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Residential Mobility And Enrollment Churn In A Medicaid Population

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RESIDENTIAL MOBILITY AND ENROLLMENT CHURN IN A MEDICAID POPULATION

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ABSTRACT

Previous investigations show high rates of enrollment discontinuity, or churn, among Medicaid participants. Discontinuity of coverage can limit appropriate use of health care, increase emergency department utilization and in-patient hospitalization, negatively affect self-reported health, increase health care spending, and compound Medicaid administrative costs. Efforts to more fully understand and ultimately reduce enrollment churn thus are vital to Medicaid agencies and beneficiaries. Residential moves are life transitions, often marking other significant life events (e.g., changes in employment or family structure) that can alter eligibility for Medicaid benefits. Few studies have examined residential moves among Medicaid members, or considered residential mobility as a potential predictor of churn. The present investigation describes within-state residential moves in a Medicaid population, and evaluates the multivariable association between within-state residential mobility and Medicaid enrollment discontinuity. Based on a sample of 428,294 full-benefit, non-elderly South Carolina Medicaid recipients, 28% of Medicaid members were found to move between ZIP Code Tabulation Areas during a 4-year observation period (2013-2016). Medicaid member movers were approximately 1.7 times more likely than non-movers to churn in the Medicaid system, considering age category, gender, race/ethnicity, and health status, and controlling for the number of observation years each subject was present in the study (AOR=1.74; 95% CI=1.72-1.76). In light of study results, Medicaid policy implications are identified and directions for future research are proposed.

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CHAPTER 1

INTRODUCTION

The population of the United States is highly mobile. Each year, approximately 1 in 7 persons nationwide changes residence (U.S. Census Bureau, 2016). Numerous theoretical frameworks have been advanced to explain human population movement both between and within nations. Economic geographic relocation theories (notably Harris & Todaro, 1970) identify economic opportunity (e.g., potential for higher income) as the primary factor influencing decisions to move. Other theoretical frameworks recognize such non-economic factors as social networks; natural, cultural, and recreational amenities; and natural and man-made disasters as drivers of geographic relocation decisions (Cheng, 2009; Hunter, 2005; Cragg & Kahn, 1997; Kohler, 1997; Massey, 1990). Although different in conceptual orientation, most residential mobility theories emphasize place-specific "push" and "pull" factors that influence individual and family decisions to move (Cheng, 2009). Formulated by Lee (1966), push-pull theory predicts residential relocation when the combined negative (push) and positive (pull) features of the area of destination are more attractive than the combined negative and positive features of the area of origin. Push factors might include such conditions as unemployment, low wages, inadequate housing, underperforming schools, social isolation, and crime. Conversely, good-paying jobs, affordable housing, educational opportunities, family connections, mild climate, and cultural amenities all can represent strong pull factors. Push-pull theory generally assumes rational decision-making by movers or potential movers to maximize individual or family wellbeing.

Propensity to move and reasons for moving vary across the life cycle, with mobility rates peeking among young adults pursuing higher education, seeking jobs, and/or establishing families (Geist & McManus, 2008; Glick, 1993). Family structure itself can influence geographic relocation decision making: studies have found single and divorced women with children move more often than married mothers (South & Crowder, 1998), and families with fewer children move more often than those with more children (Long, 1972). Socioeconomic status also can affect mobility rates. Despites costs associated with residential relocation, persons with low incomes move at least as frequently (Nord, 1998) or more frequently (Schacter, 2001; Deane, 1990) than those with higher incomes.

A growing body of literature associates geographic relocation with poor health. A study of the 2007 National Survey of Children's Health, for example, found that children with 3 or more lifetime moves reported poorer health than non-movers, adjusting for such potentially confounding variables as age, race/ethnicity, family structure, parental education, poverty status, and health insurance (AOR=1.21; 95% CI=1.01-1.46) (Busacker & Kasehagen, 2012). A recent examination of National Longitudinal Study of Adolescent Health data found that among parents of adolescents, those with self-reported fair or poor health were more likely to move than those in good or excellent health, adjusting for age, sex, race/ethnicity, education level, occupation, and welfare receipt (OR=1.40; p=0.02) (Dunn, Winning, Zaika, & Subramanian, 2014). Numerous other studies link residential mobility with both adverse physical (Exeter, Sabel, Hanham, Lee,

& Wells, 2015; Cohen, Yantzi, Guan, Lam, & Guttmann, 2013) and behavioral health conditions (Susukida, Mojtabai, Murcia, & Mendelson, 2016; Beautrais, Joyce, & Mulder, 1996; Simpson & Fowler, 1994). In some instances the observed relationship between geographic mobility and poor health might be interpreted in terms of psychosocial stress (Coddington, 1972)—i.e., health deteriorates as a consequence of the harmful psychological and physiological effects of stress associated with residential relocation and such potentially related life events as eviction, unemployment, job change, or social network disruption, including change of family structure. In other cases, however, *existing* health conditions clearly influence residential mobility decision-making, as when, for example, persons with a serious illness move to achieve closer proximity to health care (McCarthy, Valenstein, & Blow, 2007; Berk, Schur, Dunbar, Bozzzette, & Shapiro, 2003). Further research is needed to clarify the complex and likely bidirectional association between geographic relocation and health through the life course. Ample evidence, however, suggests geographic relocation is a valuable marker for poor health in low-income and other vulnerable populations.

Medicaid is a public health insurance system for people in the U.S. with low incomes and limited resources, jointly funded by the federal government and individual states (CMS, 2016). To date, very little research has focused on Medicaid population geographic relocation. A study evaluating the effect of state decisions regarding Medicaid eligibility expansion on the interstate migration of low-income, nonelderly adults found no evidence of increasing migration *to* expansion states or *out of* non-expansion states prior to the implementation of the Affordable Care Act (i.e., a “welfare magnet” effect was not observed) (Schwartz & Sommers, 2014). In a direct examination of Medicaid member moves between states from 2005-2007, in-migration rates for Medicaid beneficiaries were found to be higher than in-migration rates for the general population (Baugh & Verghese, 2013). Higher rates of between-state migration among persons enrolled in Medicaid may represent greater risk for poor health and indicate a need for policy and programming mechanisms to improve health care access, continuity and coordination for Medicaid movers.

Between 2013 and 2015 the uninsurance rate among nonelderly persons in the U.S. fell from 16.6% to 10.5%, primarily as a result of the full implementation of ACA health insurance coverage provisions in January 2014 (The Henry J. Kaiser Family Foundation, 2016). Despite the overall decline in uninsurance, many persons in the U.S. continue to transition between private and/or public health insurance plans, or between periods of insurance coverage and uninsurance, a phenomenon commonly called "churning." Indeed, a greater proportion of people experience discontinuous insurance coverage than are consistently uninsured (Short & Graefe, 2003).

Discontinuity of health insurance coverage can negatively impact health and health care delivery. Uninsured persons are at increased risk for late-stage disease diagnosis of cancer (Simard, Fedewa, Ma, Siegel, & Jemal, 2012) and have a higher mortality rate than the insured (Wilper et al., 2009). Without insurance individuals are less likely to have a regular source of care (Garfield, Majerol, Damico, & Foutz, 2016), refill prescriptions (Banjeree, Ziegenfuss, & Shah, 2010), or undergo recommended health screenings (Garfield et al., 2016), and more likely to delay needed health care (Olson, Tang, &Newacheck, 2005), seek emergency department care (Sommers, Gourevitch, Maylone, Blendon, & Epstein, 2016; Banjeree et al., 2010), and require hospitalization (Banjeree et al., 2010). Even for persons with no coverage lapse, changing health insurance plans has been associated with decreased access to primary care and specialty providers, and increased emergency department utilization (Sommers et al., 2016).

Low-income populations are more likely to experience health coverage discontinuity (Short & Graefe, 2003). Approximately 1 in 5 low-income Medicaid recipients experiences discontinuous enrollment in the course of a single year (Ku, MacTaggart, Pervez, & Rosenbaum, 2009). An examination of Medical Expenditure Panel Survey (MEPS) data indicated 43% of adult Medicaid recipients experienced at least one episode of discontinuous enrollment during a 2-year time period (Banjeree et al., 2010). More than 3 in 5 California Medicaid participants experienced discontinuity of coverage at least once over a four-year period (Bindman, Chattopadhyay, & Auerback, 2008).

Research suggests Medicaid coverage gaps often are of short duration. A recent study of administrative data from 10 states found 21% of child Medicaid disenrollees were re-enrolled in the same program within 7 months (Orzol, Hula, & Harrington, 2015). Another study of Medicaid coverage in 5 states showed a majority of child disenrollees were re-enrolled in 2 to 3 months (Fairbrother, Emerson, & Partridge, 2007). Coverage gaps of any duration are of concern, however, because persons churning in and out of Medicaid usually have no other insurance source (Ku et al., 2009). Policy and programmatic efforts to reduce churn among Medicaid beneficiaries therefore are especially critical.

Once a year (every 6 months in some states), Medicaid participants must re-apply for program benefits. Enrollment renewals are required by states to ensure all participants meet current eligibility criteria. Transitions into and out of means-tested Medicaid typically reflect changes in income, job changes affecting access to employer-sponsored insurance, or changes in family structure (e.g., presence of dependent children) (Cardwell, 2016; Sommers et al., 2016). In addition, unintentional disenrollment (administrative churn) can occur when procedural issues delay or prevent processing of enrollment renewal forms (Cardwell, 2016; Sommers et al., 2016; Rosenbaum, 2015).

Residential moves often mark significant life events (e.g., changes in employment or family structure) that may impact Medicaid eligibility status. Moreover, mailing address changes concomitant with residential relocation may slow or prevent delivery of Medicaid enrollment renewal notices, thereby precipitating unintentional administrative disenrollment of Medicaid members. For both of these reasons a positive association between residential mobility and Medicaid enrollment churn might be expected.

To date, no study has described within-state residential mobility patterns among Medicaid recipients or assessed within-state Medicaid mobility rate differences by age, sex, race/ethnicity, or health status. Moreover, no study has examined within-state residential mobility as a potential predictor of Medicaid enrollment churn. To address these knowledge gaps, the following research aims and associated research questions are established:

<u>Aim 1: Assess within-state residential mobility rates and geographic patterns for South Carolina Medicaid enrollees (low-income eligible, nonelderly, full benefit participants).</u>

What proportion of Medicaid enrollees move over a 5-year period?

What is the multiple move rate (2 or more moves) among Medicaid enrollees over a 5-year period?

How far (miles) do Medicaid enrollees move?

Do Medicaid enrollee move rates and move distances vary by age category? By sex? By race/ethnicity? By health status?

What areas in South Carolina have the highest and lowest levels of net residential mobility (total Medicaid enrollee in-moves minus total Medicaid enrollee out-moves)?

<u>Aim 2: Evaluate the association between South Carolina Medicaid participant within-state residential mobility and Medicaid enrollment churn.</u>

Controlling for Medicaid participant age, sex, race/ethnicity, and health status, is move status (mover/non-mover) associated with Medicaid enrollment churn over a 5-year period?

By addressing existing gaps in the literature, the proposed study can contribute valuable new information about Medicaid population mobility and associated enrollment churn, thereby strengthening policies and programming to improve health care accessibility, continuity and coordination for Medicaid participants.

CHAPTER 2

LITERATURE REVIEW AND STUDY RATIONALE

2.1 Residential Mobility versus Migration

The 21st Century has seen growing interest among researchers in the movement of human populations through geographic space. Many recent studies have focused on international population flows (Coulter, Ham, & Findlay, 2016), particularly in such contexts as global trade (Ortega & Peri, 2014), "brain drain" (Kuhn & McAusland, 2006), climate (Beine & Parsons, 2015; Reuveny, 2007), and violent conflict (Dreher, Krieger, & Meierrieks, 2011). Other studies have emphasized comparatively short-distance moves, e.g., within the political boundaries of smaller nations (Liebig & Sousa-Poza, 2006) or within metropolitan regions in the U.S. (Kim, 2011). Although the terms "migration" and "residential mobility" sometimes are used interchangeably, researchers increasingly prefer "migration" to describe international and long-distance moves, and "residential mobility" to describe short-distance moves in localized areas (Coulter et al., 2016). In the present investigation, the term "residential mobility" is used to characterize within-state moves by South Carolina Medicaid beneficiaries. In some instances, theoretical concepts and underlying dynamics apply equally to migration and residential mobility flows. In this study, the phrase "geographic relocation" is used when no distinction between migration and residential mobility is intended.

Numerous conceptual frameworks explaining why people move have been advanced. In the sections that follow, the evolution of geographic relocation theory is reviewed. Then, drawing on multiple theoretical perspectives, a modified push-pull conceptual framework is formulated to aid understanding of within-state moves by South Carolina Medicaid enrollees.

2.2 Human Geographic Relocation: Theoretical Perspectives

2.2.1 Ravenstein: Initial Conceptualization

Writing in the late-19th Century, Ernst Georg Ravenstein provided one of the earliest treatises on human geographic relocation (Ravenstein, 1885). Based on an examination of population data for principal European countries, Canada, and the United States, Ravenstein derived a set of "laws" describing human population flows. Although he used the terms "migrants," "migratory," and "migration" in his paper, some of his laws explicitly describe short-distance moves. According to Ravenstein, population growth in large urban centers is driven by in-migration from surrounding rural areas, most migrants move only short distances, and short-distance movers are predominantly female. Further, he states migratory movement is gradual; every migration flow produces a weaker counter flow; and transportation, manufacturing, and commerce all influence migration intensity. Criticized even by contemporaries for failing to provide true "laws" of migration (Corbett, 2003), Ravenstein's seminal work nonetheless laid the foundation for subsequent geographic relocation theoretical development (Corbett, 2003; Grigg, 1977).

2.2.2 *Economic Models of Geographic Relocation*

Most associated with Harris & Todaro (1970), and Sjaastad (1962), neoclassical economic theory explains geographic relocation in terms of rational choice, utility, and cost-benefit expectations. According to the neoclassical economic perspective, moves are the result of rational decision-making intended to maximize income while minimizing household expenses. Such decision-making can motivate both short-distance moves (as when, for example, an individual relocates to another city in the same state to get a higher paying job) and transnational migration, particularly the movement of labor from low-wage to high-wage regions. More recent economic models of geographic relocation—especially new economies of labor migration (Stark &Bloom, 1985; Taylor, 1999), dual labor market theory (Piore, 1979), and world system theory (Wallerstein, 1974)—have been proposed. These perspectives primarily address international migration, however (Massey, Arango, Hugo, Kouaouci, & Pellegrino, 1993), and thus are of limited utility in describing the residential mobility of Medicaid beneficiaries.

2.2.3 *Noneconomic Models of Geographic Relocation*

A number of conceptual models emphasize primarily noneconomic factors that motivate people to move. <u>Social network theory</u> identifies familial, friendship, and other social ties as key influences on geographic relocation decision making. In short, people are more likely to move if they have established social support in destination areas. Social networks can provide job and housing assistance (Cheng, 2009; Massey, 1990), information about schools and welfare programs (Cheng, 2009), and a sense of familiarity and shared community in a new environment (Massey, 1990), thus encouraging and facilitating geographic relocation.

Pursuit of wide-ranging noneconomic amenities also can motivate moves. Numerous housing amenities, especially, extra space to accommodate family needs, but also new appliances, central heating/air conditioning, and various aesthetic features, can encourage moves to increase residential satisfaction (Speare, 1974). Similarly, community amenities like quality schools, libraries, museums, medical centers, parks, and recreational facilities, and such physical amenities as natural beauty, beach access, mild temperatures, and sunshine, all can influence move decisions (Cragg and Kahn, 1997; Kohler, 1997). Negative environmental features (disamenities), including underperforming schools, crime, pollution, and natural environmental hazards also can motivate, and in some instances necessitate, geographic relocation (Boggess & Hipp, 2010; Hunter, 2005; Clapp, 2000). Indeed, moving is a primary coping response in the aftermath of such natural disasters as floods and hurricanes (Hunter, 2005). Hurricane Katrina is an especially poignant example of an environmental disaster in the U.S. that forced the geographic relocation of a large population. Although the majority of evacuees returned home within 2 months, approximately one quarter of dislocated individuals (about 400,000 persons) lived in a different county one year after the storm event, suggesting many moves away from affected areas were permanent (Groen & Polivka, 2008).

2.2.4 Life Cycle/ Life Course Perspectives

Studies consistently demonstrate age differences in rates of geographic relocation. Compared to other age groups, young adults are most likely to move, especially as they seek educational and job opportunities, and establish families (Geist & McManus, 2008; Glick, 1993). After young adulthood, mobility rates decline with increasing age (Geist &

McManus, 2008; Glick, 1993). Health-related moves and/or moves to be near family may moderately increase mobility rates among the elderly (Geist & McManus, 2008; Hayward, 2004). Household composition also influences move decisions. Studies indicate single adults are more likely to move than those who are married (South & Crowder, 1998; Long, 1988). Among younger married couples, the presence of any child decreases move likelihood (Long, 1972). Similarly, families with fewer children are more likely to move than those with more children (Long, 1972). Single and divorced women with children move more often than married mothers (South & Crowder, 1998; Long, 1972). Propensity to move also is influenced by housing tenure and employment: renters are more likely to move than homeowners, and the unemployed are more likely to move than persons with jobs (South & Crowder, 1998; Long, 1988).

According to life cycle theory, observed age, household composition, housing tenure, and employment status differences in rates of geographic relocation reflect changing residential needs and levels of satisfaction through the family life cycle (Rossi, 1955). Salient family life cycle events include career initiation and promotion, job loss, marriage, parenthood, separation, divorce, child departure (e.g., loss of child custody or departure of an adult child from the family household), frailty, and death (Geist & McManus, 2008; Warnes, 1992; Rossi, 1955). Many of these transitions alter household size, thereby prompting moves to increase or downsize living space (Geist & McManus, 2008; Clark & Onaka, 1983). Family life cycle events also can change residential satisfaction (including satisfaction with housing tenure) and expectations regarding, for example, housing costs and geographic proximity to work and schools (Clark & Onaka, 1983; Rossi, 1955).

Building on life cycle theory, the life course perspective emphasizes both the timing and sequence of life events in explaining geographic relocation (Kull, Coley, & Lynch, 2016). Age alone is not a sufficient predictor of life cycle stage, as many young adults delay marriage and parenthood until later in life. Nor is the traditional life cycle succession of education, career initiation, marriage, child-rearing, and retirement (Geist & McManus, 2008; Madigan & Hogan, 1991) broadly applicable in the 21st century. Instead, many adults cohabitate before marriage, marry and divorce multiple times, blend families from multiple unions or form other nontraditional families, and pursue education in mid-life to enhance employment opportunities or change career paths. Further, many older adults delay retirement for financial reasons (Burtless, 2013) and a growing number of older workers provide childcare for grandchildren (Lumsdaine & Vermeer, 2015). Thus varying in timing and sequence, life course transitions reflect the cumulative effect of prior life events and influence future life experiences (Robison & Moen, 2000).

