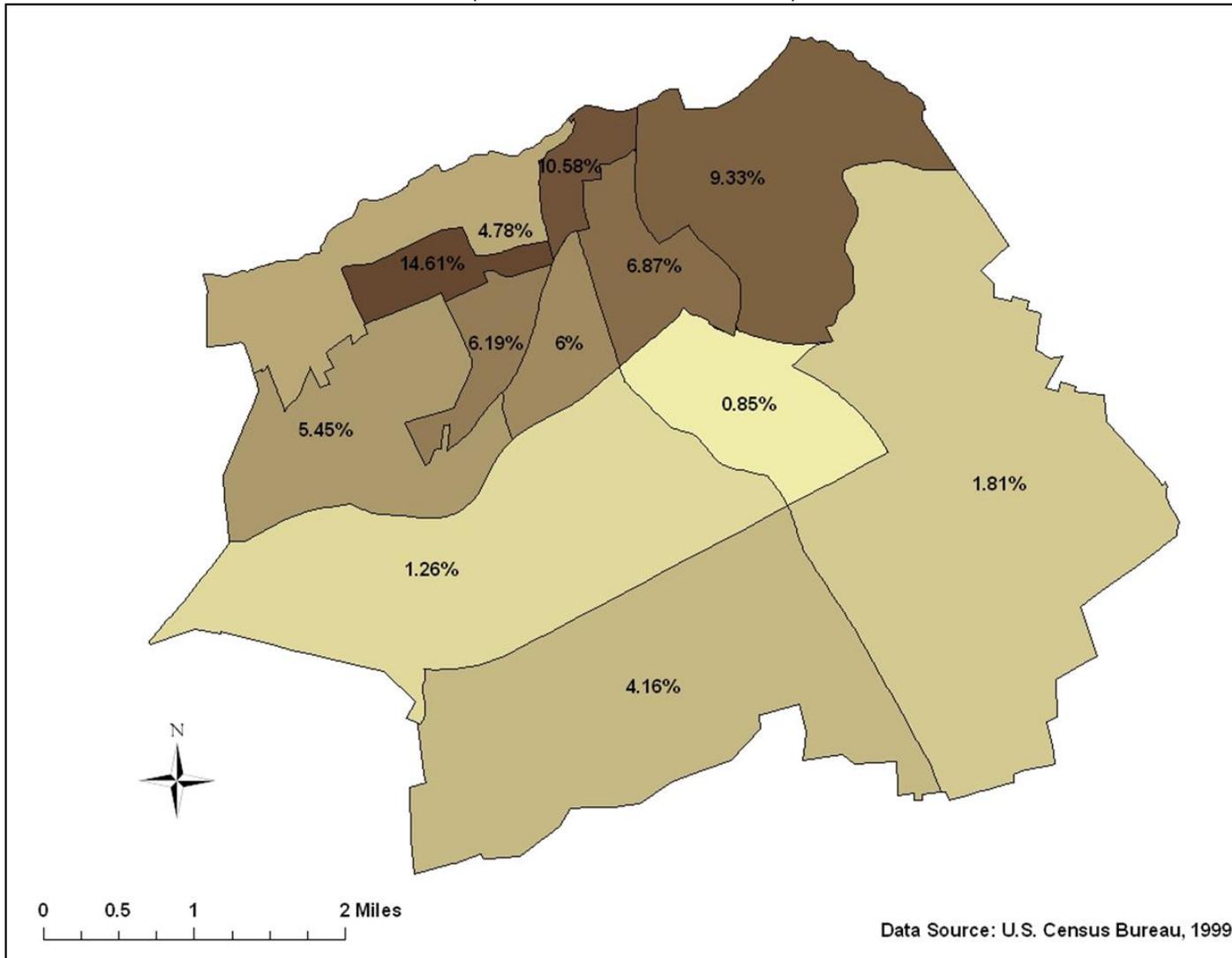
Map 12: Per Capita Median Income
(Observed 1999 and displayed in 1999 dollars)



