INTRODUCTION

In an effort to improve community health outcomes, access to primary care has been a priority of policy-makers as it is often the first step for the prevention and treatment of chronic diseases and other serious health conditions (Brown, Polsky, Barbu, Seymour, and Grande, 2016; Friedberg, Hussey, and Schneider, 2010). The positive association between access to primary care and health outcomes has been well established within the empirical literature (Kringos, Boerma, Zee, and Groenewegan, 2013; Chang, Stukel, Flood, and Goodman, 2011; Fields, Bigbee, and Bell, 2016; Gaglioti, Patterson, Bazemore, and Phillips, 2016). The 2016 study by Fields et al., found that higher primary care provider-to-population ratios were related to better health outcomes, including reduction in years of potential life lost, lower rates of poor and fair health, and a reduction in teen births. These results were consistent for both urban and rural counties, however they increased in magnitude with the level of rurality (Fields et al., 2016). Other recent studies have also found a positive relationship between increased levels of primary care physicians and better overall population health outcomes, including chronic health conditions, mortality, and obesity (Chang et al., 2011; Kringos et al., 2013; Gaglioti et al, 2016; Campbell, Ramirez, Perez, Roetzheim, 2003; Roetzheim, Ferrante, Lee, Chen, Love-Jackson, Gonzalez, Fisher, McCarthy, 2012).

In addition to decreasing health inequality, access to primary care plays an important role in slowing down the growth in health care costs (Kringos et al., 2013). Kringos et al. (2013) demonstrated this relationship by analyzing the health care systems of thirty-one European Union countries. Their results showed that although increased primary care is not associated with lower overall spending it is linked to a reduction in the growth of spending. These findings are relevant given that health care spending in the U.S. increased by 5.8 percent in 2015, reaching $3.2 trillion, and per capita spending increased 5.0 percent (Martin, Hartman, Washington, and Catlin, 2016). In 2015, increases in the utilization of health care good and services contributed to 3.2 percent of the growth of per capita health care spending (Martin et al., 2016). The overutilization of health care services is one of the main drivers of this growth (Martin et al., 2016). Recently, there have been renewed efforts by policy makers to reduce unnecessary care, including increased access to primary care. In 2016, a number of states, including Washington State received a Section 1115 waiver and has begun implementing its Medicaid Transformation. Initiative I of the Medicaid Transformation includes an emphasis on primary care (whole person), “the demonstration aims to support and make investments that enable providers to better address local health priorities and deliver cost-effective quality care that treats the whole person” (Washington State Health Care Authority). Also, an increasing number of studies have shown a negative relationship between primary care and the utilization of health care services (Cabana and Jee, 2004; Kravet, Shore, Miller, Green, Kolodner, and Wright, 2008; Fung, Wong, Fong, Lee, Lam, 2015; Turbitt and Freed, 2016; Kringos et al., 2013). These studies have indicated that increased levels of primary care physicians are associated with a reduction in hospital admissions, emergency care services, and surgeries (Cabana and Jee, 2004; Kravet, Shore, Miller, Green, Kolodner, and Wright, 2008; Fung, Wong, Fong, Lee, Lam, 2015; Turbitt and Freed, 2016; Kringos et al., 2013).

To effectively reduce health care costs and increase health outcomes through primary care it is important to understand where current primary care access disparities may exist. A 2013 study of all primary care service areas (PCSA) in the U.S., found that on average a PCSA had 87 primary care providers per 100,000 residents, or a population to provider ratio of 1150 to 1 (Huang and Finegold, 2013). The U.S. Department of Health and Human Services considers a population to provider ratio above 3000 to 1 to indicate need of increased primary care (SOURCE). Therefore, the results of Huang and Finegold’s study indicate that the average PCSA in the U.S. is not in need of additional primary care providers. However, it is important to recognize that estimates based on high level of aggregation, such as PCSA, may not capture underlying health care disparities (Gentili, Isett, Serban, Swann, 2015, Wright and Ricketts, 2010; Mobley, Kuo, and Andrews, 2008). This could lead to either the over or underestimation of primary care accessibility within the area being analyzed because the level of access is being smoothed out over a large area. Gentili et al. (2015) demonstrated this smoothing effect in their study by comparing the health care accessibility and availability estimates of counties and their respective census tracts in both California and Georgia. They found that county level estimates tend to underestimate spatial access because they did not accurately account for different levels of accessibility within the county and thus spread out access over space. By only analyzing primary care access at higher levels of aggregation any disparities at the local level are being ignored. While there has been an increasing number of studiesevaluating , most of the estimates are based onTo our knowledge, ts primary care (Brown et al., 2016; Luo and Wang, 2003; Mathison, Chaberlain, Cowan, Engstorm, Fu, and Shoo, 2013; Guagliardo, Chacko, and Joseph, 2004)

Another potential problem when measuring access over space that needs to be accounted for is the presence of spatial spillovers (Mobley, Root, Finkelstein, Khavjou, and Will, 2006). These spatial spillovers can come from both social and non-social factors. Social spatial spillovers are when neighborhoods have similar behavioral risk factors and health outcomes due to peoples influence over one another over space (Mobley, Root, Anselin, Lozano-Garcia, and Koschinsky, 2006). Non-social spatial spillovers may stem from the placement of physicians. These types of spillovers occur because one community’s investment in new health infrastructure may impact a neighboring community’s access. Both types of spatial spillovers occur because the boundaries of small geographic areas are not physically defined. Because of this there is nothing to prevent residents of one community from going to another community for health services. The presence of spatial spillovers can cause spatial autocorrelation, which if not accounted may lead to misleading estimates (Anselin, 2006).

The objective of this study is to estimate the spatial accessibility to primary care at the local level (census tract) within Washington State, while controlling for a populations demographic and socio-economic characteristics. Washington State was chosen as the setting for this study because in October 2016, Washington State received a five-year demonstration waiver from CMS. This waiver allows Washington State to transform its current Medicare system. Imitative I of the Medicaid Transformation incentives primary care providers to change how care is delivered. A goal within Initiative I is to ensure that primary care is provided at the local level statewide.