EXECUTIVE SUMMARY

ACSC EXPERIENCE BY USUAL SOURCE OF HEALTH CARE: COMPARING MEDICAID BENEFICIARIES WHO RELY ON CHCs WITH MEDICAID BENEFICIARIES WHO RELY ON OTHER PRIMARY CARE PROVIDERS

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EXECUTIVE SUMMARY

ACSC EXPERIENCE BY USUAL SOURCE OF HEALTH CARE: COMPARING MEDICAID BENEFICIARIES WHO RELY ON CHCs WITH MEDICAID BENEFICIARIES WHO RELY ON OTHER PRIMARY CARE PROVIDERS

Ambulatory Care Sensitive Conditions

Access to timely and appropriate primary care remains a problem within communities of low-income and minority populations. Recent research reports higher prevalence rates for specific acute and chronic conditions, such as asthma, diabetes and hypertension, among low-income and minority populations, and the greater likelihood of complicating morbidities and potentially avoidable hospitalizations.[1]

MDS Associates was commissioned by the HRSA Bureau of Primary Health Care (BPHC) to assess the performance of community health centers, compared with other providers of health care 'services, in providing timely access to preventive and primary care services by examining ambulatory care sensitive conditions (ACSCs).[2] A decade's worth of ACSC research suggests that ACSC hospitalizations reveal access problems -- a failure to obtain timely access to appropriate primary care for treatable medical conditions.[3] The ACSCs are medical conditions such as diabetes, asthma, hypertension or gastroenteritis for which timely, appropriate primary care can prevent or reduce the likelihood of hospitalizations. Hadley and Steinberg, for example, define ACSCs as medical conditions where "... *timely and effective outpatient care can help*

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[1] A. Zuvekas, et. al. (1995), Identifying and Selecting Gaps in Morbidity and Mortality Rates for Low-Income and Minority Populations: LIterature Review Bureau of Primary Health Care; M. Milhnan, (ed), (1993), Access, Institute of Medicine, 103-124.

[2] This MDS Associates' study was supported under HRSA contract #240-94-0036, Task Order 240-96-0402, and conducted in collaboration with Laguna Research Associates and several consultants, including Jack Needleman, John Billings, Joanne Lukomnik, Marie Diener-West and Ann Zuvekas.

[3] Key ACSC studies include: J. Billings (1989), Consideration of the Use of Small Area Analysis as a Tool to Evaluates to Access; J. S. Weissman, C. Gatsonis, and A. M. Epstein (1992), ***Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland,*** Journal of the American Medical 268:2388-94; A.B. Bindman, K. Grumbach, D. Osmond, M. Komaromy, K. Vranizan, N. Lurie,'J. Billings, and A. Stewart (1995), ***Preventable Hospitalizations and Access to Health Care, Journal*** the American Medical Association 274:305-11; J. Billings, G. M. Anderson, and L. S. Newman (1996), ***Recent Findings on Preventable*** *Hospitalizations*, ***Health***, 15:239-49; G. Pappas, W.C. Hadden, L.J. Kozak, and G.F. Fisher (1997), ***Potentially Avoidable*** *Hospitalizations:* ***Inequalities in Rates Between Socioeconomic Groups, American*** of Public Health, 87:811-816.

reduce the risks of hospitalization either by (a) preventing the onset of an illness or condition; (b) controlling an acute episodic illness or condition; or (c) managing a chronic disease or condition" .[4]

The ACSCs constitute a set of medical conditions which can and should be treated within outpatient or ambulatory care settings. ACSCs serve as "markers" for monitoring access and possibly, quality of primary care for several medical conditions.[5] A growing body of research suggests the potential value of ACSCs by:

- documenting variations in ACSC hospitalization rates that underscore access barriers;
- identifying forces that influence ACSC hospitalization rates, for example, ACSC hospitalization rates are significantly higher in communities with low-income, minority and disadvantaged populations;[7]
- exploring the potential utility of ACSCs as performance measures, by comparing health plans or alternative sources of care, for profiling utilization, monitoring access or assessing quality of care.[8]

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[4] J. Hadley and E. Steinberg (1993), Access to Care in the Medicaid Program: Construction of Indicators of Access to Care from Diagnoses and Procedures of Hospitalized People and Preliminary Statistical Results, Technical Report, Georgetown University.

[5] For example, see: M. Millman (ed), (1993), Access to Health Care in America, Institute of Medicine; J. Billings (1990), Consideration of the Use of Small Area Analysis as a Tool to Evaluate Barriers to Access, Health Resources and Services Administration, Consensus Conference on Small Area Analysis, DHHS-HRSA-PE 91-1[A] (Washington: U.S. Department of Health and Human Services; J. Arnold, A. Zuvekas, J. Needleman, et. al. (1987), Incorporating Health Status Indicators into the Measurement Lewin/ICF, prepared for Health Resources and Services Administration, Department of Health and Human Services.

[6] J. Billings, G. M. Anderson, and L. S. Newman (1996), *Recent Findings on Preventable Hospitalizations,* Health Affairs, 15:239-49.

[7] J. Billings, G. M. Anderson, and L. S. Newman (1996), *Recent Findings on Preventable Hospitalizations,* Health Affairs 15:239-49; J. Billings, and N. Teicholz (1990), *Uninsured Patients in District of Columbia Hospitals,* Health Affairs 9:158-65; J. Billings, L. