

**Underinsurance in Children with Special Health Care Needs**

by

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## Abstract

Children with Special Health Care Needs (CSHCN) are a small part of the total population, but use more services and account for more costs than do their healthy peers. By the very nature of who they are and the health-related challenges they face, CSHCN are vulnerable to poor outcomes associated with delayed care and often live in families that are the most likely to be negatively impacted by high cost-sharing requirements. Current literature has suggested that inadequate insurance—underinsurance — is a much larger problem than is uninsurance. This supports the idea that researchers and policymakers should move beyond simple discussions of presence or absence of insurance coverage, but should pursue more in-depth analyses of the adequacy of insurance. This is critical to assuring that appropriate, necessary benefits and services are provided at a reasonable and affordable cost. This project has examined what it means to be underinsured according to four separate definitions – attitudinal, economic, structural, and equipment/supplies.

This research used existing data from the National Survey of Children with Special Health Care Needs, 2005/06 to examine four definitions for underinsurance using specific questions from the survey in an effort to more fully describe the insurance experiences of CSHCN and their families. Only CSHCN who were continuously insured for the entire year preceding the survey interview were included in analysis. SPSS 17.0, Complex Samples was used for univariate, bivariate, and multivariate analysis. Since all

4 definitions for the dependent variable were dichotomous, categorical responses, binary logistic regression – LOGIT – techniques were utilized.

Varying percentages of CSHCN were identified as underinsured based upon which definition was considered. Also, different predictor variables had significant impact by definition, indicating that the definitions identified unique groups of children with diverse risk factors. It is important to consider a broad definition to comprehensively describe the scope of underinsurance in this population. Certain groups of CSHCN and those with specific condition characteristics may be more at risk for underinsurance based upon the definition use in analysis. Stratifications by insurance type and condition-specific subgroups revealed additional variation.

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## List of Abbreviations

CSHCN	Children with Special Health Care Needs
SCHIP	State Children's Health Insurance Program
EPSDT	Early, Periodic, Screening, Diagnosis, and Treatment

## **Chapter 1 Introduction**

This study analyzes how well insurance meets the health and related service needs of children with special health care needs. It goes beyond the simple presence or absence of insurance coverage to provide an in-depth analysis of the adequacy of insurance to provide appropriate, necessary benefits and services at a reasonable and affordable cost. With health reform once again on the national policy agenda, it is critically important that the unique needs of children with special health care needs and their families be considered in any attempt to revise the current system of insurance or in efforts to create universality in terms of access, care, or coverage.

### **1.1 Background of Study**

According to the National Survey of Children with Special Health Care Needs (2005-2006), about 10,221,439 U.S. children and youth from birth to 17 years have special health care needs, representing about 13.9 percent of all children and youth in this age range (Child and Adolescent Health Measurement Initiative). Extrapolated, this means that about one in seven children under age 18 years has a special health care need (Kogan, Strickland, & Newacheck, 2009). This group of children is diverse not only demographically, but also in terms of illness characteristics, ability to carry out the activities of daily life, and impact on the family. There have been attempts to define this population; however, a standardized definition was not adopted until 1998, when McPherson and colleagues, together with a workgroup of stakeholders, established the

Maternal and Child Health Bureau definition as “those who have or are at increase risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type and amount beyond that required by children generally.” This provides a common meaning and general understanding for researchers who wish to address this population.

Until the National Survey of Children with Special Health Care Needs (NS-CSHCN) was first conducted in 2001, there was a lack of national and state data on this population. The NS-CSHCN is the first and largest survey of the health and health care experiences of this population and is also the first to offer the capability of state-level comparisons and analysis (Kogan & van Dyck, 2005). The 2005-2006 iteration of this survey is used for this project. Although adequate insurance is an outcome specifically defined and addressed in the survey, this project will examine three additional definitions for inadequate insurance — or underinsurance — using specific questions from the survey in an effort to more fully describe the insurance experiences of children with special health care needs and their families. Adequate insurance is one aspect of a well-functioning system of care for children with special health care needs and is a federal Surgeon General’s Healthy People 2010 objective (Kogan & van Dyck, 2005).

## **1.2 Research Objectives and Questions**

Broadly, the intent and basic research objective of this project is to analyze a group of children with special health care needs (CSHCN) to determine factors that influence the adequacy of insurance coverage in terms of meeting condition-specific needs.

Specifically, the research work examines whether some CSHCN are more likely to have inadequate insurance—or to be underinsured — than are others based on demographics,



family characteristics, or illness-related variables. Further, the work compares selected subgroups of CSHCN – the insured groups (private and public), those with functional limitations, those with higher severity, and those who qualified only by needing prescription medications – to determine any statistically significant differences in the adequacy of coverage. This will involve between group analysis and within group analysis to consider the following overarching questions:

- 1) What characteristics increase the likelihood of CSHCN being underinsured?
- 2) Is there is a difference in the likelihood of being underinsured between CSHCN with public insurance and CSHCN with private insurance?
- 3) Is there a difference within each subset of insured CSHCN – public and private – such that certain groups are more likely to be underinsured than are others?

### **1.3 Significance of the Study**

Tu & Cunningham (2005) note that CSHCN are less likely to be uninsured than are children in general (4.8 percent vs. 8.3 percent), but that they still are more likely to have unmet health and prescription drug needs. Further, CSHCN are a small part of the total population, but use more services and account for more costs than do their healthy peers (Tu & Cunningham, 2005). It is estimated that CSHCN account for 42-50% of all child health care costs (Kogan & van Dyck, 2005; Newacheck & Kim, 2005). In addition, by the very nature of who they are and the health-related challenges they face, CSHCN are the most vulnerable to poor outcomes associated with delayed care and are most likely to be negatively impacted by high cost-sharing requirements that may be imposed by some health insurance plans (Tu & Cunningham, 2005). In summary, CSHCN may be small in number – an estimated 13.9 percent of the total U.S. population of children under age 18 years (Child and Adolescent Health Measurement Initiative,

2005/2006) – but they consume more health resources, account for more cost in the health care systems, experience more unmet health care need, and are the most at-risk group of children in terms of negative impact of inadequate health care. They merit special attention and focus and have experiences with the health care system that are uniquely different from other groups.

Although efforts at health reform are admirable, it seems that this small population group with high usage of services and high associated cost might not fare well in any general policy development or blanket universal coverage. The specialized services and related medication, equipment, and medical supply needs could potentially be excluded or limited such that the plan does not meet the needs of CSHCN. It is the adequacy of benefits that is crucial for CSHCN, not just presence or absence of coverage. The quality of coverage is more of a continuum than is represented by the two opposing labels — insured and uninsured. In fact, Kogan, Newacheck, Honberg, and Strickland (2005) conclude that inadequate insurance—underinsurance — is a much larger problem than is uninsured and that the underinsured represent what they call the “hidden uninsured.” They also support the idea that policymakers should not treat insurance as a dichotomy of insured vs. uninsured. This research examines what it means to be underinsured and describes points along the continuum between the dichotomous extremes. It will a) add to the body of knowledge about what types of services are needed by CSHCN in order to have the best health outcomes, b) suggest which groups of CSHCN may be most at risk of underinsurance, and c) support a foundation for building better insurance coverage for this group and promote improvements in the system of care for CSHCN and their families.

Much of the current literature on underinsurance is focused on adults, though this population is very different from children in terms of need and coverage opportunities through public insurance. Children have very specific developmental needs and unique windows of opportunity to shape their health outcomes, quality of life, and future potential for independence given the appropriate health and related service interventions in the face of chronic illness and disability. The NS-CSHCN has opened the door for a few studies related to underinsurance, though only one looks at more than one definition of underinsurance. Based upon literature reviewed for this project, no other research has specifically compared public insurance to private insurance in terms of multiple definitions of underinsurance. Also, no other studies have looked within private insurance for subgroups that may be more at risk for underinsurance, such as by income level, pervasiveness of special health care needs, complexity of special health care need, specific type of need, and functional limitations.

#### **1.4 Organization of the Study**

This study includes five chapters. Chapter 1 provides an introduction as well as background of the study, a statement of the research objective and questions, and details on the significance of the study. Chapter 2 covers definitions of concepts important to the research, including health insurance, Medicaid, State Children's Health Insurance Program (SCHIP), private/employer-sponsored insurance, children with special health care needs (CSHCN), and underinsurance. It also includes a review of the pertinent literature, covering the importance of insurance for children and CSHCN, the role of public insurance as a safety net, underinsurance, state culture, and studies specific to children and CSHCN. These include underinsurance/adequacy of insurance, public vs.

private insurance, income level/financial problems, reason for inclusion in the NS-CSHCN, impact of the condition/severity/pervasiveness, functional limitations, age, regional differences, race/ethnicity, education/maternal education, and family structure. Chapter 3 provides details about the methodology of the study, including the research hypotheses, data source, conceptual models, variables, and the statistical analysis plan. Chapter 4 presents the research findings, while Chapter 5 offers conclusions, including a summary of the findings, implications of the study, limitations, and suggested directions for future research.

## **Chapter 2 Literature Review**

This chapter provides a thorough background on concepts important to this study, including health insurance, public and private coverage models, underinsurance, and children with special health care needs (CSHCN). Further, a pertinent literature review related specifically to CSHCN and insurance is presented. The concluding section addresses the concept and measurement of state culture. This is a contextual issue in the study and is treated as a control variable in the analysis, however further explanation is warranted.

### **2.1 Health Insurance**

Health insurance protects consumers and families from the risk of financial exposure due to illness and injury (“Questions and Answers,” 2007). Research has also linked the presence of insurance to positive health outcomes and access to care. Studies show that people with insurance are more likely to have a usual source of care, to receive primary and preventive care, and to obtain treatment and management of both acute and chronic conditions. Those without insurance are more likely to delay or forgo needed care, to have unmet health care needs, to not receive recommended follow-up care, to incur high medical debt, and to have preventable or avoidable hospitalizations (Hoffman, 2009; “The Uninsured,” 2008; “The Uninsured and the Difference,” 2008).

According to the U.S. Census Bureau, in 2007, 84.7 percent of all Americans and 89 percent of children younger than 18 had some type of health insurance (DeNavas-

Walt, Proctor, & Smith, 2008). However, one study notes that the 11 percent of uninsured children amount to more than the total of all first and second graders in all of the United States (“A Needed Lifeline,” 2008). Although almost 85 percent of Americans had coverage, 45 million younger than 65 were still left uninsured and unprotected in 2007 (“The Uninsured,” 2008). When considering underinsurance, many more American adults and children may be exposed to high financial burden and limited access to care. This concept is discussed in more detail later in this chapter.

In the United States, insurance is provided primarily through private, employer-sponsored programs or through public-funded systems, mainly Medicare and Medicaid (Moran, 2005). Depending upon the type of insurance, individual policy details, and federal and state-specific regulations, the consumer may bear a portion of the cost of medical care; may have limitations placed on the types of providers, services, and benefits they can receive; and/or may have administrative regulations such as pre-certification, preauthorization, or referral requirements before services can be delivered (“Questions,” 2007). In 2007, 67.5 percent of Americans were covered through private health insurance, with 59.3 percent of these being via employer-sponsored plans. At the same time, 27 percent of Americans were covered by government-sponsored insurance plans (DeNavas-Walt et. al., 2008).

## **2.2 Medicaid**

The Medicaid program is one of the unique policy outcomes from the 20th century. It was created on July 30, 1965, through Title XIX of the Social Security Act and signed into law by President Lyndon Johnson (“Role,” 2004). Originally enacted as a companion to Medicare, the massive program created to provide health insurance for

seniors, Medicaid was designed to be a safety net for ensuring health care for those deemed too vulnerable to provide their own insurance coverage (Mann & Westmoreland, 2004). This narrow focus — including people receiving welfare, children, and the “aged, blind, and disabled” (Mann & Westmoreland, 2004) — has been expanded over the 40 years of the program’s history such that Medicaid is now the largest single insurer in the United States and is the major public health program for the low-income population, including children and their families, the elderly, and people with disabilities (“Briefing,” 2005; Mann & Westmoreland, 2004; “Role,” 2004).

According to a briefing from the Kaiser Family Foundation, 52 million Americans are now covered by Medicaid, with 39 million of those depending entirely on the program for their health insurance and 13 million who use the coverage in combination with Medicare or other private health insurance to provide “wrap-around” services or to fill gaps in benefits (“Briefing,” 2005). Medicaid has been termed to have counter-cyclical growth because as the economy takes a downturn, the program grows in response to greater needs (Mann & Westmoreland, 2004). In that light, Medicaid’s role may be even more critical during times of economic recession and fiscal uncertainty.

As many as eight million people with disabilities who are younger than age 65 are served by Medicaid, providing a critical safety net of comprehensive benefits and wrap-around services for this population, which is almost twice as likely as their non-disabled peers to have incomes below 200 percent of federal poverty guidelines. The program covers one in five people with chronic disabilities, most notably children (“Crowley & Elias, 2003; “Medicaid’s Role,” 2001).

The Medicaid program was originally linked to the welfare system, meaning it served only those with the lowest income who received cash assistance from the government or those considered blind, aged, or disabled. However, this connection between welfare and eligibility was gradually eliminated, starting in 1984 with the Consolidated Omnibus Budget Reconsolidation Act (COBRA), which allowed states the option to expand coverage to pregnant women and children with family incomes above the level of eligibility for Aid to Families with Dependent Children (AFDC) but below federal poverty level (“Historical Overview”, 1995). This cash assistance connection was severed entirely by 1996 with the re-vamping of the welfare program for children and families, AFDC, now Temporary Assistance for Needy Families (TANF) (Mann & Westmoreland, 2004). Medicaid continues as a means-tested entitlement program, meaning that a person’s income, resources, and assets (in addition to other factors such as disability status) are used in determining eligibility, but all those who meet program guidelines are entitled to participate in the program.

While the Medicare program was designed to be solely federally funded, Medicaid was established as a jointly funded program, with the states contributing a portion and the federal government matching these funds at least at the 50 percent level (“Briefing,” 2005; Mann & Westmoreland, 2004; “Role,” 2004). Medicaid is administered federally by the Centers for Medicare and Medicaid Services (CMS), formerly the Health Care Financing Administration (HCFA). CMS determines the amount of federal matching money that will go to states using a formula which compares the ratio of the cost of living in a state to the cost of living for all states while attempting to account for income variations (“Historical Overview,” 1995; “Role,” 2004). This



federal matching rate, the Federal Medical Assistance Percentage (FMAP), is calculated based on a rolling three-year average of a state's per capita income ("Briefing," 2005). This three-year average, rather than annual updates, is intended to more accurately represent the fiscal health of a state ("Briefing," 2005).

With all states receiving at least a 50 percent match, the federal government pays at least half of the states' Medicaid expenditures. States with per capita incomes below the national average receive greater than the 50 percent match. Before recent federal response to the current economic crisis, the national FMAP average was calculated at 57 percent ("Briefing," 2005; "Role," 2004). According to a briefing from the Kaiser Family Foundation, on average, for "every 43 cents a state spends, the federal government sends the state 57 cents" ("Briefing," 2005). In response to the recent economic downturn, the American Recovery and Reinvestment Act of 2009 was enacted. This legislation provides for a temporary 6.2 percentage point increase in FMAP for all states. This 27-month increase covers the time period October, 1, 2008, to December 31, 2010, in an effort to shore up state Medicaid programs and provides the potential for additional increases up to 17.7 percentage points based on unemployment rate increases in the state (Moody & Silow-Carroll, February/March, 2009).

The joint federal-state partnership structure of the Medicaid program extends not only to funding, but also to the implementation of services. The program was designed with minimum standards set by the federal government, leaving wide flexibility for states to expand benefits, services, and eligibility ("Briefing," 2005; "Historical Overview," 1995). Although the program receives federal direction, it is administered largely at the state level in terms of programmatic decision-making ("Briefing," 2005). States must

provide services in an adequate amount, duration, and scope and may not vary these based on diagnosis or condition. They must also provide services throughout the state (that is, may not vary based on residence). States may impose small cost-sharing requirements, but these may not apply to emergency care or to pregnant women, children, or nursing home residents (Medicaid Resource Book, 2002). The original Title XIX language set forth certain basic health services that must be provided, but described optional services that states could incorporate to enhance the scope of services of their program (“Historical Overview,” 1995). Figure 1 below lists these services.

Figure 1. The Medicaid program: required and elective services as set forth by Title XIX of the Social Security Act

<b>Required Services</b>
Hospital inpatient care
Hospital outpatient services
Laboratory and x-ray services
Skilled nursing facility services for those aged 21 and older
Home health services for those eligible for skilled nursing facility services
Physician services
Family planning services
Pregnancy related services, including postpartum
Nurse midwife services
Nurse practitioner services
Federally Qualified Health Centers
Rural health clinic services
Early and periodic screening, diagnosis, and treatment (EPSDT) for children under 21 years
<b>Elective / Optional Services</b>
<i>Drugs for adults</i>
<i>Eyeglasses for adults</i>
<i>Intermediate care facility services for adults</i>
<i>Clinic services-preventative, diagnostic, therapeutic, rehabilitative, or palliative services for adults provided by a facility that is not part of a hospital</i>
Critical Access Hospital (CAH) services
Dental services-diagnostic, preventative, and corrective procedures
Dentures
<i>Diagnostic, screening, preventative, and rehabilitative services for adults</i>
Emergency hospital services at hospitals that do not meet conditions of participation for Medicare
<i>End stage renal disease for adults</i>
<i>Home and Community Based services for adults</i>
<i>Hospice services for adults</i>
<i>Inpatient hospital services, nursing facility services, or intermediated care facility services for persons age 65 or over in institutions for mental disease</i>
Inpatient psychiatric care for the aged and those under 21 years of age
Skilled nursing facilities for individuals under age 21

Medical care provided by licensed practitioners other than physicians (ex. Chiropractors)
<i>Organ transplants for adults</i>
Personal care services
<i>Primary care case management services for adults</i>
Private duty nursing services
Prosthetic devices for adults
Respiratory care for ventilator dependent individuals (adults)
Services for adults with speech, hearing, and language disorders
<i>Targeted Case Management services for adults</i>
<i>Transportation for adults</i>
Physical therapy for adults
Occupational therapy for adults

\*Italicized services provided by Alabama Medicaid  
Note. From “Historical Overview,” 1995; “Primer,” 2005

The flexibility afforded to states in terms of services provided is also mirrored in determining eligible populations to be included in the program. States are required to cover certain groups, termed “mandatory populations,” but are allowed to include others at their discretion as a matter of state policy (“Briefing,” 2005; “Primer,” 2005). These “optional populations,” also termed “categorically needy,” are often similar to mandatory populations, though eligibility criteria are broadened to allow more citizens to qualify (“Primer,” 2005). Figure 2 below lists populations by eligibility.

Figure 2. Medicaid beneficiary groups

<b>Mandatory</b>
Low income families with children who were eligible for AFDC (TANF) as of July 16, 1996
Supplemental Security Income (SSI) recipients
Infants born to Medicaid-eligible pregnant women (continues through first year of life as long as child remains in mother’s house and she remains eligible)
Children under age 6 and pregnant women with family income up to 133% of federal poverty level (Omnibus Budget Reconciliation Act, OBRA ’89, effective April 1990) ; Children age 6-19 with family income up to 100% of poverty (pregnant women eligible through end of month of 60 <sup>th</sup> day postpartum) (based on Sixth Omnibus Budget Reconciliation Act, SOBRA or OBRA ’90, effective July 1991)
Recipients of adoption assistance and foster care
Certain Medicare beneficiaries
Special protected groups who retain Medicaid for a period of time (ex. persons who lose SSI payments due to earnings from work)
<b>Optional “Categorically Needy”</b>
Infants up to age one and pregnant women not covered by mandatory rules but below 185% of poverty (percentage may be set by the state)
Optional targeted low income children
Aged, blind, or disabled adults with incomes above mandatory rules but below federal poverty level
Children under 21 who meet income requirements for AFDC (TANF) but who otherwise are not eligible

for ADFC (TANF)
Institutionalized individuals with incomes and resources below specified limits
Persons who would be eligible if institutionalized but are receiving care under home and community-based services waivers
Recipients of state supplementary payments
TB infected persons who would be financially eligible at the SSI level
Low-income, uninsured women screened and diagnosed through a Centers for Disease Control and Prevention's breast and cervical cancer early detection program and determined to need treatment

Note. From "Historical Overview," 1995; "Primer," 2005

Given this wide flexibility, states can design Medicaid programs that best fit the needs within the state. They may also expand eligibility or benefits to include more participants or to better serve high-risk individuals or persons with disabilities. As long as state programs meet the minimum requirements for services and eligibility, they are considered in compliance with federal regulations and may continue to bring down federal matching dollars. Federal matching dollars represent an open-ended commitment, meaning that as long as the state remains in compliance with basic requirements, the more money they spend on their Medicaid program, the more federal money they can receive.

One of the most important features of Medicaid for children is Early and Periodic Screening, Diagnosis, and Treatment (EPSDT). This benefit expands mandatory services for Medicaid-eligible children in the state. EPSDT applies to children younger than age 21 and promotes the early identification of conditions which may lead to lifelong illness or disability ("What is EPSDT," n.d.). This early and continuous screening is carried out through a primary care physician assigned by the agency, and all children must be screened annually. The physician acts as a gatekeeper and is paid for office visits to manage the child's care. Under EPSDT, state Medicaid programs must provide comprehensive health and developmental assessments, screening services (dental, vision, hearing, medical), diagnostic and prevention services. This benefit was enacted in 1967

because of high rates of rejection for new draftees for the Vietnam War because of untreated childhood diseases (“Early and Periodic,” 2005). Under EPSDT, once a condition is diagnosed, all services identified as medically necessary are automatically covered and must be provided to correct or ameliorate symptoms, even if these services are not typically covered by a state’s Medicaid program. It provides for a broader definition of “medical necessity,” resulting in more uniform and comprehensive coverage for children than is seen for adults (“Early and Periodic,” 2005). Because of EPSDT, state Medicaid programs have less discretion to restrict services for children. This is critical for children, especially CSHCN, so that they can receive medications, durable medical equipment, specialized therapies, and other services deemed important to their care.

In addition to general program structure and EPSDT for children, states are also allowed to apply for waivers to pay for certain conditions or populations that would not ordinarily be covered or to seek an exemption from certain requirements in order to better serve its participants. Waivers have been used by states to significantly impact care for people with disabilities and to provide an important safety net for this population. Through waivers, EPSDT, and general program design, Medicaid provides the most comprehensive insurance benefits package for people with disabilities and children as well as supplements services provided by other insurance plans (“Briefing,” 2005; Crowley & Elias, 2003).

### **2.3 State Children’s Health Insurance Program (SCHIP)**

The creation of the State Children’s Health Insurance Program (SCHIP) was the largest expansion of public health insurance coverage since Medicare and Medicaid in

1965 ("The Basics," 2007; Kenney & Yee, 2007; Weil, 1999). The program was created as Title XXI of the Social Security Act and was passed in August 1997 as a part of the Balanced Budget Act of 1997 (P.L. 105-33) ("State Children's Health," 1997). The intent of SCHIP was to provide health insurance for children in families with too much income to qualify for Medicaid but too little to afford private insurance (Lambrew, 2007). Together with Medicaid, SCHIP provides a vital safety net in terms of health insurance for low-income children ("State Children's Health Insurance Program," 2007).

SCHIP is a federal and state collaboration. Its design is a hybrid model with elements of both an entitlement program and a block grant. The limited, predictable federal budget liability combined with built-in flexibility to allow for state variations against minimum standards is cited as critical to the quick and smooth implementation of the program. In addition to this flexibility, incentives are provided to states to promote outreach and simplification of enrollment procedures. This not only increased participation in the program, but led to its rapid adoption as SCHIP became attractive to state policymakers (Dubay, Hill, & Kenney, 2002; Lambrew, 2007; "The Basics," 2007).

SCHIP has enjoyed bipartisan support and is broadly considered to be a successful program in improving the nation's health coverage for one of most vulnerable populations and reducing the number and rate of uninsured children (Lambrew, 2007). At the time SCHIP was created, there were 10.7 million uninsured children, and 22 percent of low income children were without health insurance ("SCHIP at 10," 2007). Today, it is estimated that 9 million children are uninsured. For low-income children, the news is even better — 2005 data indicate a decrease in uninsurance to 14.9 percent (Lambrew, 2007). Almost eight percent of the nation's children rely on SCHIP for

coverage at some point in any year (Kenney & Yee, 2007). SCHIP's focus on enrollment and outreach with its requirement to screen for Medicaid has also had a spillover effect on that program, increasing enrollment nationwide (Lambrew, 2007). The program has helped equalize eligibility for health insurance coverage across age groups of children in the United States (Dubay et al., 2002; Lambrew, 2007).

SCHIP was designed, debated, and enacted with incredible speed, especially considering that it closely followed the 1993-94 failure of the Clinton attempt at health reform. The passage was made possible through compromises and the fact that the discussion occurred during a window of opportunity when health care and federal/state relations were the focus of political attention (Mann & Rudowitz, 2005). Stakeholders and policymakers agreed that comprehensive health proposals for all Americans were not politically feasible but that inaction was unacceptable, opening the door for incremental expansions. In the aftermath of a highly charged national debate over welfare reform (TANF) and failed health reform, attention was focused on potential negative consequences of policy changes on children (Weil, 1999).

SCHIP became the centerpiece of Bill Clinton's second term agenda, focusing on expanding coverage to children between 100 percent -200 percent of federal poverty level (FPL), a population disproportionately uninsured in 1997 (Lambrew, 2007). Since the SCHIP provision was a part of the Balanced Budget Act of 1997, its funding had to match the overall goal of the legislation, which was to eliminate the federal debt. It was part of larger negotiations between a Democratic president and a majority Republican Congress to balance the nation's budget. President Clinton won on his priority of expanding children's coverage, but the Republicans got acceptable concessions on the

funding structure and benefit design of the program (Lambrew, 2007). The outcome is a delicate balance between state and federal government and political ideologies, both liberal and conservative.

Sens. Orrin Hatch (R-Utah) and Ted Kennedy (D-Mass.) proposed a large block grant to fund the program. Sens. John Chafee (R-RI) and Jay Rockefeller (D-WV) proposed a broad Medicaid expansion, an entitlement program (Lambrew, 2007). However, the final program balanced two overriding interests: to provide coverage to uninsured children and to limit federal expenditure (Mann & Rudowitz, 2005). The SCHIP design has elements of both a block grant and an entitlement program. Federal funding outlay is limited and states are entitled to an amount of money, but individuals are not entitled to services. Ultimately, SCHIP was a compromise between the two design alternatives, the open-ended matching of Medicaid and a block grant structure with fixed federal payments regardless of state expenditures. This balance made SCHIP acceptable to President Clinton, Congress, and a wide range of private interests, both political and institutional (Weil, 1999).

Two major features led to the acceptance of SCHIP: the fact that it was a closed-ended matching program and that controversial program design questions were left to states. The federal government set adequate parameters and controls on the program to assure accountability while states received incentives and flexibility to design programs to meet their local needs. The actual program operation was left to states with limited federal oversight, an important caveat since part of the reason the Clinton Health Plan failed in 1993-94 was due to debates over whether the state or federal government should administer the plan (Weil, 1999). Rather than battle over program design issues at the



national level and risk the failure of the entire proposal, legislation and policy were decisions left to the states (Weil, 1999). Each state's political culture played a big role in how it responded to the SCHIP opportunity. State choices reflected their political views toward government intervention in areas of private market domination and the relationship of the private, employer-based system and the public system (Weil, 1999).

Although both Medicaid and SCHIP provide insurance to low-income Americans, including children, their program designs are different. SCHIP entitles states to funds, but doesn't entitle individuals to services or benefits as seen in Medicaid ("A Decade of SCHIP," 2007; Dubay et al., 2002; "State Children's Health Insurance Program," 2007; Weil, 1999). For SCHIP, federal budgetary exposure is capped as an upper limit has been set on costs. Costs are fully predictable and the original statute set funding levels and specific annual amounts for first 10 years of the program (Kenney & Yee, 2007; Weil, 1999). This capped matching financing is the essential component of the SCHIP design. States must spend some of their own money to bring down federal matching dollars (Weil, 1999). This assures that the program is not a blank check for states to cash without accountability for an overall budget. The structure provides incentives to states to participate much better than if they had to pay for the whole program from state dollars. Effectively, the "price" of the program is reduced to states so "demand" increases. Also, the match structure allows the federal government to balance expenditures with state dollars so the program in essence costs less than it would if the federal government had to fully fund the program (Weil, 1999).

Similar to the Medicaid programs states receive a federal match for the state dollars they allocate for SCHIP, but SCHIP grants "enhanced rates" that are 30 percent

points above 70 percent of Medicaid match rate. This means that states receive an "enhanced" federal match compared with the state Medicaid match rate. The SCHIP rate reduces by 30 percent the amount states would pay under their Medicaid match. Also, unlike Medicaid, federal allotments are subject to annual limits and any unspent funds may be redistributed from states to those states that spend all of their allocation (see below). The upper limit for an SCHIP match rate is 85 percent, and states are guaranteed an annual minimum federal allocation of \$2 million (Lambrew, 2007; "SCHIP's financing structure," 2006; "State Children's Health," 1997). The average SCHIP funding is 70 percent federal, 30 percent state while the average Medicaid funding structure is 57 percent federal, 43 percent state (Mann & Rudowitz, 2005; Peterson, 2007).

For the first two years of SCHIP, state allotments were determined by a state's share of the nation's rate of uninsured low-income children. A blended measure was phased in for 2000 to include the state's share of low-income children. This prevented states from being discouraged to increase enrollment, which would in effect decrease their federal dollars since they would be decreasing their uninsurance rate (Mann & Rudowitz, 2005). The federal allocation to states is based on 1) "number of children" — blend of the number of uninsured children with the number of low-income children in the state using estimates from Current Population Survey (U.S. Census Bureau) and 2) "state cost factor" — geographic variation in wages; a minor contributor (Lambrew, 2007; "State Children's Health," 1997).

The federal allocation may be spent in the current year and two following years. Any federal funds not spent within three years qualify for redistribution under the direction of the Secretary of Health and Human Services. These funds are transferred

from states that did not spend all of their allotment to those that may need higher amounts to operate their programs. Typically, the total amounts are divided among shortfall states (those that spent their entire federal allotment). Any redistributed funds not spent within one year are reverted back to the U.S. Treasury (Lambrew, 2007). The original intent was that this redistribution would solve any problems of unevenness in original allocation. However, some states with accumulated funds felt pressure to increase to higher eligibility levels or to cover other populations not targeted by the original legislation (adults) rather than to give funds up for redistribution to other states (Mann & Rudowitz, 2005; "SCHIP's financing structure," 2006).

As stated previously, important program design decisions were left to states. These included whether to use SCHIP funds to expand Medicaid eligibility or to create a separate program, whether to provide entitlement services to individuals, whether to provide a comprehensive benefits package, and whether to charge premiums. These issues are discussed in more detail below.

*Type of Program:* States were given a choice as to the type of program they would create. They could choose a Medicaid expansion only, to create a separate SCHIP program, or use a combination of both. However, if states use the Medicaid option, children must be entitled to full Medicaid benefits and must be guaranteed eligible if SCHIP funds run out. The state could still receive the lower federal Medicaid match rate in that case. If states choose a separate SCHIP program, they can design different benefits and delivery systems and can establish eligibility based on geographic area, age, income, resources, residency, disability status, etc. Under this option, since enrollees are not entitled to services or benefits (as they would be under the Medicaid expansion

option), states can specify a length of coverage and can impose waiting lists (Dubay et al., 2002; Lambrew, 2007; "State Children's Health," 1997).

*Target Population and Eligibility:* As originally legislated, SCHIP targeted low-income children in families between 100 percent and 200 percent FPL. The program was built on top of Medicaid, and eligibility began where Medicaid ended. Those eligible for SCHIP are uninsured children younger than age 19 in families below 200 percent FPL. Since some states had already expanded their Medicaid programs prior to the passage of SCHIP, eligibility was also allowed up to 50 percentage points above the then-current Medicaid eligibility level. Children must be ineligible for private coverage, Medicaid, or state employee health benefits ("A Decade of SCHIP," 2007; "Children's eligibility for SCHIP," 2006; Lambrew, 2007; Mann & Rudowitz, 2005; "SCHIP at 10," 2007; "State Children's Health," 1997; "The Basics," 2007; Weil, 2007).

Within these mandated parameters, states can set their own rules for eligibility, income, assets, deductions, and disregards. Deductions and disregards adopted by individual states make upper eligibility thresholds difficult to compare across states. The 200 percent FPL may be different in two states based on the amount of disregards or deductions allowed in calculating income. Also, 200 percent eligibility may be narrower for one state vs. another depending on where the eligibility level starts, i.e., pre-SCHIP Medicaid eligibility limit ("Children's eligibility for SCHIP," 2006).

*Benefits Package:* The federal government provided broad guidelines in terms of benefits packages. States must design programs with benefit designs that meet minimum standards. These are: 1) Medicaid - full Medicaid for expansions; 2) benchmark - Federal Employees Blue Cross/Blue Shield PPO plan, state employee coverage plan, or

coverage offered by HMO with largest commercially enrolled population; 3) benchmark-equivalent - any package with value equal to or greater than the benchmark plan; hospital, physician, lab, x-ray, and well child care included at 100 percent equivalent value to benchmark; must also include 75 percent value of prescription drugs, mental health, vision, and hearing if benchmark plan includes them; 4) Pre-existing plan for some states - New York, Florida, Pennsylvania; or 5) Other plans as approved by the Secretary Health and Human Services (Lambrew, 2007; "State Children's Health," 1997; "State Children's Health Insurance Program," 2007).

*Cost Sharing:* States may impose cost-sharing requirements including premiums and co-pays, excluding co-pays for well child care or immunizations. For incomes below 150 percent FPL, states may require "nominal" cost sharing (\$15-\$19 per family per month premium, co-pays up to \$3 per service). For incomes above 150 percent FPL, states may charge based on an income-related sliding scale, but total costs are not to exceed five percent of family income. Providers can deny service for failure to pay co-pays (Lambrew, 2007; "State Children's Health," 1997; "State Children's Health Insurance Program," 2007).

The SCHIP funding structure has been its most significant weakness, with the \$40 billion originally allocated now not meeting program requirements. The annual costs for the program are now about \$70 billion in combined state and federal funds ("State Children's Health Insurance Program," 2007). Federal funding limits and capped state allocations have forced Congress to modify program rules six times since enactment in order to prevent shortfalls (Lambrew, 2007). Also, reauthorization has been a major political debate over fundamental policy issues. The original Congressional authorization

for SCHIP expired on Sept. 30, 2007, after lawmakers were unable to reach a consensus on debates related to funding and design (Lambrew, 2007; Shoffner, 2007; "The Basics," 2007). A continuing resolution provided a short-term extension of the program with 2007-level funding through December 2007 (Wayne, 2007). Another resolution provided an 18-month extension through March 2009 and provided \$1.6 billion additional federal dollars in FY 2008 over the 2007 levels. Two attempts at reauthorization met with a veto by President George W. Bush (Kenny, 2008). In February 2009, President Barack Obama signed the Children's Health Insurance Program Reauthorization Act, which reauthorizes SCHIP through 2013, expands eligibility to up to 300 percent of FPL, and provides an additional \$32.8 billion in federal dollars over that timespan in an effort to expand coverage to 4.1-6.5 million more children (Armstrong, 2009; Moody & Silow-Carroll, February/March, 2009).

#### **2.4 Private/Employer-Sponsored Insurance**

Private health insurance in the United States has its roots in the late 1800's when railroad, mining, and lumber industries began to deduct a portion of wages to offer selected employees general medical care and treatment for illness or injury (Fronstin, 2001). Because the fields of science and medicine were not advanced, very little could be done about illness and injury. As a result, medical expenses were low. True health insurance similar to today's system was not necessary, so "sickness" insurance was offered to supplement the largest cost of illness and injury — time away from work (Thomasson, 2002, 2003).

Commercial industry was not interested in the health insurance market initially, so few early examples exist. However, as costs rose and demand increased due to

advancing medical technology and treatments, formal insurance companies began to develop. In 1929, a group of Dallas teachers reached an agreement with Baylor Hospital to provide hospitalization for a fixed-rate payment (Thomasson, 2002, 2003). This became a predecessor for Blue Cross plans in the early 1930's. The American Hospital Association established Blue Cross to provide pre-paid hospital plans to give consumers a way to afford hospitalization and to provide hospitals with income during the hard times of the Great Depression. As the popularity of Blue Cross plans grew, physicians became concerned over competition from hospitals and feared the universal health coverage proposals that were being debated nationally. In this light, the American Medical Association developed Blue Shield plans in the late 1930's to provide pre-paid plans for physician services (Thomasson, 2002, 2003).

Other commercial companies entered the insurance market as demand increased, though one event and three major federal rulings led to the rapid expansion of private, employer-sponsored insurance. During World War II, the federal government placed a limit on salary increases that could be offered to employees. However, the 1942 Stabilization Act allowed offering and expanding fringe benefits, including insurance, as a means of attracting workers (Blumenthal, 2006; Moran, 2005; Thomasson, 2002, 2003). Shortly after, a 1949 National War Labor Board ruling opened the way for unions to negotiate benefit packages, including insurance, in addition to wages when establishing labor contracts (Blumenthal, 2006; Thomasson, 2002, 2003). Employer-sponsored insurance was further advanced following a 1954 Internal Revenue Service decision that employer contributions for health insurance for employees were not to be considered as part of taxable income, creating a clear tax advantage to companies for providing health

insurance (Blumenthal, 2006; Fronstin, 2001; Thomasson, 2002, 2003). By the 1960's, employer-sponsored insurance had become the major source of health benefit access for Americans and remains the "cornerstone of the U.S. health care system" (Blumenthal, 2006; Moran, 2005). According to Blumenthal, "...the federal government, having decided not to provide health insurance to most of its citizens, privatized the job by default, delegating it to private employers and insurance companies" (2006).

Early forms of private insurance were traditional indemnity or fee-for-service plans. This type of insurance allows beneficiaries to go to any physician of choice and receive covered services that are then reimbursed in part by the insurance company. Depending on the policy, the recipient is responsible for a deductible (minimum threshold of spending that must be paid each year before the plan begins paying) and any co-insurance (charges to the recipient after deductible is met; usually 20 percent of approved amount) and/or co-pay amounts (fees paid by the insuree) each time a service is received ("Questions and Answers," 2007).

More common today, employer-sponsored insurance takes the form of a managed-care plan, either a preferred provider organization or a health maintenance organization. Under these plans, the consumer may have more limited choices or may have lower out-of-pocket-costs if they use physicians and other providers who participate in the approved network. Physician, drug, and hospital fees and charges are negotiated by the organization, which limits cost to the insurance company and may result in reduced co-pay amounts ("Questions and Answers," 2007).

Health Maintenance Organizations (HMO's) became more popular in the 1990's in response to increasing cost of health care. This growth was an attempt to produce



fiscal responsibility in physicians who, according to Fronstin (2001), had little incentive for efficiency and cost containment under traditional fee-for-service arrangements.

HMO's focus on prevention and require a primary care provider who acts as a gatekeeper to coordinate services for individual patients. He or she is paid a fee to manage the care of each patient and must provide a referral for specialty and other allied health care. All services must be pre-certified before delivery. Co-payments are typically lower and there may be no deductible (Fronstin, 2001; "Questions and Answers," 2007).

The popularity of HMO's has waned due to controversy over how costs were reduced, but most employer-sponsored plans today are still some form of managed care (Blumenthal, 2006). Preferred Provider Organizations (PPO's) provide the cost-control features of an HMO, but allow for more consumer choice. Services are still provided through an approved network of physicians, however, referrals are not necessary. Consumers who use this network have lower out-of-pocket costs. Deductible, co-insurance, and co-pay amounts vary according to the individual policy provided by the employer (Fronstin, 2001; "Questions and Answers," 2007).

With employer-sponsored private insurance, the premium (cost to belong to the plan) is fully or partially covered by the employer as a part of the overall compensation package (Blumenthal, 2006; "Questions and Answers," 2007). This feature, combined with negotiated rates resulting in low co-pay and co-insurance amounts, has sheltered insured consumers from the true cost of health care. This, combined with advancing technology, has resulted in increased demand and inflation of cost such that the uninsured consumer often cannot afford charges (Moran, 2005). Even those who are insured must spend a continuously increasing portion of income on health care cost (Moran, 2005).

Blumenthal notes that in 2005, for the first time the average cost for family coverage roughly equaled that of the annual income of a minimum-wage worker. In light of these increasing costs, many employers are dropping coverage, increasing portions of the premium that employees must pay, increasing co-pay amounts, or are reducing covered benefits (Blumenthal, 2006; Moran, 2005). This is one of the greatest weaknesses embedded in the success of employer-sponsored insurance. Accessibility to and adequacy of insurance coverage is linked to the fortunes of private companies. As economies weaken, businesses reduce their workforce or reduce benefits, both resulting in a negative impact on the security of insurance for many American families (Blumenthal, 2006). This direct link between health care access via insurance and private industry is uniquely American and will continue to be a vexing issue among many debated nationally, as health reform initiatives come into focus under the new president and Congress.

On a final note, the vast majority of private insurance in the United States is provided through the group model of employer-sponsored coverage. In some cases, private insurance may be purchased on the individual market, directly from an insurance company. The full cost of the premium is borne by the consumer, and these costs as well as the benefits provided vary widely. Often, these policies are quite costly and benefits may not be as comprehensive as those in group, employer-sponsored plans (Banthin, Cunningham & Bernard, 2008; Davidoff, 2004; "Questions and Answers," 2007; "Underinsured in America," 2002).

## **2.5 Children with Special Health Care Needs (CSHCN)**

In 1998, the Maternal and Child Health Bureau's Division of Services for Children with Special Health Care Needs established a workgroup to develop a standard definition of "children with special health care needs" in an effort to assist the planning and policy efforts of federal and state programs. The resulting definition is: "[c]hildren with special health care needs are those who have or are at increase risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type and amount beyond that required by children generally" (McPherson et al., 1998).

The definition is intentionally broad in that it covers a wide variety of chronic health conditions, but also includes children who are at risk for developing problems due to exposures to biological or environmental stressors that are associated with increased likelihood of developing a chronic condition. These include low birth weight, chromosome abnormalities, metabolic deficiencies, extreme poverty, child abuse and neglect, and air pollution (McPherson et al., 1998).

Balanced against the presence of a chronic condition or the risk of developing one, are the requirement of health and related services and the use of these above and beyond what would be expected for most children. McPherson et al. (1998) defined these as services that "maintain or improve the health and functioning of children." These include specialized medical or nursing services, special therapies (physical, occupational, or speech therapies; mental health services; home health care), family support services (care coordination, respite, family counseling); equipment and supplies, and related services such as early intervention and special education (McPherson et al., 1998).

As expected, children with special health care needs (CSHCN) are different from children without special health care needs on many measures of health, financial impact, and access to care issues. Houtrow, Kim, and Newacheck (2008) found that CSHCN have greater health care service needs and significantly higher health care service utilization rates for all services assessed. They asserted that CSHCN use more services, are more likely to have access to care issues, and have greater expenditures and family burden of out-of-pocket costs. Specifically, they noted that CSHCN had expenditures that were much higher when compared with healthy children (\$2923/year vs. \$770/year, respectively) and found that more than 10 percent of families of CSHCN spent \$500 or more annually on health care (Houtrow et al., 2008).

Newacheck & Kim (2005) found that CSHCN use many more services and medications (at least five times as many) and had three times higher health expenditures (however, the greatest expenses were skewed to the upper 10 percent CSHCN only). The average out-of-pocket expenditures for CSHCN were twice that for other children.

A report published in 2007 by the Kaiser Family Foundation held that regardless of the type of insurance, CSHCN have more unmet needs compared with their healthy peers (“Impacts of Medicaid and SCHIP”). Similarly, Tu and Cunningham (2005) found that CSHCN were almost twice as likely to have unmet health needs and were more than three times as likely to have an unmet need for a prescription drug. They also noted that about one-fourth of CSHCN lived in families with medical debt problems compared with 17 percent non-CSHCN. They further described the population as less likely to have private insurance (55.6 percent vs. 63.6 percent), but also less likely to be uninsured (4.8 percent vs. 8.3 percent) because they are enrolled in public programs at a higher rate

(38.3 percent vs. 26.9 percent) when compared with non-CSHCN (Tu and Cunningham, 2005).

In summary, CSHCN have a greater need for and use of health and related services, so they generate larger out-of-pocket expenses. They are also more likely to delay or forgo care due to cost. CSHCN have more problems with access to health care and their families report more difficulties with paying medical bills (Tu & Cunningham, 2005).