The life course model further emphasizes social context as a mediating influence on move decisions (Kull et al., 2016). Differences in socioeconomic status, particularly income, can lead to divergent geographic relocation experiences, even for persons in similar life cycle stages. Despite the financial costs of geographic relocation, low income individuals are just as likely (Nord, 1998) or more likely to move than those with greater economic resources (Schacter, 2001; Deane, 1990). Compared to more affluent families, however, low-income families are less likely to move to attain preferred residential amenities (Kull et al., 2016). Instead, moves among the poor typically are job-related (Phinney, 2009), impelled by a need for more affordable housing (Fitchen, 1994; Rossi, 1955), or motivated by changes or violence in partnering relationships (Kull et al., 2016;

Fitchen, 1994). In addition, low-income families are more often forced to relocate due to eviction, property destruction, or condemnation of substandard housing (Kull et al., 2016; Desmond & Kimbro, 2015; Hartman & Robinson, 2003; Rossi, 1955). For poor families, housing choices are constrained not only by income, but by the availability of affordable housing; eligibility for housing assistance; bank, mortgage lender, and real estate practices (Palm, 1976); lack of information pertaining to housing opportunities; and, potentially, structural racism and segregation (South & Crowder, 1998). Such constraints limit the ability of low income families to secure and maintain safe, stable residences. Indeed, residential mobility among poor families may be more accurately viewed as residential instability, not as an orderly progression of moves to achieve greater residential satisfaction (Kull etal., 2016).

Finally, the life course perspective recognizes the intersection of multiple educational, employment, and social family trajectories or "careers" (Mulder & Hooimeijer, 1999), which may be differentially affected by geographic relocation. For example, a long-distance, job-related move to improve the salary of one worker in the family may diminish employment opportunities for other family workers, and negatively impact school-aged children by disrupting meaningful social ties.

2.2.5 Push-Pull Theory

Nearly all geographic relocation conceptual models recognize place-specific "push" and "pull" factors that influence move decisions (Cheng, 2009). Push-pull theory (Lee, 1966) explicitly identifies origin/destination push (-) and pull (+) features as drivers of geographic relocation. Potential push factors (encouraging moves *from* the place of origin) include unemployment, low-wage employment, unaffordable housing, high taxes, insufficient living space, home disrepair, underperforming schools, neighborhood crime, harsh winters, pollution, social isolation, intimate partner violence, and eviction. Potential pull factors (encouraging moves *to* a specific destination) include high-paying jobs, short commute to work, low housing costs, low tax burden, additional living space, central heat/air, aesthetic home amenities, quality schools, parks, health care facilities, mild climate, and social ties. As conceived by Lee, push and pull factors encompass economic, housing, neighborhood, natural amenity/disamenity, and social features emphasized by other geographic relocation perspectives.

Push-pull theory predicts geographic relocation when the combined negative and positive features of the area of destination are more attractive than the combined negative and positive features of the area of origin. More precisely, the benefit of moving must exceed the benefit of staying by a degree sufficient to overcome natural residential inertia and such intervening obstacles (costs) as travel distance, physical barriers, and relocation expenses. Notably, move costs increase with increasing "impedimenta" (e.g., a greater number of children and/or more household possessions). Thus, large families are less likely to move than smaller ones. Push-pull theory generally assumes rational decision-making by movers or potential movers to maximize individual or family wellbeing. However, the perception of origin/destination push and pull factors often varies from person to person and individually at different stages of the life cycle.

2.2.6 Understanding Medicaid Enrollee Residential Mobility: A Modified Push-Pull Model

Conceptually straightforward and accommodating of diverse theoretical perspectives, the push-pull model remains highly relevant in contemporary studies of geographic relocation (Cheng, 2009). As originally formulated, however, push-pull theory provides insufficient detail about the residential mobility of low-income populations. This critical social context is more thoroughly elucidated by life course theory. A modified push-pull model, specifically informed by the life course perspective, provides a useful conceptual framework to better understand residential mobility among low-income Medicaid enrollees. The modified model predicts residential moves by Medicaid members when the combined push and pull features of the area of destination are more attractive than the combined push and pull features of the area of origin, and when the perceived benefit of moving exceeds the perceived benefit of staying by a degree sufficient to overcome relocation costs (Lee, 1966). For Medicaid beneficiaries, salient push factors can include unemployment, unaffordable housing, eviction, inadequate living space, and neighborhood crime (Kull et al., 2016; Desmond & Kimbro, 2015; Boggess & Hipp, 2010; South & Crowder, 1998; Fitchen, 1994). Motivating pull factors can include job opportunities, low housing costs, additional living space, neighborhood safety, and family or friendship ties (Kull et al., 2016; Cheng, 2009; Phinney, 2009). Medicaid members are more likely to move for economic and social reasons (especially changes in partnering relationships) than for purposes of residential amenity improvement (Kull et al., 2016). Low income, lack of affordable housing, long waiting lists for housing assistance, housing opportunity knowledge deficits, and other social contextual constraints all can limit the ability of Medicaid enrollees to find and keep safe places to live (Kull et al., 2016). Frequent moves to accommodate immediate family needs create a pattern of residential instability (Kull et al., 2016) that can negatively impact the health and wellbeing of individual family members (Exeter et al., 2015; Susukida et al., 2016; Busacker & Kasehagen, 2012; Beautrais et al., 1996).

2.3 Geographic Relocation of Medicaid Beneficiaries: Previous Research

Two related studies have examined the effect of state decisions regarding Medicaid eligibility expansion on total population migration. An evaluation of data from the Annual Social and Economic Supplements to the Current Population Survey (1998-2012) found no evidence of increasing low-income, nonelderly adult migration *to* early expansion states (Arizona, Massachusetts, Maine, and New York) or *out of* selected non-expansion states (Connecticut, Nevada, New Hampshire, Pennsylvania, and Rhode Island) before the implementation of ACA (Schwartz & Sommers, 2014). Another investigation, based on ACS public-use microdata (2005-2014), found no evidence of increasing migration *from* non-expansion *to* expansion states following ACA implementation (Goodman, 2017). Only one study has directly examined geographic relocation among Medicaid enrollees (Baugh & Verghese, 2013). In this investigation, researchers used Medicaid Analytic eXtract data to identify Medicaid member moves between states from 2005-2007. Moves by Medicaid beneficiaries were captured only if Medicaid enrollment was re-established in the new state of residence. Among 76 million Medicaid enrollees, 3.7% moved across state lines at least once during the measurement period. Less than 1% of beneficiaries moved twice and only 0.1% moved three or more times. Excluding those in foster care, 5.5% of children between the ages of 1 and 6 moved between states, compared to 3.9% of children over the age of 6. The rate of Medicaid member in-migration (calculated as the number of moves to a state divided by the number of state enrollees) ranged from 1.2% in California to 11.9% in Nevada. In nearly every state, the rate of Medicaid in-migration exceeded the rate of total population in-migration (Alaska, California, Hawaii, and Vermont were exceptions).

No study has examined within-state residential mobility among Medicaid beneficiaries. Research is needed to assess Medicaid population residential mobility in South Carolina to inform health system policy development, planning, and programming aimed at improved health care accessibility, continuity, and coordination for Medicaid members.

2.4 Geographic Relocation and Health

An increasing number of studies associate geographic relocation with suboptimal health. For example, a cross-sectional analysis of 2007 National Survey of Children's Health data found children 6-17 years of age with 3 or more lifetime moves were more likely than non-movers to have at least one moderate or severe chronic behavioral or physical health condition (AOR=1.40; 95% CI=1.19-1.65; adjusted for age, race/ethnicity, family structure, parental education, poverty level, and health insurance status) (Busacker & Kasehagen, 2012).

The association between moves and behavioral health problems in adolescents and adults is well established. Using data from the National Survey on Drug Use and Health (2005-2012), researchers found children ages 12-17 years with one or more moves in the past 5 years were more likely to experience a major depressive episode (MDE), compared to non-movers (AOR=1.35; 95% CI=1.28-1.43; adjusted for age, sex, race/ethnicity, household income, and survey year). Notably, MDE likelihood increased with increasing number of moves (Susukida et al., 2016). A case-control study of New Zealand youth ages 13-24 years showed greater odds of a serious suicide attempt for those who had moved versus those who had not moved in the past 6 months (OR=2.2; 95% CI=1.3-3.6) (Beautrais et al., 1996). Geographic relocation also has been associated with adolescent smoking (Lee, 2007), other substance abuse (DeWit, 1998), school suspension or expulsion (Simpson and Fowler, 1994), lower social skills (Coley & Kull, 2016), emotional problems (Simpson and Fowler, 1994), and psychiatric hospitalization (Mundy, Robertson, Greenblatt, & Robertson, 1989). Among adults, geographic relocation has been linked with such mental health problems as generalized anxiety disorder, social phobia, depression, and post-traumatic stress disorder (Phinney, 2009).

Moves also are associated with poor physical health. An examination of data from the 2007 National Survey of Children's Health found that children with 3 or more lifetime moves had poorer reported physical health than non-movers, adjusting for such potentially confounding variables as age, race/ethnicity, family structure, parental education, poverty level, and health insurance status (AOR=1.21; 95% CI=1.01-1.46) (Busacker & Kasehagen, 2012). A study conducted in New Zealand (Exeter et al., 2015) showed that among adults ages 30 years and older, those who moved between 2006 and 2012 were more likely than non-movers to require hospitalization for cardiovascular disease, controlling for age, sex, ethnicity, and neighborhood deprivation trajectory (e.g., no change in neighborhood deprivation status, move to more deprived neighborhood, or move to less deprived neighborhood) (RR=1.22; 95% CI=1.19-1.26).

The observed relationship between geographic mobility and poor health has been interpreted by some investigators in terms of psychosocial stress (Coddington, 1972). According to this perspective, health problems arise due to the adverse effects of stress associated with geographic relocation and such move-related life experiences as eviction, unemployment, familial disruption, and neighborhood dislocation (Kull et al., 2016; Mok, Webb, Appleby, & Pedersen, 2016; Busacker & Kasehagen, 2012). As emphasized by life course theory, the stressful effects of residential mobility and associated life events are cumulative. Sustained exposure to stress and high accumulated stress levels can increase allostatic load, triggering harmful physiological changes that disrupt hormonal balance, alter inflammatory responses, and suppress autoimmune processes, thereby increasing vulnerability to disease (Busacker & Kasehagen, 2012; McEwen, 1998).

Another explanation for the association between geographic relocation and adverse health outcomes is inadequate health care utilization by movers. An examination of data from the 1988 National Health Interview Survey of Child Health showed that children with 1-2 lifetime moves were more likely than non-movers to lack both a regular preventive care provider (AOR=1.6; 95% CI=1.3-2.0) and regular site for sick care (AOR=2.1; 95% CI=1.6-2.8), controlling for age, sex, race/ethnicity, maternal educational attainment, maternal marital status, family income, and health insurance status. Children with 3 or more lifetime moves were even more likely than non-movers to lack a usual source of preventive care (AOR=2.4; 95% CI=2.0-3.1) and regular site for sick care (AOR=3.3; 95% CI=2.3-4.3) (Fowler, Simpson, & Schoendorf, 1993). Similarly, an analysis of Winnipeg, Manitoba child cohort data found that among children 2-5 years of age, those who moved were more likely than non-movers to experience discontinuity of routine health care, defined as the provision of less than 80% of ambulatory care by a regular source of care (AOR=1.33; 95% CI=1.20-1.46; adjusted for maternal age, marital status, ethnicity, income, birth parity, adequacy of prenatal care, annual number of child health care visits, and provider type) (Mustard, Mayer, Black, & Postl, 1996). “Fragmented” health services (e.g., not having a usual source of care, care discontinuity, and not getting needed referrals) may contribute to worse health outcomes among the geographically mobile (Busacker & Kasehagen, 2012; Fowler et al., 1993).

Several investigators, however, have noted the existence of health problems in study participants *prior to* observed moves. For example, an examination of National Longitudinal Study of Adolescent Health data found that among parents of adolescents, those with self-reported fair or poor health at baseline were more likely than those in good or excellent health to experience a move later in the measurement period (AOR=1.40; p=0.02; adjusted for age, sex, race/ethnicity, education level, occupation, and welfare receipt) (Dunn et al., 2014). Clearly, geographic relocation is not deterministic of health problems that exist before moves are undertaken. Rather, poor health in these instances may reflect impoverished life circumstances (e.g., low income, low educational attainment, unemployment, and limited social support) that predispose future residential instability (Kull et al., 2016). In other studies, such serious health problems as HIV/AIDS, bipolar disorder, and schizophrenia have been demonstrated to explicitly motivate moves to achieve closer proximity to specialized health care (McCarthy et al., 2007; Berk et al., 2003).

In summary, research shows geographic relocation can both precede and follow individual health decline, an observation that is consistent with life course theory, which recognizes life course transitions as both cumulative effects and causes of subsequent life events (Robison & Moen, 2000). Further analyses, especially longitudinal investigations, are required to better understand the complex, often bidirectional association between geographic relocation and health (Dunn et al., 2014). In particular, studies are needed to more clearly specify the psychological, physiological, economic, and social contextual mechanisms by which residential moves negatively impact wellbeing. New studies also might identify specific health circumstances (e.g., singular health conditions, comorbidities, or medical histories) that increase the likelihood of future moves. Despite these gaps in understanding, substantial research evidence suggests geographic relocation is a valuable marker for suboptimal health (Jelleyman & Spencer, 2008), as well as for fragmentation of health services (Busacker & Kasehagen, 2012). Associations between geographic relocation, poor health, and inadequate health care may be especially pronounced in low-income and other vulnerable populations (Exeter et al., 2015; Cole et al., 2006; Scanlon & Devine, 2001). The residential mobility of low-income Medicaid enrollees thus merits greater attention by health care providers, health administrators, health services researchers, and others seeking to strengthen health care and improve health outcomes for at-risk Medicaid members.

2.5 Health Insurance Churn

Broadly defined, churn is the transition into and out of health insurance coverage. Individuals may churn, either voluntarily or involuntarily, between employer-sponsored insurance plans, private non-group plans, publicly subsidized insurance programs, and/or periods of uninsurance (Sommers et al., 2016). Unfortunately, churn is a common occurrence in the United States. An analysis of health coverage data from the U.S. Census Bureau's Survey of Income and Program Participation (SIPP) found 22% of nonelderly individuals lost insurance in a 12-month period between 2001 and 2004 (Cutler & Gelber, 2009).

2.5.1 Private Insurance Churn

Although multiple factors prompt transitions into, out of, and between private insurance plans, frequent causes include job change, change in employer-sponsored health insurance provider, change in family composition (e.g., a marriage or divorce that alters eligibility for coverage through a spouse's health plan), and unaffordability of coverage (Sommers et al., 2016). Rates of churn are comparatively low for persons with employer-sponsored insurance (12% annually by one estimate; Sommers et al., 2016). For individuals with private non-group insurance, however, churn rates are considerably higher. An examination of U.S. Census data from 2008-2011 showed more than half (58%) of persons covered by private non-group plans retained coverage for less than 12 months (Sommers, 2014).

2.5.2 Medicaid Enrollment Churn

In the U.S., Medicaid is a publicly (federal- and state-) funded health insurance program for people with low incomes and limited resources (CMS, 2016). Medicaid primarily serves low-income children and their impoverished parents (Buchmueller, Ham, & Shore-Sheppard, 2015; Sommers, Graves, Swartz, & Rosenbaum, 2014). Pregnant women, blind or disabled individuals, and the elderly also may be eligible for Medicaid benefits (Buchmueller et al., 2015; Sommers et al., 2014).

To ensure compliance with eligibility rules, states are required to reassess the eligibility of current Medicaid enrollees at the end of each participant's program eligibility period (12 months in most states, but only 6 months in others) (Rosenbaum, 2015). At this time, Medicaid participants must reapply for continued program benefits. Typically, states require that renewal applications be received and processed within an approximately 6-week timeframe (Rosenbaum, 2015). Transitions into and out of means-tested Medicaid can reflect changes in income, job changes affecting access to employer-sponsored insurance, or changes in family structure (especially, the presence of minor children in the household) (Cardwell, 2016; Sommers et al., 2016). In addition, unintentional disenrollment (administrative churn) can occur when procedural issues delay or prevent processing of enrollment renewal forms (Cardwell, 2016; Sommers et al., 2016; Rosenbaum, 2015).

Rosenbaum (2015) provides a useful conceptual diagram of Medicaid enrollment churn (Figure 2.1). Each month, a subset of current Medicaid participants (represented by the individual squares in the green box at the bottom of the graphic) reach the end of their eligibility period. Many of these participants are deemed eligible by the state for continued benefits and are reenrolled in Medicaid within the renewal timeframe. Others (represented by the gray arrow) exit the Medicaid system, either because they are deemed ineligible for means-tested benefits or because they choose to leave the Medicaid program. Those who remain eligible for Medicaid, but who do not reapply for benefits in a timely fashion, are administratively disenrolled. Churners include these administratively lapsed Medicaid members (shown in orange), as well as former Medicaid participants who were deemed ineligible for continued benefits, but who later reestablished program eligibility and reenrolled in Medicaid (a dynamic not represented in the graphic) (Rosenbaum, 2015).

Research demonstrates substantial churn among publically insured Medicaid beneficiaries. Data from the Congressional Budget Office indicate 1 in 5 low-income Medicaid recipients experienced discontinuous enrollment in federal fiscal year 2009 (Ku et al., 2009). An analysis of 2000-2004 Medical Expenditure Panel Survey (MEPS) data found 43% of adults ages 18-64 years enrolled in Medicaid had at least one coverage gap in a 2-year period; 16.7% experienced multiple episodes of churn (Banjeree et al., 2010). In California, 62% of non-elderly adult Medicaid recipients had at least one gap in coverage during a 5-year period from 1998 to 2002 (Bindman et al., 2008).

Child Medicaid recipients have somewhat greater coverage continuity, compared to non-elderly adult beneficiaries. Using data from the Medicaid Statistical Information System (MSIS) for federal fiscal years 2004-2006, researchers found the average length of continuous enrollment in a single year was 9.6 months for children versus 8.2 months for non-elderly, non-disabled adults (Ku et al., 2009). Enrollment continuity among children in Medicaid, however, can differ markedly between states. An analysis of MSIS data from 1997 for 28 reporting states showed the percentage of 2-year-olds with continuous coverage in a 12-month period ranged from only 15% to 84% (state names were not associated with reported results) (Fairbrother et al., 2004). Among all U.S. children in Medicaid, it has been estimated that almost half (48.5%) have at least one coverage gap in a 5-year timeframe (Simon, Driscoll, Gorina, Parker, & Schoendorf, 2013).