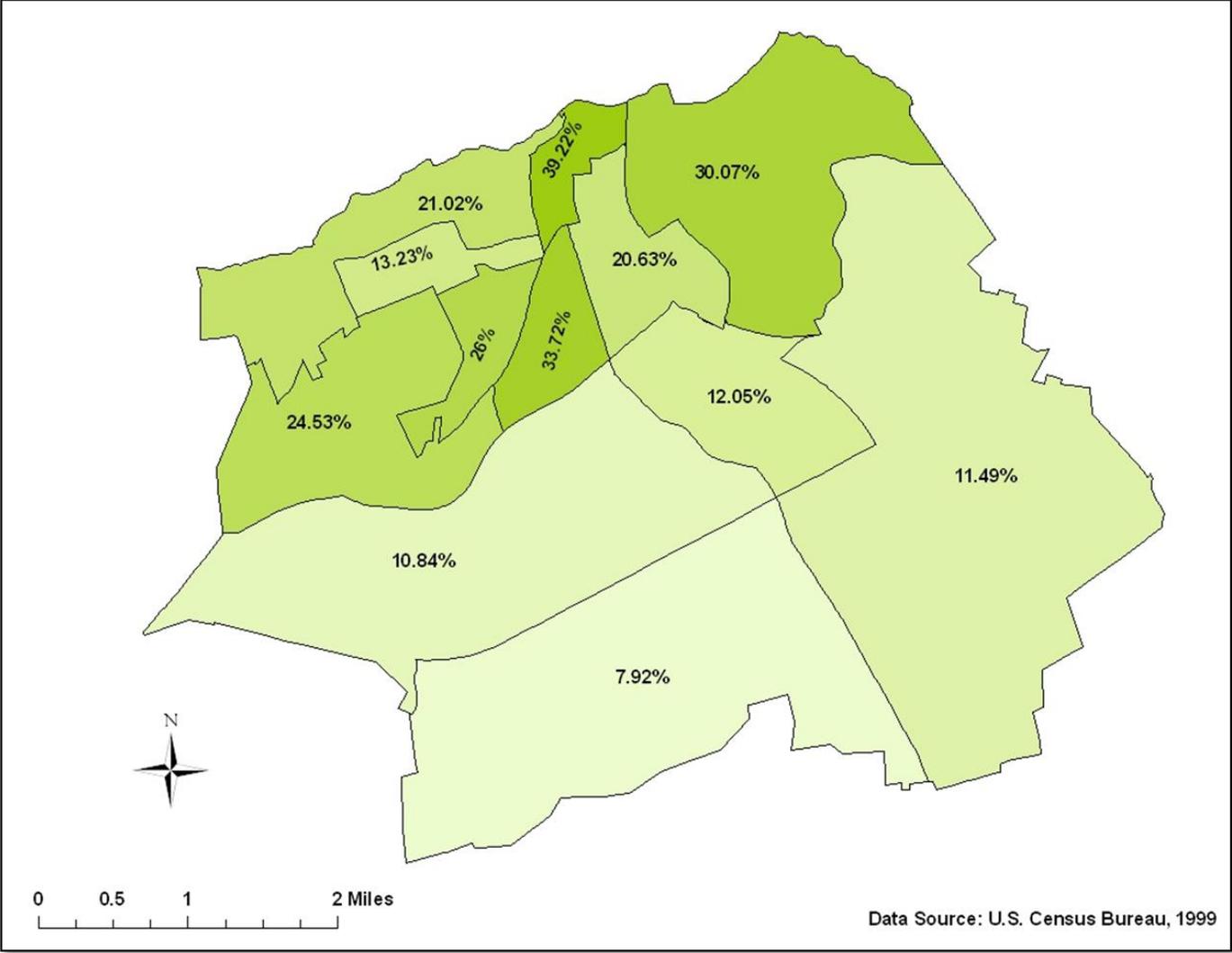
Map 13: Working Individuals 16 Years and Older
(% of Tract population)