## **2.6 Underinsurance**

Donelan, DesRoches, and Schoen (2000) suggested the basic idea of insurance is that a person can get access to care and be protected from financial risk, but that increasingly this is not the case for those who have insurance coverage. They examined the concept of a continuum of coverage from well-insured to uninsured, with range of quality and coverage in between. This is different from an approach that considers just two distinct groups: insured and uninsured. The authors held that policy analysts must consider the comprehensiveness (benefits/needs) and affordability for vulnerable populations in any definition of the adequacy of insurance (Donelan et al., 2000).

To suggest a definition and model, Ward (2006) examined the concept of underinsurance. He noted that any characterization of underinsurance involves value judgments about “adequate” and “inadequate” coverage. Ward examined several definitions of underinsurance, including “structural,” “attitudinal/perceptual,” and “economic,” but asserted that there were really only two dimensions — economic or benefits. Economics-based definitions pertained to co-insurance, deductibles, premiums, expenses exceeding set percentage of income, or actuarial values less than some

benchmark. Benefits-related definitions relate to necessary benefits not being offered, health needs not being covered, necessary benefits covered only under specific criteria, or inadequate delivery of offered benefits (Ward, 2006). He held that one can only understand underinsurance as a comparison of a plan to some benchmark or standard of adequate health insurance, and it is this benchmark specification that is a critical element of any definition of underinsurance. The author also noted that the characteristics of insurance chosen as elements of an underinsurance definition of benchmark reflect the values of people using or designing a survey (Ward, 2006).

An alternate definition is suggested by the Kaiser Family Foundation in a 2002 paper (“Underinsured in America”). The authors suggest that people considered underinsured have health insurance but have significant cost-sharing or limits on benefits that negatively impact access and ability to pay. Further, the paper notes that since there is no “standard” insurance plan, big variations exist in terms of benefits and cost-sharing. Gaps in coverage (i.e., underinsurance) include a plan not covering all necessary services, benefit restrictions, high cost-sharing, and maximum lifetime caps (“Underinsured in America,” 2002).

Other definitions vary according to study. These include: 1) the presence of insurance, but failing to see a physician due to cost, (“State-Specific Prevalence,” 1998); 2) insured all year but annual out-of-pocket medical expenses at 10 percent or more of income or five percent if under 200 percent FPL or deductibles at five percent or more of income (Schoen, Doty, Collins, & Holmgren, 2005; Schoen, Collins, Kriss, & Doty, 2008; Weinstock, 2007); and 3) insured, but the plan would not prevent out-of-pocket

expenses more than 10 percent of income if faced with the average medical expenses of the highest one percent of expenditures in a risk group (Short & Banthin, 1995);

Although the reviewed studies make estimates of underinsurance for adults, these indicate the vastness of the problem. The percentage of Americans who are underinsured ranges from 12 percent to 32.2 percent based upon the year and the definition used in the study (Schoen et al., 2005; Schoen et al., 2008; Short & Banthin, 1995; “State-Specific Prevalence,” 1998; Weinstock, 2007). These figures combine with the rates of uninsurance such that between 20 percent and 42 percent of Americans younger than age 65 are estimated to be uninsured or underinsured (Schoen et al., 2005; “State-Specific Prevalence,” 1998).

Several studies highlighted factors associated with underinsurance (Schoen et al., 2005; Schoen et al., 2008; “State-Specific Prevalence,” 1998). One study showed that the prevalence of adequate insurance was higher in the northern plains and upper Midwest, but lower in the South, Southwest, and West (“State-Specific Prevalence,” 1998). In 2005, Schoen and colleagues found that low-income and sicker adults were most at risk of being underinsured. The study indicated that 73 percent of those who were considered underinsured had incomes below 200 percent FPL and 43 percent of adults with chronic conditions or who classified themselves as being in fair-poor health were also found to be uninsured or underinsured. In 2008, Schoen and colleagues again discussed underinsurance. They suggested that much of growth in underinsurance is represented in the middle class as the underinsurance rate for adults above 200 percent FPL has tripled since 2003.

Underinsurance is an added burden to uninsurance and increases the number of Americans who face financial risk because of health expenditures, limited access to care, and potentially poorer health outcomes. Schoen et al. (2005) stated that inadequate health insurance coverage creates similar burdens and barriers to care (forgone/delayed care, medical debt) as does lack of coverage and held that it is increasingly hard to distinguish between the uninsured and the underinsured. Several studies discussed the adverse impacts of being underinsured and the close comparisons with those who are uninsured. Authors found that 44 percent to 54 percent of underinsured adults and 59 percent to 68 percent of uninsured adults went without needed care (skipped a test or follow up, did not fill a prescription, did not go to the doctor for a problem, or did not see a specialist as recommended) (Schoen et al., 2005; Schoen et al., 2008; Weinstock, 2007). Studies also found similar levels of medical debt or referrals to collection agencies for underinsured adults compared with uninsured adults. About 45 percent of the underinsured and 51 percent of the uninsured had difficulty paying bills, were contacted by collection agency, or changed their way of life to pay medical bills (Schoen et al., 2005; Schoen et al., 2008).

The concept of underinsurance, its potential definitions, and estimates of those impacted have been discussed above. However, the remainder of this subsection will expand on the previous discussion to include underinsurance within private plans, those more likely to experience this problem, and the idea of risk of or potential for underinsurance.

A Kaiser Family Foundation report identifies those who are underinsured as those having health insurance, but with significant cost-sharing or limits on benefits that



negatively impact access and ability to pay (“Underinsured in America,” 2002). This leads to gaps in coverage, including not covering all services, benefit restrictions, high cost-sharing, and maximum lifetime caps. It is noted that Medicaid is a key gap-filler for services not available in private plans.

Analyzing data from the 2001 and 2004 Medical Expenditures Panel Survey, Bantlin, Cunningham, and Bernard (2008) identified 45 million Americans in families that spent more than 10 percent of after-tax income on health expenses, an increase to 18 percent over the 2001 estimate of 16 percent. According to the authors, most of this group had private insurance, but it did not provide adequate financial protection. They found a higher burden among poor and low-income, privately insured families and suggested that private insurance does not protect this group from underinsurance. As one might expect, they noted that private insurance exposes families to a greater risk of financial burden than does public insurance with its limits on out-of-pocket expenses.

Schoen et al. (2005) examined the 2003 Commonwealth Fund Biennial Health Insurance Survey of 3,293 adults ages 19-64 to estimate that 12 percent, or 16 million adults, were underinsured at that time. A critical notation made by the authors is that without targeted protections, policies with high costs related to income have a negative impact on access to care and that those with chronic conditions or who have low income are more vulnerable. They suggest that private insurance policies are regressive because they do not take into account income in calculating cost-sharing or out-of-pocket limits. Further, these insurers levy the same deductibles and limits regardless of income, and this has the potential for a different and sometimes worse impact for those with lower incomes.

Ziller, Coburn, and Youseflan (2006) suggest the idea of potential underinsurance in a study utilizing the 2001 and 2002 Medical Expenditures Panel Surveys. They state that underinsurance is related to private health insurance plan design since the concept means potential access barriers due to out-of-pocket cost. They note that without specific health policy information, researchers are unable to detect people who might be inadequately covered if they were to develop an acute or chronic condition. This idea of potential risk based on future development of disability is correlated to the health plan (i.e., do not need a service now, but might need it in the future based on critical illness or disability).

### **2.7 Importance of Insurance for Children and Children with Special Health Care Needs (CSHCN)**

For CSHCN, health insurance plays a key role in providing access to critical medical and related services. These include not only primary and specialty care, but also medications, allied health therapies, medical supplies, and durable medical equipment. According to a Catalyst Center report, these services are vital for CSHCN to identify problems, prevent worsening of the condition, maximize the child's ability to develop like his or her peers, and ultimately to perform the job of childhood — to learn and play (“Why Health Insurance is Important,” 2006). In addition to maximizing a child's potential, in some cases these services mean the difference between life and death (“Why Health Insurance is Important,” 2006). Also, CSHCN are more at risk for adverse health outcomes and condition exacerbations related to not receiving appropriate care in the proper frequency and in a timely manner (Szilagyi, 2003).

Several studies discuss the importance of health insurance for CSHCN (“Children’s Health,” 2002; Davidoff, 2004; Houtrow et al., 2008; Tu & Cunningham, 2005). Researchers have noted that CSHCN have greater health needs and higher service usage, which results in higher health expenditures, more out-of-pocket costs for families, and problems with medical debt (“Children’s Health,” 2002; Davidoff, 2004; Houtrow et al., 2008; “Impacts of Medicaid and SCHIP,” 2007; Newacheck, Inkelas, & Kim, 2004; Szilagyi, 2003; Tu & Cunningham, 2005). Others have noted that CSHCN have problems with access to care, resulting in unmet health needs and delayed or forgone care (“Children’s Health,” 2002; Houtrow et al., 2008; Tu & Cunningham, 2005). This is even worse for CHSCN who are without insurance (“Children’s Health,” 2003). Several authors discuss insurance as a protective factor against cost and cite its role in promoting access to care (Davidoff, 2004; Houtrow et al., 2008). The rest of this section provides further detail related to several of these studies.

A 2002 Kaiser Family Foundation article reported that uninsured children are less likely to have seen a physician in the previous year (even if they are CSHCN) and are more likely to lack a usual source of care, to have unmet health needs, to forgo preventive care, and to not get care for an illness (“Children’s Health”). Also, nearly 33 percent of uninsured CSHCN were unable to get care compared with 10 percent for insured CSHCN. This demonstrates the importance of insurance not only related to access to care, but also in obtaining health care services.

Houtrow et. al. (2008) used the 2001 and 2003 Medical Expenditures Panel Surveys in a study examining the medical expenditures for CSHCN. They found that 2.6 million children younger than six years have special health care needs. This sample of

children has greater health care service needs and significantly higher health care service utilization rates for all services examined. They are also more likely to have access to care issues. Medical expenditures for this group were much higher (\$2923/year) vs. healthy peers (\$770), and more than 10 percent of their families spent \$500 or more annually on health and related services. Houtrow et al. (2008) concluded that CSHCN use more health services and have greater expenditures and family burden associated with out-of-pocket costs. They noted that having insurance helped protect families from the high costs of care.

In earlier work, Newacheck et al. (2004) also examined health-service usage and health care expenditures for children with disabilities. Using the 1999 and 2000 Medical Expenditures Panel Surveys, they analyzed the records of 13,792 children younger than 18 using a definition of disability that identified children who were limited in age-appropriate social role activities or those who received specialized services such as early intervention or special education. Authors viewed financial burden in terms of expenses as a percentage of income, with expenses greater than five percent of income considered catastrophic. The analysis identified 7.3 percent of the study population as children with disabilities. This group used many more services, especially hospital days, non-physician professional visits, and home health provider days. They had much higher health expenditures (\$2669 vs. \$676) and out-of-pocket expenditures (\$297 vs. \$189). Even given this finding of higher overall expenditures, Newacheck et al. (2004) found that only a small proportion of these children accounted for most of costs. When authors ranked the expenditures of all children identified in the sample, they found that the top 10 percent of children accounted for 65 percent of expenditures and represented 85 percent

of the out-of-pocket payments for the whole population of children with disabilities in study. This shows that expenditures are clearly higher for CSHCN in general, but outliers in the sample can skew the expenditure results given the small concentration of children with higher-level costs.

Davidoff (2004) used the 2000 and 2001 National Health Interview Survey of children ages 0-17 to identify CSHCN by an algorithm that simulated the screener questions used to identify children for the National Survey of Children with Special Health Care Needs (NSCSHCN). He compared CSHCN (2,879) to non-CSHCN (21,909) and stratified by income and poverty status, created a summary measure of unmet need due to cost, and established a measure for out-of-pocket cost. He noted that insurance plays a critical role in access to care for CSHCN and for protection against financial risk. Davidoff found higher out-of-pocket spending for CSHCN and noted that this was greater in high-income families due to more available resources and less Medicaid coverage. These findings are similar to Houtrow et al. (2008) and Newacheck et al. (2004), but add to the body of knowledge by breaking down out-of-pocket spending results in terms of income.

Tu and Cunningham (2005) used the 2003 Community Tracking Study Household Survey to identify a sample of 7,327 children younger than age 18; of those, 1,523 were determined to be CSHCN by also utilizing the same screener questions created as a part of the National Survey of Children with Special Health Care Needs. The authors noted that CSHCN have more access to care problems and that their families report more problems paying medical bills. This study found that CSHCN were almost twice as likely to have an unmet health need and were more than three times as likely to have an

unmet prescription drug need. The authors noted that CSHCN have a greater need for and use of services, so they generate larger out-of-pocket expenses and are more likely to delay or forgo care due to cost. In this sample, compared with families of non-CSHCN, families with CSHCN were more likely to have medical debt problems (25 percent vs. 17 percent, respectively). This work again shows the added problems families of CSHCN face in accessing and paying for health care. Given the body of work highlighting these issues, it is clear that adequate insurance is critical to the health and quality of life for CSHCN and in protecting their families from excessive monetary risk and catastrophic financial burden.

## **2.8 Role of Public Insurance as Safety Net**

The previous section focused on the importance of insurance for children and especially for CSHCN. This section will focus more on the role that public insurance programs play as a safety net in providing insurance in general and in offering comprehensive benefits that are critical for CSHCN. In addition, this section will examine the efficiency of public programs compared with private and will address family satisfaction with public insurance.

Davidoff (2004) found that compared with non-CSHCN, CSHCN had lower rates of private insurance (62.5 percent vs. 69.1 percent), higher rates of public insurance (29.8 percent vs. 18.5 percent), and lower rates of uninsurance (8.1 percent vs. 11.5 percent). Tu and Cunningham (2005) also found that CSHCN were less likely to have private insurance than were non-CSHCN (55.6 percent vs. 63.6 percent) and that they had lower uninsurance rates (4.8 percent vs. 8.3 percent) because of higher public insurance

enrollment rates (38.3 percent vs. 26.9 percent). This supports the safety net feature of public insurance in protecting CSHCN from being uninsured.

Several studies estimate the reach of public insurance, especially for children and CSHCN (“Health Coverage of Children,” 2007; “Impacts of Medicaid and SCHIP,” 2007; Tu & Cunningham, 2005). Tu and Cunningham (2005) estimated that there were about 13.5 million CSHCN in the United States, and that Medicaid or SCHIP covered two of five. Authors of a 2007 Kaiser Family Foundation report (“Impacts of Medicaid and SCHIP”) noted that one-fourth of all children and one-half of all low-income children are covered by Medicaid or SCHIP. The study estimates that about four in 10 CSHCN are covered by Medicaid and may lack access to other coverage or require care that is excluded or limited by private coverage plans. Another Kaiser Family Foundation report noted that Medicaid and SCHIP cover one in four U.S. children (“Health Coverage of Children,” 2007). The report concludes that over the past decade, public programs (Medicaid and SCHIP) have led to reductions of one-third in the rate of uninsured children.

In an effort to evaluate changes before and after implementation of the State Children’s Health Insurance Program (SCHIP), Davidoff, Kenney, and Dubay (2005) used data from the National Health Interview Survey for 1997, 2000, and 2001 to identify children with chronic conditions based on specific diagnoses and the presence of activity limitations. They found a 9.8 percentage point increase in children with chronic conditions who were covered by public insurance (Medicaid or SCHIP) and 6.4 percentage point decline in the number of uninsured children. Also, the authors found an

eight percentage point decrease in unmet health needs, indicating improved access to care for children with chronic health conditions.

Perhaps one of the most compelling issues surrounding public insurance is the safety net role it has seemingly played in preventing Americans, especially children, from becoming uninsured during trying economic times. In a Commonwealth Fund article, Davis (2008) stated that the number of uninsured Americans in 2007 fell to 45.7 million from 47 million in 2006. She indicated that 1.3 million of this decline equals the growth in Medicaid, while employer-sponsored coverage declined over this same time period. The number of uninsured children fell from 11.7 percent to 11 percent (down from 8.7 to 6.1 million) and there was also a decline in the uninsured rate for children in poverty. Davis concludes that these data show increased coverage for children due to public programs and highlight the importance of safety net insurance as provided by Medicaid and SCHIP. A 2007 Kaiser Family Foundation report, “Impacts of Medicaid and SCHIP on Low-Income Children’s Health,” also commented upon this issue. The report noted that over 2000-2004, the number of uninsured adults rose due to losses in enrollments in employer-sponsored insurance. However, Medicaid and SCHIP offset these losses for children such that the rate of uninsured children fell during the same timeframe.

The previous section indicated the vital importance of health insurance, especially for CSHCN. Thus far, this section has focused on the role of public insurance in preventing children from becoming uninsured. However, several studies conclude that the presence of insurance in and of itself does not guarantee the adequacy of benefits provided or offered (Davidoff, 2004; Houtrow et al., 2008; Newacheck & Kim, 2005; Szilagyi, 2003; Tu & Cunningham, 2005). Davidoff (2004) noted that there is a strong



incentive for CSHCN to have coverage, but if the child cannot qualify for public insurance, the family may have difficulty obtaining and paying for private insurance, which may not provide adequate access to necessary services anyway. He stated that public insurance provides a broader spectrum of services with minimal or no cost-sharing, while private plans vary significantly by benefits allowed and cost-sharing requirements. Also, he noted that medical necessity standards in private health plans, which must be met before services will be covered, often do not reflect the developmental needs of children.

Davidoff (2004) expounded that due to high cost-sharing and coverage limits or exclusions, families of CSHCN often seek double coverage or private/public combinations to maximize the range of covered services and minimize out-of-pocket cost. Skinner, Slattery, Lachicotte, Cherlin, and Burton (2002) also concluded that children with disabilities were not better off with private insurance unless they also had Medicaid coverage as a supplement. They noted that private insurance coverage, even when available through work, could be too expensive for families with limited incomes to purchase. Davidoff (2004) noted that public programs, particularly Medicaid, provide wrap-around coverage to pay for services not covered by private insurance and pay out-of-pocket costs that could otherwise pose a burden for families.

Other authors have extolled the benefits of public insurance — SCHIP and Medicaid — as a primary coverage model particularly well-suited for CSHCN specifically because of the provision of more comprehensive benefits and gap-filling services (“A Needed Lifeline,” 2008; “Children’s Health,” 2002; Davidoff, 2004; Davidoff et al., 2005; Newacheck et al., 2004; Skinner et al., 2002; Szilagyi, 2003; Tu &

Cunningham, 2005). The effect may be even greater for low-income families (Davidoff et al., 2005; “Impacts of Medicaid and SCHIP,” 2007; Skinner et al., 2002). Researchers conclude that the comprehensive benefits offered through public programs offer critical services for CSHCN and surpass private plans that may have coverage limits, exclusions, or high associated costs which place financial burdens on families. This places CSHCN at risk of not receiving the type and amount of health care they need for positive outcomes. Public insurance leads to favorable results for CSHCN, specifically increased access to care, decreased unmet need, and protection from high out-of-pocket costs (Davidoff et al., 2005).

Several authors conclude that it is Medicaid’s EPSDT benefit that assures access to the comprehensive services required by CSHCN (“Early and Periodic,” 2005; “Impacts of Medicaid and SCHIP,” 2007; Szilagyi, 2003). The Kaiser Family Foundation article entitled “Early and Periodic Screening, Diagnostic, and Treatment Services” (2005) holds that EPSDT is critical for children with disabilities since it provides for more comprehensive coverage than typical private plans and provides access to specialty services and equipment that are often excluded or limited in private plans. EPSDT was discussed in detail in Chapter 2, section 2.2. In summary, the EPSDT benefit shores up Medicaid as a powerful safety net for children’s coverage, especially for CSHCN.

Beyond protection from uninsurance and comprehensiveness of benefits, several studies have examined access to care and the efficiency of service provision for CSHCN in public health insurance programs (“Health Coverage of Children,” 2007; “Impacts of Medicaid and SCHIP,” 2007; Szilagyi, 2003). One report noted that CSHCN in public or private coverage models have more unmet needs compared with non-CSHCN, but these

unmet needs are similar in public and private plans, indicating comparable access to care (“Impacts of Medicaid and SCHIP,” 2007). The 2007 Kaiser Family Foundation report “Health Coverage of Children: The Role of Medicaid and SCHIP” also stated that these programs provide comparable access to care when compared with private insurance and with similar efficiency. Szilagyi (2003) notes that children with chronic conditions who are covered by Medicaid use more services than children with similar diagnoses who are covered by private insurance. He suggests that this may reflect a greater severity of illness among CSHCN in public coverage or may possibly represent lower cost barriers to families for CSHCN covered by public plans. He warns that researchers should not conclude less efficiency in the Medicaid program, but should consider other social and disease-related factors that may be associated with the findings.

Families of CSHCN are also satisfied with the coverage provided through public insurance, specifically Medicaid. Szilagyi (2003) cites a 1998 survey by Family Voices (a grassroots advocacy group for caregivers of CSHCN) that showed families covered by Medicaid were more satisfied than those in private managed-care plans due to broader coverage in Medicaid. A Family Voices Policy Brief (“The Importance of Public Insurance/Medicaid Coverage for Children with Special Health Care Needs,” n.d.) reports results from this same survey to conclude that based on family satisfaction rates, public plans provide more appropriate coverage for children with severe health needs than does private insurance and were especially beneficial for children who required specialized therapies. Skinner et al. (2002) examined data from 42 low-income families who had children younger than 8 years with moderate to severe disabilities. The

caregivers ranked Medicaid as most important social welfare benefit and commented that they felt it provided a comprehensive benefit package for children with disabilities.

From the literature reviewed above, it is clear that public insurance is critically important for CSHCN because of its comprehensive benefits and protection from excessive cost-sharing requirements. Also, public insurance has filled key gaps to prevent loss of insurance, while providing similar quality, access to care, and efficiency when compared with private insurance. Finally, surveys show that families are satisfied with public insurance, especially Medicaid, due to the broad coverage provided.

## **2.9 Children and Children with Special Health Care Needs (CSHCN) Studies**

There is a modest body of work surrounding the health experiences, family impact, and financial burden of CSHCN and families compared with non-CSHCN and families. Literature includes but is not limited to such topics as need for care coordination, medical home experience, transition to all aspects of adulthood, and ease of use of community-based systems of care. For the purposes of this study, only those articles related to underinsurance, financial impact, and the proposed independent or dependent variables will be reviewed. Also, limitations of the reviewed studies as well as any suggestions for future research or potential implications for this study will be discussed.

### *2.9.A Underinsurance / Adequacy of Insurance*

Several studies are related to underinsurance or the adequacy of insurance (Honberg, McPherson, Strickland, Gage, & Newacheck, 2005; Honberg, Kogan, Allen, Strickland, & Newacheck, 2009; Kogan et al., 2005; Oswald et al., 2005; Oswald, Bodurtha, Willis, & Moore, 2007; Stroupe, Kinney, & Kniesner, 2000). These lay the

foundation for the dependent variable and definitions to be examined, as further discussed in Chapter 4.

In a study of the adequacy of insurance, Stroupe et al. (2000) found that having a chronic illness decreased the probability of having adequate insurance by 10 percentage points. This study utilized a telephone survey focused on individuals with cancer and was not limited to children. However, it did show a link between chronic illness and problems with adequacy in insurance.

The rest of the literature in this subsection covers research specific to children and all but one study is based on data from the National Survey of Children with Special Health Care Needs (NSCSHCN), 2000-2001. Most results are based on the first iteration of the survey, the Honberg et. al., 2009 study is based on the second iteration – 2006-2006. As will be discussed in Chapter 4, Section 4.2, the second iteration of this survey will provide the data to be used in the work of this research study.

Honberg et al. (2005) examined the adequacy of insurance coverage as measured from the family perspective — whether the plan covered needed services, whether costs were reasonable (uncovered services and coinsurance), and whether the plan allowed the child to see providers. They found that 59.6 percent of CSHCN met the outcome of having adequate insurance by the presence of continuous, adequate coverage according to the established definition. The authors found that poverty status (below poverty less likely), race/ethnicity (Hispanic, Black less likely), and functional ability (most limited less likely) were significant predictors of adequacy of insurance. In this sample, more than one-fourth of families reported that costs not covered by insurance were not

reasonable. Honberg et al. (2005) also found that children who did not have adequate insurance were more likely to have an unmet health need.

With the release of the 2005-2006 data from the second iteration of the National Survey of Children with Special Health Care Needs, Honberg et. al. (2009) again examined the adequacy of insurance following similar methodology to the previous study. The authors found that the percentage of families reporting adequate insurance increased to 62 percent from the previous finding of 59.6 percent. Also, the authors noted that the greater the impact of the child's condition, the less likely the child was to be adequately insured. Finally, Honberg et. al., (2009) found that privately insured CSHCN were less likely to be adequately insured than are publicly insured CSHCN.

Kogan et al (2005) examined the association between underinsurance and access to care among CSHCN. According to the authors, 95 percent of children in the sample had some type insurance, but 32 percent were classified as underinsured. This study defines underinsured as insured continuously but inadequate to meet needs. It uses the same questions as Honberg et al. (2005) — did benefits meet needs, were costs reasonable, and did plan allow child to see needed providers — to create a summary measure for the adequacy of insurance. This represents a derived measure established by the Maternal and Child Health Bureau as a core outcome for CSHCN and one of six outcomes that describe a comprehensive system of care of CSHCN. (Other core outcomes include presence of a medical home, family/professional partnerships and satisfaction, early and continuous screening, organized community systems, and transition to adulthood and adult health care.) The authors include independent variables for region, severity by number of special health care needs, functional ability, and type of

special health care need (i.e. reason for inclusion). Kogan et al. (2005) note that excessive costs were the most common reason for a child being included in the group identified as having inadequate insurance. The authors conclude that underinsurance is a much larger problem than uninsurance and that the underinsured represent “hidden uninsured,” a particular problem for CSHCN. They support the idea that policymakers should not treat insurance as a dichotomy of insured vs. uninsured.

Oswald et al. (2005) analyzed a sample of Virginia CSHCN in order to define underinsurance in that State. The authors held that underinsurance puts CSHCN at increased risk for medical complications or compromise because of gaps in services. They state that no universal definition of underinsurance exists and that there is not a universally accepted benchmark for adequate insurance. To that end, they tested three definitions of underinsurance based on a division of survey questions: 1) Attitudinal - emphasizes consumer perceptions and satisfaction, 2) Structural - considers type of benefits offered and providers covered, uses benchmark, and 3) Economic - focuses on ability to pay premiums, deductibles, co-pays. The authors provide a table to direct researchers in which questions from the NSCSHCN are associated with each definition. Oswald et al. (2005) found that CSHCN in the Virginia sample were underinsured by each definition — 28.9 percent Attitudinal, 25.6 percent Economic, and 2.9 percent Structural — and that the definitions did not identify the same children. This supports the inclusion of multiple definitions of underinsurance so that accurate assessments of the scope of the problem can be made and broad policy solutions can be considered.

Oswald et al. (2005) found that for the attitudinal definition, children “below 200 percent FPL” and the “pervasiveness” of special health care needs (based on the number

of criteria met on CSHCN screener, i.e. positive answers) were associated with a higher likelihood of underinsurance. For the economic definition, “single adult household”, “below 200 percent FPL”, “mother has less than a post-high school education”, and “pervasiveness” were associated with a higher likelihood of underinsurance. There were no predictors or associations for the structural definition.

Oswald et al. (2005) found an orderly relationship between pervasiveness and underinsurance rates by both the attitudinal and economic definitions. For the attitudinal definition, income below 200 percent FPL and pervasiveness were predictors of underinsurance. For the economic definition, more than one CSHCN in the house, single adult household, income below 200 percent FPL, and pervasiveness were predictors of underinsurance. The authors suggest that the MCHB core outcome for adequate insurance resembles the attitudinal definition, but since the economic definition identified different CSHCN, it may be important to include the economic definition as well to fully describe the population of CSHCN that are underinsured.

In 2007, Oswald and colleagues further examined underinsurance and the core outcomes for CSHCN. They again used the attitudinal and economic definitions of underinsurance as established via specific survey questions as in their previous study. The authors note that the two definitions identified about equal numbers of underinsured (28.9 percent vs. 25.6 percent), but the groups are different, an indication that the two approaches are distinct. Predictor variables included gender, age, ethnicity/race, mother’s education level, poverty level, private insurance, severity, functional impairment, and stability of needs. Underinsurance was analyzed against other MCHB core outcomes for CSHCN and was found to be negatively related to “families partner and are satisfied with



services,” “medical home,” “organized community-based systems,” and “transition.”

They reported findings for CSHCN similar to other studies in terms of unmet need, more financial burden, more burden for low income, greater expenditures and out-of-pocket costs, less private insurance, more public insurance, and lower uninsured rates. Oswald et al. (2007) state that underinsurance has a disproportionately negative impact for vulnerable populations due to potential exacerbations and complications from gaps in service and delayed or forgone care.

### *2.9.B Public vs. Private*

This next subsection focuses specifically on literature describing studies that have examined public vs. private health insurance in some capacity. The results are mixed — with five finding no difference, two indicating differences based on expenditures or medical debt only, and four finding better performance for public insurance. Of all the studies reviewed, only one actually focuses on the concept of adequacy of insurance, while all others focus on individual aspects of care, such as unmet need, financial burden, and access to care.

Honberg et al. (2005) found that after the effects of poverty level, race/ethnicity, age, gender, and activity impact were controlled for, there was no significant difference between those with public vs. private insurance in meeting the outcome of adequate insurance as defined by the Maternal and Child Health core measure. This core measure is defined according to the attitudinal definition of underinsurance as presented by Kogan et al. (2005), Oswald et al. (2005), and Oswald et al. (2007). A more recent study by the same primary author (2009) did find privately insured CSHCN to be less likely to meet

this outcome compared to publicly insured CSHCN. No comparisons are made for any of the other definitions of underinsurance.

Kane, Zotti, and Rosenberg (2005) used data from the 2000-2001 NSCSHCN to study CSHCN in Mississippi. They found that the type of insurance was less important than a lapse in coverage, and that costs in addition to problems with the health plan were key barriers to obtaining routine and specialty care.

Mayer, Skinner, and Slifkin (2005) used 2000-2001 NSCSHCN data to examine unmet need for routine and specialty care. They found that more CSHCN reported unmet needs for specialty care than routine care, and noted differences based on race, maternal education, income level, and severity (see relevant sections below for further details). Mayer et al. (2005) found that the uninsured were more likely than the continuously insured to have unmet routine and specialty care needs, but no significant differences were seen between privately vs. publicly insured children related to unmet needs.

Smaldone, Honig, and Byrne (2005) used data from the 2000-2001 NSCSHCN to study delayed and forgone care among CSHCN in New York. They found significant differences among those with delayed or forgone care for those who were uninsured or inconsistently insured. There were no differences among those who were continuously insured; however, the authors did not make comparisons within type of insurance (public vs. private) based on other included characteristics such as income, severity and impact of condition, functional status, maternal education, and race/ethnicity.

A Kaiser Family Foundation report entitled “Impacts of Medicaid and SCHIP on Low-Income Children’s Health” (2007) found equal access to primary and specialty care for children with public insurance compared with private insurance. The report also

noted that CSHCN in both public and private insurance plans have more unmet needs compared with non-CSHCN, but the results are similar for each group, indicating comparable access to care.

Tu and Cunningham (2005) found similar experiences for CSHCN on private and public insurance related to unmet health needs and delayed or forgone care. The authors noted that CSHCN were more likely to experience medical debt if, among other variables, they lacked private insurance. The study did not look at the reason for inclusion as CSHCN, severity or condition, impact of condition, functional limitations, or income level categories within private insurance.

Davidoff (2004) found that for low income CSHCN, there was little evidence of better or worse performance related to meeting needs for public or private plans. However, she did note a lower distribution of out-of-pocket costs for families of CSHCN who had public insurance coverage.

Banthin et al. (2008) suggested that private insurance does not provide protection from financial burden and exposes Americans to a greater risk of financial burden, especially among the poor and low income.

Bumbalo, Ustinich, Ramcharran, and Schwalberg (2005) used data from the 2000-2001 NSCSHCN to study CSHCN living in New Hampshire. They found that insurance type was associated with out-of-pocket cost (i.e. private and uninsured spend more), financial problems, and cutting work hours. This suggests that public plans provide more protection from cost, financial problems, and reduced work time.

Kuhlthau, Hill, Yucel, and Perrin (2005) considered the financial burden for families of CSHCN using the 2000-2001 NSCSHCN. They used a dichotomous

summary measure of whether a family experienced one of four impacts (condition created financial problems, needed additional income, family member had to cut work hours, family member had to stop working). In one aspect of the study, Kuhlthau et al. used CSHCN with private insurance as the reference group in an odds ratio analysis of financial impact. The authors found that expense-related outcomes were weakly significant (need additional income and condition caused financial problems) and the CSHCN in this study were slightly better if they had public insurance.

In a study of unmet need and problems accessing specialty medical and related services, Warfield and Gulley (2006) found that having Medicaid as the primary insurance coverage decreased the chances that a family would have problems getting enough visits or having enough money to pay for services needed by CSHCN. Also, the authors noted that if Medicaid was present as a secondary insurance, the family was less likely to report unmet health needs. This supports the idea of public insurance, either alone or in combination with private insurance, as better meeting the needs of CSHCN — access and cost — than does private alone.

### *2.9.C Income Level /Financial Problems*

In addition to the studies already discussed above, several other works included income level, poverty status, or financial problems either as independent variables or outcome measures (Kogan et al., 2005; Kuhlthau et al., 2005; Mayer et al., 2005; Newacheck & Kim, 2005; Parish, Rose, Andrews, Grinstein-Weiss, Richman, & Dababnah, 2009; “Payer of last resort,” 2007). All support the inclusion of poverty level/income level as an important variable associated with many aspects of care.

Parish et. al. (2009) found that 28 percent of children with disabilities live below the federal poverty level (FPL), a threshold definition set by the government in the 1960s based on a multiple of three times the then annual cost of a basic food budget. The authors note that FPL has only been adjusted for inflation of food costs, suggesting that it underestimates the burden of health care, housing, and other household expenditures and also fails to account for regional differences in cost of living. Parish et. al. (2009) note the additional financial hardships faced by families of CSHCN, including therapy, specialized child care, special equipment, and home modifications. The study found that across all income levels, families of CSHCN experienced greater material hardships than families of children without disabilities or special health care needs. These material hardships included food, housing, and utility insecurity. Finally, Parish et. al. (2009) found that “near-poor” families, those up to 200 percent of FPL, fared no better in general than did those at 100 percent of FPL and families at up to three times the poverty level (300 percent FPL) still experienced medical hardships (delayed care) at similar levels to those at 100 percent FPL. Similarly, Mayer et al. (2005) found that CSHCN below the poverty level were more likely to have unmet routine care needs compared with those above poverty level, as were the near-poor compared with the non-poor.

Newacheck and Kim (2005) used the 2000 Medical Expenditures Panel Survey to analyze the cost data for 6,965 children younger than age 18 and identified 949 CSHCN through the use of the screener questions developed for the NSCSHCN. They found that families of CSHCN with high out-of-pocket costs were 11 times more likely to be from households with incomes below 200 percent of FPL than from 400 percent or more, and CSHCN with expenses above five percent of income more likely from

households below 200 percent FPL. The authors also found that CSHCN in families with incomes below 200 percent FPL spent 164 percent more of their income on health care than did those at 400 percent or more; those in families at 200-400 percent FPL spent 46 percent more than those above 400 percent. Newacheck and Kim suggested that families of CSHCN below 200 percent FPL are less likely to have absolute out-of-pocket expenses than those with middle and upper incomes, but they are much more likely to have financial burden when expenses are considered as a ratio to income.

A 2007 Catalyst Center article focused on financing and hardship among families of CSHCN (“Payer of last resort...”). The publication notes that severity of the condition is associated with financial hardship, with more severe conditions resulting in higher out-of-pocket expenditures for co-payments and deductibles. These higher expenditures cause varying levels of hardship depending upon family income and other expenses, with lower income families being more likely to report financial difficulties related to the child’s health condition (“Payer of last resort...,” 2007). The study also cited the above noted Newacheck and Kim (2005) finding that found that families with incomes below 200 percent of FPL were 11 times more likely to spend more than five percent of total income on out-of-pocket costs.

Kogan et al. (2005) found more underinsured CSHCN in the lower income levels and that they were more likely to report delayed care, unmet health needs, and difficulty getting a specialty referral. They were also more likely to have financial problems and to report that a family member reduced or stopped work due to the child’s health condition.

In their analysis of the financial burden for families of CSHCN, Kuhlthau et al. (2005) included predictor variables such as the six core outcome measures as determined

by the Maternal and Child Health Bureau (medical home, family/professional partnerships, adequate insurance, organized community systems, transition, early and continuous screening), poverty level by category, type of insurance, race/ethnicity, gender, maternal education, a health status measure (amount of time affected by condition, severity of disability, school days missed), severity of condition, out-of-pocket cost, a financial impact measure, how often the child is affected by condition, and age by range. As seen in other work, the authors found a greater need for care and higher out-of-pocket costs for CSHCN. They determined that 40 percent of families with CSHCN have financial burdens related to the child's condition. Poverty level was found to be strongly related to family financial problems. In comparing across states, the study concluded that states with better results on the MCHB core outcome indicators had lower levels of family financial problems.

#### *2.9.D Inclusion Reason*

This subsection focuses exclusively on studies that used the 2000-2001 NSCSHCN data and included inclusion reason as a predictor variable for the health-related outcome. Inclusion reason pertains to positive answers on questions covering five areas. These screener questions determine which children will be included in the sample of CSHCN. (See Chapter 4, Section 4.2 for more detailed information.) Only three studies are relevant to this project: Bramlett, Reade, Bethell, and Blumberg (2009); Kogan et al. (2005); and Mulvihill et al. (2005). They support the idea that outcomes are different for CSCHN based on the reason they were included in the NSCSHCN.

Kogan et. al. (2005) found that CSHCN who need physical therapy, occupational therapy, and/or speech therapy are more likely to be underinsured. They also found that

CSHCN treated for emotional, developmental, and/or behavioral conditions were also more likely to be underinsured. This supports the structural definition of underinsurance as examined by Oswald et al. (2005) and a proposed hypothesis for this current study, as outlined in Chapter 4.

In their study of the association of condition severity with family functioning and provider relationships, Mulvihill et al. (2005) divided the population of CSHCN into a medication only (MO) group compared with a non-medication only (NMO) group based on answers to the CSHCN screener questions used by the survey to determine those included in the analysis. As hypothesized, the authors found the MO group had lower condition severity and suggested that they may have better outcomes in terms of insurance adequacy. Mulvihill et al. found that more of the NMO group live in poverty, have higher disease severity scores, have higher unmet needs in provider relationships, and have a greater need for care coordination. This highlights the importance of inclusion reason related to health characteristics and health care experiences.

Bramlett et al. (2009) used data from the 2000-2001 NSCSHCN, the 2003 National Survey of Children's Health, and the 2001 and 2002 Medical Expenditures Panel Surveys to establish subgroups of CSHCN for analysis based on the screener questions used in the NSCSHN. They note that the drawback to simply counting the number of responses to screener questions is that this method does not give information on which qualifying reason(s) is/are present. The authors labeled their method as the "type of qualifying health consequences" approach. The groups of analysis were as follows: 1) prescription medication only (prescription drugs only question and no other), 2) elevated services only (only one or more of the three service use questions — medical,



mental health, or educational services; specialized therapies; and/or treatment or counseling for chronic emotional, behavioral, or developmental condition), 3) prescription medication and elevated service use, and 4) functional limitation (alone or in combination with any other question). They found differences in health status, complexity, cost, and impact of condition on the family based upon these groupings.

According to the study results, CSHCN with functional limitations or those who qualify on more screener items have a poorer health status and more complex health needs, their insurance is more often inadequate, medical costs are higher, actual out-of-pocket costs are greater, and the impact on the family is greater. The authors conclude that CSHCN with prescription medication-only needs had better health in general and less complex needs, but were still significantly different from non-CSHCN in terms of health status, medical cost, and limitations to daily activities. This study again supports the inclusion of inclusion reason into analysis to more fully and adequately explain the health experiences of CSHCN.

#### *2.9.E Impact of Condition / Severity / Pervasiveness*

This subsection focuses on work that considered the impact or severity of the health condition using several measurements. Together, these studies support the importance of this aspect in any research analyzing outcome for CSHCN. Overall, they indicate that higher severity or great impact of the condition is associated with poorer outcomes. Also, Kogan et al. (2005) found that CSHCN with more limitations to daily activities were more likely to be underinsured.

Bumbalo et al. (2005) examined the economic impact on families of CSHCN in New Hampshire. The authors found that the impact of the condition, defined as the

amount of time affected plus the impact on ability to function, was associated with all economic impact measures considered (whether family member stopped work or reduced work hours to care for child, whether additional income was needed, whether family experienced financial problems). Kuhlthau et al. (2005) also found health status (severity) to be strongly related to family financial problems.

In their study, Inkelas, Smith, Kuo, Rudolph, and Igdaloff (2005) examined CSHCN in California. They found that CSHCN in California have poorer health care experiences compared with children in other states, specifically for unmet needs and problems with referrals. They found bigger differences for children with greater levels of impairment.

Kane et al. (2005) found that severity of illness was associated with less access to routine care and that there was a greater likelihood of not obtaining routine care as illness severity increases. In another study, Mayer et al. (2005) found that CSHCN with mild to moderate severity rankings were more likely to report unmet specialty care needs, but the most severe and least severe had no difference. They suggest a possible threshold of severity above which a family becomes adept at navigating the system or receives care coordination to assist them in meeting the child's needs.

Mulvihill et al. (2005) examined the association of condition severity with family functioning and provider relationships in Alabama CSHCN. The authors found that higher severity scores were associated with delayed or forgone care and an increased strain on family time and financial resources. Condition severity was based on a summary score calculated by the number of positive responses to the CSHCN Screener, the amount of time the condition affects the child's ability to do things, and the parent's

report of level of severity by rank. There was no weighting of individual items in the summary score as all were assumed to contribute equally. The authors conclude that special attention must be paid to children with more complex and severe conditions as they are more at risk for adverse outcomes.

In their study of underinsurance in Virginia CSHCN, Oswald et al. (2005) found pervasiveness (number of positive NSCSHCN screener question answers) to be associated with and a predictor of both the attitudinal and economic definitions of underinsurance that were utilized in the research.

In their work to establish subgroups of CSHCN for analysis, Bramlett et al. (2009) also categorized subgroups by the number of positive screener questions (1, 2, 3, 4-5). In this study, CSHCN with 4-5 positive questions had more than five times the total medical expenditures as did CSHCN with only one positive screening question. The authors suggest that the number of positive screener questions (pervasiveness) is a good linear measure of health status and complexity of need, but the type of qualifying screener (inclusion reason-see previous section) indicates subgroups with distinct needs and problems as well as differences in cost and impact on the family. They suggest that complexity indicates a need for more specialized services and specialists and of a frequency greater than that for CSHCN with less complex needs.

#### *2.9.F Functional Limitations*

This subsection focuses on the importance of functional limitations as a predictor variable. Four studies are relevant to the current work and are included for review. Two of these specifically focus on the association of functional limitation with inadequate

insurance (Bumbalo et al., 2005; Honberg et al., 2005). Overall, functional limitations have been shown to be associated with worse outcomes.

Bumbalo et al. (2005) found that families with CSHCN with greater levels of functional impact were more likely to report financial and time impacts as well as inadequate insurance.

Honberg et al (2005) found that CSHCN who were more limited functionally were half as likely to have adequate insurance and were four times more likely to have unmet needs. The authors conclude with the thought that children with the most functional limitations may provide a “barometer for how well the system is working for CSHCN” (p. 1239).

Nageswaran, Silver, and Stein (2008) used the 2000-2001 NSCSHCN data to examine the association of functional limitation with the needs and experiences of CSHCN. They found that CSHCN with severe functional limitations were more likely to receive special education, have physician visits, and have health needs. CSHCN with more severe functional limitations were found to have greater odds of delayed care, unmet needs, need for care coordination, referral problems, dissatisfaction and difficulty using the health system, and worse insurance experiences in terms of coverage, co-payments, plan problems, financial problems, and not being able to see needed providers.

Stein and Silver (2005) conducted a state-level analysis of the data from the 2000-2001 NSCSHCN and the 2000 rates of Medicaid spending per child in order to study the association between functional limitations and access to care. They found that proportions of CSHCN with functional limitations were higher in states with higher rates of uninsured and unmet health needs. Although they found no relation between

functional limitations and Medicaid spending, the authors did find that functional limitations impact the adequacy of meeting needs and insurance coverage.

### *2.9.G Age*

Many reviewed studies included age as a predictor variable, but only five specifically mention age-related findings: Inkelas et al. (2005); Kane et al. (2005); Kogan et al. (2005); Mayer et al. (2004); Warfield and Gulley (2006).