Rates of churn into and out of Medicaid vary by income level, educational attainment, race/ethnicity, and health status. Notably, Medicaid members with *very low incomes* are less likely to have lapses in coverage, probably because higher income Medicaid recipients are more likely to lose program eligibility as a result of income fluctuations (Simon et al., 2013; Banjeree et al., 2010). Likewise, Medicaid participants with low educational attainment (reflecting diminished employment opportunities) are less likely to churn than program participants with more education (Simon et al., 2013; Banjeree et al., 2010). Finally, for persons in Medicaid, minority race/ethnicity, disability, and poor health all have been associated with greater coverage continuity (Simon et al., 2013; Banjeree et al., 2010).

Studies suggest coverage gaps for many Medicaid beneficiaries are of short duration. A recent analysis of administrative data from 2007-2012 for 10 states (Alabama, California, Florida, Louisiana, Michigan, New York, Ohio, Texas, Utah, and Virginia) showed 21% of child Medicaid recipients who lost coverage were re-enrolled in the same program within 7 months (Orzol et al., 2015). Another study of Medicaid data from 2001-2003 representing 5 states (California, Michigan, Ohio, Oregon, and Pennsylvania) found half of child disenrollees were re-enrolled in the Medicaid system in 2 to 3 months (Fairbrother et al., 2007). Whether of short or long duration, Medicaid coverage gaps merit the attention of policy makers and program administrators, especially because Medicaid disenrollees most often have no other source of insurance (Ku et al., 2009).

2.5.3 Health Coverage Continuity Typology

Variability in churn rates reported for the privately insured and for defined Medicaid subpopulations may be due in part to differences in the definition of churn used by researchers. Guevara et al. (2013) distinguished eight different domains of health coverage continuity: always insured, single gap in coverage, transition out of coverage, repeatedly uninsured, change in coverage from one plan to another, transition from no insurance to coverage, maintenance of insurance eligibility regardless of coverage status, and always uninsured. More precise reporting of health coverage continuity types under investigation in future studies may yield more reliable and meaningful estimates of churn rates for privately insured and Medicaid-enrolled populations.

2.5.4 Churners and the Uninsured

The distinction between health coverage discontinuity (single or multiple gaps in coverage) and "always uninsured," as identified by Guevara et al., is especially important for purposes of health policy formation and implementation to reduce the number of uninsured nationally. Conventionally, "the uninsured" are assumed to be a relatively stable population of individuals who routinely are without health coverage. In fact, a greater proportion of people experience lapses in insurance coverage than are continually uninsured. Using SIPP data representing the years 1996-1999, researchers found approximately 12% of the nation's nonelderly population were "always uninsured" during the measurement period; in contrast, 19% experienced a single gap of coverage and 33% were repeatedly without insurance (Short & Graefe, 2003). Ultimately, efforts to reduce the number of the uninsured in the U.S. must include policy and programming initiatives to address churn by closing health insurance coverage gaps.

2.5.5 Churn Effects

Persons without insurance, including those in coverage gaps, typically have less access to health care than their insured counterparts. Indeed, a recent investigation shows adults without coverage are three times more likely than the insured to have had no contact with a health care provider in the past year (Garfield et al., 2016). Many uninsured individuals have no usual source of care. An examination of 2003 California Health Interview Survey data revealed nonelderly adults who experienced coverage discontinuity were significantly less likely to have a usual care provider, compared to continuously insured individuals (OR = 0.63; p<0.001) (Lavarreda, Gatchell, Ponce, Brown, & Chia, 2008). Among children in Oregon receiving food stamps (and presumably eligible for public insurance) in 2005, those with less than a 6-month gap in coverage were 2.5 times more likely to lack a usual source of care, compared to those with continuous coverage, adjusting for age, race/ethnicity, household income, and parental employment (AOR = 2.51; 95% CI = 1.50-4.20). For children with coverage gaps lasting 6-12 months, the adjusted odds ratio of having no usual source of care increased to 4.68 (95% CI = 2.18-10.02). Adjusted odds further increased to 8.48 for children with coverage gaps exceeding 12 months (95% CI = 4.50-15.99) (DeVoe, Graham, Krois, Smith, & Fairbrother, 2008). Lack of insurance also can limit access to dental care. A survey of parents in Nevada, conducted from 2008-2010, showed uninsured kindergarteners were significantly more likely than their insured peers to have had no dental visit in the past year, adjusting for race/ethnicity, family income and urban versus rural residence (AOR = 3.27; 95% CI = 3.05-3.51) (Haboush-Deloye, Hensley, Teramoto, Phebus, & Tanata-Ashby, 2014). In Oregon, low income children with a gap in health coverage lasting less than 6 months were more than twice as likely to have unmet dental care needs, compared to the continuously insured (AOR = 2.28; 95% CI = 1.61-3.21). Adjusted odds ratios increased to 5.91 for children with coverage gaps lasting 6-12 months (95% CI = 3.12-11.19) and 6.74 for those with gaps lasting more than a year (95% CI = 3.65-12.44) (DeVoe et al., 2008).

For persons transitioning in and out of coverage, limited access to providers can delay or prevent delivery of needed care. An examination of data from the 2000-2001 National Health Interview Surveys showed significantly higher percentages of continuously uninsured and discontinuously insured children had delayed care, compared to those with either continuous public or continuous private insurance ($p<0.01$ for all comparisons) (Olson et al., 2005). Among children in California with health problems, those experiencing coverage gaps were significantly more likely than the continuously insured to delay care (OR = 5.48; $p<0.001$) (Lavarreda et al., 2008). In Oregon, low-income children with coverage gaps lasting less than 6 months were 2.5 times more likely to delay urgent care compared to children who were always insured, adjusting for age, race/ethnicity, household income, and parental employment (AOR = 2.52; 95% CI = 1.58-4.03). Children with coverage gaps of 6-12 months were 4.5 times more likely (AOR = 4.58; 95% CI = 1.95-10.78) and those with gaps longer than one year almost 7 times more likely (AOR =6.81; 95% CI = 3.43-13.52) to delay urgent care, compared to those with continuous coverage (DeVoe et al., 2008).

Many uninsured people fail to receive appropriate preventive care, including recommended blood pressure, blood sugar, and cholesterol tests (Garfield et al., 2016; Collins, Davis, Doty, Kriss, & Holmgren, 2006). An analysis of 2004-2005 practice management data representing Federally Qualified Health Centers participating in Oregon's Our Community Health Information Network (OCHIN) found that among adult patients with diabetes, lower percentages of continuously uninsured and discontinuously insured individuals received LDL screening, nephropathy screening, and flu vaccination compared to those with continuous coverage (Gold, DeVoe, Shah, & Chauvia, 2009). The uninsured also are less likely to receive pap smears, colonoscopies, and mammograms (Garfield et al., 2016; Collins et al., 2006). With limited access to screenings, uninsured individuals are at greater risk for late-stage diagnosis of serious health conditions. A study of National Vital Statistics System data from 26 states, 2005-2007, showed that among nonelderly women, the risk of late-stage cervical cancer diagnosis for those without insurance was significantly higher than for the privately insured in both non-Hispanic White (RR = 1.7, 95% CI = 1.5-1.9) and non-Hispanic Black (RR = 1.5, 95% CI = 1.2-1.8) populations, adjusting for age, histological type, and geographic region ($p < 0.05$) (Simard et al., 2012).

People without continuous health coverage are less likely to obtain prescribed medications. A study of 2000-2004 MEPS data representing nonelderly adult Medicaid beneficiaries showed prescription medication refills in a 2-year study round were 19% lower for those with coverage gaps compared to those continuously enrolled in Medicaid (Banjeree et al., 2010). Low-income children in Oregon with coverage gaps lasting less than 6 months were more than twice as likely to have an unmet prescription need compared to the continuously insured, adjusting for age, race/ethnicity, health status, urban versus rural residence, household income, and parental employment (AOR = 2.24; 95% CI = 1.58-3.20). Children with coverage gaps of 6-12 months were nearly 4 times more likely (AOR = 3.85; 95% CI = 1.96-7.58) and those with gaps longer than one year almost 5 times more likely (AOR =4.78; 95% CI = 2.74-8.33) to have an unmet prescription need compared to those with continuous coverage (DeVoe et al., 2008). An investigation of churn among low-income adults in Arkansas, Kentucky, and Texas found individuals with any coverage gap in a 12-month period were significantly more likely to stop filling prescriptions compared to those who were continuously enrolled (AOR = 2.25, $p < 0.01$; adjusted for age, sex, race/ethnicity, marital status, education, income, health status, insurance type, length of coverage gap, urban versus rural residence, state of residence, and survey mode) (Sommers et al., 2016).

With limited access to appropriate health care, uninsured individuals are more likely than the insured to use emergency department (ED) services and require in-patient hospitalization. An examination of nationally representative data from the Commonwealth Fund Biennial Health Insurance Survey (2005-2006) indicated 35% of uninsured adults 19-64 years of age with at least one of four chronic conditions (asthma, emphysema, or other lung disease; cardiovascular disease; hypertension; or diabetes) sought ED treatment, required hospitalization overnight, or both in the previous 12 months. In contrast, only 16% of continuously insured nonelderly adults with a chronic condition required ED care and/or in-patient hospitalization (Collins et al., 2006). Coverage discontinuity also increases the likelihood of ED utilization and in-patient hospitalization. Using data from the 2000-2004 MEPS, investigators found nonelderly adult Medicaid recipients with multiple enrollment transitions had 17.5% more ED visits and 36.6% more in-patient hospitalizations than their continuously enrolled peers, adjusting for demographic, health, and socioeconomic variables, as well as time-varying factors measured across multiple measurement rounds (Banjeree et al., 2010). A study of Florida Medicaid claims data (1999 to 2002) for nonelderly adults with depression showed significantly increased ED and hospital-based care utilization, and longer hospital stays, following a single interruption of health insurance coverage lasting 32 or more consecutive days ($p < 0.001$) (Harman, Hall, & Zhang, 2007).

Gaps in health insurance coverage can decrease self-reported health. Among low-income adults in Arkansas, Kentucky, and Texas who changed coverage in 2015, 44.9%

of those with any coverage gap versus 22.4% of those with no coverage gap reported a decline in health (Sommers et al., 2016). Moreover, mortality rates are higher for persons without coverage than for the insured. A study of National Health and Nutrition Examination Survey (NHANES) III data (1988-1994) representing persons 17-64 years of age showed the uninsured had a significantly higher mortality rate compared to those with insurance, adjusting for age, sex, race/ethnicity, education, income, body mass index, health status, exercise, smoking, and alcohol use (hazard ratio = 1.40, 95% CI = 1.06-1.84) (Wilper et al., 2009). Similarly, among children represented in the Kids' Inpatient Database (KID) and National Inpatient Sample (NIS) between 1988 and 2003, those without insurance had a significantly higher all cause in-hospital mortality rate compared to the insured (AOR = 1.60, 95% CI = 1.45-1.76, adjusting for age, sex, race/ethnicity, geographic region, type of hospital, and reporting year) (Abdullah et al., 2010).

Lack of health coverage puts the uninsured at considerable financial risk. Those without coverage often are liable for the full price of medical treatment, rather than reduced prices negotiated for members of large insurance providers (Garfield et al., 2016). Indeed, nearly 1 in 3 uninsured adults receiving doctor's care in 2013 (31%) were asked to pay the full cost of treatment "up front" before receiving services (Garfield et al., 2016). For low-income adults in Arkansas, Kentucky, and Texas, experiencing a coverage gap significantly increased the likelihood of reporting problems paying medical bills (AOR = 2.95, $p < 0.01$, adjusted for age, sex, race/ethnicity, marital status, education, income, health status, insurance type, length of coverage gap, urban versus rural residence, state of residence, and survey mode) (Sommers et al., 2016). An analysis of

Commonwealth Fund Biennial Health Insurance Survey (2005-2006) data representing adults 19-64 years of age indicated 53% of individuals with a coverage gap in the previous 12 months had outstanding medical debt or problems paying a bill, compared to 26% of persons with continuous coverage. Additionally, 26% of those with a gap in coverage had been contacted by a collection agency, versus only 8% of those insured all year. Among uninsured adults with medical debt or bill problems, 40% said they were unable to pay for such basic necessities as food, rent, or utilities (Collins et al., 2006). Surveys of a random national sample of people who filed for bankruptcy in 2007 (identified using the Automated Access to Court Electronic Records database) revealed 62.1% of all bankruptcies were due to medical debt. Bankruptcy filers who had a gap in coverage were significantly more likely than those with continuous coverage to report a medical cause of bankruptcy (Himmelstein, Thorne, & Warren, 2009).

Coverage gaps have been shown to increase Medicaid system spending. In a study of Florida Medicaid data, average total Medicaid expenditures for nonelderly beneficiaries with depression and a single gap in coverage lasting 32 or more consecutive days increased by approximately $400 in the 3 months following coverage interruption compared to the 3 months preceding loss of coverage ($p < 0.001$) (Harman et al., 2007). Similarly, for nonelderly Florida Medicaid recipients with diabetes and a single gap in coverage, mean total expenditures per member were $719 higher in the 3 months after the lapse compared to the 3 months preceding the coverage gap (95% CI = $552-$902). Notably, most of the observed increase in spending resulted from greater ED utilization and hospitalization following a lapse in coverage (Hall, Harman, & Zhang, 2008). Closing coverage gaps can result in health care cost savings by encouraging regular use of appropriate outpatient care. A study of children enrolled in California's Medicaid system compared hospitalization costs for ambulatory care sensitive conditions (including asthma, pneumonia, and gastroenteritis) before (1999-2000) and after (2001-2002) a policy change extending the state's Medicaid eligibility redetermination period from 3 to 12 months. This redetermination period extension increased continuous coverage among child enrollees from 49% to 62%, resulting in an estimated hospitalization cost savings of $17 million, as children were better able to access outpatient treatment to manage ambulatory care sensitive conditions (Bindman et al., 2008).

Enrollment churn also increases Medicaid and other health system administrative costs. New enrollment, disenrollment, and reenrollment all require time, labor, information technology, and material resources to process required forms and documentation (Ku et al., 2009). Consequently, frequent churning can quickly escalate administrative spending (Buettgens, Nichols, & Dorn, 2012; Banjeree et al., 2010).

For managed care plans subject to federal and state care quality standards and reporting requirements, enrollee churn can compromise the completeness and accuracy of HEDIS and other quality measurement systems (Buettgens et al., 2012; Banjeree et al., 2010; Ku et al., 2009). Finally, but not inconsequentially, enrollee churn in managed care decreases any single plan's incentive to make long-term investments in the health of its members (Buettgens et al., 2012;) and weakens plan accountability for service delivery (Fairbrother et al., 2004).

For all the reasons identified, churn in and out of health insurance coverage represents a formidable challenge to health and health care delivery in the U.S. Even when individuals maintain continuous coverage, switching from one health care plan to another can limit primary and specialty care accessibility, increase ED utilization, reduce care quality, impede quality measurement, and compound administrative burden (Sommers et al., 2016; Buettgens et al., 2012; Banjeree et al., 2010; Ku et al., 2009). To better understand and reduce health insurance churn, new research is needed to identify "high-churn" subpopulations and evaluate potential churn risk factors not considered in previous studies.

2.6 Geographic Relocation and Churn: Previous Research

Very few studies have examined the association between geographic relocation and health insurance churn. A cross-sectional analysis of the 2007 National Survey of Children's Health found that children 6-17 years of age with 3 or more lifetime moves were more likely to experience periods of uninsurance in the past 12 months, adjusting for such potentially confounding variables as age, race/ethnicity, family structure, parental education, and poverty status (AOR=1.35; p=0.01). No statistically significant association between geographic relocation and periods of uninsurance was observed for children with only 1-2 lifetime moves (Busacker & Kasehagen, 2012). Only one study has directly examined geographic relocation and health coverage discontinuity in a Medicaid population (Baugh & Verghese, 2013). Based on an examination of Medicaid Analytic eXtract data representing the years 2005-2007, 27.8% of Medicaid members who moved between states experienced an enrollment gap during the measurement period. Notably, this study provides only descriptive results and these pertain only to Medicaid movers (no information about enrollment gaps among non-movers is supplied).

New multivariable analyses are needed to evaluate residential mobility as a potential risk factor for churn among child and adult Medicaid beneficiaries.

2.7 Study Rationale

Geographic relocation is associated with suboptimal health (Exeter et al., 2015; Susukida et al., 2016; Busacker & Kasehagen, 2012; Beautrais et al., 1996) and fragmentation of health services (Busacker & Kasehagen, 2012; Mustard et al., 1996; Fowler et al., 1993). Moreover, geographic relocation may increase the likelihood of health insurance churn (Busacker & Kasehagen, 2012), which contributes to poor health outcomes (Sommers et al., 2016), inadequate health care utilization (Garfield et al., 2016; Lavarreda et al., 2008), diminished care quality assessment (Buettgens et al., 2012), and increased care costs (Harman et al., 2007). To date, no study has examined within-state residential mobility among Medicaid recipients or evaluated within-state residential mobility as a potential predictor of Medicaid enrollment churn. To address these knowledge shortcomings, the following research aims and associated research questions are established:

<u>Aim 1: Assess within-state residential mobility rates and geographic patterns for South Carolina Medicaid enrollees (low-income eligible, nonelderly, full benefit participants).</u>

What proportion of Medicaid enrollees move over a 5-year period?

Studies consistently demonstrate high levels of geographic mobility in low-income populations (Schacter, 2001; Nord, 1998; Deane, 1990). Only one study, however, has assessed geographic relocation among low-income Medicaid beneficiaries. In this analysis of between-state moves undertaken from 2005-2007, the rate of Medicaid in-migration exceeded the rate of total population in-migration in nearly every state

(Baugh & Verghese, 2013). Notably, the largest number of moves in the U.S. are within—not between states (U.S. Census Bureau, 2016). The present investigation represents the first-ever assessment of within-state residential mobility in a Medicaid population. Study results can help identify residentially mobile Medicaid enrollees potentially at increased risk for poor health and inadequate health care utilization.

What is the average number of moves among Medicaid enrollees over a 5-year period?

Greater move frequency increases the likelihood of suboptimal health care utilization (Fowler et al., 1993) and poor health outcomes (Busacker & Kasehagen, 2012). Little information exists about the frequency of moves among Medicaid beneficiaries. The present study establishes the overall within-state move frequency for South Carolina Medicaid recipients, thus permitting the identification of higher-than-average frequency movers who may be at increased risk for adverse health conditions and health services fragmentation.