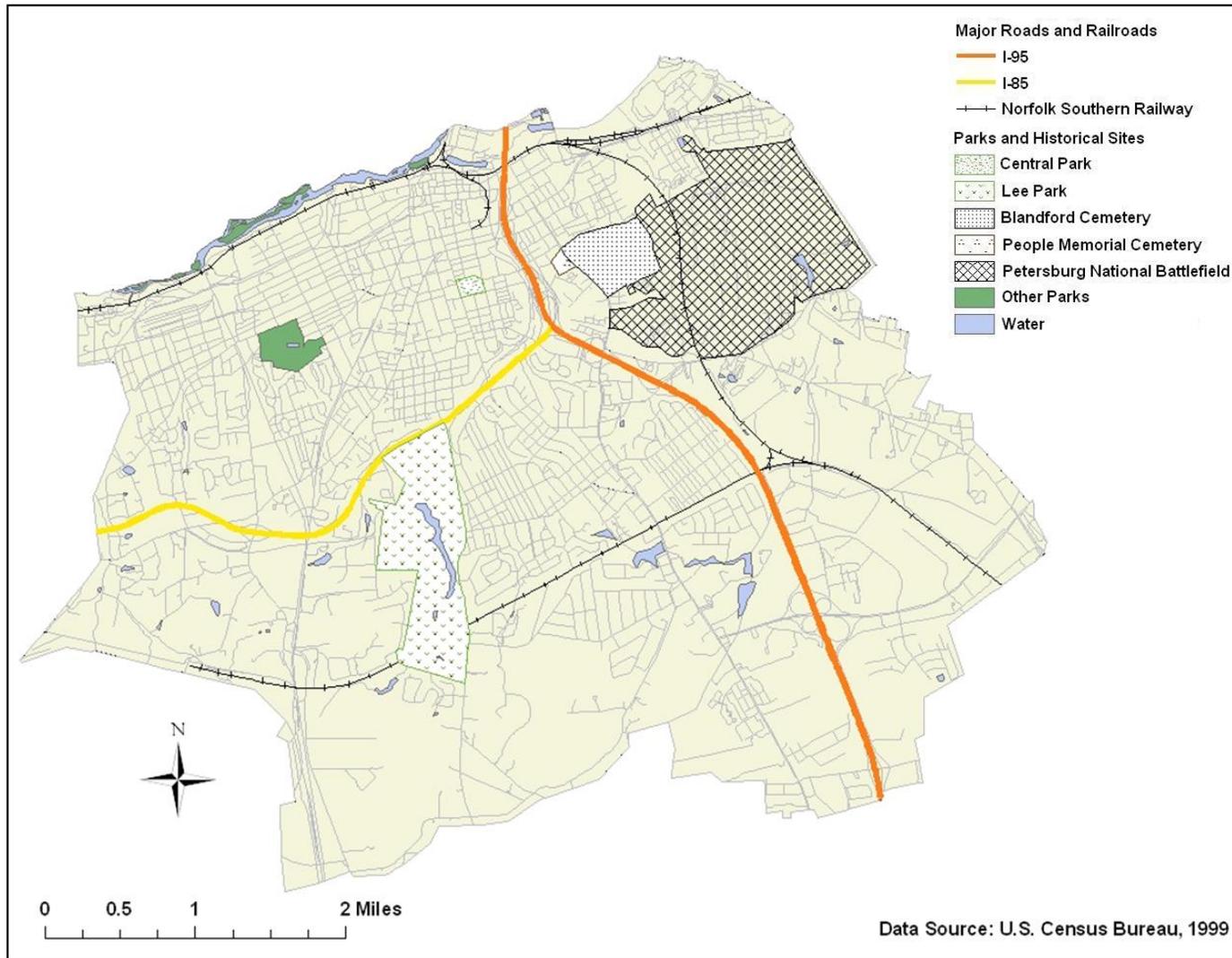
Map 14: Households on Public Assistance
(% of Households in Tract)