One study – Kogan et al. (2005) – did not find age differences related to underinsurance in CSHCN.

Four other studies found associations with age. In the Inkelas et al. (2005) study of unmet health needs and problems with referrals, in addition to children with greater levels of impairment, the authors also found bigger differences for adolescents. Kane et al. (2005) noted that adolescents tended to use less routine care than younger children. Warfield and Gulley (2006) found that families of CSHCN who were older were more likely to report unmet health needs. Mayer et al. (2004) found that older children were significantly more likely to have an unmet need for specialty care than were younger children. These studies support the idea that older CSHCN may have poorer experiences than do their younger counterparts.

### *2.9.H Regional Differences*

Several studies included states and/or regions in analysis of concepts related to this study (Kogan et al., 2005; “State-Specific Prevalence,” 1998; Stein & Silver, 2005; Ziller et al., 2006). Each highlights regional differences pertaining to their outcome of interest.

Kogan et al. (2005) found that CSHCN living in the South were more likely to be underinsured than were those living in the Northeast.

In an article in the *Morbidity and Mortality Weekly Report*, it was noted that the prevalence of adequate insurance was higher in the northern plains and upper Midwest, while lower in the South, Southwest, and West (“State-Specific Prevalence,” 1998).

Stein and Silver (2005) performed a state-level analysis of access to care and suggest that the variations they found reflect state policies in insuring and meeting needs, such as the differences in percent Medicaid coverage, cost/reimbursement, and EPSDT implementation in each state/region.

In a study of out-of-pocket spending, Ziller et al. (2006) compared the experiences of residents who had private insurance as categorized by urban, rural adjacent to urban, and rural nonadjacent to urban. The authors found that those categorized as living in either rural designation were more likely to be underinsured than were those categorized as living in urban settings.

### *2.9.1 Race / Ethnicity*

Many studies included race/ethnicity as a predictor variable, but three are important to the current work and indicate potential hypotheses related the race-ethnicity. Mayer et al. (2005) found that CSHCN who were African American had twice the odds of having unmet routine care needs. Kogan et al. (2005) found that Hispanic CSHCN were more likely to be underinsured than are other racial/ethnic groups. Honberg et al. (2004) found that CSHCN who were Hispanic or Black were less likely to have adequate insurance compared with other groups.

### *2.9.J Education / Maternal Education*

Several studies included educational levels as a predictor variable. Kuhlthau et al. (2005) included maternal education as an independent variable, but did not find a significant association with financial burden. Mayer et al. (2005) found that CSHCN who had mothers with less than a high school education had twice the odds of having unmet routine care needs. Warfield and Gulley (2006) found that survey respondents who had less education were less likely to report unmet health needs or problems with access to care for CSHCN. In a study of the adequacy of insurance, Stroupe et al. (2000) found that chronically ill individuals who have less than a high school education are less likely to have adequate insurance than are those with higher levels of education. Similarly, Young et al. (2005) found that CSHCN mothers with a college education were more likely to report a need for specialist care than were those mothers with less education and were less likely to report a problem getting a referral to a specialist.

### *2.9.K Family Structure*

Family structure has been shown to be related to underinsurance in two studies. In their study of underinsurance among Virginia CSHCN, Oswald et al. (2005) found that single adult household was associated with being underinsured by the economic definition of underinsurance. Also, Stroupe et al (2000) found that individuals who had a chronic illness and were married were more likely to have adequate insurance than were those who were single.

## **2.10 State Culture**

According to Elazar (1994), culture is “the way of life of a people” (p. 3). It is the “patterns of shared beliefs, values, and traditions about life held by a particular people”

(Elazar, 1994, p. 3). It is a sense of common understanding that is learned through growing up within a group and becomes second nature to members. Elazar stated that “culture is the integrating factor in society” (1994, p. 6). This shared belief system of culture is dynamic in nature as it adapts over time and in response to environmental change, but is the framework of acceptable community living within groups. The idea of culture is important to this study research because cultural differences may explain why some states and communities are more likely to feel an obligation to protect those who are less fortunate and may be less likely to tolerate disparities in, among other things, access to and quality of health care. Cultural differences may help explain why some states have designed public programs that better meet the needs of children with special health care needs and also require more of private plans in terms of coverage and benefits.

Elazar (1972) has written extensively on political culture as one of the most important factors influencing and shaping state political structure and voting behavior. Political culture is the pattern of political orientation that imbeds the political system of a state or region (Elazar, 1972, 1994). It is primarily the underlying social, economic, and psychological factors that shape politics in a state and is the source of differences in habits, perspectives, and attitudes that resonate within a particular state or region as seen through voting behavior and political organization. Political culture sets the framework for individual and group political behavior, resulting in acceptable actions, attitudes, and values. Different states and regions have different responses based on their different political cultures and it is these cultural patterns that give states their individual character and set the tone for their interaction with the nation as a whole (Elazar, 1972, 1994). This



concept is important to this study research in the sense that political culture leads states to determine what is appropriate in terms of government interaction and intervention. These cultural factors are important to whether and to what extent a state is willing to spend for government social aid programs and to how receptive they are to national initiatives based on their policy preferences as shaped by culture (Elazar, 1972). Political culture shapes the public's perception of or expectation from government service as well as the purpose of politics in general (Elazar, 1994).

Elazar (1972, 1994) holds that political culture is rooted in the historical experiences of people and came from the socio-cultural differences among early immigrants as they moved in fifteen migrational streams across the United States. These streams brought cultural characteristics that impacted the social and political structures of the states they traversed and eventually settled (Elazar, 1994). For Elazar (1972), political order is basically a difference in orientation of society as a marketplace or as a commonwealth, with power and justice sitting at two opposite poles. However, he also suggests that the national culture is a synthesis of three major subcultures – individualistic, moralistic, and traditionalistic – that are tied to sections of the country related to these migrational patterns and represent the varied heritage and ethnic and religious backgrounds of the people (Elazar, 1972, 1994). These subcultures are present in more complex societies and reflect differences within the society and culture. They are created by the different values and social interests of people to create dynamic, yet cohesive cultural patterns based not only on the migrations of old, but those still seen today. These include moves from towns to cities, from cities to suburbs, and from south

to north (Elazar, 1972, 1994). Elazar's (1972, 1994) political subcultures are summarized in Table 1 below.

Table 1. Elazar's political subcultures

Individualistic	<ul style="list-style-type: none"> <li>• State as a marketplace</li> <li>• Commitment to commercialism</li> <li>• Government for utilitarian purposes only</li> <li>• Individual opportunity and individual freedom most important</li> <li>• Private interests emphasized</li> <li>• Limited governmental intervention in private sector</li> <li>• Government intervention only to improve economy</li> <li>• Political leaders act only when public demands</li> <li>• Unwilling to initiate new programs unless public demands</li> <li>• Ambivalent towards bureaucracy</li> <li>• Most supportive on integration of diverse groups (social, religious, ethnic) into mainstream</li> <li>• Influenced by English, Continental, East European, Mediterranean, and Irish populations</li> <li>• Tend to be located more in middle states and Southwest</li> </ul>
Moralistic	<ul style="list-style-type: none"> <li>• State as a commonwealth</li> <li>• Commitment to public welfare</li> <li>• Politics to promote a “good society” and public interest</li> <li>• Communal power (if non-government impossible) to intervene in private sector if needed to promote public good</li> <li>• Government is responsible for general welfare of its people</li> <li>• Government serves the community</li> <li>• More tolerant of government intervention in economic and social life of community</li> <li>• Favor bureaucracy</li> <li>• Influenced by Yankee, North Sea, Jewish, Scottish, Dutch, Scandinavian, and Swiss populations</li> <li>• Tend to be located more in North, Northwest, and Pacific Coast</li> </ul>
Traditionalistic	<ul style="list-style-type: none"> <li>• Linked to pre-industrial and pre-commercial social order</li> <li>• Government is positive but limited to maintaining social order</li> <li>• Good government maintains traditional patterns and ways of life</li> <li>• Maintain old racial caste system and status quo</li> <li>• Hierarchical society based on elitism</li> <li>• Social and family ties emphasized</li> <li>• Conservative political leaders</li> <li>• Anti-bureaucratic</li> <li>• Influenced by African-American former slaves and Hispanic and Southern populations</li> <li>• Tend to be located more in the South</li> </ul>

Building on the work of Elazar, Joel Lieske is known for a body of work pertaining to the development of regional subcultures that have been found to be strong

predictors of social and political behavior. Using data from the 2000 U.S. Census (3,141 counties) and the 2000 Glenmary Religious Survey (13 mainline church groups), Lieske (2007) performed factor cluster analysis of 50 indicators to create regional subcultures in an effort to better predict and explain social and political behavior than other single measures. He created a vector measure by combining the proportions of the total statewide populations under the influence of 11 subcultures, thereby showing the strength of contending subcultures in the state. The 50 cultural and behavioral indicators include five measures of racial origin, 14 measures of ethnic ancestry, 16 measures of religious affiliation, and 15 measures of social structure. Behavioral indicators include measures of social disorganization, racial inequality, political partisanship, and governmental activity. Cultural indicators include social diversity (racial homogeneity, income inequality), religious beliefs (percent Christian, percent religious), social well-being (percent college, per capital income, and Elazar’s measures of subculture (traditionalistic, individualistic, moralistic). The resulting 11 regional subcultures are summarized in

Table 2 below:

Table 2. Lieske’s regional subcultures

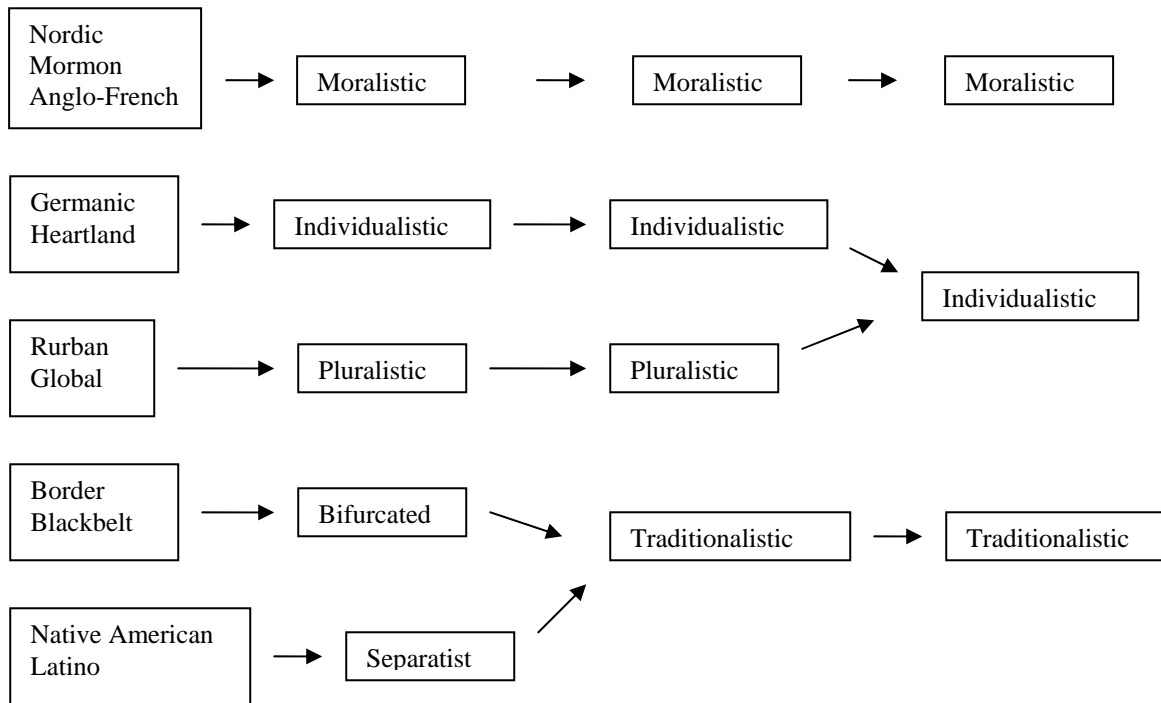
Anglo-French	<ul style="list-style-type: none"> <li>• French, British, Irish, Italian, Slavic ancestry</li> <li>• Catholic, Episcopal</li> <li>• Professional jobs</li> </ul>	1
Blackbelt	<ul style="list-style-type: none"> <li>• High divisions between black and white racial indicators and social diversity</li> <li>• Significant numbers Scot-Irish ancestry and married couples</li> </ul>	4,5
Border	<ul style="list-style-type: none"> <li>• Strong indicators of religiosity and membership in conservative churches; Southern Baptist Association, Churches of Christ</li> <li>• Significant number claim no ancestry other than “American”</li> </ul>	4,5
Global	<ul style="list-style-type: none"> <li>• Concentrated in largest and most urbanized metropolitan areas</li> <li>• Asian, Italian, Greek, Hungarian, Arab, West Indian ancestry</li> <li>• Judaism</li> </ul>	3,6
Germanic	<ul style="list-style-type: none"> <li>• German ancestry</li> <li>• Lutheran, United Church of Christ</li> <li>• Large numbers of working women</li> <li>• Low levels of income inequality</li> </ul>	1
Heartland	<ul style="list-style-type: none"> <li>• Regional location, settled central heartland</li> <li>• Sided with the North during Civil War</li> </ul>	1

	<ul style="list-style-type: none"> <li>• American Baptist, United Methodist, Christian Church, Churches of Christ</li> </ul>	
Latino	<ul style="list-style-type: none"> <li>• High percentage identified self as “Latino”</li> <li>• Catholic</li> <li>• Western states; mining industry</li> </ul>	4
Mormon	<ul style="list-style-type: none"> <li>• Dutch, British ancestry</li> <li>• Presbyterian, Mormon</li> </ul>	1,7
Native American	<ul style="list-style-type: none"> <li>• “Nation within a nation” because of reservations</li> <li>• Outside cultural mainstream</li> <li>• Native American and Episcopal religions (missionary and ranchers)</li> </ul>	4
Nordic	<ul style="list-style-type: none"> <li>• High concentrations of Scandinavian and German ancestry</li> <li>• Lutheran</li> <li>• High proportions claim membership in religious organizations</li> </ul>	1,2,7
Rurban	<ul style="list-style-type: none"> <li>• Frontier, rural-urban habitats</li> <li>• High levels of education, working women, residential mobility, and younger populations</li> <li>• Pastoral academic settings, less populated states west of Mississippi River</li> <li>• Emerging high-tech industry</li> <li>• Seaside coastal communities of wealthy baby boomers nearing retirement</li> </ul>	3

- 1 Most culturally homogenous
- 2 Most Christian and religious
- 3 Highest mean levels of education and income
- 4 Lowest mean levels of education and income
- 5 “Traditionalistic”
- 6 “Individualistic”
- 7 “Moralistic”

Building upon his previous work, Lieske (2008) sought to create reduced typologies of his 11 regional subcultures so that they might be applied more easily to state-level research. The reduced typologies are good indicators of the original subcultures; however, they do not do as well in predicting and explaining social and political behavior and lead to results that are underspecified. This may be due in part to the concept of state and political culture being a distinctive blend of factors as opposed to uniform characteristics (Lieske, 2008). The reduced typologies for regional subcultures are as shown in Figure 3 below:

Figure 3. Lieske's reduced typologies for regional subculture



The second tier reductions to one of five subcultures can be represented along a continuum of characteristics as displayed in the Figure 4 below (Lieske, 2008):

Figure 4. Continuum of Lieske's reduced subcultures

**Moralistic → Individualistic → Pluralistic → Bifurcated → Separatist**

- More homogeneous, communalist, assimilationist, nationalist
- Encourage political participation
- Women in state legislative office, but not Black or Hispanic
- Lower female head of household, poverty, and crime
- Lower levels of social disorganization and racial inequality

- More heterogeneous
- Multicultural
- Higher female head of household, poverty, crime
- Higher levels social disorganization and racial inequality

### **Chapter 3 Research Hypotheses and Methodology**

The research aim of this work is to analyze a group of children with special health care needs (CSHCN) to determine factors that influence the adequacy of insurance coverage in terms of meeting condition-specific needs. Also, comparisons will be made within subgroups – the insured groups (private and public), those with functional limitations, those with higher severity, and those who qualified only by needing prescription medications – to examine whether some children are more likely to be underinsured than others based on demographics, family characteristics or illness-related variables. This will involve between group analysis and within group analysis to consider the following overarching questions:

- 1) What characteristics increase the likelihood of CSHCN being underinsured?
- 2) Is there a difference in the likelihood of being underinsured between CSHCN with public insurance and CSHCN with private insurance?
- 3) Is there a difference within each subset of insured CSHCN – public and private – such that certain groups are more likely to be underinsured than are others?

#### **3.1 Research Hypotheses**

The research considers the hypotheses presented in Figure 5 below. These are discussed in detail over the remainder of this section.

Figure 5. Hypotheses by research question

**Research Question 1. What characteristics increase the likelihood of CSHCN being underinsured?**

1. Among CSHCN with insurance, the higher the severity, the greater the likelihood of being underinsured.
2. Among CSHCN with insurance, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.
3. Among CSHCN with insurance, those who qualify with “medication only” needs are less likely to be underinsured than are those who qualify with “any other” needs.

**Research Question 2. Is there a difference in the likelihood of being underinsured between CSHCN with public insurance and CSHCN with private insurance?**

4. Among CSHCN with insurance, those with private insurance are more likely to be underinsured than are those with public insurance.
5. Among CSHCN with insurance who have higher severity, those with private insurance are more likely to be underinsured than are those with public insurance.
6. Among CSHCN with insurance who have functional limitations, those with private insurance are more likely to be underinsured than are those with public insurance.

**Research Question 3. Is there a difference within each subset of insured CSHCN – public and private – such that certain groups are more likely to be underinsured than are others?**

7. Among CSHCN with private insurance, those with lower the income levels are more likely to be underinsured than are those with higher income levels.
8. Among privately insured CSHCN and publicly insured CSHCN respectively, those with higher severity are more likely to be underinsured than are those with lower severity.
9. Among privately insured CSHCN and publicly insured CSHCN respectively, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.

*Hypothesis 1. Among CSHCN with insurance, the higher the severity, the greater the likelihood of being underinsured.*

This hypothesis is supported through the reviewed literature presented in Chapter 2, Section 2.9.E (Bramlett et al., 2009; Bumbalo et al., 2005; Honberg et al., 2009; Inkelas et al., 2005; Kane et al., 2005; Kogan et al., 2005; Kuhlthau et al., 2005; Mayer et al., 2005; Mulvihill et al., 2005; Oswald et al., 2005). None of the reviewed studies except Honberg et al. (2005, 2009) and Kogan et al. (2005) focus specifically on

underinsurance. However, the outcomes of interest of the researchers in this section (economic impact, unmet needs, problems with referrals, access to routine care, unmet specialty care needs, financial problems, and family functioning and provider relationships) are related to underinsurance at least in some definitions. These alternate definitions will be examined in the proposed research. Kogan et al. (2005) did find that CSHCN with more limitations to daily activities were more likely to be underinsured, suggesting that higher condition severity might also be related to underinsurance. Also, Honberg et. al. (2009) found that the greater the impact of the child's condition, the less likely the child was to have adequate insurance. This finding is based on data from the same source as will be used in this study research; however, the results are for only one definition of underinsurance – aligned with the attitudinal definition in this project.

*Hypothesis 2. Among CSHCN with insurance, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.*

The formulation of this hypothesis is based upon the literature reviewed in Chapter 2, Section 2.9.F. Bumbalo et al. (2005) and Honberg et al. (2005) found that CSHCN with more functional limitations were less likely to be adequately insured. This supports the idea that regardless of type of insurance, those CSHCN whose condition results in functional limitations will be more likely to be underinsured. Work by Nageswaran et al. (2008) and Stein and Silver (2005) focused on specific aspects of care, including access to care, delayed care, unmet needs, satisfaction, difficulty using the health system, and insurance experiences. These researchers also found that CSHCN with more functional limitations were more likely to have poor outcomes than were those CSHCN without or with lower levels of functional impact.



*Hypothesis 3. Among CSHCN with insurance, those who qualify with “medication only” needs are less likely to be underinsured than are those who qualify with “any other” needs.*

This hypothesis is based upon anecdotal experiences gained through involvement in the administration of the Title V Children with Special Health Care Needs program in Alabama as well as reviewed literature in Chapter 2, Section 2.9.D (Bramlett et al., 2009; Kogan et al., 2005; Mulvihill et al., 2005). Kogan et al. (2005) found that specific reasons for inclusion in the National Survey of Children with Special Health Care Needs other than medication were more likely associated with underinsurance. Similarly, Bramlett et al. (2009) and Mulvihill et al. (2005) found those included based on medication needs only were different from those CSHCN who had other needs and qualified under other reasons. This “medication only” group had less complex health conditions in general, suggesting better outcomes. The findings merit further research in specifically comparing this group with other CSHCN in terms of underinsurance, but do support the formulation of a hypothesis that CSHCN who were included based on medication needs may be more likely to have adequate insurance than do their counterparts who have different and more complex needs.

*Hypothesis 4. Among CSHCN with insurance, those with private insurance are more likely to be underinsured than are those with public insurance.*

This hypothesis is based upon my anecdotal experiences gained in providing allied health and related services to children with disabilities. In addition, it is supported through the literature reviewed in Chapter 2, Section 2.8. The Family Voices study discussed by Szilagyi (2003) is detailed in a policy brief released by the organization (“The importance of public insurance/Medicaid coverage for children with special health care needs”). In that report, families of CSHCN with severe levels of need were

surveyed. Those with Medicaid as the primary insurance were more likely to report their health plan as good or excellent in providing access to physical, occupational and speech therapy than were those whose primary insurance was a private plan (62 percent vs. 42 percent). The same report also showed that families of CSHCN with Medicaid either as primary or secondary coverage had an easier time accessing mental health services (54 percent vs. 38 percent), were more satisfied with obtaining a needed special diet or nutrition services (70 percent vs. 48 percent) and were more satisfied in receiving necessary disposable medical supplies (80 percent vs. 62 percent) than were families of CSHCN who only had private coverage.

Finally, this issue merits further research given the mixed findings in the literature, as described in Chapter 2, Section 2.9.B. Of the studies reviewed, five found no significant differences in results based on public vs. private insurance, two indicated differences in expenditures and/or medical debt only, and five found better performance for public insurance (Banthin et al., 2008; Bumbalo et al., 2005; Davidoff, 2004; Honberg et al., 2005; Honberg et al., 2009; “Impacts of Medicaid and SCHIP,” 2007; Kane et al., 2005; Kuhlthau et al., 2005; Mayer et al., 2005; Smaldone et al., 2005; Tu & Cunningham, 2005; Warfield & Gulley, 2006). Of all these studies reviewed, only two actually focus on the concept of adequacy of insurance as opposed to other dependent variables of interest (Honberg et al., 2005 and 2009). In both cases, the authors used only one definition of underinsurance as the dependent variable – aligned with the attitudinal definition in the project – and the results were mixed with private/public differences noted in the second, but not the first study (Honberg et al., 2005 and 2009).

*Hypothesis 5. Among CSHCN with insurance who have higher severity, those with private insurance are more likely to be underinsured than are those with public insurance.*

This hypothesis is supported through the reviewed literature presented in Chapter 2, Section 2.9.E (Bramlett et al., 2009; Bumbalo et al., 2005; Inkelas et al., 2005; Kane et al., 2005; Kogan et al., 2005; Kuhlthau et al., 2005; Mayer et al., 2005; Mulvihill et al., 2005; Oswald et al., 2005). This literature supports the idea of impact of condition severity on underinsurance and other aspects of care regardless of type of insurance. Going further, this hypothesis will compare CSHCN grouped by severity to examine whether those with private insurance are more likely to be underinsured than are those with public insurance. Other research has examined private-public differences (see Chapter 2, Section 2.9.B), but none have specifically analyzed differences in underinsurance between public and private insurance based on condition severity.

*Hypothesis 6. Among CSHCN with insurance who have functional limitations, those with private insurance are more likely to be underinsured than are those with public insurance.*

The formulation of this hypothesis is based upon the literature reviewed in Chapter 2, Section 2.9.F., which suggests that the impact of functional limitation on underinsurance and other aspects of care is important regardless of type of insurance. Going further, this hypothesis will compare CSHCN grouped by functional limitation to examine whether those with private insurance are more likely to be underinsured than are those with public insurance. Other research has examined private-public differences (see Chapter 2, Section 2.9.B), but none has specifically analyzed differences in underinsurance between public and private insurance based on functional limitation.

*Hypothesis 7. Among CSHCN with private insurance, those with lower income levels are more likely to be underinsured than are those with higher income levels.*

The literature reviewed in Chapter 2, Section 2.9.C justifies the consideration of this hypothesis (Kogan et al., 2005; Kuhlthau et al., 2005; Mayer et al., 2005; Newacheck & Kim, 2005; Parish et. al., 2009; “Payer of last resort,” 2007). Although all studies but one focused on unmet routine care needs, out-of-pocket costs, and financial burden as the result of illness, it is plausible that lower income would also be related to underinsurance. Kogan et al. (2005) found more underinsured CSHCN in the lower income levels. This supports the overall idea that there will be groups of privately insured CSHCN who are more likely to be underinsured than others, with income level potentially being one of these predictive variables.

*Hypothesis 8. Among privately insured CSHCN and publicly insured CSHCN respectively, those with higher severity are more likely to be underinsured than are those with lower severity.*

As above, the literature reviewed related to Hypothesis 1 supports the idea of impact of condition severity on underinsurance. It is plausible to consider that groups may form within insurance type, perhaps more commonly among private plans since they have wide variability in terms of benefits provided and cost-sharing requirements. Rather than comparing public and private plans or examining the total group based on condition severity, this hypothesis will consider whether some CSHCN within privately insured and publicly insured groups are more likely to be underinsured based upon condition severity. The goal is to identify more vulnerable groups within the population of CSHCN covered by public and private insurance.

*Hypothesis 9. Among privately insured CSHCN and publicly insured CSHCN respectively, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.*

As above, the literature reviewed that pertains to Hypothesis 2 supports the possibility of impact of functional limitation on underinsurance. It is plausible to consider that groups may form within insurance type, perhaps more commonly in private plans since these plans have wide variability in terms of benefits provided and cost-sharing requirements. Rather than comparing public and private plans or examining the total group based on functional limitation, this hypothesis will consider whether some CSHCN within privately insured and publicly insured groups are more likely to be underinsured based upon functional limitation. The goal is to identify more vulnerable groups within the population of CSHCN covered by public and private insurance.

### **3.2 Data Sources**

#### *3.2.A National Survey of Children with Special Health Care Needs*

##### *3.2.A.1 Overview*

The majority of data for this project comes from a portion of data collected through the National Survey of Children with Special Health Care Needs, 2005-06 (NSCSHCN) (Centers for Disease Control and Prevention, National Center for Health Statistics, National Survey of Children with Special Health Care Needs, 2005-06). This survey is sponsored by the U.S. Department of Health and Human Services, Maternal and Child Health Bureau and was conducted by the National Center for Health Statistics at the Centers for Disease Control and Prevention (Blumberg, Welch, Chowdhury, Upchurch, Parker, and Skalland, 2007; Child and Adolescent Health Measurement Initiative [CAHMI], 2008). The goals of the survey were to provide national and state-specific estimates of the prevalence of CSHCN, to describe the need for and use of services, and to identify barriers to care experienced by CSHCN and their families

(Blumberg et al., 2007). The data represent parent- or caregiver-reported information on health status and experiences with the system of care for CSHCN and their families (CAHMI, 2008). The results are weighted to characterize the population of CSHCN from ages 0 to 17 years, nationally and within states (Blumberg et al., 2007; CAHMI, 2008).

The NSCSHCN interview covers 11 sections: age-eligibility screening, special health care needs screening, health and functional status, access to care/utilization and unmet needs, care coordination, family-centered care/transition issues/ease of service use, health insurance, adequacy of health care coverage, impact on the family, family composition, and income and other demographics. A series of stem and follow-up questions yields results for individual and derived variables.

Of those children included in the survey, a subset is identified as CSHCN via the use of a screening instrument, the CSHCN Screener. This validated tool includes five stem questions with follow-up questions for each. These pertain to health needs that may result from chronic health conditions. If a respondent answers positively to any of the stem questions, the interviewer then administers the follow-up questions. A child is “screened into” the survey if the respondent answers positively to any of the five stem questions and the subsequent follow-up questions associated with it. Figure 6 below displays the design of the CSHCN Screener.

Figure 6. CSHCN Screener questions, 2005-06 survey

**Table A. CSHCN Screener questions used in the 2005-06 survey**

<b>Introductory Statements</b>	
The next questions are about any kind of health problems, concerns, or conditions that may affect your child's physical health, behavior, learning, growth, or physical development. Some of these health problems may affect your child's abilities and activities at school or at play. Some of these problems affect the kind or amount of services your child may need or use.	
<b>Stem Question</b>	<b>Follow-Up Questions</b>
1. Does your child currently need or use medicine prescribed by a doctor, other than vitamins?	(IF YES) Is your child's need for prescription medicine because of any medical, behavioral, or other health condition? (IF YES) Is this a condition that has lasted or is expected to last 12 months or longer?
2. Does your child need or use more medical care, mental health or educational services than is usual for most children of the same age?	(IF YES) Is your child's need for medical care, mental health or educational services because of any medical, behavioral, or other health condition? (IF YES) Is this a condition that has lasted or is expected to last 12 months or longer?
3. Is your child limited or prevented in any way in his or her ability to do the things most children of the same age can do?	(IF YES) Is your child's limitation in abilities because of any medical, behavioral, or other health condition? (IF YES) Is this a condition that has lasted or is expected to last 12 months or longer?
4. Does your child need or get special therapy, such as physical, occupational or speech therapy?	(IF YES) Is your child's need for special therapy because of any medical, behavioral, or other health condition? (IF YES) Is this a condition that has lasted or is expected to last 12 months or longer?
5. Does your child have any kind of emotional, developmental or behavioral problem for which he or she needs treatment or counseling?	(IF YES) Has your child's emotional, developmental or behavioral problem lasted or is it expected to last 12 months or longer?

Note. From Blumberg SJ, Welch EM, Chowdhury SR, Upchurch HL, Parker EK, Skalland BJ. Design and operation of the National Survey of Children with Special Health Care Needs, 2005-06. National Center for Health Statistics. Vital Health Stat 1. Forthcoming. Advance Access Online Version (November 28, 2007).

### 3.2.A.2 Development / Sampling Design / Data Collection

The NSCSHCN was first conducted in 2001 and was the first survey to use comparable methods across all states to provide information on this population (Blumberg et al., 2007). The survey was revised for its second iteration, and was piloted in the fall of 2004 (Blumberg et al., 2007; CAHMI, 2008). A total of 40,840 CSHCN interviews were conducted – approximately 750 per state – with an overall response rate of 56.1 percent. There was also a 6,083 national reference sample of non-CSHCN (Blumberg et al., 2007; CAHMI, 2008).

This survey was conducted as a part of the State and Local Area Integrated Telephone Survey (SLAITS) program, which is a large, ongoing survey system dedicated to monitoring the “health and well-being of children and adults” (Blumberg et al., 2007, p. 9). Surveys using this program follow the sample designs of the National Immunization Study (NIS), targeting children ages 19 to 35 months for information about vaccination rates. This study design calls for the use of random-digit dialing and computer-assisted telephone interviewing (CATI) to contact more than 1 million households each year to identify children in the above-noted age range. This allows the opportunity to conduct other surveys during the process (Blumberg et al., 2007). The NIS establishes non-overlapping estimation areas across the United States, with each area lying totally within the borders of a state. Telephone numbers are then randomly selected from banks of consecutive numbers for the area. Cellular numbers are excluded (Blumberg et al., 2007).

For the NSCSHCN, the first level of sampling design involved using the telephone numbers generated as a part of the NIS. In some states, the NIS sample was not large enough to assure the desired number of interviews, so the second level design resulted in additional random telephone numbers being drawn to supplement. The number of telephone numbers that would need to be contacted was calculated based on the estimated proportion of households with children younger than age 18 in the estimation area and the number of expected working residential lines with increases to compensate for non-response. The overall goal was to have a sample large enough to represent state populations of CSHCN and allow for comparisons of characteristics within the state. The objectives were to obtain a sample of at least 750 CSHCN per state



(including the District of Columbia) and a response rate of at least 50 percent in each state (Blumberg et al., 2007).

Interviews were conducted by trained and certified interviewers from the National Opinion Research Center of the University of Chicago or one of its subcontractees. An assurance of confidentiality was given and informed consent was obtained from each respondent. The survey was administered in English and Spanish directly, and through a translator for those respondents who spoke Mandarin, Cantonese, Vietnamese, or Korean (Blumberg et al., 2007).

Data collection occurred over seven quarters between April 5, 2005, and Feb. 5, 2007. Methods to improve response rates included an advance letter, toll-free numbers, refusal conversion efforts, and translation. Monetary incentives of \$15 and \$25 were offered beginning in the July 2006 and fall 2006, respectively, because response rates were lower than deemed acceptable in several states. Overall, the monetary incentives improved response rates in the CSHCN sample by 3.5 percentage points and by 4.5 percentage points in the reference sample. These efforts resulted in more than 750 completed interviews in some states as researchers continued to conduct interviews in an effort to achieve response rates of at least 50 percent. At conclusion, only Alaska failed to achieve the desired number of 750 completed CSHCN interviews and only New Jersey failed to meet the desired CSHCN response rate (Blumberg et al., 2007).

### *3.2.A.3 Specifications for Weighting / Analysis*

According to technical specifications, the NSCSHCN samples must be weighted to provide estimates that can be generalized to children or households with children at state and national levels. These must be adjusted to reflect characteristics from the U.S.

Census, and more adjustments must be made to account for probability of selection, access to telephones, multiple phone lines, and non-response bias. Further, the CSHCN sample must be weighted to reflect the non-institutionalized population of CSHCN ages 0-17 years (Blumberg, et al., 2007; CAHMI, 2008).

Three sampling weights were calculated for the main sample and one additional weight was developed for the reference sample. Specifically, a base sample weight was created for each location by calculating the inverse probability of selection of any telephone line. Then, the household screener weight (households that completed a screener interview) was created by adjusting the base sample weight for non-response and multiple telephone lines and then stratifying to match Census population estimates. The child screener weight (demographic information and CSHCN status gained from main sample) was created by adjusting the household screener weight to annual population estimates from the Census Bureau (2005 estimates projected to March 2006) and the Current Population Survey (averaged over 2004, 2005, and 2006). The child interview weight (information from the entire interview) was generated by adjusting the child screener weight for non-response and the number of CSHCN in the household and then stratifying so the results sum to the number of children in the nation as estimated in the child screener weight (Blumberg, et al., 2007).

### *3.2.B Geographic Region*

The data for geographic region was obtained from the United States Census Bureau designations. The designations by state are included in the Appendix of this project.

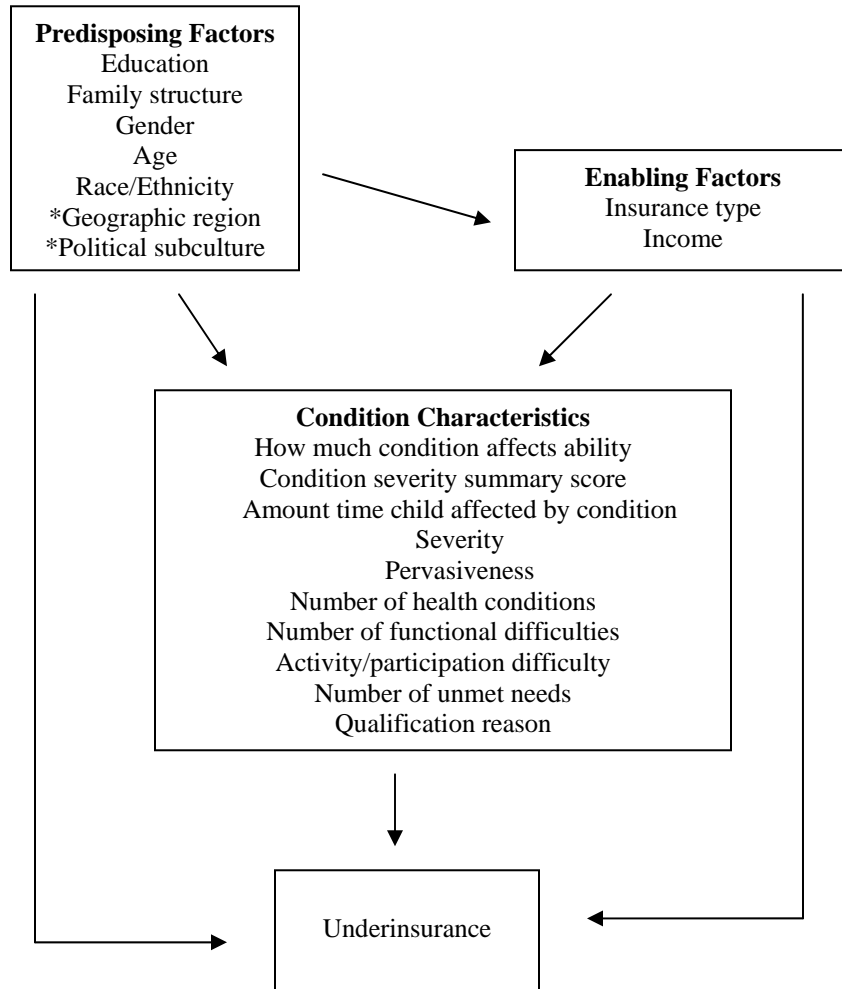
### *3.2.C Lieske's Regional Subcultures*

The data for Lieske's regional subcultures and reduced typologies are obtained from his article entitled, "Indexing State Cultures: Unidimensional Versus Multidimensional Measures," (2008). The designations by state are included in the Appendix of this project.

### **3.3 Conceptual Model**

Figure 7 graphically depicts the conceptual model that represents the work of this project. The dependent variable is "underinsurance" by any of four definitions – attitudinal, economic, structural, or equipment/supplies. Predictor or independent variables are divided into three broad categories: predisposing factors, enabling factors, and condition characteristics. Although geographic region and political subculture may have separate, contextual influences, they are presented as predisposing factors in this conceptual model because they are part of the background influences on the child and family. The sample includes only CSHCN who were continuously-insured during the year prior to the survey interview. This is the general conceptual model for the project. Additional analysis will follow based on public/private insurance type stratification and condition-specific subgroups of influence. Although the model will follow the same general format, some variables may be omitted based on this secondary analysis. For example, a separate variable for insurance type will be excluded from the conceptual model when public/private stratifications are analyzed.

Figure 7. Conceptual model: influences on underinsurance in continuously-insured CSHCN



\*Contextual variables

### **3.4 Variables**

#### *3.4.A. Dependent Variables*

The dependent variable in this study is underinsurance; however four separate definitions and measures were used. This is based on concepts discussed by Ward in 2006 and on research by Oswald et al. (2005). Oswald et al. (2005) found that using different definitions of underinsurance identified different children. The authors suggested that using one definition only does not fully describe the population of

underinsured CSHCN. Given the variability of need and lack of consensus on a definition of underinsurance, the use of four measurements will assure a more comprehensive assessment of how well insurance meets the needs of CSHCN. The following definitions are utilized and are described in this section:

- 1) Underinsured – Attitudinal definition
- 2) Underinsured – Economic definition
- 3) Underinsured – Structural definition
- 4) Underinsured – Equipment / Supplies definition

Each definition is recoded from individual survey responses following the guidelines described in the literature (Honberg et. al., 2005; Honberg et. al., 2009; Kogan et. al., 2005; Oswald et. al., 2005; Oswald et. al., 2007). The coding is summarized below; however those interested may view a more detailed description by examining the syntax output, included in the Appendix.