How far do Medicaid enrollees move (measured in miles)?

According to push-pull geographic relocation theory, intervening obstacles (costs) encourage shorter rather than longer moves (Lee, 1966). Therefore, most, but not all, residentially mobile South Carolina Medicaid enrollees are expected to undertake short-distance moves. The proposed investigation provides new information about Medicaid member move distance variation. Potentially, study results could guide the development of alternative strategies to strengthen health care continuity and coordination for long- versus short-distance movers.

Do move rates and move distances vary by age category? By sex? By race/ethnicity? By health status?

Age, sex, race/ethnicity, and health all may affect the residential mobility of Medicaid beneficiaries. Age effects on geographic relocation are well known. Compared to other age groups, young adults are most likely to move. After young adulthood, geographic mobility declines with increasing age (Geist & McManus, 2008; Glick, 1993). Among children, moves are more likely to occur between the ages of 0 and 5 years (Michielin, & Mulder, 2008; Clark, Deurloo, & Dielman, 2003). Life course theory suggests sex- and race- or ethnicity-specific social contexts may differently shape the residential mobility trajectories of women and minorities (Kull et al., 2016; Mulder & Hooimeijer, 1999). In fact, research has shown women account for a larger proportion of short-distance movers in the U.S. than men (Macisco & Pryor, 1963). Although overall rates of geographic relocation among African Americans and Whites are similar (South & Deane, 1993; Long, 1988), African Americans are more likely to experience negative mobility (i.e., moves resulting in dissatisfaction with housing) (Phinney, 2013). Finally, numerous studies indicate persons in poor health are more likely to move than those who are healthy (Dunn et al., 2014; Cohen et al., 2013). The present study identifies age, sex, racial/ethnic, and health status differences in Medicaid member move rates and move distances. Study results can help strengthen Medicaid services planning and programming for at-risk subpopulations, and inform future studies of residential mobility, negative mobility, and move distance as predictors of health and health care utilization.

What areas in South Carolina have the highest and lowest levels of net residential mobility (total Medicaid enrollee in-moves minus total Medicaid enrollee out-moves)?

Push-pull theory predicts greater residential in-flow in areas where perceived positive place characteristics (e.g., job opportunities, affordable housing, and social support) substantially outweigh perceived negative characteristics (e.g., underperforming schools and crime) (Lee, 1966). Currently, no information exists about the net residential mobility of Medicaid enrollees into and out of South Carolina communities. The proposed investigation describes and graphically depicts geographic patterns of Medicaid population net residential mobility across the state. Study results can help target health care continuity and coordination interventions (for example, programs to help newly arrived Medicaid enrollees establish medical homes in high net in-flow neighborhoods).

Aim 2: Evaluate the association between South Carolina Medicaid participant within-state residential mobility and Medicaid enrollment churn.

Controlling for Medicaid participant age, sex, race/ethnicity, and health status, is move status (mover/non-mover) associated with Medicaid enrollment churn over a 5-year period?

Residential moves are life transitions (Clark, 2005), often marking other significant life events (e.g., changes in employment or family structure) (Geist & McManus, 2008; Dieleman, 2001; Warnes, 1992) that can alter eligibility for Medicaid benefits (Sommers et al., 2016; Rosenbaum, 2015). In addition, address changes associated with residential relocation can prevent timely delivery of Medicaid enrollment renewal notices, thereby causing unintentional administrative disenrollment of Medicaid beneficiaries (Rosenbaum, 2015). For both of these reasons, a positive association between Medicaid member residential mobility and enrollment churn is hypothesized (Figure 2.2).

One previous study has examined geographic relocation as a predictor of health insurance churn. This analysis found children 6-17 years of age with 3 or more lifetime moves were more likely to experience periods of uninsurance in the past year, controlling for age, race/ethnicity, family structure, parental education, and poverty status (AOR=1.35; p=0.01) (Busacker & Kasehagen, 2012). The present investigation is the first multivariable evaluation of the association between within-state residential mobility and enrollment churn in a Medicaid population.

As specified, the proposed study can provide valuable new insights to strengthen health care accessibility, continuity and coordination, and improve health outcomes for residentially mobile Medicaid members. Moreover, the study establishes critical baseline information that will permit evaluation of South Carolina Medicaid enrollee residential mobility and churn trends over time. The study also provides comparison benchmarks for researchers investigating residential mobility and churn in other state Medicaid populations. Finally, the proposed investigation builds a conceptual and methodological foundation to support future Medicaid enrollee research examining, for example, residential mobility into, out of, or within high socioeconomic deprivation areas; residential mobility into, out of, or within high chronic disease burden areas; and potential associations between 1) residential mobility and ambulatory/preventive care utilization, emergency department use, comprehensive diabetes care, and asthma medication management; 2) childhood residential mobility and well child visits, behavioral health diagnoses, ADHD medication follow-up care, and blood lead screening; and 3) enrollment churn and breast cancer, cervical cancer, and chlamydia screening.

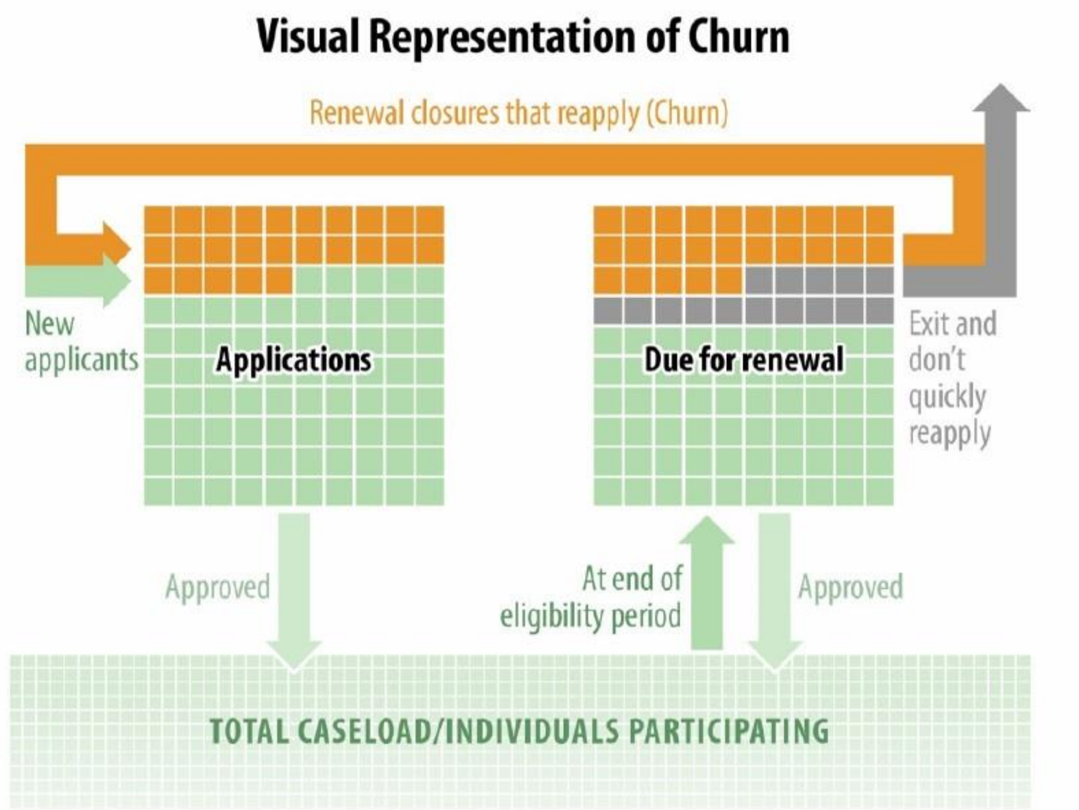

Figure 2.1 Visual representation of Medicaid enrollment churn. Reprinted from Rosenbaum (2015).

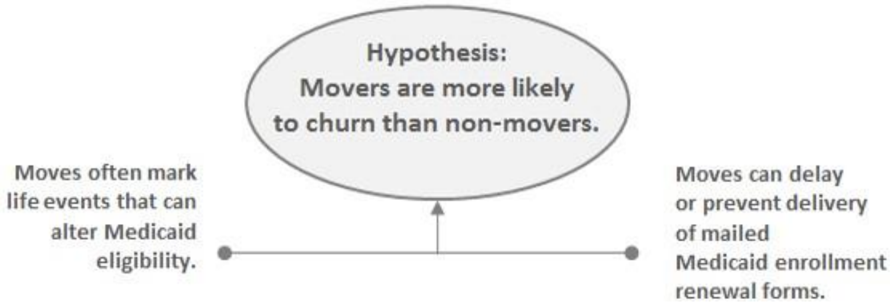

Figure 2.2 Hypothesized association between residential mobility and Medicaid enrollment churn.

CHAPTER 3

METHODS

The sections that follow describe the study population, measurement period, main variables of interest, units of analysis, data sources, geographic and analytic approaches undertaken, and software utilized in the proposed investigation. Methods notes for Research Aims 1 and 2 are presented separately.

3.1 Aim 1: Assess within-state residential mobility rates and geographic patterns for South Carolina Medicaid enrollees (low-income eligible, nonelderly, full benefit participants).

3.1.1 Study Population and Measurement Years

Study subjects include low income-eligible, non-elderly, full-benefit South Carolina Medicaid recipients enrolled as of June 2009 (end of state Fiscal Year 2009). Dual eligible (Medicare/Medicaid), institutionalized, waiver, foster care, and other special populations with non-means-based eligibility are excluded from analysis. Subjects with an out-of-state address at any time during the study period also are excluded. Residential mobility is measured over a 5-year period following the baseline year (baseline = FY20009; measurement years = FY2010, FY2011, FY2012, FY2013, and FY2014; the South Carolina state fiscal year extends from July 1 to June 30). To ensure the study population includes only Medicaid recipients 0 to 64 years of age in all measurement years, the baseline population is restricted to enrollees less than 60 years old.

3.1.2 Study Variables

Residential Mobility (Mover/Non-Mover)

Residential mobility is measured in terms of observed moves. A move is defined as a change of residential ZIP Code Tabulation Area (ZCTA) over the study period (e.g., $ZCTA_{t1} \neq ZCTA_{t2}$ = move; $ZCTA_{t1} = ZCTA_{t2}$ = no move). ZCTAs are Census enumeration districts that spatially approximate United States Postal Service mail delivery areas. These geographic units have been used in numerous other investigations of population health (Villanueva & Aggarwal, 2013; Oren, Koepsell, Leroux, & Mayer, 2012; Lopez-DeFede, Stewart, Harris, & Mayfield-Smith, 2008). ZCTAs are assigned based on Medicaid recipient ZIP Code information. ZIP Code data for individual Medicaid members are recorded annually at the time of enrollment/reenrollment and represent the last known recipient address as of June of each state fiscal year. Residential mobility (measured over 5 years) is operationalized for individual Medicaid beneficiaries as either "mover" or "non-mover." Figure 3.1 illustrates the classification of hypothetical "movers" and "non-movers" over a 5-year period beyond the baseline year, using simulated (not actual) Medicaid recipient data.

Number of Observed ZCTA-to-ZCTA Moves per 5 Person Years

A Medicaid recipient present in the study for all 5 measurement years has greater opportunity to contribute to the total observed move count than a recipient present in the study for only 2 years. Therefore, observed moves are standardized by the number of person years in the study period, and are reported per 5 person years. Figure 3.2 illustrates the calculation of hypothetical observed moves and person years over a 5-year period beyond the baseline year, using simulated Medicaid recipient data. For the sample of hypothetical Medicaid recipients represented in the Figure, 1.63 moves per 5 person years were observed [(13/40)*5].

Distance Moved

For each observed move, move distance (miles) along the South Carolina road network is measured from the population centroid (population center of gravity) of the ZCTA of origin to the population centroid of the destination ZCTA. Based on all observed moves, minimum, maximum, and average distance values are calculated. Because a few very long-distance moves can inflate mean distance move values, both mean and median distances are derived. Figure 3.3 illustrates the observed move distances undertaken by a sample of hypothetical Medicaid "movers." For the 9 hypothetical "movers" combined (26 observed moves), the minimum move distance = 1 mile (Member #75), maximum move distance = 105 miles (Member #60), mean move distance = 24.9 miles (SD=29.5), and median move distance = 15.0 miles.

Age

Previous research shows geographic mobility varies by age (Geist & McManus, 2008; Glick, 1993). To assess potential age differences in Medicaid enrollee within-state residential mobility, the following age categories (years of age) are employed in analyses: 0-5, 6-17, 18-30, 31 and older. These age groupings represent young children, older minor children, young adults in early stages of labor force participation, and older, non-elderly adults at middle and later stages of labor force participation, as operationalized in previous studies (Falkingham et al., 2016; Clark et al., 2003; Rogers & Watkins, 1987).

Sex

Because geographic mobility can vary by sex (Macisco & Pryor, 1963), Medicaid enrollee within-state residential mobility is examined separately for males and females.

Race

Different social contexts can differently affect the geographic mobility trajectories of U.S. majority and minority populations (Kull et al., 2016; Phinney, 2013; Mulder & Hooimeijer, 1999; South & Crowder, 1998). Therefore, Medicaid enrollee within-state residential mobility is examined by race. African Americans and Whites comprise the largest number of South Carolina Medicaid recipients (South Carolina Medicaid Management Information System [SC MMIS], 2017). Because recipients of other races represent such a small proportion of total Medicaid members, only two race categories are specified for analytic purposes, White and Non-White.

Health Status

Numerous studies indicate persons in poor health are more likely to move than those who are healthy (Dunn et al., 2014; Cohen et al., 2013). In the present study, within-state residential mobility is examined separately for Medicaid recipients with and without a serious health problem. Clinical Risk Groups (CRGs), based on recipient clinical and demographic characteristics, provide a means of risk adjustment for health care payment and management (Hughes, et al., 2004). CRG scores range from 1: *healthy* to 9: *catastrophic*, with scores of 5 or higher indicating the presence of a serious chronic disorder (3M Health Information Systems, 2016). Based on CRG scores, Medicaid recipients are classified either as having (CRG 5+) or not having (CRG <5) a serious chronic condition.

3.1.3 Units of Analysis

Residential mobility characteristics (mover/non-mover, number of observed moves, and move distance) are measured at the individual Medicaid recipient level. For the Medicaid population, net residential mobility is evaluated at the ZIP Code Tabulation Area (ZCTA) level.

3.1.4 Data Sources

Medicaid member residential ZIP Code, demographic, and health status data are derived from the South Carolina Medicaid Management Information System (SC MMIS, 2015). South Carolina 5-digit ZCTA geographic boundary files are from the 2010 Census (U.S. Census Bureau, 2014).

3.1.5 Geographic Analysis

Medicaid recipient ZIP Codes are geocoded (spatially located) at the ZCTA level. The use of ZCTAs rather than raw ZIP Codes in the present study has two main advantages. First, false "moves" to or from ZIP Codes representing P.O. Boxes are excluded from analysis. For example, a recipient with a 29201 ZIP Code in Year 1 and a 29202 ZIP Code in Year 2 would be considered a "mover" based on raw ZIP Code data. In fact, this recipient may not have moved at all, as 29202 represents a P.O. Box. Both ZIP Codes—29201 and 29202—are spatially located in ZCTA 29201, so no move would be indicated using ZCTA-level data. Second, the use of ZCTAs will permit the association of Census-based population data in follow-up investigations exploring potential associations between geographic residential mobility patterns and such socioeconomic contextual factors as poverty, income inequality, unemployment, and segregation.

Census 2010 block-level population data (U.S. Census Bureau, 2011) are used to calculate the population centroid in each of South Carolina's 424 ZCTAs. Move distance is measured along the shortest path on the physical road network from the population centroid of the ZCTA of origin to the population centroid of the destination ZCTA.

Measuring distance traveled on the physical road network yields more accurate estimates than straight-line (as the crow flies) distance calculations.

The number of net moves by Medicaid recipients over the 5-year measurement period (total in-moves minus total out-moves) is calculated for each South Carolina ZCTA. Optimized Getis-Ord hotspot mapping is used to identify statistically significant geographic clusters of ZCTAs with large net in-moves (hotspots) and large net out-moves (coldspots). Optimization of the Getis-Ord statistic corrects for multiple testing and spatial dependence inherent in the data (ESRI, 2016). Hotspot mapping has been employed in at least one previous study of population migration (Xu, 2014).

3.1.6 Statistical Analysis

Univariate (Descriptive)

The total number of study subjects and the number and percent of subjects in each of the following categories are calculated: male, female, ages 0-5, ages 6-17, ages 18-30, ages 31 and above, White, Non-White, CRG <5, and CRG 5 and above. Further, the number and percent of movers, mean number of observed moves per 5 person years, and minimum, maximum, mean, and median move distances are calculated for the study population as a whole and for each of the identified subpopulations. The age and CRG categories of some subjects may change over the 5-year study period. The present investigation, however, is not a longitudinal study. For purposes of analysis, the age category and CRG status of each subject are established at baseline (FY2009). In this way, individual subjects contribute to one and only one age and CRG analytic category (i.e., subject membership in separate age and CRG classes is mutually exclusive).

3.1.7 Software Utilized

Geospatial analysis and mapping are performed using ESRI ArcGIS 10.4 (ESRI, 2016). Statistical analyses are conducted using SAS 9.4 (SAS, 2014).

3.2 Aim 2: Evaluate the association between South Carolina Medicaid participant within-state residential mobility and Medicaid enrollment churn.

3.2.1 Study Population and Measurement Years

As defined for Aim 1 above.

3.2.2 Study Variables

As defined for Aim 1 above, plus:

Medicaid Enrollment Churn (Churner/Non-Churner)

Enrollment churn is defined as less than 11 months continuous enrollment in Medicaid in any single measurement year followed by any period of enrollment in a subsequent year (i.e., churn = enrolled at baseline, disenrolled for more than one month in a measurement year, and reenrolled in a subsequent measurement year). A similar marker for Medicaid coverage interruption (two or more continuous months without coverage, followed by reenrollment) was used in a previous investigation of churn among Medicaid beneficiaries (Harman et al., 2003). In the present study, Medicaid recipients who experience any enrollment churn over the 5-year study period are classified as "churners;" all others are classified as "non-churners." Notably, Medicaid recipients who simply exit the Medicaid program—without reentering later in the study period—are NOT considered churners. In fact, these individuals may have successfully transitioned out of Medicaid to employer-sponsored or other private health insurance. Such a scenario is especially plausible, given that the study baseline year (FY2009) represented the height of the economic downturn in South Carolina. Individuals entering Medicaid in FY2009 due to a job loss, wage reduction, or cut in working hours may have regained employment or otherwise increased income and acquired private coverage during the ensuing years of economic recovery. Figure 3.4 illustrates the identification of hypothetical "churners" over a 5-year period beyond the baseline year, using simulated Medicaid recipient data. Notice that hypothetical Medicaid members "7" and "9" both are classified as "non-churners." Although these members were enrolled less than 11 months in a measurement year, they were not reenrolled in a subsequent year and thus are not classified as "churners."