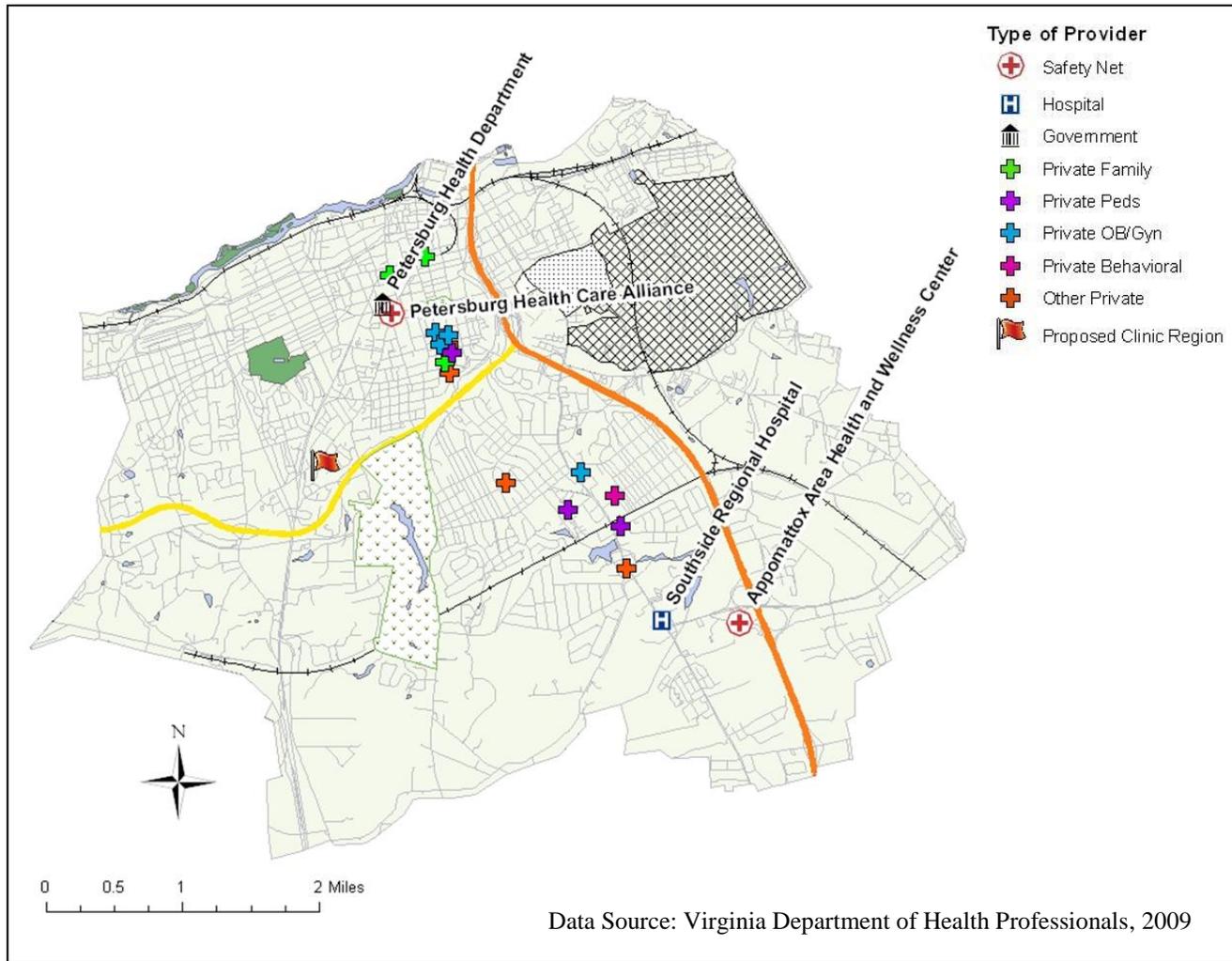
Map 15: Residents Below 100% of Poverty Line
(% of Tract Population)



Map 16: Transportation, Historical Sites and Parks



Map 17: Health Providers and Proposed Clinic Region



Appendix F: Quantifying Preventable Hospitalizations

	Cost per admission, 2006*	Number of Admissions in Petersburg, 2007**	Total Potential Savings	8% of Admissions	8% Potential Savings, (2006 dollars)
ADULTS					
<i>Diabetes</i>					
Uncontrolled diabetes without complications	\$4,632.65	21	\$97,285.65	1.68	\$7,782.85
Short-term diabetes complications	\$6,796.99	76	\$516,571.24	6.08	\$41,325.70
Long-term diabetes complications	\$10,135.59	93	\$942,609.87	7.44	\$75,408.79
Diabetes-related lower extremity amputations	\$19,710.84	26	\$512,481.84	2.08	\$40,998.55
<i>Circulatory Diseases</i>					
Angina w/o procedure	\$4,750.00	14	\$66,500.00	1.12	\$5,320.00
Congestive Heart Failure	\$8,004.78	348	\$2,785,663.44	27.84	\$222,853.08
Hypertension	\$5,092.44	47	\$239,344.68	3.76	\$19,147.57
<i>Chronic Respiratory Diseases</i>					
Asthma	\$5,876.33	77	\$452,477.41	6.16	\$36,198.19
COPD	\$7,030.11	130	\$913,914.30	10.4	\$73,113.14
<i>Acute Diseases</i>					
Bacterial Pneumonia	\$7,775.86	161	\$1,251,913.46	12.88	\$100,153.08
Dehydration	\$5,322.58	113	\$601,451.54	9.04	\$48,116.12
Urinary Tract Infection	\$5,743.34	105	\$603,050.70	8.4	\$48,244.06
CHILDREN					
Short-term Diabetes complication (age 6-17)	\$4,187.50	4	\$16,750.00	0.32	\$1,340.00
Pediatric asthma (age 2-17)	\$3,117.02	24	\$74,808.48	1.92	\$5,984.68
Pediatric gastroenteritis (age 3 mos-17)	\$2,022.56	42	\$84,947.52	3.36	\$6,795.80
Urinary Tract Infection (age 3 mos to 17)	\$3,272.73	8	\$26,181.84	0.64	\$2,094.55
TOTAL		1289	\$9,185,951.97	103.12	\$734,876.16

*Source: HCUP Statistical Brief #72

**Source: Virginia Health Information Quality Indicators; http://www.vhi.org/ahrq_county.asp

Appendix G: Cost-Benefit Analysis

Appendix G-A: Estimating Salary and Benefit Costs over Time

Year	Salaries of 1 Full-time Physician, 2009	Benefits	Salary of 1 Full Time PA, 2009	Benefits	Salaries of 1 Full-Time LPN, 2009	Benefits	Salary of 1 Part-time RN, 2009	Benefits
0	\$162,013.68	\$45,363.83	\$65,975.76	\$18,473.21	\$38,018.88	\$10,645.29	\$30,872.28	\$0.00
1	\$167,619.35	\$46,933.42	\$68,258.52	\$19,112.39	\$39,334.33	\$11,013.61	\$31,940.46	\$0.00
2	\$173,418.98	\$48,557.32	\$70,620.27	\$19,773.67	\$40,695.30	\$11,394.68	\$33,045.60	\$0.00
3	\$179,419.28	\$50,237.40	\$73,063.73	\$20,457.84	\$42,103.36	\$11,788.94	\$34,188.98	\$0.00
4	\$185,627.19	\$51,975.61	\$75,591.73	\$21,165.69	\$43,560.13	\$12,196.84	\$35,371.92	\$0.00
5	\$192,049.89	\$53,773.97	\$78,207.21	\$21,898.02	\$45,067.32	\$12,618.85	\$36,595.79	\$0.00
6	\$198,694.81	\$55,634.55	\$80,913.18	\$22,655.69	\$46,626.64	\$13,055.46	\$37,862.00	\$0.00
7	\$205,569.65	\$57,559.50	\$83,712.77	\$23,439.58	\$48,239.93	\$13,507.18	\$39,172.02	\$0.00
8	\$212,682.36	\$59,551.06	\$86,609.23	\$24,250.59	\$49,909.03	\$13,974.53	\$40,527.38	\$0.00
9	\$220,041.17	\$61,611.53	\$89,605.91	\$25,089.66	\$51,635.88	\$14,458.05	\$41,929.62	\$0.00
10	\$227,654.60	\$63,743.29	\$92,706.28	\$25,957.76	\$53,422.48	\$14,958.29	\$43,380.39	\$0.00
NPV	\$1,720,198.01	\$481,655.44	\$700,504.87	\$196,141.36	\$403,669.63	\$113,027.50	\$327,789.82	\$0.00

Original costs	Physician	Benefits	FT PA	Benefits	FT LPN	Benefits	PT RN	Benefits
2008 dollars	\$156,990.00	\$43,957.20	\$63,930.00	\$17,900.40	\$36,840.00	\$10,315.20	\$29,915.00	\$0.00

Calculations Based on:

Discount Rate

From OMB

Inflation for Future Years

Rate for Hospital prices

Avg CPI for Hospital Prices

Rate for General Expenditures

Avg of CPI General

Rate for Medical Salaries

Avg of Med Prof Svcs

Rate for Medical Equip

Avg of CPI med commodities

4.20%

6.63%

2.82%

3.46%

2.82%

Inflating to 2009

Rate for Medical Salaries

Medical Svcs CPI from 2008 to 2009

Rate for Medical Equipment

Medical Commodities CPI from 2008 to 2009

Rate for General Expenditure

General CPI from 2008 to 2009

Inflating and Discount Formulas

$FV = PV (1 + i)^t$

T

$NPV = \sum_{t=0} (1/1+r)^t$

t=0

3.20%

3.70%

-1.29%

Appendix G-A (continued): Estimating Salary, Benefit Costs, and Payroll Taxes over Time

Year	Benefits	Director, 2009	Benefits	FICA taxes	Medicare taxes
0	\$15,914.18	\$62,250.24	\$17,430.07	\$25,897.28	\$6,926.82
1	\$16,464.81	\$64,404.10	\$18,033.15	\$26,574.52	\$7,166.49
2	\$17,034.50	\$66,632.48	\$18,657.09	\$27,275.18	\$7,414.45
3	\$17,623.89	\$68,937.96	\$19,302.63	\$28,000.10	\$7,670.99
4	\$18,233.68	\$71,323.22	\$19,970.50	\$28,750.09	\$7,936.41
5	\$18,864.56	\$73,791.00	\$20,661.48	\$29,526.03	\$8,211.00
6	\$19,517.28	\$76,344.17	\$21,376.37	\$30,328.82	\$8,495.11
7	\$20,192.57	\$78,985.68	\$22,115.99	\$31,159.39	\$8,789.04
8	\$20,891.24	\$81,718.58	\$22,881.20	\$32,018.69	\$9,093.14
9	\$21,614.07	\$84,546.05	\$23,672.89	\$32,907.73	\$9,407.76
10	\$22,361.92	\$87,471.34	\$24,491.97	\$33,827.53	\$9,733.27
NPV	\$168,970.58	\$660,948.75	\$185,065.65	\$264,931.86	\$73,546.28

Original costs 2008 dollars	Benefits	Director	Benefits
	\$15,420.72	\$60,320.00	\$16,889.60

Calculations Based on:

Discount Rate
From OMB 4.20%

Inflation for Future Years
Rate for Hospital prices 6.63%
Avg CPI for Hospital Prices
Rate for General Expenditures 2.82%

Avg of CPI General 3.46%
Rate for Medical Salaries
Avg of Med Prof Svcs
Rate for Medical Equip 2.82%
Avg of CPI med commodities

Inflating to 2009

Rate for Medical Salaries 3.20%
Medical Svcs CPI from 2008 to 2009

Rate for Medical Equipment 3.70%
Medical Commodities CPI from 2008 to 2009
Rate for General Expenditure -1.29%

General CPI from 2008 to 2009

Inflating and Discount Formulas

$$FV = PV (1 + i)^t$$

$$NPV = \sum_{t=0}^T (1/1+r)^t$$

Appendix G-B: Estimating Facility, Utilities, Insurance, Equipment, Administrative Costs, and All Costs over Time

Year	Facility Rent	Utilities, 2009	Insurance, 2009	Equipment, 2009	Administrative Costs, 2009	Sum across All Costs
0	\$80,325.26	8,362.71	\$12,702.00	\$10,577.40	\$36,498.02	\$784,116.33
1	\$82,590.43	8,598.54	\$13,060.20	\$10,875.68	\$37,527.27	\$810,077.76
2	\$84,919.49	8,841.02	\$13,428.50	\$11,182.38	\$38,585.54	\$836,910.67
3	\$87,314.21	9,090.34	\$13,807.18	\$11,497.72	\$39,673.65	\$864,644.44
4	\$89,776.48	9,346.68	\$14,196.54	\$11,821.96	\$40,792.44	\$893,309.48
5	\$92,308.17	9,610.26	\$14,596.89	\$12,155.33	\$41,942.79	\$922,937.20
6	\$94,911.26	9,881.27	\$15,008.52	\$12,498.12	\$43,125.58	\$953,560.09
7	\$97,587.76	10,159.92	\$15,431.76	\$12,850.56	\$44,341.72	\$985,211.74
8	\$100,339.74	10,446.43	\$15,866.93	\$13,212.95	\$45,592.16	\$1,017,926.88
9	\$103,169.32	10,741.02	\$16,314.38	\$13,585.55	\$46,877.85	\$1,051,741.40
10	\$106,078.69	11,043.92	\$16,774.45	\$13,968.67	\$48,199.81	\$1,086,692.44
NPV	\$827,332.62	86,134.09	\$130,827.85	\$108,944.90	\$375,921.64	\$8,268,219.17

Original costs	Rent	Utilities	Insurance	Equipment	Admin Costs
2008 dollars	\$81,375.00	8,472.00	\$12,868.00	\$10,200.00	\$36,975.00

Calculations Based on:

Discount Rate

From OMB

Inflation for Future Years

Rate for Hospital prices

Avg CPI for Hospital Prices

Rate for General Expenditures

Avg of CPI General

Rate for Medical Salaries

Avg of Med Prof Svcs

Rate for Medical Equip

Avg of CPI med commodities

4.20%

6.63%

2.82%

3.46%

2.82%

Inflating to 2009

Rate for Medical Salaries

Medical Svcs CPI from 2008 to 2009

Rate for Medical Equipment

Medical Commodities CPI from 2008 to 2009

Rate for General Expenditure

General CPI from 2008 to 2009

Inflating and Discount Formulas

$$FV = PV (1 + i)^t$$

T

$$NPV = \sum_{t=0} (1/1+r)^t$$

t=0

3.20%

3.70%

-1.29%

Appendix G-C: Estimating Benefits over Time

Year	Increased health and productivity of patients	Diversion from ER, 2009	Preventable Hospitalizations, 2009	Revenues, 2009	Increased Economic Development of Petersburg, 2009	Sum Across Benefits
0	\$132,450.56	\$547,036.61	\$896,548.92	\$135,756.55	\$100,000.00	\$1,811,792.64
1	\$136,995.77	\$583,305.14	\$955,990.11	\$138,916.13	\$102,820.00	\$1,918,027.14
2	\$141,697.18	\$621,978.27	\$1,019,372.25	\$142,149.41	\$105,719.52	\$2,030,916.64
3	\$146,560.16	\$663,215.43	\$1,086,956.63	\$145,458.12	\$108,700.81	\$2,150,891.17
4	\$151,590.29	\$707,186.61	\$1,159,021.86	\$148,844.02	\$111,766.18	\$2,278,408.96
5	\$156,793.31	\$754,073.09	\$1,235,865.01	\$152,308.92	\$114,917.98	\$2,413,958.30
6	\$162,175.17	\$804,068.13	\$1,317,802.86	\$155,854.65	\$118,158.67	\$2,558,059.48
7	\$167,742.02	\$857,377.85	\$1,405,173.19	\$159,483.12	\$121,490.75	\$2,711,266.92
8	\$173,500.23	\$914,222.00	\$1,498,336.17	\$163,196.25	\$124,916.78	\$2,874,171.44
9	\$179,456.39	\$974,834.92	\$1,597,675.86	\$166,996.03	\$128,439.44	\$3,047,402.63
10	\$185,617.31	\$1,039,466.48	\$1,703,601.77	\$170,884.48	\$132,061.43	\$3,231,631.46
NPV	\$1,404,441.90	\$6,770,502.37	\$11,096,307.64	\$1,366,140.76	\$1,029,978.11	\$21,667,370.78

Original Costs	ED Diversion, 2003 \$377,266.63	Preventable Hosp, 2006 \$734,876.16
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Calculations Based on:

Discount Rate From OMB	4.20%	Inflating to 2009 <i>ED Diversion Rate</i>	1.45%
Inflation for Future Years <i>Rate for Hospital price</i> Avg CPI for Hospital Prices	6.63%	Hospital CPI from 2003 to 2009 <i>Preventable Hospitalization Rate</i> Hospital CPI from 2006 to 2009	1.22%
<i>Rate for General Expenditures</i> Avg of CPI General	2.82%	Inflating and Discount Formulas FV = PV (1 + i) ^t T	
<i>Rate for Medical Salaries</i> Avg of Med Prof Svcs	3.46%	NPV = $\sum_{t=0}^T (1/1+r)^t$	
<i>Rate for Medical Equip</i> Avg of CPI med commodities	2.82%		

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