The attitudinal definition of underinsurance is based on Ward's concepts (2006) and on work by Honberg et. al. (2005), Honberg et. al. (2009), Kogan et. al. (2005), Oswald et. al. (2005), and Oswald et. al. (2007). All works used the 2001 iteration of the National Survey of Children with Special Health Care Needs except the more recent Honberg et. al. (2009), which used the second version from 2005-06. The same measurement was used in this study by replicating the coding by question as described in the literature. The measurement and coding is as follows:

*Attitudinal Definition* (designated as underinsured if any one or more of the following conditions is true):

- Does ("S" CHILD)'s health insurance offer benefits or cover services that meet (his/her) needs?  
Response = Never or Sometimes
- Does ("S" CHILD)'s health insurance allow (him/her) to see the health care providers (he/she) needs?  
Response = Never or Sometimes

- Are the costs not covered by (“S” CHILD)’s health insurance reasonable?  
Response = Never or Sometimes

Table 3. Coding summary: underinsured – attitudinal definition

<b>I. Underinsured – Attitudinal</b>		<b>0 = No 1 = Yes</b>	<b>If any (A. – C.) = 1, code 1</b>
A.	Health insurance benefits meet child's needs	<b>1= Never</b>	<b>1</b>
		<b>2= Sometimes</b>	
		3= Usually	0
		4=Always	
B.	Non-covered charges reasonable	<b>1= Never</b>	<b>1</b>
		<b>2= Sometimes</b>	
		3= Usually	0
		4=Always	
		5= No Out Of Pocket	
C.	Insurance allows child to see providers as needed	<b>1= Never</b>	<b>1</b>
		<b>2= Sometimes</b>	
		3= Usually	0
		4=Always	

The economic definition of underinsurance is based on Ward’s concepts (2006) and work by Oswald et al. (2005), and Oswald et al. (2007). Again the works utilized the 2001 iteration of the National Survey of Children with Special Health Care Needs. The same measurement was used in this study by replicating the coding by question as described in the literature and based upon a phone conversation with Dr. Oswald. The measurement and coding is as follows:

*Economic Definition* (designated as underinsured if any one or more of the following conditions is true):

- Did you delay or not get health care for (“S” CHILD) because you didn’t have enough money to pay the health care provider?  
Response = Yes
- Child did not receive needed (insert type of care listed below) because  
 routine preventive care  
 care from a specialty doctor  
 dental care  
 prescription medications  
 physical, occupational, or speech therapy  
 mental health care or counseling  
 substance abuse treatment  
 Response = Cost too much

- Parent or family did not receive needed (insert type of care listed below) because  
 respite care  
 genetic counseling  
 mental health care or counseling  
 Response = Cost too much
- Have you needed additional income to cover (“S” CHILD)’s medical expenses?  
 Response = Yes
- Has (“S” CHILD)’s health care caused financial problems for your family?  
 Response = Yes

Table 4. Coding summary: underinsured – economic definition

<b>II. Underinsured – Economic</b>		<b>0 = No 1 = Yes</b>	<b>If any (A. – E.) = 1, code 1</b>
<b>A. Delayed care</b>			<b>0 = No 1 = Yes</b>
Delayed care – did not have money to pay provider		<b>0 = No</b>	<b>1 = Yes</b>
<b>B. Health Services</b>		<b>If any (1. – 8.) = 1, code 1</b>	<b>0 = No 1 = Yes</b>
1.	Did not receive needed routine care – cost too much	<b>0 = No 1 = Yes</b>	
2.	Did not receive needed care from a specialist – cost too much	<b>0 = No 1 = Yes</b>	
3.	Did not receive needed preventive dental care including check ups – cost too much	<b>0 = No 1 = Yes</b>	
4.	Did not receive needed other dental care – cost too much	<b>0 = No 1 = Yes</b>	
5.	Did not receive needed prescription medications – cost too much	<b>0 = No 1 = Yes</b>	
6.	Did not receive needed physical, occupational, or speech therapy – cost too much	<b>0 = No 1 = Yes</b>	
7.	Did not receive needed mental health care – cost too much	<b>0 = No 1 = Yes</b>	
8.	Did not receive needed substance abuse treatment – cost too much	<b>0 = No 1 = Yes</b>	
<b>C. Support Services</b>		<b>If any (1. – 3.) = 1, code 1</b>	<b>0 = No 1 = Yes</b>
1.	Did not receive needed respite care – cost too much	<b>0 = No 1 = Yes</b>	
2.	Did not receive needed genetic counseling – cost too much	<b>0 = No 1 = Yes</b>	
3.	Did not receive needed family mental care – cost too much	<b>0 = No 1 = Yes</b>	
<b>D. Financial Problems</b>			<b>0 = No 1 = Yes</b>
Child's health care has caused financial problems		<b>0 = No</b>	<b>1 = Yes</b>
<b>E. Additional Income</b>			<b>0 = No 1 = Yes</b>
Needed additional income for child's medical expenses		<b>0 = No</b>	<b>1 = Yes</b>

The structural definition of underinsurance is based on Ward’s concepts (2006) and on work by Oswald et al. (2005). The work utilized the 2001 iteration of the National Survey of Children with Special Health Care Needs. The same measurement was used in this study by replicating the coding by question as described in the literature and based upon a phone conversation with Dr. Oswald. The measurement and coding is as follows:

*Structural Definition* (designated as underinsured if any one or more of the following conditions is true):

- Did you delay or not get health care for (“S” CHILD) because the type of health care was not covered by your health plan?  
Response = Yes
- Did you delay or not get health care for (“S” CHILD) because you could not get approval from your health plan or doctor?  
Response = Yes
- Child did not receive needed (insert type of care listed below) because
  - routine preventive care
  - care from a specialty doctor
  - dental care
  - prescription medications
  - physical, occupational, or speech therapy
  - mental health care or counseling
  - substance abuse treatment
 Response = Health plan problem
- Parent or family did not receive needed (insert type of care listed below) because
  - respite care
  - genetic counseling
  - mental health care or counseling
 Response = Health plan problem

Table 5. Coding summary: underinsured – structural definition

<b>III. Underinsured – Structural</b>		<b>0 = No</b> <b>1 = Yes</b>	<b>If any (A. – C.) = 1, code 1</b>
<b>A. Delayed Care</b>		If 1. or 2. = 1, code 1	
		0 = No	<b>1 = Yes</b>
1.	Delayed care – type of care not covered by health plan	0 = No	<b>1 = Yes</b>
2.	Delayed care – could not get approval from health plan or doctor	0 = No	<b>1 = Yes</b>
<b>B. Health Services</b>		If any (1. – 8.) = 1, code 1	
		0 = No	<b>1 = Yes</b>



1.	Did not receive needed routine preventive care – health plan problem	0= No 1= Yes
2.	Did not receive needed care from a specialist – health plan problem	0= No 1= Yes
3.	Did not receive needed preventive dental care including check ups– health plan problem	0= No 1= Yes
4.	Did not receive needed other dental care – health plan problem	0= No 1= Yes
5.	Did not receive needed prescription medications – health plan problem	0= No 1= Yes
6.	Did not receive needed physical, occupational, or speech therapy – health plan problem	0= No 1= Yes
7.	Did not receive needed mental health care – health plan problem	0= No 1= Yes
8.	Did not receive needed substance abuse treatment – health plan problem	0= No 1= Yes
<b>C. Support services</b>		
	If any (1. – 3.) = 1, code 1	0 = No 1 = Yes
1.	Did not receive needed respite care – health plan problem	0= No 1= Yes
2.	Did not receive needed genetic counseling – health plan problem	0= No 1= Yes
3.	Did not receive needed family mental care – health plan problem	0= No 1= Yes

The equipment/supplies definition is based on anecdotal experiences gained through involvement in administration of the Title V CSHCN Program in Alabama as well as a Survey and Policy Brief by Family Voices (Szilagyi, 2003; “The importance of,” 1998). In Section 3.1, the description of Hypothesis 4 cites differences in satisfaction for obtaining medical supplies among other services. The highlighting of this specific service shows its importance to families of CSHCN and support the inclusion of this definition of underinsurance that includes medical supplies. Also, based on internal data reports of expenditures over the past three years by Alabama’s Title V CSHCN Program (Children’s Rehabilitation Service), vision and hearing services/eyeglasses and hearing aides, durable medical equipment/mobility aids/augmentative communication devices, orthotics/prosthetics, and medical supplies were the 3<sup>rd</sup>, 4<sup>th</sup>, 7<sup>th</sup>, and 10<sup>th</sup> highest

categories of expenditures, respectively (“Authorizations and expenditures,” run date 3/20/2009). The measurement and coding is as follows:

*Equipment / Supplies Definition* (designated as underinsured if any one or more of the following conditions is true):

- Child did not receive all needed:
  - Home health care
  - Eyeglasses/vision care
  - Hearing aids /hearing care
  - Mobility aids or devices
  - Communication aids or devices
  - Medical supplies
  - Durable medical equipment

Table 6. Coding summary: underinsured – equipment/supplies definition

<b>IV. Underinsured – Equipment / Supplies</b>		0 = No 1 = Yes	If any (1. – 7.) = 1, code 1
1a.	Past 12 months, needed home health care	0= No 1= Yes	<b>If 1.a = 1 and 1.b = 0, code 1</b> If any other, code 0
1b.	Received all the home health care needed	0= No 1= Yes	
2a.	Past 12 months, needed eyeglasses/vision care	0= No 1= Yes	<b>If 2.a = 1 and 2.b = 0, code 1</b> If any other, code 0
2b.	Received all needed eyeglasses/vision care	0= No 1= Yes	
3a.	Past 12 months, needed hearing aids/hearing care	0= No 1= Yes	<b>If 3.a = 1 and 3.b = 0, code 1</b> If any other, code 0
3b.	Received all needed hearing aids/hearing care	0= No 1= Yes	
4a.	Past 12 months, needed mobility aids/devices	0= No 1= Yes	<b>If 4.a = 1 and 4.b = 0, code 1</b> If any other, code 0
4b.	Received all needed mobility aids/devices	0= No 1= Yes	
5a.	Past 12 months, needed communication aids/ devices	0= No 1= Yes	<b>If 5.a = 1 and 5.b = 0, code 1</b> If any other, code 0
5b.	Received all needed communication aids/ devices	0= No 1= Yes	
6a.	Past 12 months, needed medical supplies	0= No 1= Yes	<b>If 6.a = 1 and 6.b = 0, code 1</b> If any other, code 0
6b.	Received all needed medical supplies	0= No 1= Yes	
7a.	Past 12 months, needed durable medical equipment	0= No 1= Yes	<b>If 7.a = 1 and 7.b = 0, code 1</b> If any other, code 0
7b.	Received all needed durable medical equipment	0= No 1= Yes	

### 3.4.B. Independent Variables

The independent or predictor variables included in this research are based on the literature reviewed in Chapter 2, beginning specifically in Section 2.9. Using a subpopulation procedure, only those CSHCN who were continuously insured for the entire year preceding the survey were included in this research. For clarity and simplicity, independent variables were divided into predisposing factors, enabling factors, and condition characteristics. Further discussion of these variables and a summary table for coding follows.

#### Predisposing factors

For the purposes of this study, predisposing factors are variables that contain demographic information about the child and his or her household. These are either inherent factors or social/educational influences that may influence underinsurance status in this population.

1. Education: This is the highest level of education of anyone in the home. It was originally coded at three levels, but these were collapsed into two categories – high school or less and more than high school – as the high school completion level is a logical stopping point for educational status. This also allows for examination of the impact of higher education on underinsurance status.
2. Family Structure: This is the family structure of the child's household. It was originally coded at four levels, but this was recoded to two levels – single mother and all other – to examine the impact of a single parent household on underinsurance status.
3. Gender: This is the sex of the target child. Coding was not altered from the original levels in the survey.
4. Age: This is the age of the child at the survey interview. Coding was not altered from the original levels in the survey.
5. Race/Ethnicity: This is a mutually exclusive variable for race & Hispanic ethnicity of the target child. The original coding presented all possibilities in one variable. These levels were recoded into dummy variables for each category.

6. Geographic Region: This is a regional classification based upon designations from the United States Census Bureau. States were recoded according to classification assigned. *Northeast* includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. *Midwest* includes Indiana, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. *South* includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. *West* is Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Oregon, Utah, Nevada, Washington, and Wyoming.
7. Political Subculture: This is a classification of the dominant political influences impacting a state based on the work of Lieske (2008). For simplicity, the designation by five reduced typologies was used and states were recoded according to classification assigned. *Bifurcated* is Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. *Individualistic* is Indiana, Iowa, Michigan, Ohio, Pennsylvania, West Virginia, and Wisconsin. *Moralistic* is Maine, Massachusetts, Minnesota, New Hampshire, North Dakota, Rhode Island, South Dakota, Utah, and Vermont. *Pluralistic* is Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Illinois, Kansas, Maryland, Missouri, Montana, Nebraska, Nevada, New Jersey, New York, Oklahoma, Oregon, Texas, Virginia, Washington, and Wyoming. *Separatist* is New Mexico.

Table 7. Predisposing factors: coding summary

Variable	Original coding in survey	Recoding for current project
Education	1= Less than high school 2= High school graduate 3= More than high school	1= High school or less 2= More than high school
Family Structure	1= CSHCN w/ 2 biological or adopted parents in HH 2= CSHCN w/ 2 parent stepfamilies 3= CSHCN w/ mother only/no father 4= Other family	1= Single mother 2= All other
Gender	1= Male 2= Female	Same
Age	1= 0-3 yrs old 2= 4-7 yrs old 3= 8-11 yrs old 4= 12-14 yrs old 5= 15-17 yrs old	Same
Race/Ethnicity	1= Hispanic 2= White, Non-Hispanic 3= Black, Non-Hispanic 4= Multi-racial, Non-Hispanic 5= Other race, including	White, Non-Hispanic 0= No 1= Yes
		Black, Non-Hispanic 0= No

	Asian, Non-Hispanic	1= Yes
		Hispanic 0= No 1= Yes
		Multi-racial, Non-Hispanic 0= No 1= Yes
		Other race, Non-Hispanic 0= No 1= Yes
Geographic Region*	N/A	Northeast 0= No 1= Yes
		Midwest 0= No 1= Yes
		South 0= No 1= Yes
		West 0= No 1= Yes
Political Subculture*	N/A	Bifurcated 0= No 1= Yes
		Individualistic 0= No 1= Yes
		Moralistic 0= No 1= Yes
		Pluralistic 0= No 1= Yes
		Separatist 0= No 1= Yes

\*Geographic region and political subculture are considered to be contextual variables in this project. See section 3.4.C for more information.

### Enabling factors

For the purposes of this study, enabling factors are those variables that may support or increase access to health and related services for this population. They are also inherent factors that may influence underinsurance status in this population.

1. Insurance: This is the type of insurance coverage at the time of the survey interview. The original coding presented all possibilities in one variable, including a category for uninsured. The design of this research used a

subpopulation procedure to analyze only those CSHCN who were continuously insured during the year prior to the survey, therefore the uninsured category was not relevant. The other levels were recoded into dummy variables for each category. *Private only* includes military coverage. *Public only* includes Medicaid, SCHIP, Medicare, and Medigap. *Other comprehensive insurance* includes insurance that covers both physician visits and hospitalizations, but for which the interviewer was unable to determine whether it was obtained publicly or privately.

2. Income: This is a measure of single imputed poverty level of the child's household based on Department of Health and Human Services guidelines. It was originally coded into nine mutually-exclusive, continuous levels. For simplicity and to better examine critical income levels related to underinsurance, this variable was recoded into two mutually-exclusive categories. The choice of cut point at 300 percent FPL was made based upon 3 factors: 1) SCHIP was reauthorized with eligibility levels at 300percent FPL, 2) Literature reviewed in Chapter 2, section 2.9.C, specifically Parrish et. al. 2009, and 3) Analysis of data showed that this cut point performed as well as the continuous variable and/or alternate choices (available upon request).

Table 8. Enabling factors: coding summary

Variable	Original coding in survey	Recoding for current project
Insurance	1= Private only 2= Public only 3= Both public and private 4= Other comprehensive insurance 5= Uninsured	Private only 0=No 1=Yes
		Public only 0=No 1=Yes
		Private and public 0=No 1=Yes
		Other comprehensive insurance 0=No 1=Yes
Income	1= Below 50% poverty level 2= 50% or greater, but below 100% FPL 3= 100% or greater, but below 133% FPL 4= 133% or greater, but below 150% FPL 5= 150% or greater, but below 185% FPL 6= 185% or greater, but below 200% FPL 7= 200% or greater, but below 300% FPL 8= 300% or greater, but below 400% FPL 9= 400% FPL or greater	1=Below 300% FPL 2=At or above 300% FPL

## Condition characteristics

Condition characteristics, as defined for the purposes of this study, are a broad group of factors based upon how the survey respondent described the child's condition. These factors deal with the impact and severity of the condition, the type of condition, unmet need, and a count of conditions and functional difficulties.

1. How Much Condition Affects Ability: This is a measure of the impact of the condition on the child's ability. Coding was not altered from the original levels in the survey.
2. Condition Severity Summary Score: This is an additive measure developed based upon the work of Mulvihill et. al. (2005). It is derived by combining measures for the amount of time a child is affected by the condition, the severity rating of the condition, and the pervasiveness of the condition (number of qualifying screener questions answered positively). Coding levels range from three to twelve with the higher the scores indicating a more severe the condition overall.
3. Amount of Time Child Affected by Condition: This is also a measure of the impact of the condition, specifically how often it affects the child's daily life. Coding was not altered from the original levels in the survey.
4. Severity Rating: This is the respondent's rating of the severity of difficulties caused by the child's condition. Coding was not altered from the original levels in the survey.
5. Pervasiveness: This is the number of positively-answered qualifying screener questions. Coding was not altered from the original levels in the survey.
6. Number of Health Conditions: This is a count of how many health conditions the respondent indicated the child had from of a list of 16 conditions. The conditions included asthma; attention deficit disorder or attention deficit hyperactivity disorder; autism or autism spectrum disorder; Down syndrome; mental retardation or developmental delay; depression, anxiety, eating disorder, or other emotional problem; diabetes; congenital heart disease; blood problems such as anemia or sickle cell disease; cystic fibrosis; cerebral palsy; muscular dystrophy; epilepsy or other seizure disorder; migraine or frequent headaches; arthritis or other joint problems; and allergies. Coding was not altered from the original levels in the survey.
7. Number of functional difficulties: This is a count of how many functional difficulties the respondent indicated the child had from a list of 15 difficulties. The difficulties included difficulty seeing even when wearing glasses or contact

lenses; using a hearing aid; difficulty hearing even when using a hearing aid; difficulty with breathing or other respiratory problems such as wheezing or shortness of breath; difficulty with swallowing, digesting food, or metabolism; difficulty with blood circulation; repeated or chronic physical pain including headaches; difficulty taking care of self (eating, dressing, bathing); difficulty with coordination or moving around (crawling, moving arms and legs, walking, running depending on age); difficulty using hands (grabbing small objects, holding a cup, eating finger foods, using scissors/pencil/fork depending on age); difficulty learning, understanding, or paying attention; difficulty speaking, communicating, or being understood; feeling anxious or depressed; difficulty with behavior problems, acting-out, fighting, bullying, or arguing; and difficulty making and keeping friends. Coding was not altered from the original levels in the survey.

8. Any Activity or Participation Difficulty: This is a measure of whether the respondent indicated that the child had any one of the following – difficulty taking care of self (eating, dressing, bathing); difficulty with coordination or moving around (crawling, moving arms and legs, walking, running depending on age); difficulty using hands (grabbing small objects, holding a cup, eating finger foods, using scissors/pencil/fork depending on age); difficulty learning, understanding, or paying attention; or difficulty speaking, communicating, or being understood. Coding was not altered from the original levels in the survey.
  
9. Number of Unmet Needs: This is a count of services needed but not received from a list of 15 services potential used by CSHCN. The list included routine preventive care, specialist care, preventive dental care, other dental care, prescription medications, therapies – occupational/physical/speech, mental health care or counseling, substance abuse treatment or counseling, home health care, vision care or eyeglasses, hearing aids or hearing care, mobility aids or devices, communication aids or devices, disposable medical supplies, and durable medical equipment. Coding was not altered from the original levels in the survey.
  
10. Qualification Reason: This is a measure of the type of special health care need based upon the CSHCN Screener questions answered positively. The original survey included separate questions for each reason, derived from stem and follow-up questions. The survey presented dummy variables for each qualification reason. Coding was not altered from the original survey.

Table 9. Condition characteristics: coding summary

Variable	Original coding in survey	Recoding for current project
How much condition affects ability	1=A great deal 2=Some 3=Very little	Same
Condition severity summary score (derived by combining next 3 variables)	N/A	3 – 12



• Amount of time child affected by condition	1=Never 2=Sometimes 3=Usually 4=Always	Same
• Rating of severity of difficulties caused by condition	1=Minor 2=Moderate 3=Severe	Same
• Pervasiveness	1 – 5 qualifying answers	Same
Number of health conditions	0=No conditions reported 1=1 condition reported 2=2 conditions reported 3=3 conditions reported 4=4 or more conditions reported	Same
Number of functional difficulties	0=No difficulties reported 1=1 difficulty reported 2=2 difficulties reported 3=3 difficulties reported 4=4 or more difficulties reported	Same
Any activity or participation difficulty	0=No activity or participation difficulties 1=One or more activity or Participation difficulties	Same
Number of unmet needs	1 – 15 unmet needs	Same
Qualification reason	Prescription medication use 0=No 1=Yes	Same
	Elevated service use or needs 0=No 1=Yes	
	Functional limitations 0=No 1=Yes	
	Use of special therapies 0=No 1=Yes	
	Ongoing emotional, developmental, or behavioral conditions 0=No 1=Yes	

### 3.4.C Contextual Variables

Contextual variables represent factors that are not part of a theoretical model and for which there are no hypotheses established, but their presence may influence the results of a study. Both regional differences and political subcultural influences may interact with the results related to underinsurance among CSHCN. These variables were

considered contextual variables in this study and were controlled for during statistical analysis.

As discussed in Chapter 2, Section 2.11, both Elazar's research on political subcultures and Lieske's work to develop regional subcultures and reduced typologies have provided a method to predict social and political behavior at the state level. Although this research has never been specifically applied to the concept of adequacy of health insurance, it is reasonable to consider that the subcultural influences represented by these typologies may also predict the state's philosophy and what is acceptable to citizens related to responsibility for the well-being of others. These typologies may also impact the way a state has chosen to implement its Medicaid and State Children's Health Insurance Programs in terms of eligibility and generosity of benefits. Comparisons between the subcultures and reduced typologies as presented in Chapter 2, Section 2.11 suggest that CSHCN who live in states under the influence of the moralistic subcultural typology may be less likely to be underinsured than those who live in states under other subcultural influences. Elazar (1972, 1994) describes the moralistic subculture as having a view of society as a commonwealth with the goal of government being to promote a good society and the public welfare, to serve the community, and to protect public interest. Lieske (2008) suggests that the moralistic subculture is more homogeneous and communalist, with lower levels of social disorganization and racial inequality. Given these characteristics, it seems conceivable that CSHCN in moralistic states may be less likely to be underinsured than are those in states influenced by other subcultural typologies.

Also, the United States Census Bureau has established regions and divisions to which all U.S. states and the District of Columbia are assigned. These are grouped regionally and the populations living in the regions may have similar characteristics. It is also feasible that the regions may differ from one another and that CSHCN living in some regions may be more likely to be underinsured than are those who live in others.

### **3.4 Potential Directions of Influence of Independent Variables**

Prior to the data analysis for this project, potential directions of influence for selected independent variables were postulated. These proposed directions of influence were based on the literature reviewed in Chapter 2. The following variables were expected to have a negative impact on a child being underinsured (i.e. child less likely to be underinsured): higher education, higher income, younger age, white, public insurance, private and public insurance, qualified with prescription medication use only, lower severity, more stable condition, fewer positive CSHCN screener questions, and less time affected by condition. The following variables were expected to have a positive impact on a child being underinsured (i.e. child more likely to be underinsured): lower education, lower income, older age, single mother, black, Hispanic, private insurance, more functional difficulties, more health conditions, having functional limitations, having activity/participation difficulties, higher severity, less stable condition, more positive CSHCN screener questions, and more time affected by condition. These propositions are summarized in Table 10 below:

Table 10. Proposed direction of influence by variable

Direction of Influence	Variable designation
Positive (child more likely to be underinsured)	lower education lower income older age single mother black Hispanic private insurance more functional difficulties more health conditions having functional limitations having activity/participation difficulties higher severity less stable condition more positive CSHCN screener questions more time affected by condition
Negative (child less likely to be underinsured)	higher education higher income younger age white public insurance private and public insurance qualified with prescription medication use only lower severity more stable condition fewer positive CSHCN screener questions less time affected by condition

### **3.5 Subgroup Coding**

Because one of the basic research objectives for this project is to look within potentially vulnerable subgroups of CSHCN for further analysis of characteristics that may influence underinsurance, a method of stratifying data was developed. Subgroups of interest included High Severity, Functional Limitations, and Prescription Medications Only. High Severity was created using a combination of severity variables – Severity rating, Amount of time affected, and How much affected. In order to isolate those CSHCN with the highest severity, the subgroup was computed as High Severity = Yes if Severity Rating = Severe, or Amount time affected = Usually or Always, or How much affected = A great deal. Subgroups for Functional Limitations and Prescription Medications Only were computed by recoding an alternate variable included in the

survey that provides mutually-exclusive categories for qualification reason. The subgroup was coded to Yes for functional limitations or prescription medications only, respectively. All subgroups were multiplicative variables of the continuously insured variable to isolate only those in the subgroup that were also continuously insured for the entire year preceding the survey interview.

Table 11. Subgroups: coding summary

<b>Subgroups</b>	<ul style="list-style-type: none"> <li>•Severity rating 1=Minor 2=Moderate 3=Severe</li> <li>•Amount time affected 1=Never 2=Sometimes 3=Usually 4=Always</li> <li>•How much affected 1=A great deal 2=Some 3=Very little</li> </ul>	<p>High Severity 0=No 1=Yes (if severity rating=3, or amount time affected=3 or 4, or how much affected=1)</p>
	<p>1= CSHCN qualified with functional limitations (only or with any other) 2= Prescription meds only 3= Service use only 4= Prescription meds and Service use</p>	<p>Functional Limitations 0=No (if original=2 or 3 or 4) 1=Yes (if original=1)</p>
	<p>1= CSHCN qualified with functional limitations (only or with any other) 2= Prescription meds only 3= Service use only 4= Prescription meds and Service use</p>	<p>Prescription Medications Only 0=No (if original=1 or 3 or 4) 1=Yes (if original=2)</p>

### **3.6 Statistical Analysis Plan**

According to technical specifications for the NSCSHCN, the three sampling weights — household weight, child screener weight, and child interview weight — must be used in national and state-level analyses of data. For this research, the child interview weight (WEIGHT\_I) is used based on the requirement that it be applied when the unit of

analysis is the child with special health care needs using data from the interview file (Blumberg, et al., 2008).

The complex, population-based sampling design as described in section 4.2.A.3 and the unequal weighting require the use of specific statistical software in order to appropriately analyze the data. Failure to do so will result in the computation of inaccurate variances and confidence intervals. Statistical tools that assume a simple random sample design will calculate standard errors that are too low and may suggest statistically significant differences or associations that may not be accurate (CAHMI, 2008). Suggested statistical tools capable of handling the complex sampling design are SUDAAN, SAS V 9.0+, STATA, WesVar, and SPSS Complex Samples (Blumberg et al., 2007; CAHMI, 2008). Per the technical specifications, stratum identifier variables and primary sampling unit codes on the data files, in addition to the sampling weights, allow for appropriate variance computation. The stratum identifier is the included variable STATE, while the primary sampling unit is IDNUMR (Blumberg et. al., 2008). These must be included in the data analysis plan, regardless of the choice of statistical tool.

One other data-related caveat is that the design of the survey, intended to provide independent state-level data, precludes subsetting to more finite population subgroups as this leads to inaccurate standard error estimations. To analyze the data at levels of interest in this project, the choice of statistical software will need to allow for a subpopulation procedure that targets specific subpopulations but retains the full sample design information (Blumberg, et. el., 2008; CAHMI, 2008).

Statistical analysis of data used for this study project was performed with SPSS 17.0 and the Complex Samples add-on. The data analysis plan included the stratum identifier variable STATE, the primary sampling unit code IDNUMR, and the sampling weight WEIGHT\_I as required in the technical specification included with the data set. In addition, a variable created to indicate CSHCN who were continuously insured was added to the analysis plan to allow more finite comparisons of subgroups of interest – privately insured, publicly insured, functional limitations, high severity, and qualified by prescription medication use only.

To avoid any potential for variability due to being uninsured or inconsistently insured and to focus only on the impact of the independent variables, only those CSHCN who were insured for the entire year prior to the survey interview will be considered in research analysis. As stated above, a subpopulation technique will be utilized to avoid any problems related to inaccurate standard error calculations that might result from subsetting the data by simply eliminating the records for those CSHCN who were not consistently insured or who were uninsured.

Analysis methods followed a three phase process. First, univariate analysis, including the calculation of frequencies and descriptive statistics, was performed. Next, bivariate techniques were employed to estimate associations between selected variables of interest and type of insurance. The goal of the first two phases of analysis were to describe the sample of CSHCN who were insured for the entire year preceding the survey interview (n=37,168) and to examine any differences in the sample by demographic characteristics and type of insurance. Finally, multivariate techniques were used to first examine potential multicollinearity of variables and then to determine associations and

predict probabilities. Since all four definitions for the dependent variable underinsurance are dichotomous and categorical (Yes, No), and the independent variables are a mixture of categorical and continuous, binary logistic regression, or Logit modeling, was necessary for this research.



## Chapter 4 Research Findings

The goals for the first and second phases of analysis in the project were to describe the sample of CSHCN who were insured for the entire year preceding the survey interview (n=37,168) and to examine any differences in the sample by type of insurance. Using SPSS 17.0, Complex Samples, analysis began with the computation of frequencies and descriptive statistics for all variables and subgroups. In addition, sample means for condition severity summary score were compared by type of insurance and underinsurance definition using t-tests. Bivariate analyses followed using crosstabs procedures to generate Pearson's Chi-square statistics so that estimates of association between type of insurance and selected variables could be determined. The final phase of analysis involved examining each hypothesis by definition of underinsurance using multivariate techniques, specifically binary logistic regression – Logit. Because of multicollinearity issues (correlation between independent variables), several models for each definition were developed given that certain variables could not be in the model at the same time. Also, using a subpopulation technique, models were required for the subgroups of interest – high severity, functional limitations, and prescription medications only. Only those models ultimately determined to best represent the data and to display the best fit are reported, though intermediate and non-selected models are available upon request. The final presentation includes models for each of the four definitions of

underinsurance according to the summary as presented in Table 12, and results are discussed by hypothesis using the 24 models for each definition.

Table 12. Multivariate models

<b>Model type</b>	<b>Number models per definition</b>
General	4
Private	4
Public	4
High Severity	2
Not High Severity	2
Prescription Medications Only	2
Not Prescription Medications Only	2
Functional Limitations	2
Not Functional Limitations	2

## **4.1 Description of Sample**

### *4.1.A Univariate Analysis*

The dependent variable, underinsurance, was developed with four definitions. Using a subpopulation technique, only CSHCN who were insured for the entire year prior to the survey interview are included in the analysis (n = 37,168). The range of CSHCN classified as underinsured is from 2.7 percent to 32.2 percent, depending upon the definition. Almost one-third of CSHCN – more than 11,600 children – are underinsured by the attitudinal definition. Nearly a quarter are underinsured according to the economic definition. Though small in number and percent compared to the other definitions, almost five percent and three percent of CSHCN were underinsured according to the structural and equipment/supplies definitions, respectively. These results are summarized in Table 13 below:

Table 13. Dependent variable; underinsurance by definition (continuously insured)

<b>Definition</b>	<b>Estimate (%)</b>	<b>Unweighted Count (n)</b>	<b>Standard Error (%)</b>
Underinsured-attitudinal	32.2	11624	.4
Underinsured-economic	23.0	8555	.4
Underinsured-structural	4.8	1647	.2
Underinsured-equipment/supplies	2.7	921	.1

The independent variables are divided into predisposing factors, enabling factors, and condition characteristics. Examining the frequencies and descriptives for the seven predisposing factors reveals that the majority of CSHCN in this sample were from households where the highest level of education is more than high school and that were not single mother homes. The study children tended to be white, male, 8 to 11 years old, live in the South, and live under the influence of the Pluralistic political subculture. Since this is a national dataset with respondent and response rate goals per state, the geographic region and political subculture findings are products of designation as determined by the data source (that is, U.S. Census Bureau designations of states to regions and Lieske’s political subcultures by state) rather than true differences among the study CSHCN. These results are summarized in Table 14 below:

Table 14. Independent variables: predisposing factors (continuously insured)

<b>Variable</b>	<b>Estimate (%)</b>	<b>Unweighted Count (n)</b>	<b>Standard Error (%)</b>	<b>Mode</b>
<b>Education</b>				
High school or less	28.6	7227	.4	More than high school
More than high school	71.4	29872	.4	
<b>Family structure</b>				
Single mother	28.8	9077	.4	All other
All other	71.2	26631	.4	
<b>Gender</b>				
Male	59.4	22063	.4	Male
Female	40.6	15038	.4	

<b>Age</b>				
0-3 years	11.0	3479	.3	8-11 years
4-7 years	21.6	7471	.4	
8-11 years	25.7	9631	.4	
12-14 years	20.8	7963	.4	
15-17 years	20.9	8624	.4	
<b>Race/Ethnicity</b>				
White, Non-Hispanic (ref)	66.3	26909	.4	White
Black, Non-Hispanic	15.7	3777	.4	
Hispanic	10.9	3412	.3	
Multi-racial, Non-Hispanic	3.7	1504	.2	
Other race, Non-Hispanic	2.9	1395	.1	
<b>Geographic Region</b>				
Northeast	18.2	6875	.2	South
Midwest	24.4	8963	.2	
South (ref)	38.0	12152	.3	
West	19.4	9178	.3	
<b>Political subculture</b>				
Bifurcated	17.9	6382	.2	Pluralistic
Individualistic	18.9	5332	.2	
Moralistic (ref)	7.0	6591	.1	
Pluralistic	55.7	17347	.3	
Separatist	.5	740	.0	

Examining the frequencies and descriptives for the two enabling factors reveals that this sample of CSHCN tended to come from households with incomes below 300 percent of FPL (55 percent). Also, more than half (62.9 percent) had private insurance only. Nearly 30 percent had public insurance only (27.6 percent), while smaller percentages had both private and public insurance or other comprehensive insurance. These results are summarized in Table 15 below:

Table 15. Independent variables: enabling factors (continuously insured)

Variable	Estimate (%)	Unweighted Count (n)	Standard Error (%)	Mode
<b>Insurance</b>				
Private only	62.9	24761	.4	Private only
Public only	27.6	8731	.4	
Public and private	7.5	2783	.2	
Other comprehensive insurance	2.0	893	.1	
<b>Income</b>				
Below 300% FPL	55.0	19359	.4	Below 300% FPL
At or above 300% FPL	45.0	17809	.4	

Examining the frequencies and descriptives for the 10 condition characteristics reveals that this sample of CSHCN tended to have mild levels of severity overall (52

percent), with most respondents reporting that the child’s condition impacted them very little or some and not very often (never to sometimes). The majority had one functional difficulty, no activity or participation difficulties, one or two health conditions, and qualified as CSHCN based on one screener answer. Most reported only one unmet need and qualified based on the use of prescription medications. Results for the combined measure – condition severity summary score – show a mean score of 5.63 (from the range 3-12), though most reported a score of four. These results are summarized in Table 16 below:

Table 16. Independent variables: condition characteristics (continuously insured)

<b>Variable</b>	<b>Estimate (%)</b>	<b>Unweighted Count (n)</b>	<b>Standard Error (%)</b>	<b>Mean</b>	<b>Mode</b>		
<b>How much condition affects ability</b>							
A great deal	19.4	4008	.5		Some		
Some	43.1	9882	.6				
Very little	37.5	8317	.6				
<b>Condition severity summary score (combination of next 3 variables)</b>							
3	19.1	6107	.4	5.63	4		
4	23.5	7099	.4				
5	15.4	4787	.4				
6	11.5	3533	.3				
7	9.3	2763	.3				
8	6.7	1968	.3				
9	4.9	1525	.2				
10	4.3	1321	.2				
11	3.5	1043	.2				
12	1.8	592	.1				
<b>Amount of time child affected by condition</b>							
Never	38.8	1479	.4			Sometimes	
Sometimes	40.1	1472	.4				
Usually	8.0	293	.2				
Always	13.1	460	.3				
<b>Severity rating of difficulties caused by condition</b>							
Minor	52.0	16467	.5	Minor			
Moderate	38.3	11605	.5				
Severe	9.7	2750	.3				
<b>Pervasiveness</b>							
1 qualifying answer	55.3	20461	.4	1.84	1		
2 qualifying answers	20.5	7579	.4				
3 qualifying answers	12.6	4833	.3				
4 qualifying answers	7.6	2778	.2				

5 qualifying answers	3.9	1517	.2		
<b>Number of health conditions</b>					
No conditions reported	9.0	3450	.3		
1 condition reported	34.5	13215	.4		
2 conditions reported	32.5	12098	.4		1
3 conditions reported	13.8	4818	.3		
4 or more conditions reported	10.2	3587	.3		
<b>Number of functional difficulties</b>					
No difficulties reported	16.0	6345	.3		
1 difficulty reported	31.2	11774	.4		
2 difficulties reported	15.5	5738	.3		1
3 difficulties reported	11.0	3874	.3		
4 or more difficulties reported	26.3	9437	.4		
<b>Any activity or participation difficulty</b>					
No activity or participation difficulties	51.9	19634	.4		No difficulties
One or more activity or participation difficulties	48.1	17534	.4		
<b>Number of unmet needs</b>					
1 unmet need	66.4	3278	1.2		
2 unmet needs	22.2	1018	1.1		
3 unmet needs	7.3	348	.6		
4 unmet needs	2.0	135	.3	1.52	1
5 unmet needs	1.2	48	.3		
6 unmet needs	.6	21	.2		
7 unmet needs	.2	8	.1		
8 unmet needs	.0	1	.0		
9 unmet needs	.0	3	.0		
10 unmet needs	.0	1	.0		
<b>Qualification reason</b>					
Prescription medication use	79.4	29641	.4		
Elevated service use or needs	38.5	14511	.4		Prescription medication use
Functional limitations	21.0	7767	.4		
Use of special therapies	17.7	6484	.3		
Ongoing emotional, developmental, or behavioral conditions	27.8	10412	.4		

For the subgroups of interest, about 25 percent met the criteria for inclusion in the high severity group. Just over 20 percent qualified based on functional limitations and nearly 45 percent qualified only on a need for prescription medications. These results are summarized below:

Table 17. Condition-specific subgroups of interest

Variable	Estimate (%)	Unweighted Count (n)	Standard Error (%)
<b>Subgroups</b>			
High severity	24.8	8653	.4
Functional limitations	21.0	7767	.4
Prescription medications only	44.6	16585	.4

To further examine and describe the sample of CSHCN, one important consideration is variation by type of insurance. To that end, the graphing software option included in SPSS 17.0 was used to create bar charts of the mean condition severity summary score by insurance type and underinsurance (each definition). Figures 8 and 9 below represent the findings:

Figure 8. Mean condition severity summary score by insurance type

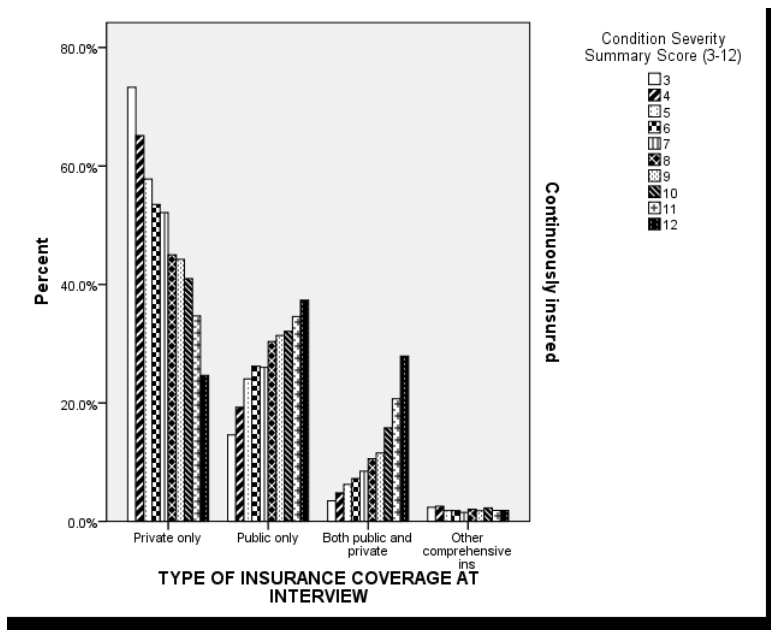


Figure 8 above graphically displays the range of condition severity summary score across the types of insurance. Within the private only group, it is apparent that the lowest score, three, is the highest percentage from among all possible scores. In general, as the score increases in this group, their percentage representation in the sample goes

down. This finding is different for both the public only and the public and private insurance groups. Within these groups, the highest score, 12, is the highest percentage and as the score increases, the percentage goes up, indicating that CSHCN with higher condition severity summary scores – higher severity – are more often found in the public only or public and private insurance groups. The other comprehensive insurance group is too small to detect differences.

The mean condition severity summary scores for each group were compared using the private only mean as the reference statistic. Results from t-tests indicate that the means from the public only, public and private, and other comprehensive insurance groups are all significantly different from the mean for the private only group. This indicates that CSHCN with the lowest severity have private insurance only. Also, the mean condition severity summary score is highest for those CSHCN with both public and private insurance, meaning that in this sample, CSHCN with the greatest severity have a combination of both coverage types. This is not surprising given that children with significant disability can qualify for Supplemental Security Income (SSI), which automatically qualifies them for Medicaid. Table 18 illustrates this finding:

Table 18. T-test results, mean condition severity summary score by insurance type

	<b>Private only</b>	<b>Public only*</b>	<b>Private and Public*</b>	<b>Other comprehensive insurance*</b>
Mean Condition Severity Summary Score (CI)	5.19 (5.14-5.25)	6.21 (6.12-6.30)	6.74 (6.57-6.92)	5.60 (5.31-5.88)

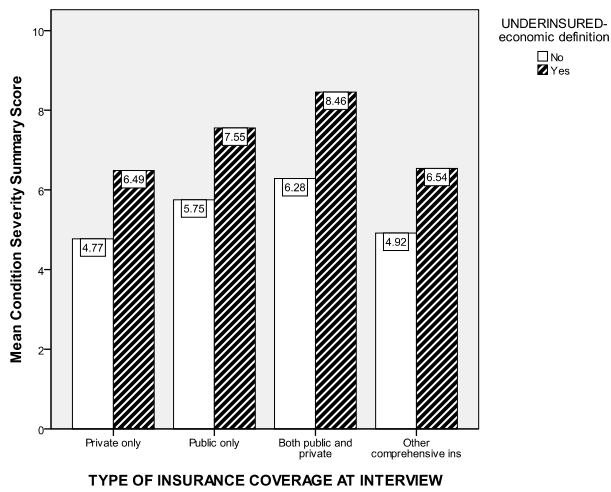
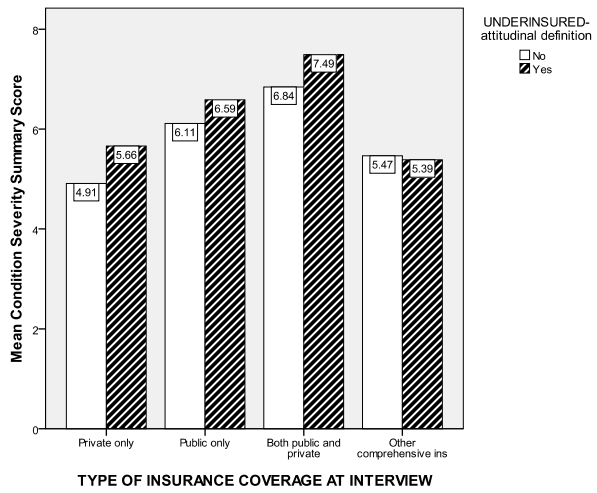
\*p < .001 mean for group vs. mean for private only

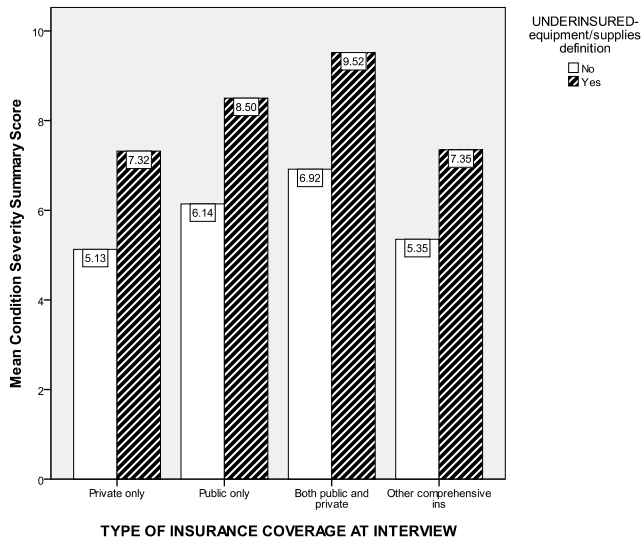
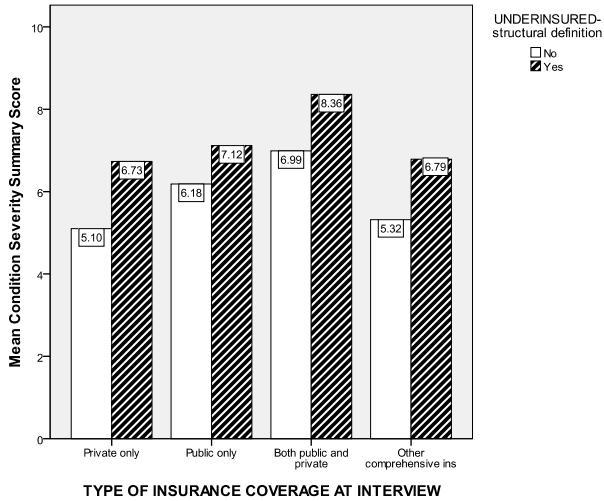
Similar findings can be observed when graphically comparing the mean condition severity summary score within each type of insurance by underinsured status. For all definitions and within each insurance type (except for other comprehensive insurance in



the attitudinal definition), those CSHCN meeting the definition for underinsured have a higher condition severity summary score than do those who are not underinsured. Figure 9 below illustrates this finding by each definition of underinsurance.

Figure 9. Severity by insurance type and underinsurance status, by definition





The mean condition severity summary scores for CSHCN who were underinsured (by each definition) were compared to those who were not underinsured using the not underinsured sample mean as the reference statistic. Results from t-tests indicate that for all definitions, the mean condition severity summary scores for CSHCN who are underinsured are significantly higher than for those who are not underinsured. Table 19 below summarizes this finding.

Table 19. T-test results, mean condition severity summary score by definition

Underinsurance definition	Mean condition severity summary score	
	Attitudinal	Yes
	No	5.44
Economic	Yes	6.99*
	No	5.17
Structural	Yes	6.86*
	No	5.56
Equipment/Supplies	Yes	8.04*
	No	5.56

\* p < .001

#### 4.1.B Bivariate analysis

To further describe the sample, cross tabulations were executed so that estimates of association between type of insurance and selected variables could be determined. In this sample, CSHCN with public only or both public and private insurance were significantly more likely than were those with private insurance only to have condition severity summary scores above the mean for the total sample, to be classified as high severity, to have functional limitations, and to rate the functional difficulties as “severe.” They were also more likely to report that the child was “always” affected by the condition, the condition affected the child “a great deal,” and that the child had “one or more” activity or participation difficulties. CSHCN with public only or with public and private insurance together were also more likely than those with private insurance only to be in single mother homes, to be in households where the highest education level was high school or less, and to be black or Hispanic. Table 20 below summarizes these results.

Table 20. Crosstabs results: selected variables by type of insurance\*

Variable	Private Only (%) (CI)	Public Only (%) (CI)	Private and Public (%) (CI)	Other Comp. Only (%) (CI)
Condition Severity Score above the mean (greater than 5.6)	27.6 (26.6-28.5)	47.4 (45.7-49.2)	54.6 (51.4-57.7)	32.4 (27.3-38.0)
High severity	17.9 (17.1-18.8)	35.6 (33.9-37.3)	42.4 (39.3-45.6)	24.6 (20.0-29.8)
Functional limitations	79.8 (79.0-80.6)	91.7 (90.7-92.6)	93.1 (91.4-94.4)	77.8 (70.2-84.0)
Condition affects ability “a great deal”	14.4 (13.3-15.5)	24.4 (22.6-26.3)	30.9 (27.7-34.2)	21.6 (15.8-28.9)
Child “always” affected by condition	9.2 (8.6-9.9)	18.7 (17.3-20.1)	25.6 (23.1-28.4)	11.0 (8.2-14.6)
Functional difficulties rated “severe”	5.6 (5.1-6.2)	15.2 (13.9-16.6)	19.6 (17.0-22.5)	10.2 (6.7-15.1)
“One or more” activity/participation difficulties	40.4 (39.4-41.5)	61.5 (59.8-63.2)	65.1 (61.9-68.2)	41.5 (35.8-47.4)
Family Structure – single mother	17.9 (17.1-18.8)	52.6 (50.8-54.5)	41.1 (37.9-44.4)	27.9 (22.9-33.5)
White	76.7 (75.7-77.6)	45.3 (43.5-47.0)	54.8 (51.6-57.9)	71.4 (65.3-76.8)
Black	8.7 (8.1-9.4)	29.2 (27.6-30.9)	26.4 (23.6-29.4)	9.3 (6.4-13.4)
Hispanic	7.8 (7.2-8.5)	17.9 (16.5-19.4)	11.1 (9.3-13.3)	10.5 (6.6-16.3)
Household Education – high school or less	15.7 (14.9-16.6)	55.2 (53.4-56.9)	40.2 (37.1-43.5)	24.6 (19.9-30.1)

\* all significant at  $p < .001$  by Pearson’s Chi-Square

#### **4.2 Examination of Hypotheses – Multivariate Analysis**

The final phase of analysis focused on examination of support for each of the nine hypotheses by each of the four definitions of the dependent variable – underinsurance through the use of multivariate techniques. Because each definition of underinsurance is a dichotomous variable with “yes” / “no” or zero-one values, traditional linear regression models are not appropriate. Binary logistic regression, or LOGIT modeling, is utilized to explain the impact of independent variables upon categorical, dichotomous dependent variables. This analysis provides a test for significance of each predictor while controlling for all other factors in the model (Demaris, 1992). This impact is summarized in the form of odds ratios, with the “logit” referring to the natural logarithm of the odds –

or the “log odds” – and indicating the relative probability of falling into one of the categories of the dependent variable (Demaris, 1992; Menard, 2001).

Model fit or explained variance for binary logistic regression is expressed by a pseudo- $R^2$  statistic that is an approximation of the  $R^2$  statistic in traditional linear regression modeling (Menard, 2001). For LOGIT modeling, it is not possible to calculate a single  $R^2$  statistic that summarizes the proportion of variance in the dependent variable that is associated with the independent or predictor variables; therefore, analogous measures are utilized. There are several different estimates of the predictive power of binary logistic regression models, but for the purposes of this research, the Nagelkerke’s  $R^2$  statistic is presented since it provides an adjusted version of the Cox and Snell  $R^2$  statistic that allows the scale of the statistic to cover the full range of zero to one (SPSS Complex Samples 17.0).

The parameter or coefficient estimates are presented as exponentiated beta ( $ExpB$ ) instead of the typical beta estimate. The typical beta estimate – the log odds ratio – is good for testing model effects, but  $ExpB$  is easier to interpret since it represents the ratio change in odds – odds ratio – of the dependent variable category of interest (being underinsured) that can be attributed to a one unit increase in the category of independent variables (Menard, 2001; SPSS Complex Samples 17.0). When  $ExpB$  is greater than one, the odds of being underinsured are increased by each unit of increase in the independent variable. Conversely, when  $ExpB$  is less than one, the odds of being underinsured are decreased by each unit increase in the independent variable (Menard, 2001; SPSS Complex Samples 17.0).  $ExpB$  can be converted to a percent change in odds using the formula  $100 (ExpB - 1)$ .

#### 4.2.A Summary of findings

The dependent variable has been developed according to four distinct definitions, and each of the nine hypotheses is examined by definition. All hypotheses are supported or partially supported for at least one definition with the exception of number 3, which pertains to qualifying as CSHCN based solely on the need for prescription medications.

Table 21 below provides a summary of findings related to support for each hypothesis by definition.

Table 21. Summary of findings, support by hypothesis

Research question	Hypothesis	Underinsurance			
		Attitudinal definition	Economic definition	Structural definition	Equipment/Supplies definition
1) What characteristics increase the likelihood of CSHCN being underinsured?	1) Among CSHCN with insurance, the higher the severity, the greater the likelihood of being underinsured	Yes	Yes	No	Yes
	2) Among CSHCN with insurance, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.	Partial	No	No	No
	3) Among CSHCN with insurance, those who qualify with “medication only” needs are less likely to be underinsured than are those who qualify with “any other” needs.	No	No	No	No
2) Is there a difference in the likelihood of being underinsured between CSHCN with public	4) Among CSHCN with insurance, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No

insurance and CSHCN with private insurance?	5) Among CSHCN with insurance who have higher severity, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No
	6) Among CSHCN with insurance who have functional limitations, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No
3) Is there a difference within each subset of insured CSHCN – public and private – such that certain groups are more likely to be underinsured than are others?	7) Among CSHCN with private insurance, those with lower income levels are more likely to be underinsured than are those with higher income levels.	No	Yes	No	No
	8) Among privately insured CSHCN and publicly insured CSHCN respectively, those with higher severity are more likely to be underinsured than are those with lower severity.	Yes, private  No, Public	Yes, private  No, public	No	No
	9) Among privately insured CSHCN and publicly insured CSHCN respectively, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.	Partial, private  No, Public	Yes, private  No, public	No	No

The next sections will provide more detail about the LOGIT models by definition and research question/hypothesis. Summary tables are provided, and significant findings by model are indicated. The reader is reminded that not all variables could be included in any one model due to issues related to multicollinearity. For this reason, multiple models are presented for each definition to assure that all potentially important variables can be examined. For those variables found to be significant across more than one model for a given definition, a range for  $ExpB$  is given in the narrative. Also, percent change in odds is estimated for each significant variable, with a range again discussed in the narrative in cases where the variable is present and significant across multiple models.

#### *4.2.A Findings for overall sample by definition*

This section provides information about models addressing the sample in general with no subgrouping by public or private insurance or by condition-specific subgroups of interest. They provide answers for research question one, hypotheses #1 – #3 and research question two, hypothesis #4.

##### Attitudinal definition

There are no statistically significant predisposing factors for this definition; however, several enabling factors and condition characteristics have important impact. Based upon LOGIT models, CSHCN with private insurance only or other comprehensive insurance only are more likely to be underinsured according to the attitudinal definition than are CSHCN with public insurance only. CSHCN with private insurance only have 1.945-1.990 the odds of being underinsured compared with those with public insurance only. This translates to a 94-99 percent increase in the odds of being underinsured. CSHCN with other comprehensive insurance only have 2.402-2.915 the odds of being



underinsured compared with those with public insurance. This translates to a 140-191 percent increase in the odds of being underinsured. For each category increase in the number of functional difficulties reported, CSHCN have 1.185 the odds of being underinsured. This translates to an 18 percent increase in odds per category increase in the number of difficulties. For each unit increase in the number of unmet health needs, there is a 1.474-1.500 increase in the odds of being underinsured. This translates to a 47-50 percent increase in odds for each additional unit increase in unmet needs. Finally, with each category increase in severity rating, CSHCN have 1.240-1.294 the odds of being underinsured. This translates to a 24-29 percent increase in the odds of being underinsured for each increase in category of severity.

In summary, CSHCN are more likely to be underinsured according to the attitudinal definition if they have private insurance only; if they have other comprehensive insurance only; as the number of functional difficulties increases; as the number of unmet health needs increases; and as severity ratings increase. Each of these conditions is as would be expected. The results address Hypotheses #1 - #4 for the attitudinal definition of underinsurance. As summarized in Table 21, Hypotheses #1 and #4 are supported by these results, Hypothesis #2 is partially supported, and Hypothesis #3 is not supported. Table 22 below presents the analyses for this definition.

Table 22. LOGIT Models: Underinsured – Attitudinal Definition

Variable	Base Model Exp B (SE)	Model 1 Exp B (SE)	Model 2 Exp B (SE)	Model 3 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.243 (.135)	1.247 (.139)	1.258 (.138)	1.246 (.137)
Family Structure	1.113 (.126)	1.181 (.126)	1.209 (.126)	1.169 (.126)
Gender	.958 (.125)	.935 (.127)	.936 (.126)	.932 (.126)
Age	1.010 (.048)	1.009 (.049)	1.010 (.051)	1.007 (.049)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.144 (.179)	1.183 (.184)	1.191 (.185)	1.160 (.182)

Hispanic	1.073 (.218)	1.060 (.214)	1.056 (.209)	1.043 (.216)
Multi-racial, Non-Hispanic	.938 (.225)	.928 (.226)	.946 (.226)	.931 (.226)
Other race (including Asian), Non-Hispanic	.935 (.289)	.954 (.290)	.963 (.289)	.945 (.295)
<b>Region</b>				
Northeast	.808 (.220)	.812 (.224)	.805 (.226)	.815 (.223)
Midwest	1.109 (.206)	1.101 (.209)	1.077 (.210)	1.103 (.208)
South	Ref	Ref	Ref	Ref
West	.969 (.208)	.977 (.209)	.966 (.209)	.970 (.208)
<b>Political Subculture</b>				
Bifurcated	.828 (.257)	.813 (.262)	.810 (.264)	.799 (.260)
Individualistic	1.085 (.204)	1.047 (.207)	1.047 (.207)	1.036 (.207)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	1.177 (.182)	1.182 (.187)	1.193 (.188)	1.160 (.186)
Separatist	1.029 (.312)	1.099 (.321)	1.069 (.323)	1.102 (.319)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	***1.945 (.159)	***1.987 (.162)	***1.986 (.161)	***1.990 (.161)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.350 (.187)	1.349 (.186)	1.349 (.185)	1.362 (.187)
Other comprehensive only	*2.402 (.392)	*2.868 (.409)	**2.915 (.407)	**2.862 (.405)
Income	.828 (.155)	.801 (.156)	.788 (.149)	.815 (.155)
<b>Condition Characteristics</b>				
How much condition affects ability	1.016 (.102)	1.038 (.122)	1.055 (.121)	1.019 (.120)
Number of health conditions	1.046 (.057)	1.024 (.060)	1.049 (.061)	1.025 (.057)
Number of functional difficulties	*1.185 (.079)	1.148 (.083)	1.120 (.085)	1.170 (.083)
Any activity or participation difficulty	.807 (.208)	.807 (.214)	.770 (.217)	.852 (.210)
Number of unmet needs	***1.474 (.075)	***1.492 (.075)	***1.487 (.074)	***1.500 (.075)
Amount of time child is affected by condition	-	.843 (.095)	.838 (.095)	.855 (.093)
Severity rating	-	*1.260 (.104)	*1.240 (.103)	*1.294 (.104)
Pervasiveness (# qualifying screener questions)	-	1.034 (.057)	-	-
<b>Qualification Reason</b>				
Prescription medication use	-	-	.811 (.134)	-
Elevated service use or need	-	-	1.221 (.141)	-
Functional limits	-	-	.998 (.143)	-
Use of specialized therapies	-	-	.992 (.152)	-
Emotional, developmental, behavioral condition	-	-	1.100 (.134)	-
Prescription medication only	-	-	-	1.232 (.198)
	Nagelkerke R <sup>2</sup> =.091 Wald F = 3.467 p < .001	Nagelkerke R <sup>2</sup> =.101 Wald F = 3.445 p < .001	Nagelkerke R <sup>2</sup> =.106 Wald F = 3.174 P < .001	Nagelkerke R <sup>2</sup> =.102 Wald F = 3.506 p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001

### Economic definition

There are several statistically significant predisposing factors, enabling factors, and condition characteristics that have important impact for this definition. Based upon LOGIT models, CSHCN who are multi-racial, non-Hispanic have 1.738 the odds of being underinsured according to the economic definition compared with CSHCN who are white, non-Hispanic. This translates to a 74 percent increase in the odds of being underinsured. CSHCN with private insurance only, other comprehensive insurance only, or both private and public insurance are more likely to be underinsured according to this definition than are CSHCN with public insurance only. CSHCN with private insurance only have 1.714-2.376 the odds of being underinsured compared with those with public insurance only. This translates to a 71-138 percent increase in the odds of being underinsured. CSHCN with both public and private insurance have 1.714-1.815 the odds of being underinsured compared with those with public insurance only. This translates to a 71-81 percent increase in the odds of being underinsured. CSHCN with other comprehensive insurance only have 2.463-3.043 the odds of being underinsured compared with those with public insurance. This translates to a 146-204 percent increase in the odds of being underinsured. CSHCN in families with incomes at 300 percent FPL or greater have .492-.522 the odds of being underinsured compared with those in families with incomes below 300 percent FPL. This translates to a 48-51 percent decrease in the odds of being underinsured for CSHCN in families with the higher income level. For each category increase in the number of health conditions reported, CSHCN have 1.157-1.194 the odds of being underinsured. This translates to a 16-19 percent increase in odds per category increase in the number of conditions. For each unit increase in the number of unmet health needs, there is a 1.592-1.655 increase in the odds of being underinsured.

This translates to a 59-65 percent increase in odds for each additional unit increase in unmet needs. With each category increase in severity rating, CSHCN have 1.396-1.483 the odds of being underinsured. This translates to a 40-48 percent increase in the odds of being underinsured for each increase in category of severity. As pervasiveness increases by one unit (each additional positive screener answer), CSHCN have 1.225 the odds of being underinsured. This translates to a 22 percent increase in the odds of being underinsured for each additional positive screener question. Finally, CSHCN who qualified based on elevated need or use of health services have 1.634 the odds of being underinsured compared with those who did not qualify for this reason. This translates to a 63 percent increase in the odds of being underinsured.

In summary, CSHCN are more likely to be underinsured according to the economic definition if they have private insurance only; if they have other comprehensive insurance only; if they have both private and public insurance; if they are in families with incomes below 300 percent FPL; if they qualify based on elevated need and use of health services; as the number of health conditions increases; as the number of unmet health needs increases; as severity ratings increase; and as pervasiveness increases. Each of these conditions is as would be expected with the possible exception of CSHCN being more likely to be underinsured if they have both public and private insurance. Given the literature of the protective benefits of public insurance, one would think that having public insurance as a supplement to the private would result in the opposite result by offsetting some of the economic burden of the condition. Given that the definition is developed based on economic indicators and financial burden, it is not surprising that lower income levels and elevated service need and use would play an important role. The

results address Hypotheses #1 - #4 for the economic definition of underinsurance. As summarized in Table 21, Hypotheses #1 and #4 are supported by these results; however, Hypothesis #2 and Hypothesis #3 are not supported. Table 23 below presents the analyses for this definition.

Table 23. LOGIT Models: Underinsured – Economic Definition

Variable	Base Model Exp B (SE)	Model 1 Exp B (SE)	Model 2 Exp B (SE)	Model 3 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.097 (.140)	1.086 (.144)	1.073 (.145)	1.109 (.143)
Family Structure	1.069 (.135)	1.090 (.135)	1.089 (.135)	1.088 (.135)
Gender	.806 (.126)	.826 (.127)	.813 (.127)	.815 (.127)
Age	1.029 (.051)	1.052 (.052)	1.047 (.053)	1.032 (.052)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.766 (.189)	.847 (.193)	.864 (.194)	.802 (.194)
Hispanic	.785 (.228)	.839 (.224)	.853 (.228)	.794 (.231)
Multi-racial, Non-Hispanic	*1.738 (.264)	1.659 (.258)	1.668 (.262)	1.634 (.264)
Other race (including Asian), Non-Hispanic	1.623 (.301)	1.618 (.327)	1.691 (.326)	1.619 (.320)
<b>Region</b>				
Northeast	.828 (.224)	.764 (.229)	.761 (.230)	.757 (.229)
Midwest	1.073 (.208)	1.025 (.212)	1.033 (.213)	1.010 (.210)
South	Ref	Ref	Ref	Ref
West	.812 (.217)	.845 (.218)	.843 (.218)	.818 (.219)
<b>Political Subculture</b>				
Bifurcated	.954 (.269)	.875 (.276)	.864 (.278)	.823 (.275)
Individualistic	.718 (.211)	.695 (.215)	.687 (.215)	.675 (.215)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.791 (.185)	.741 (.192)	.743 (.193)	.712 (.192)
Separatist	.653 (.312)	.593 (.321)	.588 (.323)	.560 (.321)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	***2.376 (.165)	***2.459 (.163)	***2.443 (.164)	***1.714 (.212)
Public only	Ref	Ref	Ref	Ref
Private and Public	**1.815 (.210)	*1.669 (.216)	*1.679 (.215)	*1.714 (.212)
Other comprehensive only	*2.463 (.431)	*3.043 (.467)	*2.939 (.484)	*3.008 (.464)
Income	***.522 (.169)	***.492 (.168)	***.501 (.164)	***.518 (.169)
<b>Condition Characteristics</b>				
How much condition affects ability	.824 (.104)	.973 (.114)	.945 (.113)	
Number of health conditions	**1.194 (.060)	1.103 (.062)	1.087 (.064)	*1.157 (.060)
Number of functional difficulties	1.105 (.077)	1.045 (.082)	1.065 (.084)	1.077 (.083)
Any activity or participation difficulty	.822 (.203)	.778 (.205)	.814 (.213)	.806 (.205)
Number of unmet needs	***1.655 (.073)	***1.592 (.072)	***1.592 (.072)	***1.611 (.074)
Amount of time child is affected by condition	-	.918 (.096)	.935 (.098)	.972 (.095)

Severity rating	-	**1.403 (.110)	**1.396 (.108)	***1.483 (.110)
Pervasiveness (# qualifying screener questions)	-	**1.225 (.059)	-	-
<b>Qualification Reason</b>				
Prescription medication use	-	-	1.298 (.139)	-
Elevated service use or need	-	-	**1.634 (.149)	-
Functional limits	-	-	1.151 (.158)	-
Use of specialized therapies	-	-	.981 (.154)	-
Emotional, developmental, behavioral condition	-	-	1.022 (.142)	-
Prescription medication only	-	-	-	.900 (.204)
	Nagelkerke R <sup>2</sup> =.153 Wald F = 5.945 p < .001	Nagelkerke R <sup>2</sup> =.176 Wald F = 6.095 P < .001	Nagelkerke R <sup>2</sup> =.183 Wald F = 5.605 P < .001	Nagelkerke R <sup>2</sup> =.166 Wald F = 5.509 p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001

### Structural Definition

There are no statistically significant enabling factors for this definition; however, several predisposing factors and condition characteristics have important impact. Based upon LOGIT models, CSHCN in families with structures other than single mother have 1.342-1.362 the odds of being underinsured according to the structural definition. This translates to a 34-36 percent increase in the odds of being underinsured over CSHCN in single mother households. CSHCN who are black, non-Hispanic have .471-.488 the odds of being underinsured than do CSHCN who are white, non-Hispanic. This translates to a 51-53 percent decrease in the odds of being underinsured. For each category increase in the rating of how much the condition affects ability, CSHCN have 1.289 the odds of being underinsured. This translates to a 29 percent increase in odds per category increase. For each unit increase in the number of unmet health needs, there is a 1.720-1.733 increase in the odds of being underinsured. This translates to a 72-73 percent increase in odds for each additional unit increase in unmet needs. Finally, for each category increase in the rating of the amount of time the child is affected by the

condition, CSHCN have .819-.826 the odds of being underinsured. This translates to a 17-18 percent decrease in the odds of being underinsured for each increase in category.

In summary, CSHCN are more likely to be underinsured according to the structural definition if they live in family structures other than single mother; as the rating of how much the condition affects ability increases; and as the number of unmet health needs increases. They are less likely to be underinsured if they are black, non-Hispanic versus white, non-Hispanic and as the amount of time impacted increases. The finding related to unmet need is as would be expected. However, the directions of influence for the other results are somewhat counterintuitive. Given what is known in the literature, one might expect single mother homes and minorities to fare worse, but for this definition, that is not the case. As noted in section 4.1.B, for this sample of CSHCN, single mother homes and those who are black are covered more often by public insurance only. Recalling that this definition is developed based on structural difficulties with the insurance plan, perhaps this finding can be explained. As discussed previously, private plans have great variability in terms of structure and benefits. These can have a high degree of variability within and between states. However, public plans vary by state, but not as much within states. Although differences can occur between Medicaid and SCHIP when SCHIP is a separate program as opposed to a Medicaid expansion, public plans are arguably still less variable in terms of structure. Given that the greater percentage of single mother homes and CSHCN who are black are covered by public insurance only, perhaps this explains the protective effects for these groups related to the structural definition of underinsurance. Also, the findings related to how much the condition affects ability and the amount of time the child is affected by the condition seem reversed

from what might be expected. As the categories increase for how much the condition affects ability, the likelihood of being underinsured increases. Recalling that the increasing categories for this variable actually represent less affect (a great deal, some, very little), this means that CSHCN who are affected the least by their condition are more likely to be underinsured. Closely related, as the categories for the amount of time the child is affected by the condition increases, the likelihood of being underinsured decreases. Recalling that the increasing categories for this variable represent more time affected (never, sometimes, usually, always), this means that CSHCN who are affected more often by their condition are less likely to be underinsured. Taken together, these results are representations of severity. As discussed in section 4.1.A and 4.1.B, CSHCN with public insurance have higher severity than do those with private insurance. Perhaps again, these CSHCN with the higher severity are covered by public insurance, thereby affording some protection from underinsurance by the structural definition. It is impossible to wholeheartedly support this theory given that the models fail to support a private/public difference for this definition. The results address Hypotheses #1 - #4 for the structural definition of underinsurance. As summarized in Table 21, none of the hypotheses are supported by these results. Table 24 below presents the analyses for this definition.

Table 24. LOGIT Models: Underinsured – Structural Definition

Variable	Base Model Exp B (SE)	Model 1 Exp B (SE)	Model 2 Exp B (SE)	Model 3 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.324 (.155)	1.340 (.159)	1.339 (.160)	1.343 (.159)
Family Structure	*1.342 (.141)	*1.362 (.146)	*1.359 (.145)	*1.354 (.146)
Gender	.796 (.144)	.808 (.144)	.803 (.143)	.806 (.145)
Age	.995 (.052)	1.008 (.054)	1.003 (.054)	1.002 (.053)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	** .488 (.214)	** .481 (.222)	** .479 (.222)	** .471 (.219)



Hispanic	.820 (.211)	.818 (.207)	.819 (.209)	.802 (.206)
Multi-racial, Non-Hispanic	1.040 (.262)	1.091 (.266)	1.081 (.264)	1.095 (.266)
Other race (including Asian), Non-Hispanic	.677 (.310)	.688 (.310)	.680 (.314)	.681 (.315)
<b>Region</b>				
Northeast	.903 (.243)	.828 (.249)	.829 (.250)	.830 (.249)
Midwest	.916 (.220)	.864 (.224)	.868 (.226)	.860 (.224)
South	Ref	Ref	Ref	Ref
West	1.140 (.221)	1.134 (.219)	1.136 (.219)	1.122 (.219)
<b>Political Subculture</b>				
Bifurcated	.757 (.277)	.724 (.285)	.720 (.286)	.705 (.283)
Individualistic	.833 (.216)	.807 (.220)	.802 (.222)	.799 (.221)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	1.126 (.189)	1.085 (.194)	1.078 (.195)	1.059 (.193)
Separatist	.578 (.313)	.580 (.318)	.581 (.327)	.571 (.317)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	1.142 (.170)	1.090 (.175)	1.080 (.177)	1.091 (.176)
Public only	Ref	Ref	Ref	Ref
Private and Public	.881 (.215)	.908 (.217)	.905 (.217)	.921 (.216)
Other comprehensive only	1.273 (.326)	1.422 (.317)	1.389 (.321)	1.425 (.317)
Income	.889 (.164)	.916 (.167)	.928 (.163)	.937 (.165)
<b>Condition Characteristics</b>				
How much condition affects ability	*1.289 (.099)	1.205 (.114)	1.225 (.115)	1.179 (.115)
Number of health conditions	1.011 (.061)	.983 (.063)	.981 (.062)	.995 (.062)
Number of functional difficulties	.985 (.077)	.972 (.081)	.978 (.083)	.993 (.083)
Any activity or participation difficulty	1.033 (.218)	1.046 (.220)	1.066 (.216)	1.101 (.215)
Number of unmet needs	***1.720 (.076)	***1.722 (.077)	***1.720 (.077)	***1.733 (.077)
Amount of time child is affected by condition	-	*.826 (.096)	*.819 (.098)	.846 (.096)
Severity rating	-	1.023 (.108)	1.028 (.108)	1.057 (.110)
Pervasiveness (# qualifying screener questions)	-	1.071 (.062)	-	-
<b>Qualification Reason</b>				
Prescription medication use	-	-	1.062 (.140)	-
Elevated service use or need	-	-	1.037 (.152)	-
Functional limits	-	-	1.251 (.151)	-
Use of specialized therapies	-	-	.986 (.179)	-
Emotional, developmental, behavioral condition	-	-	1.007 (.144)	-
Prescription medication only	-	-	-	1.155 (.203)
	Nagelkerke R <sup>2</sup> =.129 Wald F = 3.878 p < .001	Nagelkerke R <sup>2</sup> =.136 Wald F = 3.484 P < .001	Nagelkerke R <sup>2</sup> =.138 Wald F = 3.069 p < .001	Nagelkerke R <sup>2</sup> =.136 Wald F = 3.443 p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001

### Equipment/Supplies Definition

There are no statistically significant enabling factors for this definition; however, there are several predisposing factors and condition characteristics that have important impact. Based upon LOGIT models, CSHCN who are black, non-Hispanic or Hispanic are more likely to be underinsured according to the equipment/supplies definition than are CSHCN who are white, non-Hispanic. CSHCN who are black have 1.620-1.703 the odds of being underinsured. This translates to a 62-70 percent increase in the odds of being underinsured. CSHCN who are Hispanic have 1.750-1.918 the odds of being underinsured, translating into a 75-92 percent increase in odds. CSHCN who live in the Northeast, the Midwest, or the West are less likely to be underinsured than are those who live in the South. Those in the Northeast have .358-.374 the odds of being underinsured, or a 63-64 percent decrease in odds. Those in the Midwest have .415-.448 the odds of being underinsured, or a 55-58 percent decrease in odds. Those in the West have .424-.441 the odds of being underinsured, or a 56-58 percent decrease in odds. CSHCN who live in states that are influenced by the bifurcated, pluralistic, or separatist political subcultures are less likely to be underinsured by this definition than are those who live in states that are influenced by the moralistic political subculture. CSHCN living in bifurcated states have .347-.370 the odds (63-65 percent decrease in odds) of being underinsured. Those in pluralistic states have .434-.471 the odds (53-57 percent decrease in odds) of being underinsured. CSHCN living in separatist states (New Mexico) have .441 the odds of being underinsured by this definition (56 percent decrease in odds). For each category increase in the rating of how much the condition affects ability, CSHCN have .714 the odds of being underinsured. This translates to a 29 percent decrease in

odds per category increase. For each unit increase in the number of unmet health needs, there is a 2.213-2.278 increase in the odds of being underinsured. This translates to a 121-128 percent increase in odds for each additional unit increase in unmet needs. With each category increase in severity rating, CSHCN have 1.358-1.434 the odds of being underinsured. This translates to a 36-43 percent increase in the odds of being underinsured for each increase in category of severity. CSHCN who qualified based on the use of specialized therapies have 1.959 the odds of being underinsured compared with those who did not qualify for this reason. This translates to a 96 percent increase in the odds of being underinsured. Finally, CSHCN who qualified due to ongoing emotional, developmental, or behavioral conditions have .685 the odds – or a 31 percent decrease in odds – of being underinsured by this definition than do those who did not qualify for this reason.

In summary, CSHCN are more likely to be underinsured according to the equipment/supplies definition if they are black, non-Hispanic or if they are Hispanic as opposed to white, non-Hispanic; if they qualified based on the use of specialized therapies; as the number of unmet health needs increases; and as severity ratings increase. They are less likely to be underinsured if they live in the Northeast, Midwest, or West as opposed to the South; if they live in states influenced by the bifurcated, pluralistic, or separatist political subcultures as opposed to the moralistic subculture; as the rating of how much the condition affects ability increases; and if they qualified based on ongoing emotional, developmental, or behavioral conditions. Most of the findings are as would be expected. In this case, the finding for how much the condition affects ability makes intuitive sense. Remembering that the increasing categories for this variable actually

represent less affect (a great deal, some, very little), this means that CSHCN who are affected the least by their condition are less likely to be underinsured according to this definition. Also, the finding that CSHCN who qualified based on an ongoing mental health need is not surprising given that this definition is developed based on equipment and supply needs. However, the directions of influence for the political subcultures are somewhat counterintuitive. Given what is known in the literature, one might expect CSHCN living in states influenced by the moralistic political subculture to fare better, but for this definition, that is not the case. The results address Hypotheses #1 - #4 for the equipment/supplies definition of underinsurance. As summarized in Table 21, only Hypothesis #1 is supported by these results. Table 25 below presents the analyses for this definition.

Table 25. LOGIT Models: Underinsured – Equipment/Supplies Definition

Variable	Base Model Exp B (SE)	Model 1 Exp B (SE)	Model 2 Exp B (SE)	Model 3 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.930 (.164)	.899 (.170)	.927 (.171)	.914 (.167)
Family Structure	1.120 (.155)	1.127 (.162)	1.093 (.163)	1.110 (.159)
Gender	1.236 (.146)	1.256 (.149)	1.196 (.147)	1.244 (.149)
Age	.881 (.065)	.892 (.066)	.946 (.068)	.885 (.066)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	*1.620 (.200)	*1.703 (.207)	*1.692 (.212)	*1.640 (.207)
Hispanic	*1.750 (.237)	**1.918 (.238)	**1.885 (.242)	**1.839 (.235)
Multi-racial, Non-Hispanic	1.037 (.317)	1.092 (.325)	1.101 (.307)	1.101 (.325)
Other race (including Asian), Non-Hispanic	2.077 (.449)	2.047 (.455)	1.989 (.424)	2.027 (.454)
<b>Region</b>				
Northeast	***.358 (.254)	***.373 (.261)	***.359 (.263)	***.374 (.258)
Midwest	***.415 (.245)	** .446 (.256)	** .431 (.258)	** .448 (.252)
South	Ref	Ref	Ref	Ref
West	** .426 (.247)	** .433 (.256)	** .441 (.257)	** .424 (.252)
<b>Political Subculture</b>				
Bifurcated	** .349 (.319)	** .370 (.326)	** .347 (.329)	** .352 (.325)
Individualistic	1.059 (.257)	1.069 (.261)	1.068 (.262)	1.037 (.262)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	** .471 (.229)	** .471 (.233)	***.434 (.233)	** .458 (.234)
Separatist	.537 (.389)	.515 (.383)	*.441 (.391)	.505 (.384)
<b>Enabling Factors</b>				
Insurance Type				

Private only	.715 (.183)	.767 (.188)	.770 (.190)	.762 (.186)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.103 (.226)	1.026 (.236)	.952 (.246)	1.037 (.236)
Other comprehensive only	1.810 (.452)	1.491 (.431)	1.435 (.418)	1.453 (.442)
Income	1.240 (.185)	1.156 (.188)	1.119 (.190)	1.195 (.188)
<b>Condition Characteristics</b>				
How much condition affects ability	** .714 (.118)	.893 (.144)	.877 (.149)	.858 (.146)
Number of health conditions	1.042 (.064)	1.012 (.066)	1.046 (.070)	1.025 (.065)
Number of functional difficulties	1.048 (.093)	1.026 (.099)	1.070 (.102)	1.067 (.100)
Any activity or participation difficulty	.761 (.244)	.674 (.247)	.602 (.268)	.737 (.253)
Number of unmet needs	***2.278 (.064)	***2.213 (.064)	***2.250 (.066)	***2.237 (.065)
Amount of time child is affected by condition	-	1.081 (.100)	1.031 (.103)	1.114 (.099)
Severity rating	-	*1.358 (.148)	*1.411 (.151)	*1.434 (.149)
Pervasiveness (# qualifying screener questions)	-	1.098 (.066)	-	-
<b>Qualification Reason</b>				
Prescription medication use	-	-	1.048 (.169)	-
Elevated service use or Need	-	-	.942 (.195)	-
Functional limits	-	-	1.028 (.185)	-
Use of specialized Therapies	-	-	***1.959 (.168)	-
Emotional, developmental, behavioral condition	-	-	*.685 (.177)	-
Prescription medication Only	-	-	-	1.382 (.269)
	Nagelkerke R <sup>2</sup> =.240 Wald F = 11.557 p < .001	Nagelkerke R <sup>2</sup> =.252 Wald F = 11.136 p < .001	Nagelkerke R <sup>2</sup> =.268 Wald F = 9.615 p < .001	Nagelkerke R <sup>2</sup> =.252 Wald F = 10.962 p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001

#### 4.2.B Findings for public and private subgroups by definition

This section provides information about models addressing the subgroups of CSHCN by public insurance only and private insurance only. They provide answers for research question three, hypotheses #7 – #9.

##### Attitudinal definition

Based on LOGIT models for CSHCN who are privately insured, there are no statistically significant pre-disposing or enabling factors, but there are several condition characteristics that have important impact. For each category increase in the number of

functional difficulties, there is a 1.247 increase in the odds of being underinsured according to the attitudinal definition. This translates to a 25 percent increase in the odds of being underinsured. For each unit increase in the number of unmet needs, there is a 1.459-1.473 increase in the odds of being underinsured. This means a 46-47 percent increase. With each category increase in the amount of time the child is impacted by the condition, there is a .737-.760 decrease in the odds of being underinsured. This translates to a 24-26 percent decrease in the odds of being underinsured. With each category increase in severity rating, CSHCN have 1.523-1.573 the odds of being underinsured. This means a 52-57 percent increase for each category increase in severity rating. Finally, privately insured CSCHN who qualified based on the need for prescription medication have .651 the odds of being underinsured by this definition than do those who qualified on other reasons. This translates to a 35 percent decrease in the odds of being underinsured.

Publicly insured CSHCN have a somewhat different experience. For each category increase in age, they have 1.184-1.199 the odds of being underinsured, or an 18-20 percent increase. Similar to their privately insured counterparts, for each unit increase in unmet needs, publicly insured CSHCN have 1.440-1.483 the odds of being underinsured. This is a 44-48 percent increase in the odds of being underinsured. Lastly, those who qualified based solely on prescription medication usage have 2.028 the odds of being underinsured according to the attitudinal definition than do those who qualified for other reasons.

In summary, CSHCN with both public and private insurance have increased odds of being underinsured with each unit increase in the number of unmet needs. For

privately insured CSHCN, as the rating of severity increases, so do the odds of being underinsured. A somewhat contradictory finding is that as the amount of time the child is affected by the condition increases, the odds of being underinsured actually decrease. Perhaps families of CSHCN who are affected more often become more adept at working within the system of care to get the services their child needs. Neither of these findings was observed in the publicly insured group. Also, for one of the four models for the privately insured group, as the number of functional difficulties increases, so do the odds of being underinsured. In addition, those who qualified on prescription medication usage at all (alone or in combination with any other qualification reason) are less likely to be underinsured than are those who qualified for other reasons. Conversely, for publicly insured CSHCN, those that qualified solely based on the need for prescription medications are more likely to be underinsured according to the attitudinal definition than are those CSHCN who qualified based on other reasons. Also, age is a factor for publicly insured CSHCN, though this was not observed in those with private insurance.

Of note, for several other variables, the experience appeared different for publicly and privately insured CSHCN, though the parameter estimates failed to reach statistical significance in the sample. These trends are represented by large, opposite-direction differences in the estimates between the two groups. This can be observed for multi-racial, non-Hispanic and other race, non-Hispanic CSHCN, for those living in states influenced predominantly by the bifurcated political subculture, and for CSHCN who qualified based on prescription medication usage only. For example, though only the estimate for publicly insured CSHCN who qualified on prescription medication usage only reached statistical significance (more likely to be underinsured – 2.028 increase in

odds), it is interesting to note that the estimate for privately insured CSHCN is largely different in the opposite direction (.858 decrease in odds). These results address Hypotheses #7 - #9 for the attitudinal definition of underinsurance. As summarized in Table 21, only Hypothesis #8 for the private group is supported. Also Hypothesis #9 is partially supported for the private group. Table 26 below summarizes the analyses for this definition.

Table 26. LOGIT Models: Underinsured – Attitudinal Definition

Variable	Base Model		Model 1		Model 2		Model 3	
	Exp B (SE)		Exp B (SE)		Exp B (SE)		Exp B (SE)	
	Private	Public	Private	Public	Private	Public	Private	Public
<b>Predisposing Factors</b>								
Education Level	1.218 (.239)	1.078 (.189)	1.217 (.249)	1.083 (.189)	1.265 (.250)	1.080 (.188)	1.236 (.244)	1.079 (.187)
Family Structure	1.067 (.198)	1.232 (.188)	1.116 (.200)	1.291 (.190)	1.178 (.198)	1.260 (.190)	1.119 (.201)	1.263 (.188)
Gender	.959 (.190)	.788 (.193)	.898 (.190)	.783 (.195)	.891 (.194)	.763 (.192)	.890 (.193)	.773 (.191)
Age	.970 (.068)	*1.181 (.077)	.958 (.070)	*1.184 (.078)	.964 (.070)	*1.198 (.080)	.952 (.071)	*1.199 (.077)
Race/Ethnicity								
White, Non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.069 (.317)	1.290 (.237)	1.158 (.334)	1.276 (.240)	1.136 (.337)	1.294 (.237)	1.136 (.325)	1.272 (.236)
Hispanic	1.092 (.379)	.935 (.282)	1.112 (.351)	.922 (.283)	1.139 (.337)	.970 (.284)	1.095 (.360)	.909 (.282)
Multi-racial, Non-Hispanic	1.413 (.355)	.538 (.412)	1.302 (.366)	.570 (.421)	1.408 (.351)	.592 (.405)	1.306 (.367)	.581 (.419)
Other race, Non-Hispanic	.796 (.439)	1.833 (.440)	.799 (.426)	1.951 (.441)	.791 (.406)	2.079 (.458)	.801 (.424)	1.942 (.450)
Region								
Northeast	.724 (.311)	.952 (.351)	.736 (.327)	.953 (.354)	.731 (.333)	.956 (.352)	.728 (.324)	.968 (.347)
Midwest	1.306 (.284)	1.200 (.339)	1.355 (.292)	1.208 (.341)	1.375 (.306)	1.243 (.341)	1.347 (.294)	1.217 (.338)
South	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
West	1.060 (.292)	1.129 (.324)	1.079 (.286)	1.129 (.325)	1.054 (.292)	1.149 (.326)	1.067 (.293)	1.152 (.314)
Political Subculture								
Bifurcated	1.303 (.358)	.677 (.438)	1.282 (.368)	.670 (.441)	1.331 (.371)	.682 (.449)	1.262 (.367)	.663 (.437)



Individualistic	1.342 (.296)	.841 (.360)	1.148 (.307)	.818 (.363)	1.127 (.314)	.842 (.369)	1.135 (.306)	.806 (.360)
Moralistic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Pluralistic	1.161 (.248)	1.484 (.337)	1.137 (.263)	1.474 (.340)	1.194 (.264)	1.499 (.346)	1.131 (.260)	1.422 (.338)
Separatist	1.026 (.440)	.995 (.533)	.995 (.451)	1.083 (.537)	.992 (.464)	1.073 (.547)	.974 (.448)	1.176 (.537)
<b>Enabling Factor</b>								
Income	.835 (.176)	.586 (.462)	.802 (.179)	.595 (.468)	.779 (.175)	.625 (.478)	.812 (.178)	.607 (.473)
<b>Condition Char.</b>								
How much condition affects ability	1.055 (.148)	.972 (.154)	1.136 (.175)	.948 (.186)	1.190 (.176)	.889 (.182)	1.131 (.173)	.906 (.180)
Number of health conditions	1.036 (.083)	.986 (.091)	1.013 (.084)	.995 (.096)	1.073 (.087)	.971 (.098)	1.030 (.081)	.966 (.090)
Number of functional difficulties	*1.247 (.100)	1.196 (.139)	1.176 (.102)	1.230 (.143)	1.091 (.101)	1.256 (.141)	1.177 (.106)	1.277 (.137)
Any activity or participation difficulty	.750 (.277)	.892 (.339)	.723 (.278)	.906 (.343)	.673 (.279)	.967 (.344)	.705 (.270)	1.014 (.342)
Number of unmet needs	***1.459 (.101)	**1.440 (.127)	***1.467 (.100)	**1.468 (.123)	***1.469 (.101)	**1.475 (.127)	***1.473 (.102)	**1.483 (.124)
Amount of time child is affected by condition	-	-	*.760 (.136)	.971 (.139)	*.737 (.137)	.978 (.138)	*.769 (.131)	.962 (.139)
Severity rating	-	-	**1.557 (.156)	1.008 (.158)	**1.523 (.154)	1.005 (.156)	**1.573 (.159)	1.059 (.154)
Pervasiveness	-	-	1.061 (.087)	.943 (.085)	-	-	-	-
<b>Qualification Reason</b>								
Prescription medication use	-	-	-	-	*.651 (.198)	1.111 (.200)	-	-
Elevated service use or need	-	-	-	-	1.089 (.208)	1.167 (.221)	-	-
Functional limits	-	-	-	-	1.224 (.216)	.830 (.219)	-	-
Use of specialized therapies	-	-	-	-	1.021 (.236)	.864 (.215)	-	-
Emotional/Dev/Beh condition	-	-	-	-	1.315 (.183)	.743 (.214)	-	-
Prescription medication only	-	-	-	-	-	-	.858 (.262)	*2.028 (.304)
	#R <sup>2</sup> =.069	#R <sup>2</sup> =.114	#R <sup>2</sup> =.090	#R <sup>2</sup> =.117	#R <sup>2</sup> =.106	#R <sup>2</sup> =.125	#R <sup>2</sup> =.089	#R <sup>2</sup> =.129

	Wald F = 1.856 p < .05	Wald F = 2.184 p < .01	Wald F = 2.019 p < .01	Wald F = 2.008 p < .01	Wald F = 2.193 P < .001	Wald F = 1.755 P < .01	Wald F = 2.073 p < .01	Wald F = 2.148 p < .01
	* p < .05	** p < .01	*** p < .001	*Nagelkerke's Pseudo R <sup>2</sup>				

### Economic definition

Based on LOGIT models for CSHCN who are privately insured, there are several statistically significant pre-disposing factors, enabling factors, and condition characteristics that have important impact. CSHCN who are multi-racial, non-Hispanic or other race, non-Hispanic are more likely to be underinsured according to the economic definition than are white, non-Hispanic CSHCN. They have 2.595-2.741 (126-127 percent increase) and 2.832-3.371 (128-134 percent increase) the odds, respectively. Those who live in families at or above 300 percent of FPL have .439 the odds of being underinsured, translating to a 56 percent decrease. For each unit increase in the number of unmet needs, there is a 1.815-1.953 increase in the odds of being underinsured. This means an 81-95 percent increase. With each category increase in the amount of time the child is impacted by the condition, there is a .718-.724 decrease in the odds of being underinsured. This translates to a 28 percent decrease in the odds of being underinsured. With each category increase in severity rating, CSHCN have 1.422-1.662 the odds of being underinsured. This means a 42-66 percent increase for each category increase in severity rating. Also, privately insured CSHCN are more likely to be underinsured as pervasiveness (number of positive screener questions) increases. This means that for each additional positive question, these CSHCN have 1.443 the odds – a 44 percent increase – of being underinsured. Finally, privately insured CSCHN who qualified based on elevated service use and need, on functional limitations, and on ongoing emotional, developmental, or behavioral conditions are more likely to be underinsured by this

definition than are those who do not qualify on these reasons. They have 1.984 (98 percent increase), 1.754 (75 percent increase), and 1.512 (51 percent increase) the odds of being underinsured, respectively.

Publicly insured CSHCN have a somewhat different experience. For each category increase in how much the condition affects ability, there is a .661 decrease in the odds of being underinsured. Recalling that increasing categories for this variable actually indicate less impact of the condition, this makes intuitive sense that the findings indicate a 34 percent decrease in odds. Also for each category increase in the number of health conditions, there is a 1.211 increase in the odds of being underinsured according to the economic definition. This translates to a 21 percent increase in the odds of being underinsured. Similar to their privately insured counterparts, for each unit increase in unmet needs, publicly insured CSHCN have 1.395-1.491 the odds of being underinsured. This is a 39-49 percent increase in the odds of being underinsured. For one of the models, publicly insured CSHCN who live in states influenced predominantly by the separatist political subculture have .337 (66 percent decrease) the odds of being underinsured. As seen in the privately insured group, those who qualified based on elevated service use and need are more likely to be underinsured – 1.646 or 65 percent increase in the odds. Lastly, those who qualified based on prescription medication usage have 1.607 the odds of being underinsured according to the economic definition than do those who qualified for other reasons.

In summary, CSHCN with both public and private insurance have increased odds of being underinsured according to the economic definition as the number of unmet needs increase and when they qualified based on an elevated need or use of services. For

privately insured CSHCN, as both the rating of severity and pervasiveness increase, so do the odds of being underinsured. Again the somewhat contradictory finding is observed that as the amount of time the child is affected by the condition increases, the odds of being underinsured actually decrease. Also, privately insured CSHCN who are either multi-racial or other race, non-Hispanic are more likely to be underinsured than their white counterparts. In addition, as might be expected, income level matters in the privately insured group, with those in the higher category being less likely to be underinsured than those in the lower category – under 300 percent FPL. None of these findings were observed in the publicly insured group. Considering the publicly insured group, although not significant across all models, those living in separatist states (New Mexico) are less likely to be underinsured than are those in moralistic states. Likewise, those whose conditions impact their abilities less are also less likely to be underinsured. Also in one public model, as the number of health conditions increases, so do the odds of being underinsured. As mentioned above, for both groups, qualifying based on elevated service use and need translated into increased chances of being underinsured. Beyond that, the results differed between the two groups. Privately insured CSHCN were more likely to be underinsured if they qualified based on functional limitations or ongoing emotional, developmental, or behavioral conditions. Publicly insured CSHCN are more likely to be underinsured if they qualified on prescription medication usage at all (alone or in combination with any other qualification reason).

Of note, for several other variables, the experience appeared different for publicly and privately insured CSHCN, though the parameter estimates failed to reach statistical significance in the sample. These trends are represented by large, opposite-direction

differences in the estimates between the two groups. This can be observed for both for black, non-Hispanic and Hispanic CSHCN, as well as for those living in the Northeast or Midwest and in states under the bifurcated political subculture. For example, though none of the estimates for geographic region were significant, it is interesting to note that the estimates for privately insured CSHCN are largely different in the opposite direction (increase in odds over South) than are those for publicly insured CHSCN (decrease in odds over South). These results address Hypotheses #7 - #9 for the economic definition of underinsurance. As summarized in Table 21, Hypothesis #7 is supported and Hypotheses #8 and #9 are also supported for the private group. Table 27 below summarizes the analyses for this definition.

Table 27. LOGIT Model: Underinsured – Economic definition

Variable	Base Model		Model 1		Model 2		Model 3	
	Exp B (SE)		Exp B (SE)		Exp B (SE)		Exp B (SE)	
	Private	Public	Private	Public	Private	Public	Private	Public
<b>Predisposing Factors</b>								
Education Level	.905 (.265)	1.356 (.187)	.920 (.271)	1.334 (.189)	.915 (.268)	1.345 (.189)	.989 (.267)	1.331 (.188)
Family Structure	1.036 (.209)	1.155 (.202)	1.068 (.211)	1.139 (.201)	1.112 (.207)	1.076 (.200)	1.044 (.211)	1.139 (.200)
Gender	.882 (.188)	.739 (.189)	.920 (.185)	.760 (.191)	.912 (.183)	.706 (.191)	.883 (.188)	.755 (.192)
Age	1.062 (.074)	1.055 (.083)	1.091 (.076)	1.070 (.083)	1.061 (.078)	1.107 (.083)	1.056 (.076)	1.055 (.082)
Race/ Ethnicity								
White, Non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.008 (.360)	.641 (.242)	1.335 (.344)	.700 (.252)	1.415 (.342)	.726 (.255)	1.107 (.356)	.678 (.249)
Hispanic	.611 (.358)	1.051 (.295)	.651 (.325)	1.216 (.281)	.643 (.320)	1.353 (.284)	.611 (.341)	1.172 (.286)
Multi-racial, Non-Hispanic	<b>**2.741</b> (.374)	1.048 (.425)	<b>*2.595</b> (.395)	.946 (.390)	<b>*2.701</b> (.388)	1.039 (.382)	<b>*2.599</b> (.390)	.914 (.403)
Other race, Non-Hispanic	<b>*2.832</b> (.470)	1.143 (.388)	<b>*3.076</b> (.538)	1.073 (.402)	<b>*3.371</b> (.541)	1.233 (.402)	<b>*2.984</b> (.497)	1.083 (.395)
Region								
Northeast	1.129	.543	1.098	.567	1.082	.564	1.022	.559

	(.321)	(.346)	(.318)	(.369)	(.314)	(.371)	(.318)	(.371)
Midwest	1.602	.869	1.660	.826	1.787	.880	1.524	.829
	(.309)	(.321)	(.305)	(.332)	(.305)	(.328)	(.312)	(.330)
South	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
West	.809	.861	.895	.915	.909	.951	.809	.898
	(.325)	(.322)	(.310)	(.310)	(.306)	(.310)	(.327)	(.311)
Political Subculture								
Bifurcated	1.693	.735	1.565	.765	1.575	.780	1.336	.736
	(.406)	(.428)	(.414)	(.443)	(.417)	(.449)	(.408)	(.443)
	.708	.645	.654	.655	.599	.671	.631	.634
Individualistic	(.291)	(.369)	(.301)	(.376)	(.311)	(.372)	(.301)	(.380)
Moralistic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Pluralistic	1.015	.638	.968	.637	1.021	.642	.872	.618
	(.246)	(.335)	(.257)	(.352)	(.263)	(.354)	(.252)	(.356)
Separatist	1.186	.369	1.120	.369	1.139	*.337	.976	.354
	(.465)	(.541)	(.497)	(.541)	(.488)	(.550)	(.478)	(.545)
<b>Enabling Factor</b>								
Income	***.439	.501	***.384	.472	***.391	.513	***.431	.475
	(.203)	(.435)	(.196)	(.438)	(.191)	(.468)	(.198)	(.444)
<b>Condition Char.</b>								
How much condition affects ability	1.001	** .661	1.126	.884	1.159	.770	1.060	.869
	(.165)	(.151)	(.172)	(.178)	(.170)	(.173)	(.174)	(.178)
Number of health conditions	1.175	*1.211	1.070	1.133	1.088	1.092	1.143	1.176
	(.090)	(.091)	(.091)	(.094)	(.092)	(.098)	(.090)	(.091)
Number of functional difficulties	1.080	1.140	1.020	1.039	.988	1.090	1.076	1.063
	(.104)	(.135)	(.108)	(.139)	(.110)	(.146)	(.113)	(.140)
Any activity or participation difficulty	1.084	.815	1.006	.719	1.063	.811	1.052	.738
	(.283)	(.326)	(.276)	(.335)	(.282)	(.344)	(.289)	(.335)
Number of unmet needs	***1.953	***1.491	***1.840	***1.395	***1.815	***1.411	***1.891	***1.405
	(.131)	(.091)	(.123)	(.091)	(.122)	(.091)	(.128)	(.092)
Amount of time child is affected by condition	-	-	*.724	1.288	*.718	1.300	.795	*1.349
			(.139)	(.133)	(.139)	(.134)	(.139)	(.134)
Severity rating	-	-	*1.461	1.290	*1.422	1.284	**1.662	1.340
			(.168)	(.170)	(.165)	(.174)	(.174)	(.168)
Pervasiveness	-	-	***1.443	1.157	-	-	-	-
			(.084)	(.091)				
Qualification Reason								
Prescription medication use	-	-	-	-	1.134	*1.607	-	-
					(.198)	(.216)		
Elevated service use or need	-	-	-	-	**1.984	*1.646	-	-
					(.214)	(.211)		
Functional limits	-	-	-	-	*1.754	.860	-	-
					(.234)	(.225)		

Use of specialized therapies	-	-	-	-	.857 (.217)	1.147 (.231)	-	-
Emotional/Dev/Beh condition	-	-	-	-	*1.512 (.193)	.675 (.223)	-	-
Prescription medication only	-	-	-	-	-	-	.893 (.305)	.932 (.315)
	#R <sup>2</sup> =.187	#R <sup>2</sup> =.162	#R <sup>2</sup> =.237	#R <sup>2</sup> =.188	#R <sup>2</sup> =.249	#R <sup>2</sup> =.214	#R <sup>2</sup> =.207	#R <sup>2</sup> =.182
	Wald F = 4.246	Wald F = 3.531	Wald F = 4.691	Wald F = 3.281	Wald F = 4.449	Wald F = 3.147	Wald F = 3.943	Wald F = 3.147
	P < .001	p < .001	P < .001	p < .001	p < .001	p < .001	p < .001	p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001 #Nagelkerke's Pseudo R<sup>2</sup>

### Structural definition

Based on LOGIT models for CSHCN who are privately insured, only one predisposing factor and one condition characteristic have statistically significant impact for this definition. For each unit increase in the number of unmet needs, there is a 2.034-2.088 increase in the odds of being underinsured. This means a 120-121 percent increase. In one private model, black, non-Hispanic CSHCN have .509 the odds of being underinsured – a 49 percent decrease – compared with white, non-Hispanic CSHCN.

Publicly insured CSHCN have a somewhat different experience. Similar to their privately insured counterparts, increasing unmet need also results in a greater likelihood of being underinsured. For each unit increase in unmet needs, publicly insured CSHCN have 1.363-1.408 the odds of being underinsured. This is a 36-41 percent increase in the odds of being underinsured. Also as noted in the private group, publicly insured CSHCN who are black, non-Hispanic are less likely to be underinsured according to the structural definition than are white, non-Hispanic CSHCN. They have .560-.574 (43-44 percent decrease) the odds. Beyond these two variables, the results for publicly insured CSHCN differ. For each category increase in the number of health conditions, there is a 1.265-1.322 increase in the odds of being underinsured. This translates to a 26-32 percent

increase in the odds of being underinsured. CHCN who live in separatist states have .184-.190 the odds of being underinsured than do those in moralistic states. This means an 81-82 percent decrease in the likelihood of being underinsured. Those who live in families where the highest household education is more than high school and also in family structures other than single mother are more likely to be underinsured. They have 1.566-1.597 and 1.562-1.584 the odds of being underinsured – a 57-60 percent and 56-58 percent increase – respectively.

In summary, CSHCN with both public and private insurance have increased odds of being underinsured according to the structural definition as the number of unmet needs increase. Black, non-Hispanic CSHCN in both groups are less likely to be underinsured than their white, non-Hispanic counterparts. Within the publicly insured group, CSHCN who live in separatist states (New Mexico) are less likely to be underinsured than are those in moralistic states. Also, publicly insured CSHCN in family structures other than single mother and where the highest household education level is more than high school are more likely to be underinsured. Both of these findings are somewhat counterintuitive to what might be expected. Finally, as the number of health conditions increases, so do the odds of being underinsured.

Of note, for several other variables, the experience appeared different for publicly and privately insured CSHCN, though the parameter estimates failed to reach statistical significance in the sample. These trends are represented by large, opposite-direction differences in the estimates between the two groups. This can be observed for both for multi-racial, non-Hispanic and Hispanic CSHCN, as well as for those living in the Northeast. It is also apparent for those CHSCN with activity and participation difficulties



and for those who qualified based on the use of specialized therapies or emotional, developmental, or behavioral conditions. For example, though the estimates for activity/participation difficulties are not significant, it is interesting to note the trends. In the privately insured group, those with one or more difficulties have an increase in odds of being underinsured (1.542-1.690; 54-69 percent increase) compared with those who have no difficulties. But in the publicly insured group, those with one or more activity/participation difficulty have a decrease in odds of being underinsured as compared with those who have no difficulties (.681-.821; 18-32 percent decrease). These results address Hypotheses #7 - #9 for the structural definition of underinsurance. As summarized in Table 21, none of the hypotheses are supported for either the public or private groups. Table 28 below summarizes the analyses for this definition.

Table 28. LOGIT Model: Underinsured – Structural Definition

Variable	Base Model		Model 1		Model 2		Model 3	
	Exp B (SE)		Exp B (SE)		Exp B (SE)		Exp B (SE)	
	Private	Public	Private	Public	Private	Public	Private	Public
<b>Predisposing Factors</b>								
Education Level	1.123 (.254)	*1.597 (.211)	1.164 (.261)	*1.573 (.212)	1.184 (.263)	*1.566 (.215)	1.178 (.267)	*1.567 (.211)
Family Structure	1.320 (.220)	1.485 (.208)	1.293 (.223)	*1.584 (.212)	1.299 (.220)	*1.562 (.211)	1.281 (.227)	*1.565 (.209)
Gender	.888 (.212)	.728 (.213)	.924 (.214)	.736 (.215)	.921 (.206)	.695 (.217)	.911 (.214)	.732 (.215)
Age	1.006 (.072)	1.053 (.087)	1.022 (.075)	1.068 (.089)	1.036 (.077)	1.066 (.091)	1.008 (.074)	1.070 (.088)
Race/Ethnicity								
White, Non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.541 (.334)	*.574 (.277)	.535 (.343)	*.572 (.283)	.516 (.350)	*.560 (.288)	*.509 (.340)	*.569 (.281)
Hispanic	.572 (.363)	1.316 (.298)	.600 (.350)	1.271 (.295)	.609 (.342)	1.337 (.293)	.588 (.357)	1.260 (.292)
Multi-racial, Non-Hispanic	.691 (.344)	1.185 (.436)	.734 (.358)	1.390 (.443)	.748 (.360)	1.359 (.454)	.731 (.350)	1.402 (.444)
Other race, Non-Hispanic	.783 (.425)	.581 (.548)	.776 (.418)	.613 (.550)	.747 (.433)	.634 (.561)	.769 (.428)	.616 (.547)
Region								

Northeast	1.318 (.322)	.526 (.379)	1.179 (.325)	.497 (.383)	1.179 (.331)	.504 (.386)	1.171 (.331)	.503 (.383)
Midwest	1.112 (.318)	1.033 (.359)	1.021 (.326)	1.037 (.366)	1.001 (.336)	1.136 (.371)	.999 (.324)	1.041 (.368)
South	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
West	1.143 (.318)	1.472 (.334)	1.160 (.312)	1.466 (.334)	1.133 (.306)	1.520 (.329)	1.119 (.318)	1.484 (.330)
<b>Political Subculture</b>								
Bifurcated	1.081 (.368)	.772 (.510)	1.003 (.373)	.762 (.524)	1.014 (.378)	.780 (.536)	.954 (.374)	.755 (.522)
Individualistic	.834 (.311)	.787 (.427)	.803 (.320)	.778 (.435)	.822 (.327)	.773 (.456)	.790 (.319)	.768 (.434)
Moralistic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Pluralistic	1.419 (.246)	.983 (.388)	1.320 (.251)	.989 (.398)	1.327 (.253)	.997 (.412)	1.271 (.252)	.969 (.397)
Separatist	1.057 (.449)	**1.188 (.623)	.985 (.453)	**1.188 (.631)	.977 (.466)	**1.184 (.641)	.948 (.451)	**1.190 (.622)
<b>Enabling Factor</b>								
Income	.837 (.119)	.800 (.486)	.852 (.193)	.814 (.482)	.828 (.187)	.815 (.503)	.886 (.187)	.823 (.485)
<b>Condition Char.</b>								
How much condition affects ability	1.190 (.145)	1.310 (.147)	1.241 (.168)	1.223 (.172)	1.265 (.169)	1.179 (.171)	1.199 (.171)	1.202 (.172)
Number of health conditions	.876 (.094)	**1.322 (.096)	.840 (.094)	**1.310 (.102)	.857 (.094)	*1.265 (.100)	.859 (.092)	**1.305 (.100)
Number of functional difficulties	.991 (.101)	.848 (.144)	1.001 (.103)	.807 (.150)	.981 (.107)	.830 (.152)	1.031 (.107)	.819 (.151)
Any activity or participation difficulty	1.622 (.293)	.681 (.338)	1.618 (.298)	.708 (.338)	1.542 (.284)	.821 (.353)	1.690 (.283)	.738 (.351)
Number of unmet needs	***2.088 (.119)	**1.363 (.104)	***2.034 (.117)	**1.403 (.109)	***2.044 (.117)	**1.405 (.111)	***2.050 (.118)	**1.408 (.110)
Amount of time child is affected by condition	-	-	.882 (.133)	.807 (.149)	.869 (.135)	.802 (.152)	.913 (.134)	.811 (.148)
Severity rating	-	-	1.060 (.162)	1.147 (.173)	1.060 (.159)	1.151 (.171)	1.120 (.167)	1.178 (.173)
Pervasiveness	-	-	1.135 (.089)	1.000 (.094)	-	-	-	-
<b>Qualification Reason</b>								
Prescription medication use	-	-	-	-	.994 (.195)	1.159 (.232)	-	-
Elevated service use or need	-	-	-	-	.996 (.214)	1.125 (.239)	-	-
Functional	-	-	-	-	1.163	1.338	-	-

limits					(.216)	(.262)		
Use of specialized therapies	-	-	-	-	1.339	.724	-	-
Emotional/Dev/Beh condition	-	-	-	-	1.241	.673	-	-
Prescription medication only							1.088	1.277
							(.259)	(.336)
	#R <sup>2</sup> =.152	#R <sup>2</sup> =.148	#R <sup>2</sup> =.158	#R <sup>2</sup> =.158	#R <sup>2</sup> =.161	#R <sup>2</sup> =.174	#R <sup>2</sup> =.154	#R <sup>2</sup> =.159
	Wald F =	Wald F =	Wald F =	Wald F =	Wald F =	Wald F =	Wald F =	Wald F =
	2.741	3.448	2.498	2.991	2.227	2.825	2.420	2.993
	p < .001	p < .001	p < .001	P < .001	P < .001	p < .001	p < .001	p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Equipment/Supplies definition

Based on LOGIT models for CSHCN who are privately insured, there are several predisposing factors and condition characteristics that have important impact. CSHCN in family structures other than single mother have 1.693-1.776 the odds of being underinsured according to this definition. This translates to a 69-78 percent increase in odds. Those who live in the Northeast have .353-.391 the odds of being underinsured as do those who live in the South – a 61-65 percent decrease in odds. For each unit increase in the number of unmet needs, there is a 2.211-2.269 increase in the odds of being underinsured. This means a 122-123 percent increase. One private model indicated that with each category increase in how much the condition impacts the child's abilities, there is a .735 decrease (26 percent decrease) in the odds of being underinsured. Again category increases for this variable mean less impact on the child. Finally, privately insured CSCHN who qualified based on the use of specialized therapies have 2.203 the odds of being underinsured by this definition than do those who did not qualify for this reason. This translates to a 122 percent increase in the odds of being underinsured.

Publicly insured CSHCN have a somewhat different experience. For each category increase in age, they have .754-.803 the odds of being underinsured, or a 20-25 percent decrease. Black, non-Hispanic, Hispanic, and other race, non-Hispanic CSHCN are more likely to be underinsured by the definition than are their white, non-Hispanic peers. They have 2.098-2.236, 2.615-3.054, and 2.320-2.483 the odds of being underinsured, respectively. This means a 109-124 percent, 161-205 percent, and 132-148 percent increase, respectively. CSHCN who live in the Northeast (as seen in the private group), Midwest, and West are less likely to be underinsured than are their counterparts in the South. They have .263-.287, .258-.285, and .316-.339 the odds of being underinsured. This translates to a 71-74 percent, 72-74 percent, and 66-68 percent decrease in odds. Similar to their privately insured counterparts, for each unit increase in unmet needs, publicly insured CSHCN have 2.270-2.404 the odds of being underinsured. This is a 127-140 percent increase in the odds of being underinsured according to the equipment-supplies definition. Also as noted for the private group, publicly insured CSHCN who qualified based on the use of specialized therapies are also more likely to be underinsured by this definition. They have 1.768 the odds – a 77 percent increase in odds – of being underinsured than do those who did not qualify for this reason.

In summary, CSHCN with both public and private insurance have increased odds of being underinsured with each unit increase in the number of unmet needs and if they qualified based on the use of specialized therapies. Also, both are less likely to be underinsured if they live in the Northeast as opposed to the South. For privately insured CSHCN, as the impact of the condition on abilities decreases, so do the odds of being underinsured. Within the publicly insured group, CSHCN who live in the Midwest or the

West are less likely to be underinsured than those who live in the South. Also both age and race/ethnicity are factors for publicly insured CSHCN (older less likely; minority more likely), though this was not observed in those with private insurance.

Of note, there were no additional trends observed for other variables as was seen for the other definitions of underinsurance. Even for other parameter estimates that failed to reach statistical significance in the sample, there were no large, opposite-direction differences in the estimates between the two groups. It appears as if the experiences for publicly and privately insured CSHCN were similar across other variables. These results address Hypotheses #7 - #9 for the equipment/supplies definition of underinsurance. As summarized in Table 21, none of the hypotheses are supported for either the public or private groups. Table 29 below summarizes the analyses for this definition.

Table 29. LOGIT Model: Underinsured – Equipment/Supplies Definition

Variable	Base Model		Model 1		Model 2		Model 3	
	Exp B (SE)		Exp B (SE)		Exp B (SE)		Exp B (SE)	
	Private	Public	Private	Public	Private	Public	Private	Public
<b>Predisposing Factors</b>								
Education Level	.871 (.294)	.880 (.237)	.868 (.292)	.876 (.246)	.872 (.298)	.896 (.247)	.873 (.289)	.875 (.235)
Family Structure	*1.693 (.248)	.847 (.248)	*1.776 (.260)	.819 (.259)	*1.762 (.258)	.793 (.253)	*1.768 (.258)	.797 (.250)
Gender	1.240 (.210)	1.037 (.240)	1.240 (.212)	1.047 (.244)	1.179 (.212)	.993 (.240)	1.235 (.212)	1.019 (.245)
Age	.976 (.101)	** .754 (.104)	.996 (.101)	*.770 (.104)	1.079 (.103)	*.803 (.101)	.994 (.101)	** .757 (.105)
Race/Ethnicity								
White, Non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.219 (.395)	**2.107 (.267)	1.249 (.430)	**2.209 (.269)	1.214 (.438)	**2.236 (.271)	1.221 (.430)	**2.098 (.271)
Hispanic	1.251 (.377)	*2.615 (.373)	1.286 (.389)	**3.054 (.370)	1.318 (.400)	**3.041 (.368)	1.277 (.388)	**2.765 (.360)
Multi-racial, Non-Hispanic	1.213 (.379)	.804 (.545)	1.239 (.383)	.830 (.560)	1.251 (.383)	.912 (.557)	1.236 (.383)	.815 (.553)
Other race,	2.360 (.682)	*2.483 (.438)	2.367 (.662)	*2.358 (.423)	2.113 (.596)	*2.405 (.413)	2.362 (.659)	*2.320 (.427)

Non-Hispanic Region								
Northeast	** .353 (.380)	** .269 (.444)	* .391 (.388)	** .287 (.456)	* .368 (.399)	** .263 (.459)	* .391 (.388)	** .282 (.453)
Midwest	.586 (.352)	** .274 (.425)	.655 (.359)	** .275 (.433)	.579 (.368)	** .258 (.432)	.650 (.359)	** .285 (.430)
South	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
West	.512 (.357)	** .316 (.413)	.532 (.361)	** .328 (.428)	.516 (.365)	** .337 (.419)	.523 (.364)	** .339 (.400)
Political Subculture								
Bifurcated	.359 (.487)	.321 (.586)	.385 (.494)	.340 (.598)	* .352 (.503)	* .306 (.602)	.379 (.494)	.320 (.596)
Individualistic	.906 (.362)	1.143 (.538)	.943 (.364)	1.205 (.554)	1.011 (.373)	1.180 (.555)	.936 (.364)	1.112 (.550)
Moralistic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Pluralistic	.548 (.314)	.401 (.501)	.572 (.319)	.402 (.508)	* .505 (.318)	.366 (.515)	.565 (.321)	.379 (.508)
Separatist	.690 (.533)	.355 (.730)	.745 (.540)	.396 (.715)	.590 (.550)	.310 (.747)	.735 (.541)	.371 (.724)
<b>Enabling Factor</b>								
Income	1.155 (.221)	.918 (.465)	1.046 (.226)	.844 (.478)	.975 (.226)	.797 (.513)	1.060 (.226)	.865 (.460)
<b>Condition Char.</b>								
How much condition affects ability	* .735 (.151)	.737 (.201)	.915 (.208)	.942 (.228)	.953 (.218)	.917 (.233)	.901 (.207)	.889 (.238)
Number of health conditions	1.019 (.100)	1.147 (.100)	1.026 (.103)	1.068 (.104)	1.076 (.108)	1.109 (.106)	1.029 (.101)	1.105 (.102)
Number of functional difficulties	1.068 (.131)	1.093 (.150)	1.021 (.149)	.983 (.162)	1.056 (.151)	1.009 (.167)	1.033 (.149)	1.040 (.165)
Any activity or participation difficulty	.712 (.323)	.706 (.368)	.724 (.331)	.610 (.380)	.602 (.372)	.577 (.418)	.740 (.324)	.720 (.396)
Number of unmet needs	***2.227 (.095)	***2.404 (.095)	***2.211 (.096)	***2.270 (.094)	***2.269 (.100)	***2.286 (.096)	***2.219 (.096)	***2.304 (.095)
Amount of time child is affected by condition	-	-	1.141 (.153)	1.179 (.159)	1.067 (.159)	1.139 (.157)	1.149 (.149)	1.253 (.154)
Severity rating	-	-	1.303 (.242)	1.358 (.222)	1.407 (.247)	1.349 (.221)	1.327 (.240)	1.513 (.230)
Pervasiveness	-	-	1.034 (.093)	1.179 (.107)	-	-	-	-
Qualification Reason								
Prescription medication use	-	-	-	-	.798 (.239)	1.056 (.276)	-	-
Elevated	-	-	-	-	.862	1.194	-	-

service use or need					(.262)	(.295)		
Functional limits	-	-	-	-	1.019 (.268)	1.024 (.304)	-	-
Use of specialized therapies	-	-	-	-	**2.203 (.257)	*1.768 (.260)	-	-
Emotional, Dev/Beh condition	-	-	-	-	.641 (.236)	.810 (.304)	-	-
Prescription medication only	-	-	-	-	-	-	1.088 (.308)	1.719 (.466)
	#R <sup>2</sup> =.198 Wald F = 5.725 p < .001	#R <sup>2</sup> =.293 Wald F = 6.446 p < .001	#R <sup>2</sup> =.207 Wald F = 5.281 p < .001	#R <sup>2</sup> =.312 Wald F = 6.185 p < .001	#R <sup>2</sup> =.231 Wald F = 4.333 p < .001	#R <sup>2</sup> =.319 Wald F = 5.424 p < .001	#R <sup>2</sup> =.206 Wald F = 5.281 p < .001	#R <sup>2</sup> =.311 Wald F = 6.017 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

#### 4.2.C Analysis by subgroup

This section provides information about models addressing CSHCN by condition-specific subgroups of interest. These include functional limitations, high severity, and prescription medications only. They provide answers for research question two, hypotheses #5 and #6. There is no hypothesis that would require looking within the subgrouping of CSHCN who qualified based solely on the use of prescription medications. However, there were conflicting results in that the general hypothesis related to this group, hypothesis #3, was not supported for any definition, but significant findings did occur in the public and private subgroups. Therefore, I decided to also examine within this subgroup of CSHCN to determine the presence of important differences.

##### 4.2.C.1 High severity

###### Attitudinal definition

CSHCN within the high severity group have several enabling factors and condition characteristics that impact whether they are underinsured according to the attitudinal definition. Those with private insurance only have 1.806-1.911 the odds of

being underinsured compared with those with public insurance only. This is an 81-91 percent increase in the odds of being underinsured if they have private insurance as opposed to public. Also, as the number of unmet needs and functional difficulties increases, so do the odds of being underinsured. For each category increase for either variable, there is 1.262-1.327 (26-33 percent increase) and 1.550-1.562 (55-56 percent increase) the odds of being underinsured, respectively.

For those CSHCN in the non-high severity group, similar findings were noted for private insurance only and unmet needs. Within this group, CSHCN with private insurance only have 1.654-1.656 the odds of being underinsured compared with those with public insurance only. This is a 65-66 percent increase in odds. Also, with each category increase in the number of unmet needs, CSHCN have 1.582-1.597 the odds of being underinsured (58-60 percent increase). Specific to the non-high severity group, CSHCN who are Hispanic have 1.497 the odds – a 50 percent increase in the odds – of being underinsured compared with their white, non-Hispanic peers. Also, those with other comprehensive insurance have 3.707-3.755 the odds of being underinsured compared with those with public insurance only. This is a 271-275 percent increase in odds.

In summary, within both groups, CSHCN with private insurance only were more likely to be underinsured according to the attitudinal definition than those with public insurance only. Also, both groups experienced increased chances of being underinsured as the number of unmet needs increase. Specifically within the high severity group, as the number of functional difficulties increases, so does the likelihood of being underinsured. Specifically within the non-high severity group, Hispanic CSHCN and



those with other comprehensive insurance only are more likely to be underinsured. There were no other large, opposite-direction trends (non-significant estimates) noted between the two group experiences. These results address Hypothesis #5 for the attitudinal definition of underinsurance. As summarized in Table 21, this hypothesis is supported.

Table 30 below summarizes the analyses for this definition and subgroup.

Table 30. Underinsured – Attitudinal Definition – High Severity vs. Non-High Severity

Variable	High Severity		Non-High Severity	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.321 (.185)	1.290 (.186)	1.088 (.140)	1.088 (.141)
Family Structure	1.135 (.176)	1.200 (.172)	1.035 (.136)	1.021 (.137)
Gender	1.166 (.160)	1.200 (.159)	1.047 (.139)	1.027 (.138)
Age	.932 (.066)	.933 (.070)	1.046 (.052)	1.057 (.052)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.065 (.250)	1.098 (.255)	1.072 (.181)	1.058 (.181)
Hispanic	1.031 (.292)	1.066 (.270)	*1.497 (.204)	1.498 (.206)
Multi-racial, Non-Hispanic	.725 (.272)	.763 (.273)	1.271 (.255)	1.251 (.256)
Other race (including Asian), Non-Hispanic	1.210 (.365)	1.232 (.366)	.671 (.394)	.672 (.394)
<b>Region</b>				
Northeast	1.068 (.283)	1.056 (.285)	.776 (.228)	.764 (.228)
Midwest	1.618 (.269)	1.591 (.267)	1.092 (.213)	1.072 (.214)
South	Ref	Ref	Ref	Ref
West	1.336 (.264)	1.337 (.254)	.921 (.231)	.914 (.227)
<b>Political Subculture</b>				
Bifurcated	1.124 (.321)	1.147 (.323)	.833 (.288)	.806 (.290)
Individualistic	.885 (.256)	.876 (.255)	1.149 (.234)	1.142 (.238)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	1.183 (.228)	1.181 (.233)	1.260 (.214)	1.235 (.216)
Separatist	1.115 (.414)	1.075 (.423)	.977 (.363)	.912 (.369)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	**1.806 (.216)	**1.911 (.211)	**1.656 (.152)	**1.654 (.152)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.316 (.231)	1.357 (.227)	.853 (.251)	.848 (.248)
Other comprehensive only	1.321 (.425)	1.402 (.414)	**3.755 (.403)	**3.707 (.411)
Income	1.025 (.201)	.985 (.194)	.804 (.166)	.801 (.165)
<b>Condition Characteristics</b>				
Number of health conditions	1.094 (.070)	1.099 (.076)	.987 (.073)	.990 (.074)
Number of functional difficulties	*1.327 (.120)	*1.262 (.115)	1.078 (.076)	1.083 (.078)
Any activity or participation difficulty	.750 (.317)	.741 (.316)	1.234 (.188)	1.209 (.190)
Number of unmet needs	***1.550 (.095)	***1.562 (.093)	***1.597 (.083)	***1.582 (.083)

Qualification Reason				
Prescription medication use	-	.792 (.171)	-	.886 (.157)
Elevated service use or need	-	1.421 (.204)	-	1.008 (.135)
Functional limits	-	.783 (.187)	-	1.282 (.165)
Use of specialized therapies	-	.944 (.176)	-	.983 (.201)
Emotional, developmental, behavioral condition	-	1.283 (.177)	-	.837 (.154)
	#R <sup>2</sup> =.128 Wald F = 2.979 P < .001	#R <sup>2</sup> =.142 Wald F = 2.816 p < .001	#R <sup>2</sup> =.094 Wald F = 3.432 p < .001	#R <sup>2</sup> =.098 Wald F = 2.985 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Economic definition

CSHCN within the high severity group have several predisposing and enabling factors as well as condition characteristics that impact whether they are underinsured according to the economic definition. Black, non-Hispanic CSHCN have .551 the odds of being underinsured compared with white, non-Hispanic CSHCN, representing a 45 percent decrease in odds. Those with private insurance only have 1.537-1.623 the odds of being underinsured compared with those with public insurance only. This is a 53-62 percent increase in the odds of being underinsured if they have private insurance as opposed to public. Also, CSHCN in families with incomes at or above 300 percent FPL have .592-.648 the odds of being underinsured. This is a 35-41 percent decrease in the odds of being underinsured compared with those in families below 300 percent FPL. As the number of unmet needs, functional difficulties, and health conditions increases, so do the odds of being underinsured. For each category increase for either variable, there is 1.561-1.602 (56-60 percent increase), 1.334 (33 percent increase), and 1.162 (16 percent increase) the odds of being underinsured, respectively. Finally, CSHCN in this group

who qualified based on elevated service usage and need have 2.099 the odds of being underinsured. This is a 110 percent increase in odds.

For CSHCN in the non-high severity group, similar findings were noted for income, unmet needs, health conditions, and qualification based on elevated service usage and need. Within this group, CSHCN in families with incomes at or above 300 percent FPL have 456-.457 the odds of being underinsured compared with those in families with incomes below 300 percent FPL. This is a 54 percent decrease in odds. Also, with each category increase in the number of unmet needs, CSHCN have 1.872-1.921 the odds of being underinsured (87-92 percent increase). For each category increase in the number of health conditions, CSHCN have 1.165 the odds of being underinsured, or a 16 percent increase in the odds. CSHCN in this group who qualified on elevated service usage and need have 1.453 the odds of being underinsured – a 45 percent increase in odds. Specific to the non-high severity group, CSHCN who live in the Northeast have .580-.583 the odds of being underinsured compared with those who live in the South. This is a 42 percent decrease in odds. Also, those who qualified based on functional limitations had 1.401 the odds of being underinsured compared with those who did not qualify for this reason. This is a 40 percent increase in odds. Females had .732-.737 the odds of being underinsured compared with males, meaning that females had a 26-27 percent decrease in the odds of being underinsured compared with males. CSHCN in the non-high severity group who lived in households other than single mother and where the highest educational level was more than high school were also more likely to be underinsured. Those in family structures other than single mother had 1.304-1.308 the odds (30-31 percent increase) of being underinsured. Those in households with the

higher education level had 1.358-1.383 the odds (36-38 percent increase) of being underinsured. Finally, for each category increase in age, there was 1.143-1.145 the odds of being underinsured, or a 14 percent increase with age.

In summary, within both groups, CSHCN with lower incomes, greater numbers of unmet needs, more health conditions, and who qualified based on elevated service usage and need were more likely to be underinsured according to the economic definition. Specifically within the high severity group, those with greater numbers of functional difficulties and those with private insurance only (as opposed to public only) were more likely to be underinsured. Also, black, non-Hispanic CSHCN were less likely to be underinsured. Specifically within the non-high severity group, older CSHCN, those in families with higher educational levels, those with family structures other than single mother, and those who qualified based on functional limitations were more likely to be underinsured. Females and those CSHCN who lived in the Midwest were less likely. The only other large, opposite-direction trends (non-significant estimates) noted between the two group experiences was for those with private and public insurance together. In the high severity group, these CSHCN appeared to have increased odds of being underinsured as compared with those with public insurance only (1.232-1.288), whereas within the non-high severity group they had decreased odds (.658-.668). These results address Hypothesis #5 for the economic definition of underinsurance. As summarized in Table 21, this hypothesis is supported. Table 31 below summarizes the analyses for this definition and subgroup.

Table 31. Underinsured – Economic Definition – High Severity vs. Non-High Severity

Variable	High Severity		Non-High Severity	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.072 (.192)	.998 (.192)	*1.383 (.134)	*1.358 (.135)
Family Structure	.982 (.181)	1.002 (.178)	*1.304 (.130)	*1.308 (.131)
Gender	1.172 (.164)	1.135 (.165)	*.732 (.125)	*.737 (.124)
Age	.977 (.068)	1.002 (.069)	**1.145 (.051)	*1.143 (.052)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	*.551 (.241)	.626 (.242)	.733 (.178)	.744 (.179)
Hispanic	.612 (.279)	.706 (.276)	.848 (.179)	.868 (.181)
Multi-racial, Non-Hispanic	1.390 (.381)	1.463 (.371)	.989 (.270)	.967 (.270)
Other race (including Asian), Non-Hispanic	1.184 (.394)	1.228 (.421)	.886 (.383)	.921 (.403)
Region				
Northeast	.741 (.298)	.746 (.297)	*.580 (.225)	*.583 (.225)
Midwest	.894 (.264)	.927 (.271)	.923 (.210)	.921 (.209)
South	Ref	Ref	Ref	Ref
West	.687 (.265)	.720 (.266)	1.007 (.203)	1.035 (.200)
Political Subculture				
Bifurcated	.861 (.356)	.921 (.360)	.717 (.271)	.715 (.275)
Individualistic	.628 (.271)	.648 (.275)	.864 (.226)	.846 (.228)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.838 (.258)	.869 (.260)	.707 (.192)	.711 (.194)
Separatist	.782 (.420)	.830 (.421)	.739 (.339)	.688 (.340)
<b>Enabling Factors</b>				
Insurance Type				
Private only	*1.537 (.205)	*1.623 (.201)	1.094 (.140)	1.122 (.140)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.318 (.272)	1.299 (.275)	.658 (.256)	.668 (.254)
Other comprehensive only	2.045 (.470)	1.982 (.478)	1.542 (.426)	1.558 (.444)
Income	*.648 (.215)	*.592 (.218)	***.457 (.159)	***.456 (.158)
<b>Condition Characteristics</b>				
Number of health conditions	*1.162 (.076)	1.059 (.082)	1.176 (.065)	*1.165 (.068)
Number of functional difficulties	*1.334 (.118)	1.260 (.121)	1.078 (.069)	1.055 (.071)
Any activity or participation difficulty	1.232 (.322)	1.288 (.334)	1.004 (.175)	.961 (.176)
Number of unmet needs	***1.602 (.084)	***1.561 (.081)	***1.921 (.085)	***1.872 (.085)
Qualification Reason				
Prescription medication use	-	1.307 (.181)	-	.915 (.140)
Elevated service use or need	-	***2.099 (.208)	-	**1.453 (.126)
Functional limits	-	1.116 (.201)	-	*1.401 (.162)
Use of specialized therapies	-	.930 (.192)	-	.782 (.177)
Emotional, developmental, behavioral condition	-	1.139 (.180)	-	.943 (.143)
	#R <sup>2</sup> =.153 Wald F = 3.755 p < .001	#R <sup>2</sup> =.184 Wald F = 3.848 p < .001	#R <sup>2</sup> =.182 Wald F = 6.361 p < .001	#R <sup>2</sup> =.195 Wald F = 5.765 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Structural definition

For CSHCN within the high severity group, only the number of unmet needs impacts whether they are underinsured according to the structural definition. For each category increase in the number of unmet needs, there is 1.591-1.604 (59-60 percent increase) the odds of being underinsured.

For those CSHCN in the non-high severity group, similar findings were noted for unmet needs. Within this group, for each category increase in the number of unmet needs, CSHCN have 1.486-1.493 the odds of being underinsured (49 percent increase). Specific to the non-high severity group, CSHCN who are black, non-Hispanic have .583-.586 the odds of being underinsured compared with their white, non-Hispanic peers. This is a 58-59 percent decrease in odds.

In summary, within both groups, as the number of unmet needs increases, so do the chances of being underinsured according to the structural definition. Specifically within the non-high severity group, black, non-Hispanic CSHCN are less likely to be underinsured than white, non-Hispanic CSHCN. There were no other large, opposite-direction trends (non-significant estimates) noted between the two group experiences. These results address Hypothesis #5 for the structural definition of underinsurance. As summarized in Table 21, this hypothesis is not supported. Table 32 below summarizes the analyses for this definition and subgroup.

Table 32. Underinsured – Structural Definition – High Severity vs. Non-High Severity

Variable	High Severity		Non-High Severity	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.547 (.225)	1.523 (.228)	.904 (.135)	.893 (.136)
Family Structure	1.112 (.195)	1.116 (.194)	1.239 (.134)	1.230 (.133)
Gender	.749 (.172)	.740 (.172)	.992 (.134)	.983 (.133)
Age	.970 (.074)	.975 (.076)	1.037 (.049)	1.043 (.049)

<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.640 (.305)	.659 (.312)	<b>** .586 (.183)</b>	<b>** .583 (.184)</b>
Hispanic	.946 (.282)	.977 (.278)	.755 (.189)	.755 (.189)
Multi-racial, Non-Hispanic	.993 (.366)	1.000 (.369)	.917 (.242)	.916 (.242)
Other race (including Asian), Non-Hispanic	.920 (.362)	.904 (.357)	.714 (.439)	.692 (.438)
<b>Region</b>				
Northeast	.706 (.345)	.706 (.347)	1.054 (.219)	1.046 (.219)
Midwest	.996 (.297)	1.007 (.298)	1.048 (.206)	1.051 (.206)
South	Ref	Ref	Ref	Ref
West	.989 (.266)	.999 (.267)	1.464 (.209)	1.479 (.205)
<b>Political Subculture</b>				
Bifurcated	.601 (.371)	.612 (.375)	.877 (.256)	.860 (.258)
Individualistic	.720 (.290)	.726 (.291)	1.030 (.209)	1.014 (.211)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.938 (.255)	.946 (.258)	1.126 (.181)	1.103 (.182)
Separatist	.790 (.404)	.817 (.411)	.562 (.340)	.551 (.342)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	1.291 (.245)	1.298 (.245)	1.202 (.141)	1.203 (.142)
Public only	Ref	Ref	Ref	Ref
Private and Public	.937 (.263)	.927 (.261)	1.262 (.285)	1.266 (.285)
Other comprehensive only	1.082 (.431)	1.062 (.444)	1.482 (.336)	1.465 (.335)
Income	1.209 (.204)	1.186 (.209)	.938 (.164)	.935 (.161)
<b>Condition Characteristics</b>				
Number of health conditions	.967 (.075)	.948 (.076)	1.045 (.068)	1.033 (.069)
Number of functional difficulties	1.097 (.143)	1.080 (.143)	.951 (.069)	.974 (.070)
Any activity or participation difficulty	2.140 (.410)	2.101 (.413)	1.230 (.178)	1.240 (.178)
Number of unmet needs	<b>***1.604 (.083)</b>	<b>***1.591 (.084)</b>	<b>***1.486 (.063)</b>	<b>***1.493 (.063)</b>
<b>Qualification Reason</b>				
Prescription medication use	-	.980 (.179)	-	1.072 (.143)
Elevated service use or need	-	1.210 (.237)	-	1.005 (.131)
Functional limits	-	1.151 (.214)	-	1.055 (.153)
Use of specialized therapies	-	.936 (.208)	-	1.031 (.204)
Emotional, developmental, behavioral condition	-	1.023 (.193)	-	.854 (.142)
	#R <sup>2</sup> =.154 Wald F = 3.252 p < .001	#R <sup>2</sup> =.156 Wald F = 2.771 p < .001	#R <sup>2</sup> =.088 Wald F = 3.235 p < .001	#R <sup>2</sup> =.090 Wald F = 2.784 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Equipment/Supplies definition

CSHCN within the high severity group have several predisposing factors and condition characteristics that impact whether they are underinsured according to the equipment/supplies definition. Females have 1.438 the odds of being underinsured – a 44 percent increase in odds. Black, non-Hispanic CSHCN have 1.792-1.946 the odds of being underinsured compared with their white, non-Hispanic peers. This represents a 79-95 percent increase in odds. For each category increase in age, CSHCN have .817 the odds of being underinsured – an 18 percent decrease in odds. CSHCN living in the Northeast or Midwest have .441-.457 (54-56 percent decrease) and .476-.508 (49-52 percent decrease) the odds of being underinsured, respectively, when compared with those who live in the South. Also, those who live in bifurcated or pluralistic subcultures have .391-.401 (60-61 percent decrease in odds) and .405-.440 (56-60 percent decrease in odds) the odds of being underinsured versus those who live in states influenced predominantly by the moralistic subculture. Finally, CSHCN in the high severity group who qualified based on the use of specialized therapies have 2.147 the odds of being underinsured (121 percent increase in odds) compared with those who did not qualify for this reason.

For those CSHCN in the non-high severity group, those who are black, non-Hispanic also have an increase in odds of being underinsured – 2.287-2.298 the odds or a 129-130 percent increase in odds. Also within this group, Hispanic CSHCN have 2.408-2.425 the odds of being underinsured, translating to a 41-42 percent increase in odds. As the number of unmet needs and functional difficulties increases, so do the odds of being underinsured. For each category increase for either variable, there is 2.203-2.211 (120-



122 percent increase) and 1.312-1.318 (31-32 percent increase) the odds of being underinsured, respectively. Finally, those with one or more activity/participation difficulties have .381-.418 the odds – a 58-62 percent decrease in odds – of being underinsured compared with those with no difficulties. This is a somewhat counterintuitive finding.

In summary, within both groups, black, non-Hispanic CSHCN are more likely to be underinsured according to the equipment/supplies definition than are their white, non-Hispanic counterparts. Also, both groups experience increased chances of being underinsured as the number of unmet needs increase. Specifically within the high severity group, females and those who qualified based on the use of specialized therapies are more likely to be underinsured. Older CSHCN and those who live in the Northeast, Midwest, bifurcated states, or pluralistic states are less likely to be underinsured. Specifically within the non-high severity group, Hispanic CSHCN are more likely to be underinsured. Also, as the number of functional difficulties increases, so does the likelihood of being underinsured. However, somewhat surprisingly, CSHCN in the non-high severity group who had activity/participation difficulties are less likely to be underinsured than those with no difficulties. There were no other large, opposite-direction trends (non-significant estimates) noted between the two group experiences. These results address Hypothesis #5 for the equipment/supplies definition of underinsurance. As summarized in Table 21, this hypothesis is not supported. Table 33 below summarizes the analyses for this definition and subgroup.

Table 33. Underinsured – Equipment/Supplies Definition – High Severity vs. Non-High Severity

Variable	High Severity		Non-High Severity	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.889 (.194)	.920 (.198)	1.031 (.181)	1.009 (.183)
Family Structure	1.115 (.184)	1.046 (.188)	1.271 (.178)	1.255 (.182)
Gender	*1.438 (.182)	1.362 (.176)	.915 (.171)	.914 (.172)
Age	*.817 (.085)	.892 (.086)	.990 (.064)	1.018 (.065)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	*1.792 (.243)	*1.946 (.260)	***2.287 (.205)	***2.298 (.205)
Hispanic	1.082 (.284)	1.073 (.284)	***2.425 (.236)	***2.408 (.239)
Multi-racial, Non-Hispanic	.799 (.366)	.823 (.372)	1.131 (.397)	1.115 (.386)
Other race (including Asian), Non-Hispanic	2.774 (.576)	2.497 (.525)	2.266 (.510)	2.275 (.521)
Region				
Northeast	*.457 (.319)	*.441 (.329)	.810 (.277)	.792 (.278)
Midwest	*.508 (.287)	*.476 (.300)	.682 (.280)	.664 (.279)
South	Ref	Ref	Ref	Ref
West	.766 (.287)	.830 (.288)	.733 (.271)	.746 (.269)
Political Subculture				
Bifurcated	*.401 (.382)	*.391 (.386)	1.054 (.371)	1.039 (.376)
Individualistic	.921 (.308)	.948 (.311)	1.451 (.323)	1.495 (.325)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	** .440 (.279)	** .405 (.283)	.975 (.284)	.979 (.287)
Separatist	.446 (.461)	.424 (.458)	.998 (.478)	.958 (.471)
<b>Enabling Factors</b>				
Insurance Type				
Private only	.668 (.222)	.668 (.232)	.888 (.199)	.890 (.198)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.143 (.274)	.993 (.291)	1.174 (.304)	1.139 (.302)
Other comprehensive only	1.505 (.547)	1.434 (.509)	1.410 (.445)	1.400 (.435)
Income	1.236 (.231)	1.108 (.235)	1.145 (.227)	1.119 (.228)
<b>Condition Characteristics</b>				
Number of health conditions	1.129 (.081)	1.145 (.087)	.960 (.077)	.963 (.084)
Number of functional difficulties	.966 (.146)	.948 (.154)	**1.312 (.079)	**1.318 (.084)
Any activity or participation difficulty	1.685 (.516)	1.260 (.549)	*.418 (.223)	***.381 (.241)
Number of unmet needs	***2.381 (.077)	***2.401 (.080)	***2.211 (.069)	***2.203 (.071)
Qualification Reason				
Prescription medication use	-	.957 (.199)	-	.941 (.213)
Elevated service use or Need	-	.886 (.278)	-	1.334 (.167)
Functional limits	-	1.502 (.257)	-	.950 (.188)
Use of specialized therapies	-	***2.147 (.212)	-	1.445 (.219)
Emotional, developmental, behavioral condition	-	.700 (.216)	-	.765 (.200)
	#R <sup>2</sup> =.289 Wald F = 8.083 p < .001	#R <sup>2</sup> =.320 Wald F = 6.973 p < .001	#R <sup>2</sup> =.226 Wald F = 9.745 p < .001	#R <sup>2</sup> =.234 Wald F = 8.189 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

#### 4.2.C.2 Functional limitations

##### Attitudinal definition

CSHCN within the functional limitations group have several predisposing and enabling factors and condition characteristics that impact whether they are underinsured according to the attitudinal definition. CSHCN in households where the highest educational level is more than high school have 1.665-1.692 the odds of being underinsured, a 66-69 percent increase in odds. Those with private insurance only have 1.800-1.979 the odds of being underinsured – an 80-98 percent increase in odds – compared with those who have public insurance only. For each category increase in the number of unmet needs, CSHCN have 1.488-1.531 the odds of being underinsured. This means a 49-53 percent increase in odds. As the number of health conditions increases in a category, CSHCN have 1.166 the odds of being underinsured, or a 17 percent increase in odds. As the amount of time the child is affected by the condition increases (increasing time), there is .703 the odds of being underinsured, meaning a 30 percent decrease in odds. Finally, for CSHCN in the functional limitations group, as the severity rating increases, so do the odds of being underinsured. For each category increase, there is 1.563 the odds of being underinsured (56 percent increase in odds).

For those CSHCN in the non-functional limitations group, those with private insurance only also have an increase in odds of being underinsured – 1.808-1.868 the odds or an 81-87 percent increase in odds – compared with those with public insurance only. Also within this group, CSHCN with other comprehensive insurance only have 4.740-5.002 the odds of being underinsured, representing a 374-400 percent increase in odds. CSHCN living in pluralistic states have 1.684-1.741 the odds of being

underinsured, translating to a 68-74 percent increase in odds. As the number of unmet needs increase, so do the odds of being underinsured. For each category increase, there is 1.575-1.632 the odds (57-63 percent increase) of being underinsured.

In summary, within both groups, CSHCN with private insurance only and those with greater numbers of unmet needs are more likely to be underinsured according to the attitudinal definition. Specifically for CSHCN in the functional limitations group, those in households with higher educational levels, those with greater numbers of health conditions, and those with higher severity ratings are also more likely to be underinsured. Those with less time affected, however, are less likely to be underinsured. For CSHCN in the non-functional limitations group, those who live in states predominantly influenced by the pluralistic political subculture are more likely to be underinsured than those under moralistic influences. Also, those with other comprehensive insurance only were more likely than those with public insurance only to be underinsured according to this definition. The only other large, opposite-direction trends (non-significant estimates) noted between the two group experiences are for other race, non-Hispanic and separatist states. For example, CSCHN in the functional limitations group who are other race, non-Hispanic appear to have increased odds of being underinsured (1.294-1.383), but those in the non-functional limitations group seem to have decreased odds (.673-.707). These results address Hypothesis #6 for the attitudinal definition of underinsurance. As summarized in Table 21, this hypothesis is supported. Table 34 below summarizes the analyses for this definition and subgroup.

Table 34. Underinsured – Attitudinal Definition – Functional Limitations vs. Non-Functional Limitations

Variable	Functional Limitations		Non-Functional Limitations	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	*1.692 (.203)	*1.665 (.213)	.940 (.156)	.926 (.157)
Family Structure	1.019 (.186)	1.019 (.184)	1.029 (.148)	1.078 (.151)
Gender	1.113 (.176)	1.118 (.175)	.933 (.149)	.883 (.152)
Age	.940 (.070)	.969 (.068)	1.064 (.058)	1.050 (.060)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.886 (.278)	.880 (.289)	1.124 (.195)	1.116 (.200)
Hispanic	1.345 (.354)	1.415 (.326)	.996 (.227)	.933 (.225)
Multi-racial, Non-Hispanic	.938 (.324)	.953 (.327)	.947 (.283)	.952 (.286)
Other race (including Asian), Non-Hispanic	1.383 (.406)	1.294 (.401)	.673 (.362)	.707 (.370)
Region				
Northeast	.694 (.310)	.642 (.327)	.997 (.261)	1.073 (.259)
Midwest	1.039 (.318)	1.023 (.313)	1.272 (.243)	1.327 (.246)
South	Ref	Ref	Ref	Ref
West	.821 (.290)	.849 (.280)	1.092 (.251)	1.102 (.254)
Political Subculture				
Bifurcated	.868 (.372)	.800 (.374)	.954 (.320)	.977 (.325)
Individualistic	1.029 (.303)	.939 (.301)	1.350 (.254)	1.329 (.259)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	1.078 (.269)	1.028 (.277)	*1.684 (.227)	*1.741 (.229)
Separatist	.561 (.517)	.555 (.515)	1.587 (.364)	1.821 (.374)
<b>Enabling Factors</b>				
Insurance Type				
Private only	*1.800 (.234)	**1.979 (.239)	**1.808 (.172)	***1.868 (.175)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.593 (.243)	1.585 (.239)	1.125 (.253)	1.105 (.259)
Other comprehensive only	1.719 (.431)	2.284 (.433)	**4.740 (.524)	**5.002 (.522)
Income	1.085 (.217)	1.005 (.213)	.745 (.190)	.728 (.192)
<b>Condition Characteristics</b>				
How much condition affects ability	1.098 (.192)	1.315 (.208)	.897 (.119)	.950 (.126)
Number of health conditions	*1.166 (.075)	1.061 (.078)	1.040 (.064)	1.045 (.070)
Number of unmet needs	***1.531 (.104)	***1.488 (.103)	***1.575 (.084)	***1.632 (.085)
Amount of time child is affected by condition	-	*.703 (.138)	-	1.106 (.108)
Severity rating	-	**1.563 (.159)	-	1.203 (.124)
	#R <sup>2</sup> =.134 Wald F =2.523 p < .001	#R <sup>2</sup> =.161 Wald F =2.772 p < .001	#R <sup>2</sup> =.102 Wald F =3.375 p < .001	#R <sup>2</sup> =.113 Wald F =3.331 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Economic definition

CSHCN within the functional limitations group have several predisposing and enabling factors and condition characteristics that impact whether they are underinsured according to the attitudinal definition. Multi-racial, non-Hispanic CSHCN have 2.378-2.567 the odds of being underinsured compared with their white, non-Hispanic peers. This is a 138-157 percent increase in odds. Those with private insurance only have 2.174-2.563 the odds of being underinsured – a 117-156 percent increase in odds – compared with those who have public insurance only. CSHCN in families with incomes at or above 300 percent FPL have .444-.517 the odds of being underinsured compared with those with incomes below 300 percent FPL. This translates to a 48-56 percent decrease in odds. For each category increase in the number of unmet needs, CSHCN have 1.525-1.577 the odds of being underinsured, a 52-57 percent increase in odds. As the number of health conditions increased, CSHCN have 1.268 the odds of being underinsured, or a 27 percent increase in odds. Finally, for CSHCN in the functional limitations group, as the severity rating increases, so do the odds of being underinsured. For each category increase, there is 1.593 the odds of being underinsured (59 percent increase in odds).

For CSHCN in the non-functional limitations group, those in families with incomes at or above 300 percent FPL also have a decrease in odds of being underinsured. They had .662-.679 the odds of being underinsured compared with those in families with incomes below 300 percent FPL – a 32-34 percent decrease in odds. Also within this group, females have .715 the odds of being underinsured, representing a 28 percent decrease in odds. With each category increase in age, CSHCN have 1.167 the odds of

being underinsured. This means that each age category increase results in a 17 percent increase in the odds of being underinsured. CSHCN living in separatist states have .458-.506 the odds of being underinsured, translating to a 49-54 percent decrease in odds. Black, non-Hispanic and Hispanic CSHCN have .634 and .627 the odds of being underinsured by this definition, respectively. This is a 37 percent decrease in odds for both. As the number of unmet needs increases, so do the odds of being underinsured. For each category increase in the number of unmet needs and health conditions, there is 1.839-1.891 the odds (84-89 percent increase) and 1.141 the odds (14 percent increase) of being underinsured, respectively.

In summary, within both groups, CSHCN with higher incomes are less likely to be underinsured according to the economic definition. Also, for both groups, as the number of unmet needs and the number of health conditions increase, so do the chances of being underinsured. Specifically for CSHCN in the functional limitations group, those with private insurance only and those with higher severity ratings are more likely to be underinsured. Also, multi-racial, non-Hispanic CSHCN are more likely than their white, non-Hispanic counterparts to be underinsured. For CSHCN in the non-functional limitations group, females and those who live in states predominantly influenced by the separatist political subculture are less likely to be underinsured than are those under moralistic influences. Also, older CSHCN are more likely to be underinsured according to this definition. There were no other large, opposite-direction trends (non-significant estimates) noted between the two group experiences. These results address Hypothesis #6 for the economic definition of underinsurance. As summarized in Table 21, this

hypothesis is supported. Table 35 below summarizes the analyses for this definition and subgroup.

Table 35. Underinsured – Economic Definition – Functional Limitations vs. Non-Functional Limitations

Variable	Functional Limitations		Non-Functional Limitations	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	*1.541 (.205)	1.496 (.210)	1.013 (.153)	1.021 (.157)
Family Structure	.916 (.203)	.917 (.202)	1.099 (.145)	1.147 (.148)
Gender	1.074 (.193)	1.102 (.193)	*.715 (.142)	.749 (.144)
Age	.993 (.077)	1.041 (.077)	**1.167 (.059)	1.179 (.060)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.709 (.291)	.759 (.300)	*.634 (.202)	.693 (.205)
Hispanic	.989 (.436)	1.041 (.398)	*.627 (.202)	.673 (.203)
Multi-racial, Non-Hispanic	*2.378 (.406)	*2.567 (.407)	1.111 (.296)	1.023 (.285)
Other race (including Asian), Non-Hispanic	1.385 (.414)	1.274 (.410)	1.190 (.437)	1.000 (.468)
Region				
Northeast	.608 (.348)	.546 (.359)	.690 (.245)	.631 (.249)
Midwest	.773 (.318)	.752 (.325)	1.056 (.242)	.998 (.244)
South	Ref	Ref	Ref	Ref
West	.603 (.325)	.619 (.321)	.982 (.228)	.992 (.229)
Political Subculture				
Bifurcated	.729 (.406)	.657 (.413)	.840 (.314)	.746 (.321)
Individualistic	.636 (.306)	.574 (.311)	.856 (.253)	.839 (.258)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.894 (.289)	.821 (.298)	.729 (.213)	.670 (.222)
Separatist	.874 (.491)	.841 (.521)	*.506 (.342)	*.458 (.348)
<b>Enabling Factors</b>				
Insurance Type				
Private only	**2.174 (.265)	***2.563 (.246)	1.057 (.168)	1.067 (.172)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.546 (.292)	1.604 (.306)	.846 (.267)	.814 (.278)
Other comprehensive Only	1.138 (.432)	1.571 (.459)	2.724 (.543)	2.886 (.561)
Income	*.517 (.256)	**1.444 (.245)	*.679 (.186)	*.662 (.192)
<b>Condition Characteristics</b>				
How much condition affects ability	.964 (.166)	1.136 (.182)	.848 (.122)	.920 (.125)
Number of health conditions	**1.268 (.083)	1.098 (.085)	*1.141 (.062)	1.090 (.167)
Number of unmet needs	***1.577 (.096)	***1.525 (.091)	***1.891 (.090)	***1.839 (.090)
Amount of time child is affected by condition	-	.879 (.127)	-	1.000 (.001)
Severity rating	-	*1.593 (.166)	-	1.246 (.123)
	#R <sup>2</sup> =.145 Wald F =3.554 p < .001	#R <sup>2</sup> =.178 Wald F =3.864 p < .001	#R <sup>2</sup> =.164 Wald F =5.050 p < .001	#R <sup>2</sup> =.179 Wald F =4.897 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>



### Structural definition

CSHCN within the functional limitations group have several predisposing factors and condition characteristics that impact whether they are underinsured according to the structural definition. CSHCN in households where the highest educational level is more than high school have 1.784-1.847 the odds of being underinsured. This translates to a 78-85 percent increase in odds. Those who live in separatist states have .397 the odds of being underinsured – a 60 percent decrease. For each category increase in the number of unmet needs, CSHCN have 1.564-1.574 the odds of being underinsured. This means a 56-57 percent increase in odds.

For those CSHCN in the non-functional limitations group, as the number of unmet needs increases, so do the odds of being underinsured. For each category increase, there is 1.556-1.571 the odds (56-57 percent increase) of being underinsured. Also, those in families with incomes at or above 300 percent FPL have .905-.943 the odds of being underinsured compared with those in families with incomes below 300 percent FPL. This is a 6-10 percent decrease in odds. CSHCN in families with structures other than single mother have 1.336 the odds of being underinsured, representing a 34 percent increase in odds. Minority CSHCN have a decreased likelihood of being underinsured by the definition for the non-functional limitations subgroup. Black, non-Hispanic, Hispanic, and other race, non-Hispanic CSHCN have 484-.487 (52 percent decrease), .533-.547 (45-47 percent decrease), and .527 (47 percent decrease) the odds of being underinsured compared with their white, non-Hispanic peers.

In summary, within both groups, CSHCN with greater numbers of unmet needs are more likely to be underinsured according to the structural definition. Specifically for

CSHCN in the functional limitations group, those in households with higher educational levels are more likely to be underinsured and those who live in separatist states are less likely. For CSHCN in the non-functional limitations group, those who live in family structures other than single mother are more likely to be underinsured. However, those with higher family incomes and who are minorities are less likely to be underinsured. The only other large, opposite-direction trends (non-significant estimates) noted between the two group experiences are for CSHCN with other comprehensive insurance only. For example, CSCHN in the functional limitations group who have this insurance type appear to have decreased odds of being underinsured (.834-.999), but those in the non-functional limitations group seem to have increased odds (2.341-2.433). These results address Hypothesis #6 for the structural definition of underinsurance. As summarized in Table 21, this hypothesis is not supported. Table 36 below summarizes the analyses for this definition and subgroup.

Table 36. Underinsured – Structural Definition – Functional Limitations vs. Non-Functional Limitations

Variable	Functional Limitations		Non-Functional Limitations	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	*1.847 (.251)	*1.784 (.249)	.869 (.149)	.877 (.152)
Family Structure	.992 (.197)	.971 (.198)	*1.336 (.145)	1.323 (.147)
Gender	.842 (.182)	.860 (.182)	.878 (.157)	.892 (.151)
Age	.976 (.072)	.997 (.073)	1.057 (.055)	1.060 (.056)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.639 (.348)	.605 (.343)	***.487 (.195)	***.484 (.198)
Hispanic	1.195 (.309)	1.217 (.294)	** .533 (.216)	** .547 (.217)
Multi-racial, Non-Hispanic	1.087 (.383)	1.098 (.393)	1.129 (.241)	1.215 (.245)
Other race (including Asian), Non-Hispanic	.742 (.386)	.707 (.385)	*.527 (.326)	.518 (.335)
<b>Region</b>				
Northeast	.964 (.363)	.933 (.359)	.788 (.250)	.721 (.254)
Midwest	.989 (.316)	.960 (.318)	1.059 (.235)	1.017 (.238)
South	Ref	Ref	Ref	Ref
West	1.331 (.281)	1.397 (.275)	1.007 (.232)	.993 (.233)
<b>Political Subculture</b>				
Bifurcated	.858 (.393)	.838 (.397)	.685 (.287)	.650 (.294)

Individualistic	.883 (.318)	.798 (.326)	.851 (.226)	.868 (.229)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	1.236 (.278)	1.198 (.277)	1.064 (.194)	1.013 (.197)
Separatist	.412 (.472)	*.397 (.461)	.719 (.348)	.722 (.352)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	1.163 (.279)	1.206 (.281)	1.215 (.152)	1.176 (.156)
Public only	Ref	Ref	Ref	Ref
Private and Public	.936 (.273)	.960 (.276)	.919 (.264)	.966 (.266)
Other comprehensive Only	.834 (.438)	.999 (.444)	2.433 (.397)	2.341 (.393)
Income	1.111 (.226)	1.102 (.227)	*.905 (.195)	*.943 (.197)
<b>Condition Characteristics</b>				
How much condition affects ability	1.158 (.163)	1.294 (.173)	1.119 (.111)	1.078 (.115)
Number of health conditions	1.058 (.079)	.998 (.082)	.968 (.068)	.963 (.072)
Number of unmet needs	***1.574 (.085)	***1.564 (.086)	***1.571 (.068)	***1.556 (.067)
Amount of time child is affected by condition	-	.778 (.137)	-	.993 (.105)
Severity rating	-	1.223 (.164)	-	.874 (.120)
	#R <sup>2</sup> =.150 Wald F =2.915 p < .001	#R <sup>2</sup> =.162 Wald F =2.763 p < .001	#R <sup>2</sup> =.122 Wald F =3.728 p < .001	#R <sup>2</sup> =.122 Wald F =3.360 p < .001

\* p < .05 \*\* p < .01 \*\*\* p < .001 #Nagelkerke's Pseudo R<sup>2</sup>

### Equipment/Supplies definition

CSHCN within the functional limitations group have several predisposing factors and condition characteristics that impact whether they are underinsured according to the equipment/supplies definition. Black, non-Hispanic CSHCN have 1.842-1.855 the odds of being underinsured. This translates to an 84-85 percent increase in odds. CSHCN who live in the Northeast or Midwest have .491-.495 and .468-.487 the odds of being underinsured, respectively. This means a 50 and 51-53 percent decrease for each compared with those living in the South. CSHCN who live in states influenced predominantly by bifurcated or pluralistic political subcultures have .381-.382 and .324-.326 the odds of being underinsured – a 62 and 67-68 percent decrease, respectively. For each category increase in the number of unmet needs, CSHCN have 2.498-2.508 the odds of being underinsured, a 150-151 percent increase in odds. As how much the condition affects the child's ability increases (decreasing impact), there is .631 the odds of being

underinsured, meaning a 37 percent decrease in odds. Again, this is somewhat counterintuitive.

For those CSHCN in the non-functional limitations group, similarities exist for the findings related to Black, non-Hispanic, geographic region, and unmet needs. Black, non-Hispanic CSHCN have 1.921 the odds – a 92 percent increase in odds – of being underinsured. Also, Hispanic CSHCN have 2.019-2.062 the odds of being underinsured. This means a 102-106 percent increase in odds. CSHCN living in the Northeast, Midwest, and West have .432-.474 (53-57 percent decrease), .550 (45 percent decrease), and .380-.403 (60-62 percent decrease) the odds of being underinsured, respectively. Also, as the number of unmet needs increase, so do the odds of being underinsured. For each category increase, there is 2.085-2.096 the odds of being underinsured. This translates to a 108-110 percent increase in odds of being underinsured for each additional unmet need category.

In summary, within both groups, black, non-Hispanic CSHCN and those with greater numbers of unmet need are more likely to be underinsured according to the equipment/supplies definition. Also within both groups, CSHCN living in the Northeast and Midwest are less likely to be underinsured than are those in the South. Specifically for CSHCN in the functional limitations group, those in bifurcated or pluralistic states are less likely to be underinsured, as are those for whom the condition affects ability more. Specifically for CSHCN in the non-functional limitations group, those who are Hispanic are more likely to be underinsured. Also, those who live in the West are less likely to be underinsured according to this definition. The only other large, opposite-direction trends (non-significant estimates) noted between the two group experiences were for those

living in individualistic or separatist states. For example, CSCHN in the functional limitations group who live in individualistic states appear to have decreased odds of being underinsured (.904-.922), but those in the non-functional limitations group seem to have increased odds (1.328-1.338). These results address Hypothesis #6 for the attitudinal definition of underinsurance. As summarized in Table 21, this hypothesis is not supported. Table 37 below summarizes the analyses for this definition and subgroup.

Table 37. Underinsured – Equipment/Supplies Definition – Functional Limitations vs. Non-Functional Limitations

Variable	Functional Limitations		Non-Functional Limitations	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.794 (.217)	.792 (.224)	1.093 (.182)	1.071 (.187)
Family Structure	1.166 (.206)	1.174 (.211)	1.109 (.183)	1.115 (.187)
Gender	1.440 (.194)	1.450 (.198)	1.040 (.170)	1.055 (.172)
Age	.855 (.092)	.849 (.095)	.956 (.073)	.973 (.075)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	*1.842 (.286)	*1.855 (.304)	**1.921 (.215)	**1.921 (.219)
Hispanic	1.359 (.313)	1.427 (.313)	**2.019 (.251)	**2.062 (.253)
Multi-racial, Non-Hispanic	1.270 (.431)	1.270 (.446)	.935 (.370)	.963 (.379)
Other race (including Asian), Non-Hispanic	2.995 (.611)	2.980 (.605)	1.631 (.639)	1.615 (.659)
<b>Region</b>				
Northeast	*.495 (.348)	*.491 (.354)	**432 (.302)	*.474 (.306)
Midwest	*.468 (.335)	*.487 (.342)	*.550 (.285)	.605 (.287)
South	Ref	Ref	Ref	Ref
West	.844 (.318)	.772 (.321)	***.380 (.255)	***.403 (.258)
<b>Political Subculture</b>				
Bifurcated	*.382 (.428)	*.381 (.431)	.661 (.390)	.738 (.396)
Individualistic	.922 (.328)	.904 (.334)	1.338 (.344)	1.328 (.348)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	***.326 (.314)	***.324 (.315)	.878 (.296)	.919 (.299)
Separatist	.446 (.510)	.505 (.510)	1.169 (.467)	1.049 (.465)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	.679 (.251)	.720 (.262)	.826 (.195)	.836 (.200)
Public only	Ref	Ref	Ref	Ref
Private and Public	.901 (.286)	.891 (.296)	1.643 (.316)	1.542 (.329)
Other comprehensive only	2.110 (.604)	1.436 (.594)	1.772 (.508)	1.768 (.509)
Income	1.454 (.243)	1.405 (.249)	.853 (.237)	.800 (.243)
<b>Condition Characteristics</b>				
How much condition affects	*.631 (.201)	.716 (.236)	1.029 (.129)	1.012 (.139)

ability				
Number of health conditions	1.039 (.091)	1.016 (.089)	1.010 (.073)	1.014 (.075)
Number of unmet needs	***2.508 (.087)	***2.498 (.089)	***2.096 (.066)	***2.085 (.066)
Amount of time child is affected by condition	-	1.045 (.142)	-	1.009 (.117)
Severity rating	-	1.517 (.233)	-	.952 (.152)
	#R <sup>2</sup> =.324 Wald F =7.120 p < .001	#R <sup>2</sup> =.336 Wald F =7.229 p < .001	#R <sup>2</sup> =.235 Wald F =9.212 p < .001	#R <sup>2</sup> =.235 Wald F =8.339 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

#### 4.2.C.3 Prescription medications only

##### Attitudinal definition

CSHCN within the prescription medications only group have several predisposing and enabling factors that impact whether they are underinsured according to the attitudinal definition. Black, non-Hispanic CSHCN have 2.285 the odds of being underinsured compared with white, non-Hispanic CSHCN. This translates to a 128 percent increase in odds. CSHCN living in the Northeast have .300 the odds of being underinsured, representing a 70 percent decrease in odds compared with those who live in the South. Finally, those with other comprehensive insurance only have 9.029-10.453 the odds of being underinsured – an 803-904 percent increase in odds – compared with those who have public insurance only.

CSHCN in the non-prescription medications only group have a somewhat different experience. Those with private insurance only also have an increase in odds of being underinsured – 2.115-1.157 the odds or a 111-116 percent increase in odds – compared with those who have public insurance only. Also within this group, CSHCN with both public and private insurance or other comprehensive insurance only have 1.495 (49 percent increase) and 2.330 (133 percent increase) the odds of being underinsured, respectively. For this group, as the number of unmet needs increases, so do the odds of

being underinsured. For each category increase, there is 1.554-1.557 the odds of being underinsured – a 55-56 percent increase. Also, with each category increase in the number of functional difficulties, CSHCN have 1.224 the odds of being underinsured. This is a 22 percent increase in odds with each category. Finally, as the severity rating increases, the odds of being underinsured also increase. With each category increase in severity, CSHCN have 1.053 the odds – a five percent increase in odds – of being underinsured.

In summary, within both groups, CSHCN with other comprehensive insurance only are more likely to be underinsured according to the attitudinal definition. Specifically for CSHCN in the prescription medications only group, black non-Hispanic CSHCN are more likely to be underinsured while those who live in the Northeast are less likely. Conversely, for CSHCN in the non-prescription medications only group, those with higher severity ratings or with activity or participation difficulties are more likely to be underinsured. This is also true for those with greater numbers of unmet need and functional difficulties. Finally, CSHCN in this group who have private insurance only or both public and private insurance are more likely to be underinsured than are those with public insurance only. There were several other large, opposite-direction trends (non-significant estimates) noted between the two group experiences when comparing other variables in the model. These would seem to indicate different experiences for the two groups in additional ways that are not captured by the models in terms of reaching statistical significance. These differences are observed for multi-racial, non-Hispanic, other race, non-Hispanic, Midwest, and bifurcated states. For example, compared with CSHCN who live in moralistic states, CSCHN in the prescription medications only group who live in bifurcated states appear to have decreased odds of being underinsured (.277-

.288), but those in the non-prescription medications only group seem to have increased odds (.999-1.020). Table 38 below summarizes the analyses for this definition and subgroup.

Table 38. Underinsured – Attitudinal Definition – Prescription Meds Only vs. Non-Prescription Meds Only

Variable	Rx Meds Only		Non-Rx Meds Only	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.892 (.326)	.915 (.337)	1.281 (.147)	1.282 (.152)
Family Structure	1.448 (.304)	1.683 (.309)	1.046 (.137)	1.090 (.136)
Gender	.918 (.284)	.889 (.296)	.932 (.135)	.912 (.134)
Age	1.080 (.114)	1.062 (.117)	1.008 (.052)	1.012 (.053)
<b>Race/Ethnicity</b>				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	1.975 (.378)	*2.285 (.406)	.930 (.194)	.964 (.200)
Hispanic	.849 (.450)	.891 (.450)	1.091 (.242)	1.090 (.234)
Multi-racial, Non-Hispanic	3.450 (.656)	2.713 (.639)	.807 (.242)	.823 (.246)
Other race (including Asian), Non-Hispanic	.276 (.775)	.243 (.840)	1.182 (.299)	1.199 (.303)
<b>Region</b>				
Northeast	*.300 (.556)	.345 (.579)	.934 (.237)	.913 (.243)
Midwest	.724 (.508)	.636 (.522)	1.224 (.223)	1.234 (.25)
South	Ref	Ref	Ref	Ref
West	.835 (.448)	.832 (.458)	.958 (.225)	.973 (.223)
<b>Political Subculture</b>				
Bifurcated	.288 (.687)	.277 (.705)	1.020 (.273)	.999 (.277)
Individualistic	.655 (.598)	.638 (.599)	1.158 (.218)	1.095 (.221)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.769 (.520)	.792 (.524)	1.277 (.197)	1.253 (.203)
Separatist	2.029 (1.266)	1.836 (1.224)	1.066 (.339)	1.146 (.348)
<b>Enabling Factors</b>				
<b>Insurance Type</b>				
Private only	1.403 (.351)	1.511 (.348)	***2.115 (.175)	***2.157 (.178)
Public only	Ref	Ref	Ref	Ref
Private and Public	.833 (.608)	.677 (.632)	1.459 (.198)	*1.495 (.197)
Other comprehensive only	*10.453 (.967)	*9.029 (.918)	1.944 (.377)	*2.330 (.399)
Income	.693 (.375)	.649 (.384)	.864 (.171)	.846 (.170)
<b>Condition Characteristics</b>				
How much condition affects ability	.699 (.249)	.637 (.277)	1.039 (.111)	1.086 (.134)
Number of health conditions	1.143 (.172)	1.149 (.175)	1.032 (.057)	.998 (.059)
Number of functional difficulties	1.046 (.155)	1.056 (.163)	*1.224 (.083)	1.181 (.087)
Any activity or participation difficulty	1.143 (.388)	1.137 (.380)	.816 (.226)	.822 (.226)
Number of unmet needs	.852 (.245)	.937 (.266)	***1.554 (.082)	***1.557 (.081)
Amount of time child is affected by condition	-	.782 (.299)	-	1.366 (.111)
Severity rating	-	.865 (.286)	-	**1.053 (.064)



	#R <sup>2</sup> =.153 Wald F = 1.298 P = .151	#R <sup>2</sup> =.161 Wald F = 1.155 p = .268	#R <sup>2</sup> =.111 Wald F = 3.677 p < .001	#R <sup>2</sup> =.122 Wald F = 3.646 p < .001
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\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

Economic definition

CSHCN within the prescription medications only group have several predisposing and enabling factors and condition characteristics that impact whether they are underinsured according to the economic definition. Females have .343-.358 the odds of being underinsured, meaning a 64-66 percent decrease in odds. Other race, non-Hispanic CSHCN have 4.810-5.524 the odds of being underinsured compared with white, non-Hispanic CSHCN. This translates to a 381-452 percent increase in odds. CSHCN with private insurance only have 3.025-3.488 the odds of being underinsured compared with those with public insurance only. This is a 202-250 percent increase in odds over those with public insurance only in this group. Also, those with other comprehensive insurance only have 8.231-8.492 the odds of being underinsured – a 723-749 percent increase in odds. Finally, as the number of functional difficulties increase by one category, CSHCN in this group have 1.425-1.474 the odds of being underinsured, or a 42-47 percent increase in odds for each additional functional difficulty category.

CSHCN in the non-prescription medications only group have a somewhat different experience. Those with private insurance only or other comprehensive insurance only also have an increase in odds of being underinsured – 2.307-2.519 the odds (131-152 percent increase) and 2.314 the odds (131 percent increase), respectively – compared with those who have public insurance only. Also within this group, CSHCN with both public and private insurance have 1.730-1.818 the odds of being underinsured, or a 73-82 percent increase in odds. CSHCN in families with incomes at or above 300

percent FPL have .442-.488 the odds of being underinsured compared with those in families below 300 percent FPL. This is a 51-56 percent decrease in odds of being underinsured for the higher income group. For this group, as the number of unmet needs increases, so do the odds of being underinsured. For each category increase, there is 1.642-1.686 the odds of being underinsured – a 64-69 percent increase in odds. Also, with each category increase in the number of health conditions, CSHCN have 1.237 the odds of being underinsured. This is a 24 percent increase in odds with each category. Finally, as the severity rating increases, the odds of being underinsured also increase. With each category increase in severity, CSHCN in this group have 1.427 the odds – a 43 percent increase in odds – of being underinsured.

In summary, within both groups, CSHCN with private insurance only or other comprehensive insurance only are more likely to be underinsured according to the economic definition. Specifically for CSHCN in the prescription medications only group, other race, non-Hispanic CSHCN and those with more functional difficulties are more likely to be underinsured. Females in this group are less likely to be underinsured. Conversely, for CSHCN in the non-prescription medications only group, those with both public and private insurance, those with more health conditions, and those with higher severity ratings are more likely to be underinsured. Income is important for this group, with those in higher income categories being less likely to be underinsured according to the economic definition. There were several other large, opposite-direction trends (non-significant estimates) noted between the two group experiences when comparing other variables in the model. These would seem to indicate different experiences for the two groups in additional ways that are not captured by the models in terms of reaching

statistical significance. These differences were observed for educational level, Northeast, Midwest, West, and bifurcated states. For example, within the prescription medications only group, CSHCN in households with higher educational levels appear to have decreased odds of being underinsured (.627-.646), but those in the non-prescription medications only group seem to have increased odds (1.213-1.249). Table 39 below summarizes the analyses for this definition and subgroup.

Table 39. Underinsured – Economic Definition – Prescription Meds Only vs. Non-Prescription Meds Only

Variable	Rx Meds Only		Non-Rx Meds Only	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.627 (.337)	.646 (.335)	1.249 (.151)	1.213 (.155)
Family Structure	1.425 (.334)	1.506 (.338)	1.011 (.148)	1.011 (.148)
Gender	***.358 (.285)	***.343 (.290)	.954 (.136)	.980 (.136)
Age	1.100 (.117)	1.096 (.124)	1.027 (.056)	1.059 (.057)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	.585 (.395)	.683 (.404)	.820 (.201)	.894 (.209)
Hispanic	1.125 (.471)	1.113 (.463)	.748 (.255)	.785 (.249)
Multi-racial, Non-Hispanic	1.286 (.570)	1.118 (.494)	1.782 (.295)	1.736 (.286)
Other race (including Asian), Non-Hispanic	*5.524 (.713)	*4.810 (.713)	1.289 (.305)	1.188 (.310)
Region				
Northeast	2.040 (.587)	1.793 (.626)	.662 (.240)	.649 (.246)
Midwest	2.618 (.554)	2.379 (.552)	.856 (.221)	.852 (.225)
South	Ref	Ref	Ref	Ref
West	1.609 (.532)	1.653 (.523)	.720 (.233)	.768 (.234)
Political Subculture				
Bifurcated	3.121 (.708)	2.232 (.711)	.766 (.289)	.747 (.296)
Individualistic	1.090 (.578)	.956 (.570)	.679 (.225)	.657 (.229)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.763 (.471)	.641 (.479)	.765 (.202)	.718 (.210)
Separatist	.554 (1.069)	.474 (1.089)	.610 (.336)	.575 (.351)
<b>Enabling Factors</b>				
Insurance Type				
Private only	**3.488 (.412)	**3.025 (.409)	***2.307 (.179)	***2.519 (.179)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.340 (.628)	.948 (.725)	**1.818 (.227)	*1.730 (.231)
Other comprehensive only	*8.231 (1.013)	*8.492 (1.021)	1.819 (.394)	*2.314 (.424)
Income	.623 (.398)	.754 (.406)	***.488 (.179)	***.442 (.182)
<b>Condition Characteristics</b>				
How much condition affects ability	1.108 (1.391)	1.162 (.273)	.811 (.111)	.952 (.124)

Number of health conditions	.976 (.160)	1.028 (.158)	**1.237 (.062)	1.121 (.065)
Number of functional difficulties	*1.425 (.164)	*1.474 (.171)	1.026 (.087)	.951 (.093)
Any activity or participation difficulty	.673 (.409)	.645 (.405)	.867 (.233)	.860 (.235)
Number of unmet needs	1.144 (.276)	1.139 (.270)	***1.686 (.076)	***1.642 (.077)
Amount of time child is affected by condition	-	.818 (.312)	-	.947 (.099)
Severity rating	-	1.489 (.296)	-	**1.427 (.120)
	#R <sup>2</sup> =.249 Wald F = 1.976 P < .01	#R <sup>2</sup> =.247 Wald F =1.720 p < .05	#R <sup>2</sup> =.156 Wald F = 5.261 p < .001	#R <sup>2</sup> =.183 Wald F =5.341 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Structural definition

CSHCN within the prescription medications only group have several predisposing factors and condition characteristics that impact whether they are underinsured according to the structural definition. Black, non-Hispanic CSHCN and Hispanic CSHCN have .412 and .251-.253 the odds of being underinsured, respectively, compared with white, non-Hispanic CSHCN. This translates to a 59 and 75 percent decrease in odds for the respective groups. Female CSHCN in this group are also less likely to be underinsured – having .525 the odds or a 47 percent decrease in odds. Those who live in family structures other than single mother households have 3.505-3.874 the odds of being underinsured. This translates to a 250-287 percent increase in odds. Also, as the number of unmet needs increases, so do the odds of being underinsured. For each category increase, there is 2.772-2.918 the odds of being underinsured – a 177-192 percent increase in odds. Also, with each category increase in the amount of time the child is affected by the condition (signifies greater time impact), there is .300 the odds of being underinsured. This somewhat counterintuitive result means a 70 percent decrease in odds with each additional category of time affected.

CSHCN in the non-prescription medications only group have a somewhat different experience. As seen in the prescription medications only group, black, non-Hispanic CSHCN in this group have decreased odds of being underinsured according to this definition. They have .467-.488 the odds, representing a 51-53 percent decrease in odds. Also similar in this group, as the number of unmet needs increase, so do the odds of being underinsured. For each category increase, there is 1.667-1.673 the odds of being underinsured – a 67 percent increase. However, CSHCN in this group who live in households where the highest level of education is more than high school have 1.459-1.500 the odds of being underinsured. This means that CSHCN in the group who live in higher education households have a 46-50 percent increase in odds of being underinsured. Also, those who live in separatist states have .482-498 the odds – a 50-52 percent decrease in odds – of being underinsured.

In summary, within both groups, black, non-Hispanic CSHCN are less likely to be underinsured according to the structural definition, while those with more unmet needs are more likely. Specifically for CSHCN in the prescription medications only group, those in family structures other than single mother are more likely to be underinsured, though females, Hispanic CSHCN, and those affected more often are less likely. Conversely, for CSHCN in the non-prescription medications only group, those in households with higher education are more likely to be underinsured. Also, CSHCN living in separatist states are less likely to be underinsured according to this definition than are those living in moralistic states. There are several other large, opposite-direction trends (non-significant estimates) noted between the two group experiences when comparing other variables in the model. These would seem to indicate different

experiences for the two groups in additional ways that are not captured by the models in terms of reaching statistical significance. These differences are observed for multi-racial, non-Hispanic, West, and private insurance only. For example, compared with CSHCN who have public insurance only, CSCHN in the prescription medications only group who have private insurance only appear to have decreased odds of being underinsured (.472-.514), but those in the non-prescription medications only group seem to have increased odds (1.235-1.277). Table 40 below summarizes the analyses for this definition and subgroup.

Table 40. Underinsured – Structural Definition – Prescription Meds Only vs. Non-Prescription Meds Only

Variable	Rx Meds Only		Non-Rx Meds Only	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	.754 (.383)	.844 (.385)	*1.500 (.172)	1.459 (.175)
Family Structure	**3.505 (.375)	***3.874 (.374)	1.146 (.152)	1.151 (.155)
Gender	*.525 (.327)	.621 (.329)	.863 (.157)	.860 (.158)
Age	1.012 (.122)	1.033 (.122)	1.000 (.057)	1.017 (.059)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	*.412 (.446)	.527 (.448)	** .488 (.244)	** .467 (.256)
Hispanic	*.251 (.614)	*.253 (.563)	.928 (.230)	.929 (.225)
Multi-racial, Non-Hispanic	.544 (.618)	.546 (.730)	1.212 (.283)	1.250 (.289)
Other race (including Asian), Non-Hispanic	.479 (.911)	.423 (.950)	.755 (.324)	.761 (.323)
Region				
Northeast	1.132 (.535)	.855 (.599)	.846 (.267)	.821 (.272)
Midwest	.736 (.498)	.751 (.521)	.941 (.246)	.902 (.250)
South	Ref	Ref	Ref	Ref
West	.689 (.519)	.625 (.507)	1.225 (.237)	1.254 (.235)
Political Subculture				
Bifurcated	.571 (.734)	.552 (.790)	.713 (.299)	.689 (.305)
Individualistic	.643 (.588)	.543 (.642)	.856 (.239)	.834 (.242)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.714 (.464)	.680 (.515)	1.146 (.208)	1.125 (.210)
Separatist	1.484 (1.069)	1.536 (1.120)	*.482 (.342)	*.498 (.345)
<b>Enabling Factors</b>				
Insurance Type				
Private only	.472 (.414)	.514 (.405)	1.277 (.189)	1.235 (.195)
Public only	Ref	Ref	Ref	Ref
Private and Public	.459 (.781)	.530 (.768)	.939 (.223)	.949 (.223)
Other comprehensive only	.759 (1.032)	.889 (.998)	1.265 (.364)	1.430 (.359)
Income	.860 (.388)	.884 (.390)	.951 (.177)	.959 (.181)

<b>Condition Characteristics</b>				
How much condition affects ability	1.356 (.271)	.954 (.292)	1.225 (.111)	1.199 (.129)
Number of health conditions	1.290 (.177)	1.259 (.184)	.994 (.065)	.950 (.067)
Number of functional difficulties	.947 (.143)	.864 (.160)	1.012 (.094)	1.008 (.098)
Any activity or participation difficulty	1.039 (.384)	1.103 (.379)	1.027 (.263)	1.054 (.269)
Number of unmet needs	**2.772 (.318)	**2.918 (.329)	***1.667 (.075)	***1.673 (.076)
Amount of time child is affected by condition	-	** .300 (.406)	-	.872 (.103)
Severity rating	-	1.334 (.292)	-	1.030 (.118)
	#R <sup>2</sup> =.273 Wald F = 2.020 p < .01	#R <sup>2</sup> =.293 Wald F = 1.970 p < .01	#R <sup>2</sup> =.138 Wald F = 3.913 p < .001	#R <sup>2</sup> =.147 Wald F = 3.526 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

### Equipment/Supplies definition

CSHCN within the prescription medications only group have several predisposing factors and condition characteristics that impact whether they are underinsured according to the equipment/supplies definition. Black, non-Hispanic CSHCN have 5.615-5.681 the odds of being underinsured compared with white, non-Hispanic CSHCN. This translates to a 461-468 percent increase in odds. Those who live in the West have .133-.165 the odds of being underinsured – an 83-87 percent decrease in odds – when compared with those who live in the South. Finally, as the number of unmet needs increase, so do the odds of being underinsured. For each category increase, there is 1.731-1.775 the odds of being underinsured. This means a 73-77 percent increase in odds.