3.2.3 Unit of Analysis

Residential mobility and enrollment churn are measured at the individual Medicaid recipient level.

3.2.4 Data Source

Medicaid member residential ZIP Code, demographic, enrollment, and health status data are derived from the South Carolina Medicaid Management Information System (SC MMIS, 2015).

3.2.5 Statistical Analysis

Univariate (Descriptive)

The number and percent of churners are calculated for the study population as a whole and for each of the identified subpopulations (male, female, ages 0-5, ages 6-17, ages 18-30, ages 31 and above, White, Non-White, CRG <5, and CRG 5 and above). As stated previously, the age category and CRG status of each subject are established at baseline (FY2009). In this way, individual subjects contribute to one and only one age and CRG analytic category.

Bivariate

Crude odds ratios are calculated to assess the likelihood of churn among all movers versus non-movers and among movers compared to non-movers in each identified subpopulation (male, female, ages 0-5, ages 6-17, ages 18-30, ages 31 and above, White, Non-White, CRG <5, and CRG 5 and above). Subject age category and CRG status are established at baseline (FY2009).

Multivariable

Adjusted odds ratios are derived using logistic regression to evaluate the likelihood of churn (dependent variable) among movers versus non-movers (main independent variable) controlling for age, sex, race, and CRG category (additional independent variables). Subject age category and CRG status are established at baseline (FY2009).

3.2.6 Software Utilized

Statistical analyses are conducted using SAS 9.4 (SAS, 2014).

3.3 Study Limitations

The methods described have a number of limitations meriting attention. First, the use of ZIP Code data to derive Medicaid member ZCTA of residence only permits the observation of ZCTA-to-ZCTA moves (i.e., in the absence of street address information it is not possible to detect moves within ZCTAs). It might be argued, however, that within-ZCTA moves are less likely to necessitate a change of health care provider(s) and thus are of lesser importance from a continuity of care perspective. Second, because Medicaid member address information is only updated annually at the time of reenrollment, some moves may go undetected. Consider, for example, the ZCTA data for a hypothetical Medicaid recipient with a reenrollment date in April (Figure 3.5; years shown are fiscal years beginning July 1 and ending June 30). Based on the data, only one move is observed for this Medicaid participant (from 29201 to 29205 between Years 2 and 3). It is possible, however, that this recipient moved from 29201 to 29450 *and back* to 29201 prior to the April reenrollment date in Year 1, or from 29205 to 29650 and *back to* 29205 prior to the April reenrollment date in Year 4. The data available for analysis in this investigation would not permit the identification of these moves. Therefore, the number of observed moves in the present study may not equal the number of actual moves undertaken by Medicaid beneficiaries. Third, move distances measured to and from ZCTA population centroids may be shorter or longer than actual travel distances between street address locations. Fourth, the enrollment continuity measures employed (<11 months continuous enrollment, 11+ months continuous enrollment) do not allow calculation of the total number of churn events in a measurement year or the number of years in which churn occurred. Fifth, it is not possible to determine the temporal sequence of moves and Medicaid disenrollment based on available data. Consider, for example, the data for a hypothetical Medicaid recipient who disenrolled in April of Year 2 and reenrolled in September of Year 3 (Figure 3.6; years shown are fiscal years beginning July 1 and ending June 30). It is possible that this individual moved in March of Year 2, prior to disenrollment in April of the same year. The recipient's new address information would not be recorded until the time of reenrollment in September of Year 3. Alternatively, the data could represent a move that occurred in August of Year 3, four months after disenrollment. Again, the new address information would not be recorded until the individual reenrolled in September. Finally, the available data do not provide information about the coverage status (e.g., privately insured or uninsured) of churners outside the Medicaid system. Therefore, it is not possible to classify churners according to Guevara et al.'s coverage continuity typology (e.g., change in coverage from one plan to another, single gap in coverage, or repeatedly uninsured). Despite these limitations, the proposed methodology provides mechanisms to identify Medicaid "movers" and "churners," thus permitting the first-ever evaluation of the association between within-state residential mobility and enrollment churn in a Medicaid population.

ZIP Code Tabulation Area

Member	Baseline	Year1	Year2	Year3	Year4	Year5	Move Class
1	29550	29550	29550	29550	29550	29550	Non-mover
2	29848	29848	29848	29848	29848	29316	Mover
3	29116	29116	29110	29110	29110	29110	Mover
4	29610	29405	29405	29405			Mover
5	29405	29405	29405	29401	29401		Mover
6	29401	29401	29401				Non-mover
7	29201	29201	29848	29848	29848		Mover
8	29950	29603	29603				Mover
9	29610	29610					Non-mover

Figure 3.1 Identification of hypothetical Medicaid "movers."

Calculation of Observed ZCTA-to-ZCTA Moves and Person Years

Member	Baseline	Year1	Year2	Year3	Year4	Year5	# Moves	Person Years
10	29550	29550	295588	295588	295588	295588	1	5
11	29037	29037	29037	29037	29037	29037	0	5
12	29848	29848	29810	29810	29848		2	4
15	29116	29110	29116	29110	29116	29110	5	5
18	29610	29610	29610	29610			0	3
23	29405	29405	29405	29405	29405		0	4
24	29401	29227	29645				2	2
25	29201	29201	29848	29845	29845	29845	2	5
30	29603	29603	29603				0	2
40	29610	29333					1	1
42	29610	29610	29610	29610	29610		0	4

Figure 3.2 Calculation of hypothetical observed moves and person years.

Distance (Miles) of Observed ZCTA-to-ZCTA Moves

Member	Move1	Move2	Move3	Move4	Move5	Mean	SD	Median
50	8					8.0	Not Defined	8.0
52	5	12				8.5	4.95	8.5
55	15	15	15	15	15	15.0	0	15.0
60	3	12	105			40.0	56.47	12.0
63	11	22	6	3		10.5	8.35	8.5
74	84	78				81.0	4.24	81.0
75	16	4	1			7.0	7.94	4.0
79	35					35.0	Not Defined	35.0
83	34	90	12	8	23	33.4	33.22	23.0

Figure 3.3 Hypothetical observed move distances (miles).

Enrollment Status

Member	Baseline	Year1	Year2	Year3	Year4	Year5	Churn Class
1	Enrolled	11 mo. +	11 mo. +	11 mo. +	11 mo. +	11 mo. +	Non-churner
2	Enrolled	11 mo. +	11 mo. +	11 mo. +	11 mo. +	11 mo. +	Non-churner
3	Enrolled	11 mo. +	11 mo. +	< 11 mo.	11 mo. +	11 mo. +	Churner
4	Enrolled	< 11 mo.	11 mo. +	< 11 mo.			Churner
5	Enrolled	11 mo. +	11 mo. +	< 11 mo.	< 11 mo.		Churner
6	Enrolled	11 mo. +	11 mo. +	11 mo. +	11 mo. +	11 mo. +	Non-churner
7	Enrolled	11 mo. +	11 mo. +	11 mo. +	11 mo. +	< 11 mo.	Non-churner
8	Enrolled	< 11 mo.	<11 mo.				Churner
9	Enrolled	< 11 mo.					Non-churner

Figure 3.4 Identification of hypothetical Medicaid “churners.”

ZIP Code Tabulation Area

Member	Baseline	Year1	Year2	Year3	Year4	Year5
101	29201	29201	29201	29205	29205	29205

Figure 3.5 ZCTA of residence for a hypothetical Medicaid recipient.

Enrollment Status and ZIP Code Tabulation Area

	Baseline	Year1	Year2	Year3	Year4	Year5
Enrollment	Enrolled	11mo.+	<11mo.	<11mo.	11mo.+	11mo.+
ZCTA	29803	29803	29803	29555	29555	29555

Figure 3.6 Enrollment and ZCTA of residence for a hypothetical Medicaid recipient.

CHAPTER 4

A DESCRIPTIVE STUDY OF RESIDENTIAL MOBILITY AMONG SOUTH CAROLINA MEDICAID BENEFICIARIES

4.1 Introduction

The population of the United States is highly mobile. Across the nation each year, approximately 1 in 7 people changes residence (U.S. Census Bureau, 2016). There have been numerous theoretical frameworks advanced to explain geographic relocation between and within nations. Economic relocation theories (notably Harris & Todaro, 1970) identify economic opportunity (e.g., potential for higher income) as the primary factor influencing decisions to move. Other theoretical frameworks recognize such non-economic factors as social networks; natural, cultural, and recreational amenities; and natural and man-made disasters as drivers of geographic relocation decisions (Cheng, 2009; Hunter, 2005; Cragg & Kahn, 1997; Kohler, 1997; Massey, 1990). Although different in conceptual orientation, most relocation theories emphasize place-specific "push" and "pull" factors that influence individual and family decisions to move (Cheng, 2009). Formulated by Lee (1966), push-pull theory predicts residential relocation when the combined negative (push) and positive (pull) features of the area of destination are more attractive than the combined negative and positive features of the area of origin. Push factors might include such conditions as unemployment, low wages, inadequate housing, underperforming schools, social isolation, and crime. Conversely, good-paying jobs, affordable housing, educational opportunities, family connections, mild climate, and cultural amenities all could represent strong pull factors.

Whatever underlying factors motivate move decisions, geographic relocation can negatively affect health. Numerous studies demonstrate an association between moves and subsequent behavioral health problems in adolescents. Using data from the National Survey on Drug Use and Health (2005-2012), researchers found children ages 12-17 years with one or more moves in the preceding 5 years were more likely to experience a major depressive episode (MDE), compared to non-movers, adjusting for such potentially confounding variables as age, sex, race/ethnicity, household income, and survey year (AOR=1.35; 95% CI=1.28-1.43). Notably, the likelihood of MDE is positively associated with increasing number of moves (Susukida et al., 2016). A case-control study of New Zealand youth ages 13-24 years showed greater odds of a serious suicide attempt for those who had moved versus those who had not moved in the preceding 6 months (OR=2.2; 95% CI=1.3-3.6) (Beautrais et al., 1996). Geographic relocation also has been associated with adolescent smoking (Lee, 2007), other substance abuse (DeWit, 1998), school suspension or expulsion (Simpson & Fowler, 1994), lower social skills (Coley & Kull, 2016), emotional problems (Simpson & Fowler, 1994), and psychiatric hospitalization (Mundy et al., 1989). Among adults, residential mobility has been linked with such mental health problems as generalized anxiety disorder, social phobia, depression, and post-traumatic stress disorder (Phinney, 2009).

Other studies associate geographic relocation with poor physical health. An analysis of the 2007 National Survey of Children’s Health, for example, found that children with 3 or more lifetime moves were reported to have poorer health than non-movers, adjusting for age, race/ethnicity, family structure, parental education, poverty status, and health insurance (AOR=1.21; 95% CI=1.01-1.46) (Busacker & Kasehagen, 2012). In a study of adults 30 years of age and older (Exeter et al., 2015), those who moved between 2006 and 2012 were more likely than non-movers to require hospitalization for cardiovascular disease, controlling for age, sex, ethnicity, and neighborhood deprivation trajectory (e.g., no change in neighborhood deprivation status, moved to more deprived neighborhood, or moved to less deprived neighborhood) (RR=1.22; 95% CI=1.19-1.26).

In some instances, the observed relationship between residential mobility, especially frequent moves, and poor health might be interpreted in terms of psychosocial stress (Coddington, 1972) or allostatic load (Busacker & Kasehagen, 2012; Logan & Barksdale, 2008)—i.e., health deteriorates as a consequence of the harmful psychological and physiological effects of cumulative stress associated with residential relocation and such potentially related life events as eviction, unemployment, job change, or social network disruption, including change of family structure (Kull et al., 2016; Mok et al., 2016; Busacker & Kasehagen, 2012). In other cases, however, *existing* health conditions clearly influence residential relocation decision-making, as when, for example, persons with a serious illness move to achieve closer proximity to health care (McCarthy et al., 2007; Berk et al., 2003). Further research is needed to clarify the complex and likely bidirectional association between geographic relocation and health through the life course. Increasing evidence, however, suggests residential mobility is an important marker for suboptimal health.

Residential relocation also may be a useful marker for inadequate health care utilization. An examination of data from the 1988 National Health Interview Survey showed that children with 1-2 lifetime moves were more likely than non-movers to lack a regular preventive care provider (AOR=1.6; 95% CI=1.3-2.0) and a regular site for sick care (AOR=2.1; 95% CI=1.6-2.8) (Fowler et al., 1993). Similarly, an analysis of Winnipeg, Manitoba child cohort data found that among children 2-5 years of age, those who moved were more likely than non-movers to experience discontinuity of routine health care, defined as the provision of less than 80% of ambulatory care by a regular source of care (AOR=1.33; 95% CI=1.20-1.46) (Mustard et al., 1996). Fragmented health services (e.g., not having a usual source of care, care discontinuity, and not getting needed referrals) may contribute to worse health outcomes among the geographically mobile (Busacker & Kasehagen, 2012; Fowler et al., 1993).

Medicaid is a public health insurance system for people in the U.S. with low incomes and limited resources, jointly funded by the federal government and individual states (CMS, 2016). Previous studies show low income individuals are just as likely (Nord, 1998) or are more likely to move than those with greater economic resources (Schacter, 2001; Deane, 1990). Very little research, however, has focused specifically on the geographic relocation of low-income Medicaid beneficiaries. One study of residential mobility between states from 2005-2007 found higher rates of relocation for Medicaid recipients than for the total population (Baugh & Verghese, 2013).

Associations between geographic relocation, poor health, and inadequate health care may be especially pronounced in low-income and other vulnerable populations (Exeter et al., 2015; Cole et al., 2006; Scanlon & Devine, 2001). The residential mobility of low-income Medicaid enrollees thus merits greater attention by health care providers, health system administrators, and health services researchers. Notably, the largest number of moves in the U.S. are within—not between states (U.S. Census Bureau, 2016). To our knowledge, no study has described within-state residential mobility in a Medicaid population. In this investigation, we measure Medicaid member moves between South Carolina ZIP Code Tabulation Areas (ZCTAs), and assess residential mobility rate differences by age, sex, race/ethnicity, and health status.

4.2 Methods

4.2.1 Study Period

We examined the geographic relocation of Medicaid members from their place of residence in the baseline year (2012) through four subsequent observation years (2013-2016).

4.2.2 Study Population

Subjects included full-benefit, non-elderly individuals enrolled in South Carolina Medicaid as of December 31, 2012. Medicaid is a complex system of health care finance, providing both federally mandated full benefits and optional limited benefits established at the discretion of individual states (Stoecker, Stewart, & Lindley, 2017; Buchmueller et al., 2015). In this investigation, persons with limited benefits (e.g., family planning only), were not considered. To ensure the final study population comprised only Medicaid recipients 0 to 64 years of age in all observation years, the baseline population was restricted to enrollees under 61 years. Dual eligible (Medicare/Medicaid), waiver, medical assistance only, foster care, and other special populations (persons in nursing homes, group homes, or correctional systems, and individuals receiving services through the South Carolina Department of Mental Health) were excluded from analysis, based on the assumption that the residential mobility patterns and drivers of these groups are different from those of traditional, full-benefit Medicaid enrollees, and warrant separate investigation.

We further excluded subjects with missing or incomplete data, and Medicaid members with out-of-state ZIP postal codes in any year, thus restricting our analysis to moves within the state of South Carolina. Subjects who were included at baseline, but who were not enrolled at any time during the observation period, also were removed, as were subjects whose study eligibility changed from baseline in any observation year (e.g., transition from full-benefit to limited-benefit, or from non-institutionalized to institutionalized).

We extracted Medicaid member data for both the present study and to study the association between residential mobility and Medicaid enrollment churn. Because our study of churn required data representing the number of months enrolled in at least two observation years, we excluded individuals who were enrolled only in the first observation year (2013). The stepwise application of all exclusion criteria yielded a final study population of 428,294 (Table 4.1). Of these, 273 (0.1%) were enrolled in just one observation year (2014, 2015, or 2016); 14,697 (3.4%) were enrolled in two observation years; 39,193 (9.2%) were enrolled in three observation years; and 374,131 (87.3%) were enrolled in all four observation years.

4.2.3 Study Variables

Residential Mobility (Mover/Non-Mover)

We measured residential mobility in terms of observed moves within the state of South Carolina. A move was defined as a change of residential ZCTA from baseline to 2013, 2013 to 2014, 2014 to 2015, or 2015 to 2016 (e.g., $ZCTA_{t1} \neq ZCTA_{t2}$ = move;

$ZCTA_{t1}$ = $ZCTA_{t2}$ = no move). ZCTAs are Census enumeration districts that spatially approximate United States Postal Service mail delivery areas. These geographic units have been used in numerous studies of population health (Villanueva & Aggarwal, 2013; Oren et al., 2012; Lopez-DeFede et al., 2008). ZCTAs were assigned to subjects based on Medicaid recipient 5-digit ZIP Code data, using a ZIP Code-to-ZCTA crosswalk. Residential ZIP Codes for individual Medicaid recipients are recorded annually at the time of enrollment/reenrollment. The crosswalk of ZIP Codes to ZCTAs eliminated false "moves" to or from ZIP Codes representing P.O. Boxes from analysis. For example, an individual with a 29201 ZIP Code at $time_1$ and a 29202 ZIP Code at $time_2$ would be considered to have moved, based on ZIP Code data. In fact, this person may not have moved at all, as 29202 represents a P.O. Box. Both ZIP Codes—29201 and 29202—are spatially located in ZCTA 29201, so no move would be indicated using ZCTA-level data. Second, the use of ZCTAs permitted the application of an existing ZCTA-level urban/suburban/rural classification system, which we used to evaluate net residential mobility across South Carolina's urban/rural continuum. As operationalized, the number of observed ZCTA-to-ZCTA Medicaid member moves could range from 0-4. Beneficiaries with one or more observed moves were classified as "movers;" those with no observed moves were classified as "non-movers."

Number of Observed Moves per 4 Person Years (Movers Only)

Subjects present in the study for all 4 observation years had greater opportunity to contribute to the total observed move count than subjects present in the study for one to three years. Therefore, observed moves were standardized by the number of person years in the study period. We calculated the number of observed moves per 4 person-years for Medicaid member movers only.

Distance Moved

For each observed move, move distance (miles) along the South Carolina road network was measured from the population centroid (population center of gravity) of the ZCTA of origin (e.g., $ZCTA_{t1}$) to the population centroid of the destination ZCTA (e.g., $ZCTA_{t2}$). Measuring road network distance yields more accurate estimates than straight-line (as the crow flies) distance calculations. Based on all observed moves, minimum, maximum, and average distance values were calculated. Because a few long-distance moves can inflate mean distance move values, both mean and median distances were derived.

Age

Studies consistently demonstrate age differences in rates of geographic relocation. Young adults, especially, are likely to move, as they seek educational and job opportunities, and establish families (Geist & McManus, 2008; Glick, 1993). To assess potential age differences in Medicaid enrollee residential mobility, the following age categories were employed: 0-5 years, 6-17 years, 18-30 years, and 31 years or older. These age groupings represent young children, school age children, young adults in early stages of labor force participation, and older, non-elderly adults at middle and later stages of labor force participation, as operationalized in previous studies (Falkingham et al., 2016; Clark et al., 2003; Rogers & Watkins, 1987).

Sex

Because geographic mobility can vary by sex (Geronimus, Bound, & Ro, 2014; Macisco & Pryor, 1963), we examined the mobility patterns of male and female Medicaid members separately.

Race

Different social contexts might differently affect the geographic mobility of U.S. White and minority populations (Kull et al., 2016; Phinney, 2013; Mulder & Hooimeijer, 1999; South & Crowder, 1998). We created a dichotomous variable to separately evaluate enrollment churn among majority (White) and minority (Non-White) South Carolina Medicaid members.

Health Status

Previous studies indicate persons in poor health are more likely to move than those who are healthy (Dunn et al., 2014; Cohen et al., 2013). In the present study, residential mobility was examined separately for Medicaid beneficiaries with and without a serious health problem. Clinical Risk Groups (CRGs), based on recipient clinical and demographic characteristics, provide a means of risk adjustment for health care payment and management (Hughes et al., 2004). CRG scores range from 1: *healthy* to 9: *catastrophic*, with scores of 5 or higher indicating the presence of a serious chronic disorder (3M Health Information Systems, 2016). Based on CRG scores, Medicaid recipients were classified either as having (CRG 5+) or not having (CRG <5) a serious chronic condition.

4.2.4 Unit of Analysis

Residential mobility characteristics (mover/non-mover, number of observed moves, and move distance) were measured at the individual Medicaid member level.

4.2.5 Data Sources

Medicaid enrollee residential ZIP Code, demographic, and health status data, appropriately de-identified for research purposes, were derived from the South Carolina

Medicaid Management Information System, CY2012-CY2016 (SC MMIS, 2017), under an agreement with the South Carolina Department of Health and Human Services.

4.2.6 Geographic Analysis

Census block-level population data (U.S. Census Bureau, 2011) were used to establish the population centroid in each of South Carolina's 424 ZCTAs. Geographic information system (GIS) network analysis was performed to measure ZCTA-to-ZCTA (centroid-to-centroid) move distance along the shortest path of the South Carolina road network.

4.2.7 Statistical Analysis

The total number of study subjects and the number and percent of subjects in each of the following categories were calculated: male, female, ages 0-5, ages 6-17, ages 18-30, ages 31 and above, White, Non-White, CRG <5, and CRG 5 and above. Further, the number and percent of movers, mean number of observed moves per 4 person-years, and minimum, maximum, mean, and median move distances were derived. The age and CRG categories of some subjects changed over the 4-year study period. Because the present investigation is not a longitudinal study, we established the age category and CRG status of each subject at baseline (2012). In this way, individual subjects contributed to one and only one age and CRG analytic category. Sex and race also were established at baseline for purposes of analysis. We performed logistic regression to evaluate potential demographic and health status differences in propensity to move.

4.2.8 Software Utilized

GIS network analysis was performed using ESRI ArcGIS 10.4 (ESRI, 2016). Statistical analyses were conducted using SAS 9.4 (SAS, 2014).

4.3 Results

Approximately one-third of subjects were young children (0 to 5), and nearly half were school-age children (6 to 17) (Table 4.2). A greater proportion of subjects were female, Non-White, and healthy or moderately healthy (CRG<5).

More than 1 in 4 Medicaid members (28%) and approximately 1 in 3 child Medicaid beneficiaries 0 to 5 years of age (34%) moved during the 4-year observation period (Table 4.3). Adjusting for sex, race, and CRG score, young children were about 1.8 times more likely to move than adults 31 years and older (AOR = 1.79; 95% CI = 1.74-1.83). Compared to males, female Medicaid members were slightly more likely to move, adjusting for age category, race, and health status (AOR = 1.08; 95% CI = 1.06-1.09). Although statistically significant, observed differences in move propensity between Whites and Non-Whites, and between healthy/moderately healthy (CRG<5) and unhealthy (CRG 5+) Medicaid enrollees were very small (AOR difference from 1 less than .05).

Medicaid movers (N=119,515) made a total of 157,012 moves over the observation period. On average, movers moved 1.38 times per 4 person-years (Table 4.4). Small, but statistically significant differences were observed in the mean number of moves per 4 person-years by age category, sex, race, and CRG status (all group differences varied by 0.2 moves or less). Among movers present in all 4 observation years (N=105,966), 72% moved just once, 23% moved twice, and 5% moved three or four times.

For Medicaid movers, the mean move distance was approximately 21 miles; the median distance was about 11 miles (Table 4.5). Median move distance for Whites was more than 2 miles farther than for Non-Whites (Whites = 12.95 miles; Non-Whites =

10.59 miles; p<0.0001). Age category differences in median move distance, even when statistically significant, were less than 1 mile. We observed no differences in the median move distance of males versus females, or healthy/moderately healthy (CRG<5) versus unhealthy (CRG 5+) subjects.

Among all moves undertaken by Medicaid members, 25% (the top quartile) were greater than 20.76 miles; we defined these as long-distance moves. Compared to older adults, young adults were slightly more likely, and children were slightly less likely to move a long distance, adjusting for sex, race, and CRG score (Table 4.6). Non-whites were less likely to move a long distance, compared to Whites (AOR = 0.78; 95% CI = 0.76-0.81). We observed no differences in the long-distance move propensity of males versus females, or healthy/moderately healthy (CRG<5) versus unhealthy (CRG 5+) Medicaid beneficiaries, adjusting for other predictors.

4.4 Discussion

One in 4 Medicaid members moved at least once during the study period. Among movers enrolled in all 4 observation years, 28% moved 2 or more times. The U.S. Census Bureau does not report ZCTA-to-ZCTA residential mobility for the general population. However, from 2013 to 2014, approximately 2% of U.S. residents moved between counties in the same state (U.S. Census Bureau, 2015). In a supplemental analysis, we found 3% of Medicaid members enrolled in 2013 and 2014 moved between counties within the state of South Carolina. Based on this result, we suggest Medicaid enrollees, like other low-income groups, are at least as likely to move as persons with greater economic resources (Nord, 1998).

Consistent with previous research (Geist & McManus, 2008; Glick, 1993), young adult Medicaid enrollees were more likely to move than older adults. Notably, 1 in 3

Medicaid beneficiaries 0 to 5 years of age had at least 1 observed move. Research suggests residentially mobile Medicaid members could be at greater risk for inadequate health care (Busacker & Kasehagen, 2012; Fowler etal., 1993) and poor health outcomes (Exeter et al., 2015; Busacker & Kasehagen, 2012), compared to non-movers. Children who move, especially, may be at increased risk for depression (Susukida et al., 2016), substance abuse (DeWit, 1998), and psychiatric hospitalization (Mundy et al., 1989) during adolescence. Given high rates of Medicaid member residential mobility and concomitant health risks, Medicaid administrators might consider the development and implementation of a data system to monitor moves, and identify recent and frequent movers.

We found female Medicaid members slightly more likely to move than males, controlling for age category, race, and health status. Very little difference was observed between the move propensity of Non-Whites versus Whites, controlling for all other predictors, a result consistent with other investigations showing similar rates of geographic relocation among Whites and African Americans (South & Deane, 1993; Long, 1988).

Contrary to previous studies indicating persons in poor health are more likely to move than those who are healthy (Dunn et al., 2014; Cohen et al., 2013), we found little difference in the move likelihood of Medicaid members versus those without a serious health problem, adjusting for age category, sex, and race. Deserving emphasis, however, is the fact that 1 in 4 subjects with a serious health condition *did move* during the study period. The residential mobility of members with serious chronic illnesses heightens concern about the adequacy of ongoing disease management, especially in light of evidence associating moves with health care fragmentation (Busacker & Kasehagen, 2012; Fowler et al., 1993). Also of importance, for purposes of Medicaid health care planning and geographic resource allocation, is the influence of residential relocation by persons with serious chronic conditions on the prevalence of specific diseases and overall disease burden in small geographic areas (Geronimus et al., 2014).

This investigation has a number of important limitations. First, the use of ZIP Code data to derive Medicaid member ZCTAs only permitted the observation of ZCTA-to-ZCTA moves. In the absence of street address information, it was not possible to detect moves within ZCTAs. Second, because Medicaid member address information is updated annually at the time of reenrollment, multiple moves in the same observation year could not be counted. Third, moves out-of-state and back in state (likely a small number) were not recorded. For all these reasons, the actual residential mobility of state Medicaid members in South Carolina almost certainly is greater than we observed.

Research indicates people with low incomes are more likely to move for economic and social reasons (especially changes or violence in partnering relationships) than for purposes of residential amenity improvement (Kull et al., 2016; Fitchen, 1994). New studies, particularly qualitative assessments, are needed to understand more completely the multiple factors—including, potentially, eviction, substandard housing condemnation, and lack of affordable housing (Kull et al., 2016; Desmond & Kimbro, 2015; Hartman & Robinson, 2003; Fitchen, 1994)—that motivate Medicaid members to relocate. Additional research is required to evaluate associations between residential mobility and health care utilization (e.g., emergency department use, comprehensive diabetes care, well child visits, and blood lead screening), and between move history and such health outcomes as depression, substance abuse, hypertension, and cardiovascular disease among Medicaid beneficiaries. Results from the present study and insights gained from future investigations along the lines suggested can help inform state Medicaid policies and programming to strengthen care and improve health outcomes for geographically mobile Medicaid members.

Table 4.1 Study population inclusion and exclusion criteria.

Initial Study Population			**Count**
South Carolina Medicaid Members			
Enrolled at Any Time in 2012			1,122,556
Exclusions (Stepwise*)	**Number**	**%**	**Remaining**
Limited Benefit	146,808	13.08	975,748
Elderly (61+ Years)	90,795	9.31	884,953
Not Enrolled as of Dec. 31, 2012	116,999	13.22	767,954
Dual Eligible	238	0.03	767,716
Waiver	13,742	1.79	753,974
Medical Assistance Only	47,453	6.29	706,521
Foster Care	11,640	1.65	694,881
Nursing Home	1,906	0.27	692,975
Department of Juvenile Justice	938	0.14	692,037
Department of Corrections	54	0.01	691,983
Department of Mental Health	33,225	4.80	658,758
Group Home	1	0.00	658,757
Invalid/Missing Data: Sex (2012)	3	0.00	658,754
Invalid/Missing Data: Race (2012)	431	0.07	658,323
Invalid/Missing Data: Clinical Risk Group (2012)	52,708	8.01	605,615
Invalid/Missing/Out-of-State ZIP Code (2012)	2,069	0.34	603,546
Not Enrolled during Observation Period (2013-2016)	26,085	4.32	577,461
Enrolled but Not Study-Eligible** in Obs. Period (2013-2016)	111,117	19.24	466,344
Enrolled in First Observation Year (2013) Only	38,050	8.16	428,294
Final Study Population			428,294

* Subject exclusions were performed in the order listed. The table shows the number and percent of subjects excluded at each step, after all previous exclusions have been applied.

** Includes Medicaid members in the baseline population (2012) whose study eligibility changed (e.g., transition from full-benefit to limited-benefit, or from non-institutionalized to institutionalized) in the observation years 2013 to 2016; also includes baseline population members with invalid/missing/out-of-state ZIP Code data or with incomplete data on the number of months enrolled in any observation year (less than 1.5% of subjects were removed due to incomplete or out-of-state data in an observation year).

Table 4.2 Study population characteristics.

	N	%
Total	428,294	100
0 to 5 Years	134,139	31.3
6 to 17 Years	200,909	46.9
18 to 30 Years	30,190	7.1
31 to 60 Years	63,056	14.7
Male	200,168	46.7
Female	228,126	53.3
White	157,243	36.7
Non-White	271,051	63.3
CRG < 5	352,337	82.3
CRG 5+	75,957	17.7

Note: Medicaid member age, sex, race, and CRG score are from the baseline year (CY2012).

Table 4.3 Population characteristics of movers versus non-movers.

	Mover N	Mover %	Non-Mover N	Non-Mover %	Move OR (Crude)	Move OR (Adj.)	95% CI (AOR)
Total	119,515	27.9	308,779	72.1	-	-	
0 to 5 Years	45,675	34.1	88,464	66.0	1.78	1.79	(1.74-1.83)
6 to 17	50,331	25.1	150,578	75.0	1.15	1.16	(1.13-1.18)
18 to 30	9,342	30.9	20,848	69.1	1.55	1.53	(1.48-1.58)
31 to 60 (ref)	14,167	22.5	48,889	77.5	-	-	
Male (ref)	54,608	27.3	145,560	72.7	-	-	
Female	64,907	28.5	163,219	71.6	1.06	1.08	(1.06-1.09)
White (ref)	44,399	28.2	112,844	71.8	-	-	
Non-White	75,116	27.7	195,935	72.3	0.97	0.96	(0.95-0.97)
CRG < 5 (ref)	100,221	28.4	252,116	71.6	-	-	
CRG 5+	19,294	25.4	56,663	74.6	0.86	0.97	(0.95-0.99)

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Percentages may not sum to 100% due to rounding error.
Adjusted odds ratios take all other predictor variables into account.

Table 4.4 Mean number of moves per 4 person years (movers only).

	Movers	Mean Number of Moves per 4 Person Years	p*
Total	119,515	1.38	-
0 to 5 Years	45,675	1.40	
6 to 17 Years	50,331	1.33	<0.0001
0 to 5 Years	45,675	1.40	
18 to 30 Years	9,342	1.53	<0.0001
0 to 5 Years	45,675	1.40	
31 to 60 Years	14,167	1.42	<0.0001
6 to 17 Years	50,331	1.33	
18 to 30 Years	9,342	1.53	<0.0001
6 to 17 Years	50,331	1.33	
31 to 60 Years	14,167	1.42	<0.0001
18 to 30 Years	9,342	1.53	
31 to 60 Years	14,167	1.42	<0.0001
Male	54,608	1.37	
Female	64,907	1.39	0.0001
White	44,399	1.41	
Non-White	75,116	1.37	<0.0001
CRG < 5	100,221	1.38	
CRG 5+	19,294	1.40	<0.0001

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Non-movers were not included in the calculation of tabled values.
* p-value for 2-sample t-test of mean number of moves.

Table 4.5 Distance moved (movers only).

	Movers	Min.	Max.	Mean	Median	p*
			Move Distance (Miles)			
Total	119,515	1.42	288.46	21.43	11.36	-
0 to 5 Years	45,675	1.42	288.46	21.19	11.36	
6 to 17 Years	50,331	1.42	285.62	21.31	11.22	0.0432
0 to 5 Years	45,675	1.42	288.46	21.19	11.36	
18 to 30 Years	9,342	1.42	261.47	22.78	12.03	<0.0001
0 to 5 Years	45,675	1.42	288.46	21.19	11.36	
31 to 60 Years	14,167	1.42	278.79	21.73	11.48	0.0515
6 to 17 Years	50,331	1.42	285.62	21.31	11.22	
18 to 30 Years	9,342	1.42	261.47	22.78	12.03	<0.0001
6 to 17 Years	50,331	1.42	285.62	21.31	11.22	
31 to 60 Years	14,167	1.42	278.79	21.73	11.48	0.0011
18 to 30 Years	9,342	1.42	261.47	22.78	12.03	
31 to 60 Years	14,167	1.42	278.79	21.73	11.48	<0.0001
Male	54,608	1.42	285.62	21.45	11.35	
Female	64,907	1.42	288.46	21.41	11.37	0.9469
White	44,399	1.42	288.46	23.81	12.95	
Non-White	75,116	1.42	258.58	20.01	10.59	<0.0001
CRG < 5	100,221	1.42	288.46	21.43	11.35	
CRG 5+	19,294	1.42	278.79	21.42	11.42	0.4207

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Non-movers were not included in the calculation of tabled values.
* p-value for Wilcoxon Rank Sum test of median differences.

Table 4.6 Population characteristics of short, middle, and long distance movers.

	Short Distance Movers (<6.96 miles)		Middle Distance Movers (6.96-20.76 miles)		Long Distance Movers (>20.76 miles)		Long Distance Move OR	95% CI
	N	%	N	%	N	%	(Adj.)	(AOR)
Total	27,108	22.7	59,872	50.1	32,535	27.2	-	
0 to 5 Years	10,281	22.5	23,093	50.6	12,301	26.9	0.94	(0.89-0.98)
6 to 17	11,749	23.3	25,165	50.0	13,417	26.7	0.93	(0.89-0.97)
18 to 30	1,862	19.9	4,680	50.1	2,800	30.0	1.09	(1.03-1.15)
31 to 60 (ref)	3,216	22.7	6,934	48.9	4,017	28.4	-	
Male (ref)	12,301	22.5	27,529	50.4	14,778	27.1	-	
Female	14,807	22.8	32,343	49.8	17,757	27.4	1.00	(0.97-1.03)
White (ref)	7,141	16.1	23,793	53.6	13,465	30.3	-	
Non-White	19,967	26.6	36,079	48.0	19,070	25.4	0.78	(0.76-0.81)
CRG < 5 (ref)	22,678	22.6	50,258	50.1	27,285	27.2	-	
CRG 5+	4,430	23.0	9,614	49.8	5,250	27.2	0.97	(0.93-1.01)

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Percentages may not sum to 100% due to rounding error.
For subjects with more than 1 move, move-distance category was based on the longest move.

CHAPTER 5

MOVERS AND CHURNERS: RESIDENTIAL MOBILITY AND ENROLLMENT DISCONTINUITY IN A STATE MEDICAID SYSTEM

5.1 Introduction

Persons with low-incomes are more likely to experience health coverage discontinuity (Short & Graefe, 2003). Medicaid is a public (federal- and state- funded) health insurance program, primarily serving low-income children and their impoverished parents (Buchmueller et al., 2015; Sommers et al., 2014). An examination of data from the Congressional Budget Office showed 1 in 5 low-income Medicaid recipients were discontinuously enrolled in federal fiscal year 2009 (Ku et al., 2009). Similarly, an analysis of 2000-2004 Medical Expenditure Panel Survey (MEPS) data found 43% of adults ages 18-64 years enrolled in Medicaid had at least one coverage gap in a 24-month period (Banjeree et al., 2010). In California, 62% of non-elderly adult Medicaid recipients had at least one gap in coverage during a 5-year period from 1998 to 2002 (Bindman et al., 2008).