CSHCN in the non-prescription medications only group have a somewhat different experience. As seen in the prescription medications only group, CSHCN who live in the West have decreased odds of being underinsured according to this definition. They have .539-.549 the odds, representing a 45-46 percent decrease. Also similar in this group, as the number of unmet needs increase, so do the odds of being underinsured. For each category increase, there is 2.272-2.326 the odds of being underinsured – a 127-133

percent increase in odds. However, black, non-Hispanic CSHCN in this group have 1.618-1.692 the odds of being underinsured. This means they have a 62-69 percent increase in odds of being underinsured. Those who live in the Northeast or Midwest have .382-.383 and .467-.492 the odds of being underinsured, respectively. This translates to a 62 percent and 51-53 percent decrease in odds for each respective group. CSHCN living in bifurcated or pluralistic states also have decreased odds of being underinsured. They have .372-.380 (62-63 percent decrease) and .459-.477 (52-54 percent decrease) the odds of being underinsured, respectively. With each category increase in how much the child is affected by the condition (signifies less impact), there is .709 the odds of being underinsured – a 29 percent decrease in odds. Finally, for each category increase in severity, there is a corresponding increase in the odds of being underinsured. With each category increase, CSHCN have 1.440 the odds of being underinsured, representing a 44 percent increase in odds with each additional category.

In summary, within both groups, CSHCN who live in the West are less likely to be underinsured according to the equipment-supplies definition, while those with more unmet needs are more likely. Specifically for CSHCN in the prescription medications only group, Hispanic CSHCN are also more likely to be underinsured. Conversely, for CSHCN in the non-prescription medications only group, black, non-Hispanic CSHCN and those with higher severity ratings are more likely to be underinsured. However, those living in the Northeast or Midwest and those impacted less by their conditions are less likely to be underinsured according to this definition. There are several other large, opposite-direction trends (non-significant estimates) noted between the two group experiences when comparing other variables in the model. These would seem to indicate



different experiences for the two groups in additional ways that are not captured by the models in terms of reaching statistical significance. These differences are observed for educational level, other race, non-Hispanic, and other comprehensive insurance only. For example, compared with CSHCN who have public insurance only, CSCHN in the prescription medications only group who have other comprehensive insurance only appear to have decreased odds of being underinsured (.163-.204), but those in the non-prescription medications only group seem to have increased odds (1.691-2.173). Table 41 below summarizes the analyses for this definition and subgroup.

Table 41. Underinsured – Equipment/Supplies Definition – Prescription Meds Only vs. Non-Prescription Meds Only

Variable	Rx Meds Only		Non-Rx Meds Only	
	Base Model Exp B (SE)	Model 1 Exp B (SE)	Base Model Exp B (SE)	Model 1 Exp B (SE)
<b>Predisposing Factors</b>				
Education Level (highest in household)	1.574 (.489)	1.433 (.490)	.849 (.169)	.850 (.173)
Family Structure	1.828 (.495)	1.732 (.514)	1.074 (.160)	1.090 (.168)
Gender	1.460 (.409)	1.494 (.415)	1.243 (.155)	1.256 (.159)
Age	.766 (.178)	.792 (.186)	.896 (.071)	.896 (.072)
Race/Ethnicity				
White, Non-Hispanic	Ref	Ref	Ref	Ref
Black, Non-Hispanic	2.507 (.482)	.251 (.489)	*1.618 (.220)	*1.692 (.228)
Hispanic	**5.615 (.499)	***5.681 (.486)	1.288 (.257)	1.377 (.258)
Multi-racial, Non-Hispanic	1.200 (.744)	1.416 (.806)	.999 (.344)	1.050 (.352)
Other race (including Asian), Non-Hispanic	.160 (1.193)	.184 (1.193)	2.316 (.480)	2.190 (.482)
Region				
Northeast	.513 (.626)	.619 (.649)	***.382 (.270)	** .383 (.277)
Midwest	.199 (.827)	.249 (.827)	** .467 (.259)	** .492 (.267)
South	Ref	Ref	Ref	Ref
West	** .133 (.596)	** .165 (.594)	* .549 (.263)	* .539 (.266)
Political Subculture				
Bifurcated	.360 (.881)	.467 (.910)	** .380 (.342)	** .372 (.347)
Individualistic	1.832 (.886)	1.712 (.902)	1.024 (.273)	.988 (.279)
Moralistic	Ref	Ref	Ref	Ref
Pluralistic	.463 (.733)	.464 (.745)	** .477 (.245)	** .459 (.249)
Separatist	.561 (1.273)	.495 (1.238)	.570 (.398)	.528 (.393)
<b>Enabling Factors</b>				
Insurance Type				
Private only	.668 (.521)	.732 (.507)	.771 (.197)	.829 (.199)
Public only	Ref	Ref	Ref	Ref
Private and Public	1.169 (.693)	.865 (.688)	1.181 (.239)	1.109 (.250)
Other comprehensive only	.163 (1.802)	.204 (1.812)	2.173 (.450)	1.691 (.446)

Income	1.861 (.484)	1.682 (.491)	1.167 (.198)	1.110 (.199)
<b>Condition Characteristics</b>				
How much condition affects ability	.650 (.319)	.642 (.369)	*.709 (.135)	.908 (.163)
Number of health conditions	.974 (.233)	1.034 (.240)	1.064 (.067)	1.046 (.069)
Number of functional difficulties	1.211 (.205)	1.208 (.223)	1.008 (.106)	.999 (.110)
Any activity or participation difficulty	.547 (.541)	.554 (.537)	.914 (.297)	.847 (.308)
Number of unmet needs	*1.775 (.255)	*1.731 (.256)	***2.326 (.068)	***2.272 (.068)
Amount of time child is affected by condition	-	.836 (.371)	-	1.168 (.102)
Severity rating	-	1.299 (.386)	-	*1.440 (.166)
	#R <sup>2</sup> =.290 Wald F = 2.201 p < .01	#R <sup>2</sup> =.287 Wald F = 1.894 p < .01	#R <sup>2</sup> =.253 Wald F = 9.952 p < .001	#R <sup>2</sup> =.265 Wald F = 9.794 p < .001

\* p < .05    \*\* p < .01    \*\*\* p < .001    #Nagelkerke's Pseudo R<sup>2</sup>

#### 4.2.D Summary of statistically significant associations by definition

Tables 42 - 45 below provide an overview at a glance of all significant findings from multivariate analysis for each definition of underinsurance by public/private stratification and also by condition-specific subgroups of interest – functional limitations, high severity, and prescription medications only. Comparing the overall definition sample with the stratifications and subgroups reveals different experiences in some cases. Also, it is apparent that the variables of interest have different impacts depending upon the definition of underinsurance that is being analyzed. This will be discussed further in the final chapter of this work.

Table 42. Summary of statistically significant associations within LOGIT models, attitudinal definition

Variable	Overall	Public	Private	Func Limit		High Sev		Rx Meds Only	
				Yes	No	Yes	No	Yes	No
<b>Predisposing Factors</b>									
Education Level				+					
Age		+							
Race/Ethnicity									
Black, Non-Hispanic								+	
Hispanic							+		
Region									
Northeast								-	
Political Subculture									
Pluralistic					+				
<b>Enabling Factors</b>									





service use or need, functional limits, use of specialized therapies, emotional/developmental/behavioral condition, prescription medication only

Table 45. Summary of statistically significant associations within LOGIT models, equipment/supplies definition

Variable	Overall	Public	Private	Func Limit		High Sev		Rx Meds Only	
				Yes	No	Yes	No	Yes	No
<b>Predisposing Factors</b>									
Family Structure			+						
Gender						F+			
Age		-				-			
<b>Race/Ethnicity</b>									
Black, Non-Hispanic	+	+		+	+	+	+		+
Hispanic	+	+			+		+	+	
Other race, Non-Hispanic		+							
<b>Region</b>									
Northeast	-	-	-	-	-	-			-
Midwest	-	-		-	-	-			-
West	-	-			-			-	-
<b>Political Subculture</b>									
Bifurcated	-	-	-	-		-			-
Pluralistic	-		-	-		-			-
<b>Condition Characteristics</b>									
How much condition affects ability	-		-	-		X	X		-
Number functional difficulties				X	X		+		
Any activity or participation difficulty				X	X		-		
Number of unmet needs	+	+	+	+	+	+	+	+	+
Severity rating	+					X	X		+
<b>Qualification Reason</b>									
Use of specialized Therapies	+	+	+	X	X	+		X	X
Emotional, developmental, behavioral Condition	-			X	X			X	X

+ = more likely to be underinsured

- = less likely to be underinsured

Blank = variable had no significant influence

X = variable not included in models for subgroup

The following variables were also included in the models but had no statistically significant impact: educational level, multi-racial non-Hispanic, individualistic, separatist, private only, public and private, other comprehensive only, income, number health conditions, amount of time child is affected, pervasiveness, prescription medication use, elevated service use or need, functional limits, prescription medication only

## **Chapter 5 Conclusions**

This study adds to the body of knowledge in four ways. First, it develops and examines four definitions of underinsurance against the preeminent national dataset for CSHCN. Previous works have utilized only one at the national level and three at a specific state level – Virginia. The fourth definition developed – equipment/supplies – has never before been developed or examined at any level for this dataset. Second, the project examines subgroups of interest for each definition. By looking within subgroups of public and privately insured CSHCN as well as within groups of high severity, functional limitations, and prescription medications only, specific risk factors can be identified. Previous works have looked at the dataset in aggregate. Third, this work utilizes variables for geographic region and political subculture to examine underinsurance. Although previous works may have included geographic regions at a preliminary level, none have included political subcultural influences. Finally, this project examines qualification reason and its impact on underinsurance. This has only been done in limited fashion previously.

The majority of this sample of CSHCN had private insurance whereas the previous literature suggests that CSHCN are less likely to have private coverage. Also, in this sample, CSHCN in the private only subgroups had lower mean severity as measured by a derived condition severity summary score than did those in the public only or public and private combination group. For all definitions of underinsurance, the underinsured

group had a higher mean condition severity summary score than did those who were not underinsured.

The multivariate analysis findings certainly support the importance of using multiple definitions of underinsurance, or at least one that is more broadly crafted. The differing estimates and performance of predictor variables confirm that at least some different children are identified depending upon the definition utilized. A key point to remember is that this work considers only CSHCN who were continuously insured through the entire year prior to the survey interview. Estimates of underinsurance are based solely on that group. Results would most certainly be different if CSHCN who were uninsured or inconsistently-insured were included. It is for that reason that the results presented are considered conservative estimates but important hallmarks of the true issues facing this group. This is the experience of CSHCN who might be considered to have the best of insurance circumstances – having insurance and having it throughout the entire year. One other caveat is that type of insurance was measured at the time of the survey interview. It is possible that a family had different types and/or combinations of insurance during the year and that the experiences described may not entirely be representative of experiences with the insurance type at interview. With that in mind, key findings by definition are presented in the next section.

### *5.1 Summary of support for hypotheses*

Nine hypotheses were developed for each of the four definitions of underinsurance examined in this study. For two hypotheses, public and private subgroups were considered, bringing the total hypotheses per definition to 11. For the attitudinal definition, five hypotheses were supported and two were partially supported.

For the economic definition, seven hypotheses were supported. No hypotheses were supported for the structural definition. For the equipment/supplies definition, one hypothesis was supported. Table 46 below summarizes these findings.

Table 46. Summary of support by hypothesis

Hypothesis	Underinsurance			
	Attitudinal definition	Economic definition	Structural definition	Equipment/Supplies definition
1) Among CSHCN with insurance, the higher the severity, the greater the likelihood of being underinsured	Yes	Yes	No	Yes
2) Among CSHCN with insurance, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.	Partial	No	No	No
3) Among CSHCN with insurance, those who qualify with “medication only” needs are less likely to be underinsured than are those who qualify with “any other” needs.	No	No	No	No
4) Among CSHCN with insurance, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No
5) Among CSHCN with insurance who have higher severity, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No
6) Among CSHCN with insurance who have functional limitations, those with private insurance are more likely to be underinsured than are those with public insurance.	Yes	Yes	No	No
7) Among CSHCN with private insurance, those with lower income levels are more likely to be underinsured than are those with higher income levels.	No	Yes	No	No
8) Among privately insured CSHCN and publicly insured CSHCN respectively, those	Yes, private	Yes, private	No	No



with higher severity are more likely to be underinsured than are those with lower severity.	No, public	No, Public		
9) Among privately insured CSHCN and publicly insured CSHCN respectively, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.	Partial, private	Yes, private	No	No
	No, public	No, public		

**Hypothesis 1. Among CSHCN with insurance, the higher the severity, the greater the likelihood of being underinsured.**

This hypothesis is supported for the attitudinal, economic, and equipment/supplies definitions. It is not supported for the structural definition.

**Hypothesis 2. Among CSHCN with insurance, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.**

This hypothesis is partially supported for the attitudinal definition. It is not supported for the economic, structural, or equipment/supplies definitions.

**Hypothesis 3. Among CSHCN with insurance, those who qualify with “medication only” needs are less likely to be underinsured than are those who qualify with “any other” needs.**

This hypothesis is not supported for the attitudinal, economic, structural, or equipment/supplies definitions.

**Hypothesis 4. Among CSHCN with insurance, those with private insurance are more likely to be underinsured than are those with public insurance.**

This hypothesis is supported for the attitudinal and economic definitions. It is not supported for the structural or equipment/supplies definitions.

**Hypothesis 5. Among CSHCN with insurance who have higher severity, those with private insurance are more likely to be underinsured than are those with public insurance.**

This hypothesis is supported for the attitudinal and economic definitions. It is not supported for the structural or equipment/supplies definitions.

**Hypothesis 6. Among CSHCN with insurance who have functional limitations, those with private insurance are more likely to be underinsured than are those with public insurance.**

This hypothesis is supported for the attitudinal and economic definitions. It is not supported for the structural or equipment/supplies definitions.

**Hypothesis 7. Among CSHCN with private insurance, those with lower the income levels are more likely to be underinsured than are those with higher income levels.**

This hypothesis is supported for the economic definition. It is not supported for the attitudinal, structural, or equipment/supplies definitions.

**Hypothesis 8. Among privately insured CSHCN and publicly insured CSHCN respectively, those with higher severity are more likely to be underinsured than are those with lower severity.**

This hypothesis is supported for the attitudinal and economic definitions for the private insurance only groups. It is not supported for the public insurance only groups for the attitudinal or economic definitions, or for the structural or equipment/supplies definitions for either group.

**Hypothesis 9. Among privately insured CSHCN and publicly insured CSHCN respectively, those with functional limitations are more likely to be underinsured than are those who do not have functional limitations.**

This hypothesis is partially supported for the attitudinal definition and is fully supported for the economic definition for the private insurance only groups. It is not supported for the public insurance only groups for the attitudinal or economic definitions, or for the structural or equipment/supplies definitions for either group.

## 5.2 Summary of findings

### Attitudinal definition

Just over 32 percent of CSHCN are considered underinsured according to the attitudinal definition. In general, those with private insurance only or other comprehensive insurance only, those with greater numbers of unmet need or functional difficulties, and those with higher severity ratings are more likely to be underinsured. These results support hypotheses made about private insurance and severity; and partially support one about functional limitations. They fail to support the hypothesis about prescription medications only.

Looking within the public insurance only group, CSHCN who are older, have greater numbers of unmet need, and those who qualified on prescription medication usage only are more likely to be underinsured. For the private insurance only group, however, in addition to greater numbers of unmet need, those with greater numbers of functional difficulties and higher severity ratings have increased odds of a child being underinsured. Those impacted more often and those that qualified based on prescription medication use at all are less likely to be underinsured by this definition. This means that severity and functional difficulty are important within the private group, but less so in the public group. It also means that, contrary to what was expected, prescription medication usage only in the public subgroup increase the likelihood of being underinsured. Although not significant, the direction of impact for this variable in the private only subgroup is to decrease the odds of being underinsured. Prescription medication use at all in the private subgroup did result in decreased odds of being underinsured. In summary, age, time affected, and prescription medication usage do not have an impact

for the combined sample by this definition, but are important within the subgroups of public and private insurance. These results support the hypothesis about severity and partially support the one about functional limitations for the private group. They fail to support the above for the public group and fail to support the hypothesis about income.

Examining by specific subgroup of interest also revealed differences. For CSHCN who qualified based on functional limitations, those with private insurance only, those in families with higher education, those with greater numbers of unmet need or health conditions, and those with higher severity ratings are more likely to be underinsured. Those impacted more often are less likely to be underinsured. Within the group of CSHCN who have high severity, those with private insurance only and those with greater numbers of unmet need or functional difficulties are more likely to be underinsured. For the group of CSHCN who qualified solely based on prescription medication usage, those who are black, non-Hispanic and those who have other comprehensive insurance only are more likely to be underinsured. Those who live in the Northeast are less likely to be underinsured than are CSHCN in the South for this definition. In summary, educational level, the number of health conditions, the amount of time affected, race, and geographic region do not have an impact for the combined sample by this definition, but are important within condition-specific subgroups. These results support the hypotheses about severity and functional limitations for this definition.

#### Economic definition

Twenty-three percent of CSHCN are considered underinsured according to the economic definition. In general, those with private insurance only, other comprehensive insurance only, or both public and private insurance are more likely to be underinsured.

Also, those who are multi-racial, non-Hispanic, those with greater numbers of unmet need or health conditions, those with higher severity ratings, those with greater pervasiveness (more positive screener questions), and those who qualified based on elevated service usage and need are more likely to be underinsured. Those with incomes at or above 300 percent FPL are less likely to be underinsured according to this definition. These results support hypotheses made about private insurance and severity. They fail to support the hypotheses about functional limitations and prescription medications only.

Looking within the public insurance only group, CSHCN who have greater numbers of health conditions or unmet need, those who are affected more often, and those who qualified based on prescription medication usage at all or on elevated service usage and need are more likely to be underinsured. Those who live in states predominantly under the influence of the separatist political subculture (New Mexico) and those impacted less are less likely to be underinsured. For the private insurance only group, however, in addition to those with greater numbers of unmet need and those who qualified based on elevated service usage and need, those who are multi-racial or other racial, non-Hispanic, those with greater pervasiveness or higher severity ratings, and those who qualified based on functional limitations or ongoing emotional, developmental, or behavioral conditions are more likely to be underinsured. Those impacted more often and those with incomes at or above 300 percent FPL are less likely to be underinsured by this definition. This means that severity and pervasiveness are important within the private group, but less so in the public group. It also means that race and income are important within the private group, but less so for the public group. In summary, time

affected, how much affected, geographic region, and qualification based on prescription medication usage, functional limitations, or emotional, developmental, or behavioral conditions do not have an impact for the combined sample by this definition, but are important within the subgroups of public and private insurance. These results support the hypothesis about income and the ones about severity and functional limitations for the private group. They fail to support the above for the public group.

Examining by specific subgroup of interest also revealed differences. For CSHCN who qualified based on functional limitations, those who are multi-racial, non-Hispanic, those who have private insurance only, those with greater numbers of unmet need or health conditions, and those with higher severity ratings are more likely to be underinsured. Those in families with incomes at or above 300 percent FPL are less likely to be underinsured. Within the group of CSHCN who have high severity, those with private insurance only, those with greater numbers of unmet need, functional difficulties, or health conditions, and those who qualified based on elevated service usage and need are more likely to be underinsured. Those who are black, non-Hispanic and those in families with incomes at or above 300 percent FPL were less likely to be underinsured. For the group of CSHCN who qualified solely based on prescription medication usage, those who are other race, non-Hispanic, those with greater numbers of functional difficulties, and those who have either private insurance only or other comprehensive insurance only are more likely to be underinsured. Those who are female are less likely to be underinsured. In summary, pervasiveness, functional difficulties, and gender do not have an impact for the combined sample by this definition, but are important within condition-specific subgroups. Also, the different race/ethnicity categories have differing

impacts within the subgroups and income is not a factor for the prescription medication only group. These results support the hypotheses about severity and functional limitations for this definition.

### Structural definition

Almost five percent of CSHCN are considered underinsured according to the structural definition. In general, those in family structures other than single mother, those with greater numbers of unmet need, and those affected less by the condition are more likely to be underinsured. Those who are black, non-Hispanic and those who are affected more often are less likely to be underinsured. The findings related to the amount of time affected and how much affected are somewhat counterintuitive. These fail to support the hypotheses made about private insurance, severity, functional limitations, and prescription medications only.

Looking within the public insurance only group, CSHCN who live in households where the highest education level is more than high school, in family structures other than single mother, and who have greater numbers of unmet need or health conditions are more likely to be underinsured. Those who are black, non-Hispanic or who live in states influenced predominantly by separatist political subcultures (New Mexico) are less likely to be underinsured according to this definition. For the private insurance only group, however, only those with greater numbers of unmet need are more likely to be underinsured. Also, only those who are black, non-Hispanic are less likely to be underinsured by this definition. This means that political subculture and the number of health conditions are important within the public group, but not as much so in the private group. In summary, the number of health conditions and political subcultural influence

do not have an impact for the combined sample by this definition, but are important within the public subgroup. Also, how much and how often the condition affects the child are important for the overall sample according to this definition, but not as important within the public and private subgroups. These results fail to support the hypotheses about severity or functional limitations for either group, as well as the hypothesis about income.

Examining by specific subgroup of interest also revealed differences. For CSHCN who qualified based on functional limitations, those in families with higher education and those with greater numbers of unmet need are more likely to be underinsured. Those living in states influenced predominantly by the separatist political subculture (New Mexico) are less likely to be underinsured. Within the group of CSHCN who have high severity, those with greater numbers of unmet need are more likely to be underinsured. For the group of CSHCN who qualified solely based on prescription medication usage, those who live in family structures other than single mother and those who have greater numbers of unmet need are more likely to be underinsured. Those who are female, black, non-Hispanic, or Hispanic are less likely to be underinsured for this definition. In summary, educational level, gender, Hispanic ethnicity, and political subculture do not have an impact for the combined sample by this definition, but are important within condition-specific subgroups. These results fail to support the hypotheses about severity and functional limitations for this definition.

#### Equipment/Supplies definition

Almost three percent of CSHCN are considered underinsured according to the equipment/supplies definition. In general, those who are black, non-Hispanic, those who



are Hispanic, and those with greater numbers of unmet need are more likely to be underinsured. Those who live in the Northeast, Midwest, or West; those who live in states influenced predominantly by the bifurcated or pluralistic political subcultures; and those who are affected less often are less likely to be underinsured according to this definition. These results support the hypothesis made about private insurance, but fail to support the ones about severity, functional limitations, and prescription medications only.

Looking within the public insurance only group, CSHCN who are black or other race, non-Hispanic or who are Hispanic; those who have greater numbers of unmet need; and those who qualified based on the use of specialized therapies are more likely to be underinsured. Those who are older; those who live in the Northeast, Midwest, or West; and those who live in bifurcated states are less likely to be underinsured. For the private insurance only group, however, in addition to greater numbers of unmet need, those in family structures other than single mother and those who qualified based on the use of specialized therapies have increased odds of a child being underinsured. Those who live in the Northeast or in bifurcated or pluralistic states and those affected less are less likely to be underinsured by this definition. This means that race/ethnicity and age are important within the public group, but not as much so in the private group. In summary, living in the Northeast is protective for the overall sample and within each subgroup, however, living in the Midwest or West reduces the odds of being underinsured for the general sample and the public subgroup. Also, age, family structure, and use of specialized therapies do not have an impact for the combined sample by this definition, but are important within the subgroups of public and private insurance. These results fail

to support the hypotheses about severity and functional limitations for both groups and the one about income.

Examining by specific subgroup of interest also revealed differences. For CSHCN who qualified based on functional limitations, those who are black, non-Hispanic and those with greater numbers of unmet need are more likely to be underinsured. Those who live in the Northeast or Midwest, those who live in states predominantly influenced by the bifurcated or pluralistic political subcultures, and those affected less are less likely to be underinsured. Within the group of CSHCN who have high severity, those who are female or black, non-Hispanic, those with greater numbers of unmet need, and those who qualified based on the use of specialized therapies are more likely to be underinsured. Those who are older, those who live in the Northeast or Midwest, and those who live in states predominantly influenced by the bifurcated or pluralistic political subcultures are less likely to be underinsured. For the group of CSHCN who qualified solely based on prescription medication usage, those who are Hispanic and those who have greater numbers of unmet need are more likely to be underinsured. Those who live in the West are less likely to be underinsured than are CSHCN in the South for this definition. In summary, age, gender, and the use of specialized therapies do not have an impact for the combined sample by this definition, but are important within condition-specific subgroups, namely the high severity subgroup. These results fail to support the hypotheses about severity and functional limitations for this definition.

### *5.3 Limitations and directions of future research*

The data source used for this study is based upon parent or caregiver report and therefore can include biases based on perception and recollection. Need for services may be subjective. This is typical for all survey data.

The survey sample included homes with landlines only and therefore households with cell phones only were excluded. It is uncertain what, if any, impact this may have had on results. Also, houses without telephones are underrepresented, but the results are weighted to cover this discrepancy.

Those families who are homeless or who are migrants and those who have CSHCN living in institutions were not interviewed and are therefore underrepresented in the dataset. This sample is weighted to be representative of the non-institutionalized population of CSHCN ages birth to 17 years only.

Finally, as noted by Kogan et. al. (2009) survey data in general limits the ability to draw causal inferences. Only associations can be identified.

The variable for unmet health needs has significant impact across all definitions and subgroups except for the attitudinal and economic definitions for the prescription medications only subgroup. This is as would be expected given that unmet need is closely related to underinsurance. Since this variable added little to the body of knowledge, future research could likely exclude it without any significant impact.

Among several suggestions, Honberg et. al. (2005) mentioned that future research should include state and regional variations. This study examined four geographic regions as established by the U.S. Census Bureau. However, future research should use the nine more detailed divisions to better describe the impact of geographic area. Using

the larger regions causes states to be collapsed together, potentially losing some of the important proximity effects of the smaller divisions. This may cancel out the effects that might be seen in the smaller divisions with the use of these larger regional combinations. The same is true for the classifications of political subculture. Lieske (2008) notes that the reduced typologies are as predictive as the full measures in terms of predicting social and political measures, but he cautions that their use in regression models may produce results that are underspecified. Using these reduced typologies for the dominant influence may result in a loss of richness that could be gained from a fuller measure of political subcultures in the states and regions. The results for the impact of political subculture and geographic region indicate that in some cases the directions conflict with one another. For example, a finding that CSHCN living in the Northeast are less likely to be underinsured than are those living in the South; but also in same model, that those in states predominantly influenced by the bifurcated political subculture are less likely to be underinsured than are those living in states predominantly influenced by the moralistic political subculture. Given that many bifurcated states are Southern and many moralistic states are Northeastern, this is difficult to explain. Future research should find a better way to incorporate political subculture that does not compromise the richness of the predictive information it can provide.

Banthin et. al. (2008) suggested the need to look at poor and low-income privately insured groups in general compared to other private as opposed to a simple private versus public comparison. This study examined this issue specifically for CSHCN using the 300 percent FPL cut point and also by looking within the private insurance only subgroup.

However, future research might look at a continuous variable for income or with more levels for richer comparisons.

Both Davidoff (2004) and Newacheck & Kim (2005) suggested that future research should look at reason for inclusion or type of special health care need since the service needs and experiences might be different. This study examined both the reasons for qualification as CSHCN and specific subgroups for functional limitations and prescription medications only. Future research should look at underinsurance by specific condition. The sample sizes were too small in this dataset to accomplish this analysis.

The experiences of individual minority groups of CSHCN were different based upon underinsurance definition and by public/private stratifications and condition-specific subgroups. Some classifications were very small, that is, multi-race and other race, non-Hispanic. Future research should look specifically at minority populations in general compared with white, non-Hispanic groups both in general and within the stratifications and subgroups.

#### *5.4 Implications of the study*

This study focuses specifically on underinsurance for children with special healthcare needs. The exclusive focus on CSHCN represents a critical policy issue because though they are only a small part of the child population, they use more services and account for more cost than their healthy and typically developing peers. They are also much more vulnerable to poor health outcomes that can result from delayed care and to not reach their maximum potential for independence because of not receiving necessary specialized services and therapies. For many CSHCN, underinsurance can be as important a barrier to access as lack of insurance. Also, CSHCN tend to live in

families that are the most likely to be negatively impacted by cost-sharing requirements and the most vulnerable to catastrophic financial burden. In this research, only those CSHCN with consistent insurance were included in the study populations. These were children seeming in the best of possible situations – having some type of insurance consistently over the previous year – yet there were still gaps noted in adequately meeting health and related service needs.

Due to the limitations of the dataset, this project focuses only on underinsurance as measured by the four separate definitions that have been developed. This is actual underinsurance. The true burden of underinsurance may be underestimated because there is no way in this survey to consider risk for underinsurance – potential underinsurance. How many more families might find that they are underinsured if their child developed a chronic illness or experienced a devastating injury that resulted in an ongoing need for specialty services, therapies, medications, equipment, or supplies?

This is an important consideration against the current backdrop of health reform and attempts to expand coverage to all Americans. As noted by Honberg et. al. (2005), for policymakers, adequacy is an important aspect beyond presence and continuity of insurance. The question should not be only how can our nation extend coverage, but how can we provide appropriate and adequate coverage that meets the need of the most vulnerable of citizens. Health policy changes should consider both the breadth and depth of insurance coverage to assure that people – and specific to this project, CSHCN – have access to critical services beyond those designed for well care or acute illness and injury. Also, for the reform to truly impact people in any real way, it must assure protection against high individual costs and catastrophic expense burden. This study leads to an

increased understanding of health and related expenses for CSHCN, as well as of specific risk groups within the population that may be more vulnerable to underinsurance either related to condition-specific needs or predisposing and enabling factors. This will support planning efforts related to benefit design and promote policies that continue to provide safety net services for CSHCN.

The findings from this study illustrate the importance of considering the severity and impact of health conditions when examining and predicting risk of underinsurance. Also, qualification reasons have different impacts on underinsurance, depending upon the definition utilized. These factors are not currently considered by private insurance companies or public programs when designing policy or benefit packages. This will be a critical issue as companies and programs develop benefit packages and coverage models in response to health reform. It will also be important for families to consider these aspects of need as they evaluate choices of coverage to select the most appropriate option.

For two of the four definitions (also the two with the largest estimated percentage), – attitudinal and economic – CSHCN with private insurance only were more likely to be underinsured than were their public insurance only counterparts. This may be in part due to the variability in structure and benefits packages of private plans and the fact that they do not offer the protections of guaranteed coverage of medically necessary services provided by EPSDT within public plans (Medicaid and some SCHIP programs, if they were designed as Medicaid expansions). This is a critical finding given the debate during health reform efforts related to the inclusion of a public option. As it stands now, a public option was not included in the health care reform legislation. Whether coverage

is labeled public or private is perhaps less important than what that coverage actually provides in terms of benefits and how it protects families. This study supports the model of public coverage in terms of protection against underinsurance. However, as health reform is implemented and health exchanges are developed, similar success related to underinsurance can be achieved through careful consideration of benefit options, covered services, and protection against unreasonable and catastrophic financial exposure.

The impact of income, specifically for economically defined underinsured, is also an important finding. The identification of 300 percent FPL as the cut point for this project, with associated protection for those CSHCN in families earning at least at that level, is critical knowledge as debates continue about health reform and what will happen when SCHIP expires again in 2012. The current reauthorization covers children in families up to 300 percent FPL, and this seems appropriate given that this work reveals those who earn at or above that level are less likely to be underinsured. However, the future is questionable beyond SCHIP if children are lumped into health exchanges as per the health reform bill without development of protections based on income level. Medicaid expansions and other reform methods may not cover up to this critical 300 percent FPL level, leaving children at lower levels – shown to be vulnerable in this project – at risk of underinsurance. Any reform efforts, whether utilizing public or private options, should give careful consideration and protections to children in families living below the 300 percent FPL guideline.

Finally, the exploration of alternate definitions for underinsurance has added a new perspective to the national discussion of underinsurance for CSHCN. The varying rates of underinsurance based upon definition, together with the behavior of predictor



variables as related to each definition, support consideration for either the adoption of multiple definitions or at least for the expansion of the current definition used for national monitoring efforts around this indicator. As our nation moves toward near universal health insurance coverage, we must not fail to consider how that will translate to meaningful usage and comprehensiveness of benefits for individuals. A good operational definition for underinsurance will be critical in this effort. This is especially true for vulnerable groups, including children with youth with special health care needs.

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## Appendix A.

Syntax for coding dependent variables

## Syntax: Coding Dependent Variables

### 1) Attitudinal definition

IF (C8Q01\_A\_J = 1 | C8Q01\_A\_J = 2) notmeetneed=1.  
EXECUTE.

IF (C8Q01\_A\_J = 3 | C8Q01\_A\_J = 4) notmeetneed=0.  
EXECUTE.

IF (C8Q01\_B\_J = 1 | C8Q01\_B\_J = 2) notreasonable=1.  
EXECUTE.

IF (C8Q01\_B\_J = 3 | C8Q01\_B\_J = 4 | C8Q01\_B\_J = 5) notreasonable=0.  
EXECUTE.

IF (C8Q01\_C\_J = 1 | C8Q01\_C\_J = 2) notseepro=1.  
EXECUTE.

IF (C8Q01\_C\_J = 3 | C8Q01\_C\_J = 4) notseepro=0.  
EXECUTE.

IF (notmeetneed = 1 | notreasonable = 1 | notseepro = 1) UNDERINS\_att=1.  
EXECUTE.

IF (notmeetneed = 0 & notreasonable = 0 & notseepro = 0) UNDERINS\_att=0.  
EXECUTE.

## 2) Economic definition

COMPUTE delaymoney=0.  
EXECUTE.

IF (C4Q04\_E\_J = 1) delaymoney=1.  
EXECUTE.

COMPUTE routinecost=0.  
EXECUTE.

IF (C40501BR01\_J = 1) routinecost=1.  
EXECUTE.

COMPUTE specialcost=0.  
EXECUTE.

IF (C40502BR01\_J = 1) specialcost=1.  
EXECUTE.

COMPUTE prevdentalcost=0.  
EXECUTE.

IF (C405031BR01\_J = 1) prevdentalcost=1.  
EXECUTE.

COMPUTE otherdentalcost=0.  
EXECUTE.

IF (C405032BR01\_J = 1) otherdentalcost=1.  
EXECUTE.

COMPUTE rxcost=0.  
EXECUTE.

IF (C40504BR01\_J = 1) rxcost=1.  
EXECUTE.

COMPUTE ptotspeechcost=0.  
EXECUTE.

IF (C40505BR01\_J = 1) ptotspeechcost=1.  
EXECUTE.

COMPUTE mhcost=0.  
EXECUTE.

IF (C40506BR01\_J = 1) mhcost=1.  
EXECUTE.

COMPUTE sacost=0.  
EXECUTE.

IF (C40507BR01\_J = 1) sacost=1.  
EXECUTE.

COMPUTE respitecost=0.  
EXECUTE.

IF (C40601BR01\_J = 1) respitecost=1.  
EXECUTE.

COMPUTE geneticcost=0.  
EXECUTE.

IF (C40602BR01\_J = 1) geneticcost=1.  
EXECUTE.

COMPUTE fmhcost=0.  
EXECUTE.

IF (C40603BR01\_J = 1) fmhcost=1.  
EXECUTE.

COMPUTE addincome=0.  
EXECUTE.

IF (C9Q07\_J = 1) addincome=1.  
EXECUTE.

COMPUTE financialproblems=0.  
EXECUTE.

IF (C9Q05\_J = 1) financialproblems=1.  
EXECUTE.

COMPUTE UNDERINS\_econ=0.  
EXECUTE.

IF (delaymoney = 1 | routinecost = 1 | specialcost = 1 | prevdentalcost = 1 | otherdentalcost = 1  
| rxcost = 1 | ptotspeechcost = 1 | mhcost = 1 | sacost = 1 | respitecost = 1 | geneticcost = 1 |  
fmhcost = 1 | addincome = 1 | financialproblems = 1) UNDERINS\_econ=1.  
EXECUTE.

### 3) Structural definition

COMPUTE delaystructural=0.  
EXECUTE.

IF (C4Q04\_H\_J = 1 | C4Q04\_I\_J = 1) delaystructural=1.  
EXECUTE.

COMPUTE routinestructural=0.  
EXECUTE.

IF (C40501BR03\_J = 1) routinestructural=1.  
EXECUTE.

COMPUTE specialstructural=0.  
EXECUTE.

IF (C40502BR03\_J = 1) specialstructural=1.  
EXECUTE.

COMPUTE prevdentalstructural=0.  
EXECUTE.

IF (C405031BR03\_J = 1) prevdentalstructural=1.  
EXECUTE.

COMPUTE otherdentalstructural=0.  
EXECUTE.

IF (C405032BR03\_J = 1) otherdentalstructural=1.  
EXECUTE.

COMPUTE rxstructural=0.  
EXECUTE.

IF (C40504BR03\_J = 1) rxstructural=1.  
EXECUTE.

COMPUTE ptotspeechstructural=0.  
EXECUTE.

IF (C40505BR03\_J = 1) ptotspeechstructural=1.  
EXECUTE.

COMPUTE mhstructural=0.  
EXECUTE.

IF (C40506BR03\_J = 1) mhstructural=1.  
EXECUTE.

COMPUTE sastructural=0.  
EXECUTE.

IF (C40507BR03\_J = 1) sastructural=1.  
EXECUTE.

COMPUTE respitestructural=0.  
EXECUTE.

IF (C40601BR03\_J = 1) respitestructural=1.  
EXECUTE.

COMPUTE geneticstructural=0.  
EXECUTE.

IF (C40602BR03\_J = 1) geneticstructural=1.  
EXECUTE.

COMPUTE fmhstructural=0.  
EXECUTE.

IF (C40603BR03\_J = 1) fmhstructural=1.  
EXECUTE.

COMPUTE UNDERINS\_struc=0.  
EXECUTE.

IF (delaystructural = 1 | routinestructural = 1 | specialstructural = 1 | prevdentalstructural = 1  
| otherdentalstructural = 1 | rxstructural = 1 | ptotspeechstructural = 1 | mhstructural = 1 |  
sastructural = 1 | respitestructural = 1 | geneticstructural = 1 | fmhstructural = 1)  
UNDERINS\_struc=1.  
EXECUTE.



#### 4) Equipment/Supplies definition

```
COMPUTE UNDERINS_equip_supplies_survey=0.  
EXECUTE.
```

```
COMPUTE nohomehealth=0.  
EXECUTE.
```

```
IF (C4Q05_X08_J = 1 & C4Q05X08A_J = 0) nohomehealth=1.  
EXECUTE.
```

```
COMPUTE novision=0.  
EXECUTE.
```

```
IF (C4Q05_X09_J = 1 & C4Q05X09A_J = 0) novision=1.  
EXECUTE.
```

```
COMPUTE nohearing=0.  
EXECUTE.
```

```
IF (C4Q05_X10_J = 1 & C4Q05X10A_J = 0) nohearing=1.  
EXECUTE.
```

```
COMPUTE nomobility=0.  
EXECUTE.
```

```
IF (C4Q05_X11_J = 1 & C4Q05X11A_J = 0) nomobility=1.  
EXECUTE.
```

```
COMPUTE nocommunication=0.  
EXECUTE.
```

```
IF (C4Q05_X12_J = 1 & C4Q05X12A_J = 0) nocommunication=1.  
EXECUTE.
```

```
COMPUTE nosupplies=0.  
EXECUTE.
```

```
IF (C4Q05_X13_J = 1 & C4Q05X13A_J = 0) nosupplies=1.  
EXECUTE.
```

```
COMPUTE nodme=0.  
EXECUTE.
```

```
IF (C4Q05_X14_J = 1 & C4Q05X14A_J = 0) nodme=1.  
EXECUTE.
```

```
COMPUTE UNDERINS_equip_supplies_recode2=0.  
EXECUTE.
```

```
IF (nohomehealth = 1 | novision = 1 | nohearing = 1 | nomobility = 1 | nocommunication = 1 |  
    nosupplies = 1 | nodme = 1) UNDERINS_equip_supplies_recode2=1.  
EXECUTE.
```

Appendix B.

Census Bureau regions and divisions

# U.S. Census Bureau

## Census Bureau Regions and Divisions with State FIPS Codes

### Region 1: Northeast

#### Division 1: New England

Connecticut (09)  
Maine (23)  
Massachusetts (25)  
New Hampshire (33)  
Rhode Island (44)  
Vermont (50)

#### Division 2: Middle Atlantic

New Jersey (34)  
New York (36)  
Pennsylvania (42)

### Region 2: Midwest\*

#### Division 3: East North Central

Indiana (18)  
Illinois (17)  
Michigan (26)  
Ohio (39)  
Wisconsin (55)

#### Division 4: West North Central

Iowa (19)      Nebraska (31)  
Kansas (20)    North Dakota (38)  
Minnesota (27)    South Dakota (46)  
Missouri (29)

### Region 3: South

#### Division 5: South Atlantic

Delaware (10)  
District of Columbia (11)  
Florida (12)  
Georgia (13)  
Maryland (24)  
North Carolina (37)  
South Carolina (45)  
Virginia (51)  
West Virginia (54)

#### Division 6: East South Central

Alabama (01)  
Kentucky (21)  
Mississippi (28)  
Tennessee (47)

#### Division 7: West South Central

Arkansas (05)  
Louisiana (22)  
Oklahoma (40)  
Texas (48)

### Region 4: West

#### Division 8: Mountain

Arizona (04)      Montana (30)  
Colorado (08)    Utah (49)  
Idaho (16)      Nevada (32)  
New Mexico (35)    Wyoming (56)

#### Division 9: Pacific

Alaska (02)  
California (06)  
Hawaii (15)  
Oregon (41)  
Washington (53)

*\*Prior to June 1984, the Midwest Region was designated as the North Central Region.*

\* Taken from U.S. Census Bureau website ([www.census.gov/us\\_regdiv](http://www.census.gov/us_regdiv))

Appendix C.

Lieske's political subcultures by state

Table C1. Lieske's Political Subcultures by State

<b>State</b>	<b>MIPBS*</b>	<b>Dominant Influence</b>
Alabama	BP	B
Alaska	PS	P
Arizona	PS	P
Arkansas	BP	B
California	PS	P
Colorado	P	P
Connecticut	PM	P
Delaware	P	P
Florida	PI	P
Georgia	BP	B
Hawaii	P	P
Idaho	PM	P
Illinois	PI	P
Indiana	IP	I
Iowa	IP	I
Kansas	PI	P
Kentucky	BP	B
Louisiana	BM	B
Maine	MP	M
Maryland	P	P
Massachusetts	MP	M
Michigan	IP	I
Minnesota	MP	M
Mississippi	BP	B
Missouri	P	P
Montana	P	P
Nebraska	PI	P
Nevada	P	P
New Hampshire	M	M
New Jersey	PI	P
New Mexico	S	S
New York	PI	P
N. Carolina	BP	B
N. Dakota	M	M
Ohio	IP	I
Oklahoma	PB	P
Oregon	P	P
Pennsylvania	IP	I
Rhode Island	M	M
S. Carolina	BP	B
S. Dakota	MP	M

Tennessee	BP	B
Texas	PS	P
Utah	M	M
Vermont	M	M
Virginia	PB	P
Washington	P	P
W. Virginia	IP	I
Wisconsin	IM	I
Wyoming	P	P

MIPBS: M-Moralistic; I-Individualistic; P-Pluralistic; B-Bifurcated; S-Separatist

\* Taken from Lieske, J. (2008) "Indexing State Cultures: Unidimensional Versus Multidimensional Measures." "Appendix B, Dominant-Subordinate Measures Of State Culture; By Reduced Typologies And State, Reduced Typologies." Paper presented at the annual meeting of the APSA, 2008 Annual Meeting, Hynes Convention Center, Boston, MA 2008-08-28 Online<Application/pdf>.2008-12-11 from [http://www.allacademic.com/meta/p279589\\_index.html](http://www.allacademic.com/meta/p279589_index.html)