Discontinuity of health insurance coverage can limit appropriate health care utilization. Among children in Oregon receiving food stamps, and thus presumably eligible for public insurance, in 2005, those with an insurance coverage gap up to 6 months in duration were 2.5 times more likely to lack a usual source of care (AOR = 2.51; 95% CI = 1.50-4.20), 2.5 times more likely to delay urgent care (AOR = 2.52; 95% CI = 1.58-4.03), and more than twice as likely to have unmet dental care needs, compared to children who were always insured, adjusting for age, race/ethnicity, household income, and parental employment (AOR = 2.28; 95% CI = 1.61-3.21) (DeVoe et al., 2008). People without continuous health coverage also are less likely to obtain prescribed medications. A study of 2000-2004 MEPS data representing nonelderly adult Medicaid beneficiaries showed prescription medication refills in a 2-year period were 19% lower for those with coverage gaps compared to those who were continuously enrolled (Banjeree et al., 2010).

With limited access to appropriate health care, discontinuously insured individuals are more likely to use emergency department (ED) services and require in-patient hospitalization. Using MEPS data from 2000-2004, investigators found nonelderly adult Medicaid recipients with multiple enrollment transitions had 17.5% more ED visits and 36.6% more in-patient hospitalizations than their continuously enrolled peers, adjusting for demographic, health, and socioeconomic variables, as well as time-varying factors measured across multiple measurement rounds (Banjeree et al., 2010). A study of Florida Medicaid claims data (1999 to 2002) for nonelderly adults with depression showed significantly increased ED and hospital-based care utilization, and longer hospital stays, following a single interruption of health insurance coverage lasting 32 or more consecutive days ($p < 0.001$) (Harman et al., 2007).

Gaps in health insurance coverage can adversely affect health and increase health care spending. Among low-income adults in Arkansas, Kentucky, and Texas who changed coverage in 2015, 44.9% of those with any coverage gap versus 22.4% of those with no coverage gap reported a decline in health (Sommers et al., 2016). In Florida, average total Medicaid expenditures for nonelderly Medicaid beneficiaries with depression and a single gap in coverage lasting 32 or more consecutive days increased by approximately $400 in the 3 months following coverage interruption compared to the 3 months preceding loss of coverage ($p < 0.001$) (Harman et al., 2007). Likewise, for Florida Medicaid recipients with diabetes and a single gap in coverage, the mean total expenditure per member was $719 higher in the 3 months after the lapse compared to the 3 months preceding the coverage gap (95% CI = $552-$902). Notably, most of the observed increase in spending resulted from greater ED utilization and hospitalization following a coverage lapse (Hall et al., 2008).

Finally, enrollment discontinuity increases Medicaid system administrative costs. Member enrollment, disenrollment, and reenrollment all require time, labor, information technology, and material resources to process required forms and documentation (Ku et al., 2009). The transition of individual members in and out of the Medicaid system, a phenomenon commonly called "churning," thus can quickly escalate administrative spending (Buettgens et al., 2012; Banjeree et al., 2010). For all the reasons identified, Medicaid enrollment discontinuity, or churn, represents a formidable challenge to health and health care delivery for persons with limited economic means.

To ensure compliance with eligibility rules, states are required to reassess the eligibility of current Medicaid enrollees at the end of each participant's program eligibility period (12 months in most states, but only 6 months in others) (Rosenbaum, 2015). At this time, Medicaid participants must reapply for continued program benefits. Typically, states require that renewal applications be received and processed within an approximately 6-week timeframe (Rosenbaum, 2015). Transitions into and out of means-tested Medicaid can reflect changes in income, job changes affecting access to employer-sponsored insurance, or changes in family structure (especially, the presence of minor children in the household) (Cardwell, 2016; Sommers et al., 2016). In addition, unintentional disenrollment (administrative churn) can occur when procedural issues delay or prevent delivery or processing of enrollment renewal forms (Cardwell, 2016; Sommers et al., 2016; Rosenbaum, 2015).

People with low incomes are at least as likely, or more likely to change residence compared to more affluent individuals (Schacter, 2001; Nord, 1998; Deane, 1990). Residential moves are life transitions (Clark, 2005), often marking other significant life events—especially changes in employment or family structure (Geist & McManus, 2008; Michielin & Mulder, 2008; Dieleman, 2001)—that can alter eligibility for Medicaid benefits (Sommers et al., 2016; Rosenbaum, 2015). In addition, address changes associated with residential relocation can prevent timely delivery of Medicaid enrollment renewal notices sent by mail, thereby causing unintentional administrative disenrollment of Medicaid beneficiaries (Rosenbaum, 2015). For both of these reasons, a positive association between Medicaid member residential mobility and enrollment churn might be expected.

Very few studies have examined the association between geographic relocation and health insurance churn. In a cross-sectional analysis of the 2007 National Survey of Children's Health, children 6-17 years of age with 3 or more lifetime moves were reported to be more likely than non-movers to be uninsured or experience periods of uninsurance in the past 12 months, adjusting for such potentially confounding variables as age, race/ethnicity, family structure, parental education, and poverty status; the stated association, however, is ambiguous (AOR=1.35; 95% CI=0.98-1.87; p=0.0119). No statistically significant association between geographic relocation and periods of uninsurance was observed for children with only 1-2 lifetime moves (Busacker & Kasehagen, 2012). We are aware of only one study that has directly examined geographic relocation and health coverage discontinuity among Medicaid participants (Baugh & Verghese, 2013). Based on an examination of Medicaid Analytic eXtract data representing the years 2005-2007, 27.8% of Medicaid members who moved between states experienced an enrollment gap during the measurement period. Notably, this study provides only descriptive results pertaining to Medicaid movers; no information about enrollment gaps among non-movers is supplied. To our knowledge, the present investigation is the first multivariable evaluation of the association between within-state residential mobility and enrollment churn in a Medicaid population.

5.2 Methods

5.2.1 Study Period

Medicaid enrollment churn was measured over a 4-year observation period (2013-2016) following a baseline year (2012).

5.2.2 Study Population

We evaluated residential mobility and enrollment discontinuity among full-benefit, non-elderly South Carolina Medicaid beneficiaries enrolled as of December 31, 2012. Persons with non-federally mandated, limited Medicaid benefits (e.g., family planning only) were not considered in this investigation. A detailed description of the study population, including our stepwise application of all inclusion and exclusion criteria, appears in Chapter 4. Briefly, we removed from analyses dual eligible (Medicare/Medicaid), waiver, medical assistance only, foster care, and institutionalized populations, persons with missing data, and individuals with out-of-state ZIP Codes. We also removed members who were enrolled in the first observation year (2013) only, to ensure all subjects had an opportunity to "churn" by our definition. Our final study population included 428,294 Medicaid beneficiaries, of whom 0.1% were enrolled in one observation year (2014, 2015, 0r 2016), 3.4% were enrolled in two observation years, 9.2% were enrolled in three observation years, and 87.3% were enrolled in all four observation years.

5.2.3 Data Source

Medicaid member enrollment, demographic, health status, and ZIP Code data came from the South Carolina Medicaid Management Information System, CY2012-CY2016 (SC MMIS, 2017), under an agreement with the South Carolina Department of Health and Human Services. All data were appropriately de-identified to protect subject confidentiality.

5.2.4 Outcome Variable

Medicaid Enrollment Churn (Churner/Non-Churner)

We defined enrollment churn as less than 11 months continuous enrollment in Medicaid in any single observation year, followed by any period of enrollment in a subsequent year. Thus, an individual enrolled at baseline (2012), disenrolled for more than one month in an observation year, and reenrolled in a subsequent observation year was considered to have churned. A similar marker for Medicaid coverage interruption (two or more continuous months without coverage, followed by reenrollment) was used in a previous investigation of churn among Medicaid beneficiaries (Harman et al., 2003). In the present study, Medicaid recipients who experienced any enrollment churn over the 4-year observation period were classified as "churners;" all others were classified as "non-churners." Notably, Medicaid recipients who simply exited the Medicaid program—without reentering later in the study period—were *not* considered churners. Some of these individuals may have successfully transitioned out of Medicaid to employer-sponsored or other private health insurance; others may have become continually uninsured.

5.2.5 Predictor Variables

We considered three different measures of residential mobility as predictors of Medicaid enrollment churn: any geographic relocation (mover versus non-mover), distance of move, and number of moves during the observation period.

<u>Mover/Non-Mover</u>

The methods used to identify Medicaid member moves within the state of South Carolina are fully described in Chapter 4. To summarize, we employed a 5-digit ZIP Code-to-ZIP Code Tabulation Area (ZCTA) crosswalk to assign every subject a residential ZCTA at baseline (2012), and in each of the 4 subsequent observation years (2013-2016). Medicaid member ZIP Code information is entered/updated once a year at the time of enrollment/reenrollment. Developed by the U.S. Census Bureau for enumeration purposes, ZCTAs geographically approximate U.S. Postal Service (USPS) ZIP Code mail service areas. We defined a residential move as a change of ZCTA from baseline to observation year 1, or from one observation year to another. Subjects with one or more observed moves were designated "movers;" all others subjects were designated "non-movers."

<u>Move Distance</u>

For all moves, we used geographic information system (GIS) software (ArcGIS 10.4; ESRI, 2016) to calculate the road network (not straight-line) distance between the population centroid of the ZCTA of origin (e.g., $ZCTA_{t1}$) to the population centroid of the destination ZCTA (e.g., $ZCTA_{t2}$). Based on the distribution of all observed move distances, we grouped Medicaid members into 1 of 4 move distance-based categories: long-distance mover (>20.76 miles; highest quartile), middle-distance mover (6.96 to 20.76 miles; interquartile range), short-distance mover (<6.96 miles; lowest quartile), and non-mover. For subjects with more than one observed move, move-distance category was based on the longest move undertaken.

Number of Moves

Among Medicaid member movers, the number of observed moves could range from 1 to 4 (one move possible per observation year).

5.2.6 Adjusted Covariates

Age

Previous research suggests child Medicaid recipients have somewhat greater coverage continuity than non-elderly adult beneficiaries. (Ku et al., 2009). To account for potential age differences, we separately evaluated enrollment churn among Medicaid members in the following age categories: 0-5 years, 6-17 years, 18-30 years, and 31 years or older. These age groups, representing early developmental, educational, and employment/career stages, have been used in other analyses (Falkingham et al., 2016; Clark et al., 2003).

Race/Ethnicity

Minority race/ethnicity has been associated with greater Medicaid coverage continuity (Simon et al., 2013). Based on the racial/ethnic composition of South Carolina as a whole, we created a dichotomous race/ethnicity variable to separately evaluate enrollment churn among majority (White) and minority (Non-White) Medicaid beneficiaries.

Sex

To assess potential sex differences, we measured churn among female versus male Medicaid participants.

Health Status

Studies have shown that persons in poor health are less likely to experience Medicaid enrollment churn, compared to those who are healthy (Simon et al., 2013; Banjeree et al., 2010). We used Clinical Risk Group (CRG) scores, based on Medicaid member clinical and demographic data, and ranging from 1 (healthy) to 9 (catastrophic), to assess enrollment churn differences among subjects with (CRG 5+) and without (CRG<5) a serious chronic disorder (3M Health Information Systems, 2016).

5.2.7 Statistical Analysis

For analytic purposes, subject age category, sex, race/ethnicity, and health status all were established at baseline. Crude odds ratios were calculated to assess the likelihood of enrollment churn among movers (including long-, medium-, and short-distance movers) versus non-movers, females versus males, Non-Whites versus Whites, and unhealthy (CRG 5+) versus healthy/moderately healthy (CRG <5) beneficiaries. We used logistic regression to evaluate 4 multivariable churn models (dichotomous outcome = churner/non-churner). In Model One, we evaluated the dichotomous residential mobility variable (mover/non-mover) as a predictor of churn, along with age category, sex, race/ethnicity, and health status, controlling for the number of observation years each subject was present in the study. We used the same predictor and control variables in Model Two, but substituted the categorical distance-based residential mobility variable (long-, middle-, short-distance mover, or non-mover) for the dichotomous move variable. We restricted Model Three to movers only (non-movers were not considered), and evaluated distance-based residential mobility, age category, sex, race/ethnicity, and health status as predictors of churn, again controlling for the number of observation years each subject was present in the study. Finally, in Model Four, we examined for movers the association between the number of observed moves (1 to 4) and churn, considering also the effect of move distance, age category, sex, race/ethnicity, and health status. To ensure all subjects had equal opportunity to complete 4 moves, we limited Model Four to Medicaid members present in all 4 observation years. Statistical analyses were performed using SAS 9.4 (SAS, 2014).

5.3 Results

A majority of subjects were children, female, Non-White, and healthy/moderately healthy (CRG <5) (Table 5.1). Among all subjects, nearly half (49.3%) experienced enrollment churn at some time during the 4-year observation period. About 28% of Medicaid beneficiaries moved at least once, and approximately 8% moved a long distance (>20.76 miles) during the observation years.

A greater percentage of movers (59.9%) compared to non-movers (45.2%) were discontinuously enrolled in Medicaid (Table 5.2). Among those who moved, a greater proportion of long- and middle-distance movers (62.3% and 60.2%, respectively) churned, compared to short-distance movers (56.3%). We observed enrollment churn in more than half of children 0-5 years of age (56.4%) and young adults 18-30 years of age (53.8%). A higher percentage of females compared to males (50.7% versus 47.7%), and healthy/moderately healthy compared to unhealthy Medicaid members (50.6% versus 43.0%) were discontinuously enrolled.

Multivariate logistic regression analysis showed Medicaid members who moved were approximately 1.7 times more likely to churn than non-movers, considering age category, sex, race/ethnicity, and health status, and controlling for the number of observation years each subject was present in the study (AOR=1.74; 95% CI=1.72-1.76) (Table 5.3). Compared to non-elderly, older adults, children 0-5 years of age were almost twice as likely to experience Medicaid enrollment discontinuity, considering all other predictor and control variables (AOR=1.96; 95% CI=1.91-2.00). Likewise, younger adults (AOR=1.75; 95% CI=1.70-1.80) and school-age children (AOR=1.41; 95% CI=1.39-1.44) were more likely to churn than older adults. We found females somewhat more likely to churn than males (AOR=1.16; 95% CI=1.15-1.17), Non-Whites slightly less likely to churn than Whites (AOR=0.97; 95% CI=0.96-0.98), and Medicaid participants with a serious chronic condition somewhat less likely to churn compared to healthy/moderately healthy beneficiaries (AOR=0.90; 95% CI=0.88-0.91).

The adjusted likelihood of churn increased with increasing move distance. Compared to non-movers, short-distance movers were about 1.5 times more likely to churn (AOR=1.51; 95% CI=1.47-1.55), middle-distance movers were approximately 1.8 times more likely to churn (AOR=1.76; 95% CI=1.73-1.79), and long-distance movers were almost twice as likely to churn (AOR=1.93; 95% CI=1.88-1.98), considering other predictor and control variables (Table 5.4).

Among movers only, move distance remained a significant predictor of churn, although the magnitude of the observed association decreased. Compared to short-distance movers, middle-distance movers were about 1.2 times more likely to experience enrollment discontinuity (AOR=1.16; 95% CI=1.12-1.19), and long-distance movers were about 1.3 times more likely to be discontinuously enrolled (AOR=1.27; 95% CI=1.23-1.31), considering all other variables (Table 5.5).

Finally, restricted to individuals who moved and were present in the study all 4 observation years, we found the number of moves undertaken to be a significant predictor of enrollment discontinuity. Compared to Medicaid members who moved only once, subjects with 2 observed moves were about 1.4 times more likely to churn (AOR=1.44; 95% CI=1.40-1.49), and subjects with 3 or 4 observed moves were approximately 1.8 times more likely to churn (AOR=1.76; 95% CI=1.65-1.87), considering move distance, age category, sex, race/ethnicity, and health status (Table 5.6).

5.4 Discussion

Nearly half of South Carolina Medicaid members experienced enrollment discontinuity during a 4-year observation period, a result that is consistent with other studies showing high rates of enrollment churn among Medicaid participants (Banjeree et al., 2010; Ku et al., 2009; Bindman et al., 2008). We found 60% of within-state movers experienced an enrollment gap, compared to 45% of beneficiaries with no observed moves. South Carolina Medicaid member movers were approximately 1.7 times more likely than non-movers to churn in the Medicaid system, considering all other predictor and control variables.

Compared to short-distance movers, long-distance movers were about 1.3 times more likely to be discontinuously enrolled. Among non-elderly Medicaid movers present in all 4 observation years, persons with 2 observed moves were about 1.4 times more likely, and subjects with 3 or 4 observed moves were approximately 1.8 times more likely to churn, compared to those with only 1 observed move. A supplementary analysis of subjects (movers and non-movers) present in all 4 measurement years showed persons who moved only once were 1.5 times more likely to churn than non-movers, adjusting for age category, sex, race/ethnicity, and health status (AOR=1.50; 95% CI=1.48-1.53).

Thus, even a single move significantly increased churn likelihood. To be clear, we do not demonstrate (or even posit) a direct causal link between moves and churn. Taken together, however, our findings suggest residential relocation, move distance, and move frequency all are valuable markers for increased enrollment churn risk among Medicaid participants.

Compared to older study subjects, school-age children (6-17 years) were 1.4 times more likely, and young children (0-5 years) twice as likely to experience a gap in Medicaid coverage. Enrollment discontinuity among children can reduce access to appropriate health care (DeVoe et al., 2008; Lavarreda et al., 2008; Olson et al., 2005). Higher rates of churn among young children, in particular, could pose a barrier to the timely delivery of immunization, lead screening, and other critical early childhood preventive care services.

Several study limitations merit attention. Notably, we captured between-, but not within-ZCTA residential moves by Medicaid members. Moreover, our reliance on annually updated Medicaid address data precluded observation of multiple ZCTA-to-ZCTA moves by a single Medicaid participant in the same year. Our operationalization of churn (churner versus non-churner) did not consider the total number of months that Medicaid beneficiaries were disenrolled or the total number of enrollment disruptions. Due to data limitations, we could not separately evaluate the residential mobility and churn patterns of individuals versus family units (children and their parents), nor could we distinguish eligibility-based versus administrative churn. Finally, the intentional exclusion of special Medicaid subpopulations (e.g., persons with limited benefits only and persons in institutional settings) limits the generalizability of our results to these groups. We might expect, for example, a higher enrollment churn rate among some Medicaid members with limited benefits, including women of childbearing age who receive only family planning services. Despite the identified shortcomings, our investigation provides compelling evidence associating residential relocation and enrollment discontinuity among Medicaid recipients.

Numerous strategies have been advanced to reduce enrollment churn in Medicaid systems. Chief among these are policies guaranteeing 12-month continuous Medicaid eligibility for adults, regardless of income fluctuations (Cardwell, 2016). Other proposals include the use of "trusted data sources" to administratively renew beneficiaries without requiring the submission of information by members, clarification of language used in written communication, simplification of forms, increased consumer assistance, and the specification of formal enrollment transition protocols (Cardwell, 2016; Rosenbaum, 2015).

In light of our results, we encourage pursuit of a wider range of Medicaid enrollment renewal mechanisms, including traditional renewal by mail, but also utilizing telephone, email, social media, and other communication modes (Rosenbaum, 2015). The provision of multiple renewal options could help decrease instances of unintentional administrative disenrollment, and might especially benefit residentially mobile Medicaid members. At the same time, we suggest Medicaid agencies more closely monitor beneficiary move activity, and more frequently update member address information. Potentially, South Carolina and other state Medicaid systems could use USPS mail forwarding data to identify member movers in near "real time." This not only would improve mail delivery of critical Medicaid notifications (including enrollment renewal notices), but would permit more accurate identification of recent and frequent movers who may be at increased risk for Medicaid enrollment disruption. Members identified as frequent movers, in particular, could be prioritized in ongoing Medicaid agency assessments of patient health care utilization and quality.

Further research is needed to clarify the association between residential mobility and Medicaid enrollment discontinuity. Based on the availability of data, researchers might, for example, examine residential mobility and churn patterns for individual adults versus family units, and explore mobility and churn propensity as a function of family composition (e.g., single parents versus married couples; families with only one young child versus those with multiple young and school-age children). Qualitative analyses are needed to shed additional light on individual and family circumstances, including residential mobility (especially frequent moves), and such potentially related factors as job instability (Geist & McManus, 2008; Michielin & Mulder, 2008), single-parent family structure (Scanlon & Devine, 2001) and cohabitation dissolution (Kamp Dush, 2011) that could increase churn likelihood.

Investigators also might examine the effects of Medicaid enrollment churn, coverage gap duration, and coverage disruption frequency on the delivery of such preventive health services as pap smears, mammograms and colonoscopies; on ED utilization and in-patient hospitalization; and on the quality of disease management for Medicaid participants with serious chronic conditions. Multi-state reviews may contribute valuable information about the effectiveness of different Medicaid agency churn reduction strategies. Finally, as some states implement Medicaid work and community engagement requirements (CMS, 2018), research will be required to evaluate the impact of these mandates on Medicaid enrollment churn, and potentially, on the residential mobility of Medicaid members in and out of states with different work and engagement rules. New studies like these can help inform policy formation and decision making to reduce churn, strengthen health care continuity, and improve health outcomes for Medicaid participants, while lowering Medicaid administrative costs associated with enrollment discontinuity.

Table 5.1 Study population characteristics.

	N	%
Total	428,294	100
Churner	211,038	49.3
Non-Churner	217,256	50.7
Mover	119,515	27.9
Non-Mover	308,779	72.1
Long-Distance Mover (>20.76 miles)	32,535	7.6
Medium-Distance Mover (6.96-20.76 miles)	59,872	14.0
Short-Distance Mover (<6.96 miles)	27,108	6.3
0 to 5 Years	134,139	31.3
6 to 17 Years	200,909	46.9
18 to 30 Years	30,190	7.1
31 to 60 Years	63,056	14.7
Male	200,168	46.7
Female	228,126	53.3
White	157,243	36.7
Non-White	271,051	63.3
CRG < 5	352,337	82.3
CRG 5+	75,957	17.7

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012). Move distance category breaks were established as follows: 25th percentile = 6.96 miles; 75th percentile = 20.77 miles.

Table 5.2 Population characteristics by enrollment churn status.

	Churner		Non-Churner		Churn Odds Ratio	95% CI
	N	%	N	%		
Total	211,038	49.3	217,256	50.7	-	-
Mover	71,568	59.9	47,947	40.1	1.81	(1.79-1.84)
Non-Mover (referent)	139,470	45.2	169,309	54.8	-	-
Long-Distance Mover	20,279	62.3	12,256	37.7	2.01	(1.96-2.06)
Medium-Distance Mover	36,034	60.2	23,838	39.8	1.84	(1.80-1.87)
Short-Distance Mover	15,255	56.3	11,853	43.7	1.56	(1.52-1.60)
Non-Mover (referent)	139,470	45.2	169,309	54.8	-	-
0 to 5 Years	75,663	56.4	58,476	43.6	2.12	(2.08-2.16)
6 to 17 Years	95,249	47.4	105,660	52.6	1.48	(1.45-1.50)
18 to 30 Years	16,227	53.8	13,963	46.3	1.90	(1.85-1.96)
31 to 60 Years (referent)	23,899	37.9	39,157	62.1	-	-
Male (referent)	95,465	47.7	104,703	52.3	-	-
Female	115,573	50.7	112,553	49.3	1.13	(1.11-1.40)
White (referent)	77,999	49.6	79,244	50.4	-	-
Non-White	133,039	49.1	138,012	50.9	0.98	(0.97-0.99)
CRG < 5 (referent)	178,370	50.6	173,967	49.4	-	-
CRG 5+	32,668	43.0	43,289	57.0	0.74	(0.72-0.75)

Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Percentages may not sum to 100% due to rounding error.
Short distance (<6.96 miles); medium distance (6.96-20.76 miles); long distance (>20.76 miles).
Move distance category breaks were established as follows: 25th percentile = 6.96 miles;
75th percentile = 20.77 miles.

Table 5.3 Multivariable association between residential mobility and churn (Model One: Any move versus none).

Parameter	Churn Odds Ratio (Adjusted)	95% CI	*p*
Dichotomous Move Variable			<0.0001
Mover	1.74	(1.72-1.76)	
Non-Mover (referent)	-	-	
Age Category			<0.0001
0 to 5 Years	1.96	(1.91-2.00)	
6 to 17 Years	1.41	(1.39-1.44)	
18 to 30 Years	1.75	(1.70-1.80)	
31 to 60 Years (referent)	-	-	
Sex			<0.0001
Male (referent)	-	-	
Female	1.16	(1.15-1.17)	
Race			<0.0001
White (referent)	-	-	
Non-White	0.97	(0.96-0.98)	
Clincal Risk Group Status			<0.0001
CRG < 5 (referent)	-	-	
CRG 5+	0.90	(0.88-0.91)	

Likelihood Ratio (chi-square) = 15038.29; p<0.0001.
Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Adjusted odds ratios consider the number of observation years each subject was present in study.

Table 5.4 Multivariable association between residential mobility and churn (Model Two: Distance-based move variable, movers and non-movers).

Parameter	Churn Odds Ratio (Adjusted)	95% CI	*p*
Distance-Based Move Variable			<0.0001
Long-Distance Mover (>20.76 miles)	1.93	(1.88-1.98)	
Middle-Distance Mover (6.96-20.76 miles)	1.76	(1.73-1.79)	
Short-Distance Mover (<6.96 miles)	1.51	(1.47-1.55)	
Non-Mover (referent)	-	-	
Age Category			<0.0001
0 to 5 Years	1.96	(1.91-2.00)	
6 to 17 Years	1.41	(1.39-1.44)	
18 to 30 Years	1.75	(1.70-1.80)	
31 to 60 Years (referent)	-	-	
Sex			<0.0001
Male (referent)	-	-	
Female	1.16	(1.15-1.17)	
Race			<0.0001
White (referent)	-	-	
Non-White	0.97	(0.96-0.99)	
Clincal Risk Group Status			<0.0001
CRG < 5 (referent)	-	-	
CRG 5+	0.90	(0.88-0.91)	

Likelihood Ratio (chi-square) = 15255.32; p<0.0001.
Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Move distance category breaks were established as follows: 25th percentile = 6.96 miles; 75th percentile = 20.77 miles. For subjects with more than 1 move, move-distance category was based on the longest move. Adjusted odds ratios consider the number of observation years each subject was present in study.

Table 5.5 Multivariable association between residential mobility and churn (Model Three: Distance-based move variable, movers only).

Parameter	Churn Odds Ratio (Adjusted)	95% CI	*p*
Distance-Based Move Variable			<0.0001
Long-Distance Mover (>20.76 miles)	1.27	(1.23-1.31)	
Middle -Distance Mover (6.96-20.76 miles)	1.16	(1.12-1.19)	
Short-Distance Mover (<6.96 miles) (referent)	-	-	
Age Category			<0.0001
0 to 5 Years	2.07	(1.99-2.17)	
6 to 17 Years	1.60	(1.54-1.67)	
18 to 30 Years	2.07	(1.96-2.19)	
31 to 60 Years (referent)	-	-	
Sex			<0.0001
Male (referent)	-	-	
Female	1.15	(1.12-1.18)	
Race			<0.0001
White (referent)	-	-	
Non-White	0.91	(0.89-0.93)	
Clinical Risk Group Status			<0.0001
CRG < 5 (referent)	-	-	
CRG 5+	0.81	(0.79-0.84)	

Likelihood Ratio (chi-square) = 2991.09; p<0.0001.
Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Move distance category breaks were established as follows: 25th percentile = 6.96 miles; 75th percentile = 20.77 miles. For subjects with more than 1 move, move-distance category was based on the longest move. Adjusted odds ratios consider the number of observation years each subject was present in study.

Table 5.6 Multivariable association between residential mobility and churn (Model Four: Distance-based move variable, movers only, subjects in all 4 observation years).

Parameter	Churn Odds Ratio (Adjusted)	95% CI	*p*
Number of Moves			<0.0001
3 or 4	1.76	(1.65-1.87)	
2	1.44	(1.40-1.49)	
1 (referent)	-	-	
Distance-Based Move Variable			<0.0001
Long-Distance Mover (>20.76 miles)	1.14	(1.10-1.18)	
Middle -Distance Mover (6.96-20.76 miles)	1.11	(1.07-1.14)	
Short-Distance Mover (<6.96 miles) (referent)	-	-	
Age Category			<0.0001
0 to 5 Years	2.14	(2.04-2.23)	
6 to 17 Years	1.67	(1.60-1.75)	
18 to 30 Years	2.19	(2.06-2.33)	
31 to 60 Years (referent)	-	-	
Sex			<0.0001
Male (referent)	-	-	
Female	1.13	(1.10-1.16)	
Race			<0.0001
White (referent)	-	-	
Non-White	0.90	(0.88-0.93)	
Clinical Risk Group Status			<0.0001
CRG < 5 (referent)	-	-	
CRG 5+	0.82	(0.79-0.85)	

Likelihood Ratio (chi-square) = 2942.98; p<0.0001.
Notes: Age, sex, race, and CRG score are from the baseline year (CY2012).
Move distance category breaks were established as follows: 25th percentile = 6.96 miles; 75th percentile = 20.77 miles. For subjects with more than 1 move, move-distance category was based on the longest move.

CHAPTER 6

SUMMARY

6.1 Study Background and Significance

Numerous studies link residential relocation with health care fragmentation (Busacker & Kasehagen, 2012; Mustard et al., 1996; Fowler et al., 1993), poor physical health (Exeter et al., 2015; Busacker & Kasehagen, 2012), and such behavioral health conditions as depression, generalized anxiety disorder, social phobia, and post-traumatic stress disorder (Susukida et al., 2016; Phinney, 2009). Associations between residential relocation, inadequate health care, and poor health may be especially pronounced in low-income and other vulnerable populations (Exeter et al., 2015; Cole et al., 2006; Scanlon & Devine, 2001). The residential mobility of low-income Medicaid enrollees thus merits careful and ongoing consideration by Medicaid administrators and health services researchers.

Previous investigations show high rates of enrollment discontinuity, or churn, among Medicaid participants (Banjeree et al., 2010; Ku et al., 2009). Discontinuity of coverage can limit appropriate use of health care (DeVoe et al., 2008), increase ED utilization and in-patient hospitalizations (Banjeree et al., 2010; Harman et al., 2007), negatively affect self-reported health (Sommers et al., 2016), increase health care spending (Hall et al., 2008), and compound Medicaid administrative costs (Buettgens et al., 2012; Banjeree et al., 2010). Efforts to more fully understand and ultimately reduce enrollment churn thus are vital to Medicaid agencies and beneficiaries.

Few studies have examined residential relocation among Medicaid members, or considered residential mobility as a potential predictor of churn. To our knowledge, the present investigation is the first to describe within-state residential mobility in a Medicaid population, and the first to evaluate a multivariable association between within-state residential mobility and Medicaid enrollment discontinuity. Study findings can help inform policy and programming to strengthen health care and improve health outcomes for residentially mobile Medicaid members. Our investigation also suggests important directions for future residential mobility and Medicaid enrollment discontinuity research.

6.2 Principal Findings

Based on a sample of 428,294 full-benefit, non-elderly South Carolina Medicaid beneficiaries, we found more than 1 in 4 Medicaid members (28%) and approximately 1 in 3 child Medicaid beneficiaries 0 to 5 years of age (34%) moved between ZIP Code Tabulation Areas (ZCTAs) within state during a 4-year observation period (2013-2016). Adjusting for sex, race, and CRG score, young children were about 1.8 times more likely to move than adults 31 years and older (AOR = 1.79; 95% CI = 1.74-1.83). The mean move distance among Medicaid movers (N=119,515) was approximately 21 miles; the median distance was about 11 miles. Among all moves undertaken by Medicaid members, 25% (the top quartile) were greater than 20.76 miles. Among movers present in all 4 observation years (N=105,966), 72% moved just once, 23% moved twice, and 5% moved three or four times.

Almost half of South Carolina Medicaid members (49%) experienced enrollment discontinuity during a 4-year observation period. This result is consistent with previous studies showing high rates of enrollment churn among Medicaid participants (Banjeree et al., 2010; Ku et al., 2009; Bindman et al., 2008). More than half of children 0-5 years of age (56.4%) and young adults 18-30 years of age (53.8%) had an enrollment gap. We found 60% of Medicaid movers experienced enrollment discontinuity, compared to 45% of beneficiaries with no observed moves. Medicaid member movers were approximately 1.7 times more likely than non-movers to churn in the Medicaid system, considering age category, gender, race/ethnicity, and health status, and controlling for the number of observation years each subject was present in the study (AOR=1.74; 95% CI=1.72-1.76).

Compared to short-distance movers (those moving fewer than 6.96 miles), long-distance movers (undertaking moves >20.76 miles) were about 1.3 times more likely to be discontinuously enrolled, considering all other covariates (AOR=1.27; 95% CI=1.23-1.31). Among movers present in the study all 4 observation years, subjects with 2 observed moves were about 1.4 times more likely to churn (AOR=1.44; 95% CI=1.40-1.49), and subjects with 3 or 4 observed moves were approximately 1.8 times more likely to churn (AOR=1.76; 95% CI=1.65-1.87), compared to Medicaid participants who moved only once, considering move distance, age category, gender, race/ethnicity, and health status. Our results do not indicate a direct causal link between moves and churn. Taken together, however, our findings suggest residential relocation, move distance, and move frequency all are valuable markers for increased enrollment churn risk among Medicaid participants.

6.3 Policy Implications

Previous research identifies residential mobility as an important marker for suboptimal health care utilization (Busacker & Kasehagen, 2012; Mustard et al., 1996; Fowler et al., 1993, and physical and behavioral health problems (Exeter et al., 2015;

Susukida et al., 2016; Phinney, 2009). The present study further identifies residential mobility as a potentially valuable marker for Medicaid enrollment discontinuity. In this light, we recommend Medicaid agencies more closely monitor Medicaid member move activity. Member address data already recorded/updated on an annual basis could be used to identify residentially mobile Medicaid participants. South Carolina and other state Medicaid systems also might use United States Postal Service mail forwarding data to detect member movers in near "real time." This not only would improve mail delivery of critical Medicaid notifications (including enrollment renewal notices), but would permit more accurate and timely identification of recent and frequent movers who may be at increased risk for health care fragmentation, adverse health outcomes, and enrollment churn. Medicaid members classified as residentially mobile could be prioritized in ongoing Medicaid agency assessments of health care utilization and quality. Such a strategy could help ensure, for example, that young children with multiple lifetime moves receive appropriate early childhood preventive care (e.g., immunizations, lead screening, and sensory screening), and that residentially mobile individuals with diabetes obtain comprehensive diabetes care (e.g., hemoglobin A1c testing, eye exam, and medical attention for nephropathy).

Our observation of enrollment discontinuity in almost half of the study population underscores the need to reduce churn via policy and program initiatives. Although many churn reduction strategies merit attention (Cardwell, 2016; Rosenbaum, 2015), we particularly support the pursuit of a wide range of Medicaid enrollment renewal mechanisms, including traditional renewal by mail, but also utilizing telephone, email, social media, and other communication modes. The provision and support of multiple renewal options could help decrease instances of unintentional administrative disenrollment, and might especially benefit residentially mobile Medicaid members who lack a stable mailing address.

6.4 Directions for Future Research

Further studies are needed to understand more completely the residentially mobility of Medicaid participants, and to clarify the association between residential mobility and Medicaid enrollment discontinuity. Qualitative investigations, in particular, might provide valuable insight regarding the multiple factors that motivate Medicaid members to relocate, and shed new light on the individual and family circumstances, including residential mobility, and such potentially related factors as job instability (Geist & McManus, 2008; Michielin & Mulder, 2008), single-parent family structure (Scanlon & Devine, 2001) and cohabitation dissolution (Kamp Dush, 2011) that might increase churn likelihood.

New research is needed to more thoroughly evaluate associations between residential mobility, enrollment discontinuity, and health care utilization (e.g., emergency department use, well child visits, and comprehensive diabetes care), and between move history, Medicaid enrollment churn, and such health outcomes as depression, substance abuse, hypertension, and cardiovascular disease. Lastly, as some states implement Medicaid work and community engagement requirements (CMS, 2018), research will be required to evaluate the impact of these mandates on Medicaid enrollment churn, considering, especially, policy effects on minorities, older adult beneficiaries, and rural Medicaid members. Investigators might examine, for instance, the impact of work requirements on rates of enrollment churn in urban areas (with multiple job opportunities) versus rural communities (with comparatively few employment options), and evaluate work mandates as potential drivers of Medicaid member rural-to-urban residential relocation. Research conducted along these and similar lines of investigation can help guide policy development and strengthen programming to encourage appropriate health care utilization, reduce enrollment churn, and promote health among residentially mobile Medicaid participants.

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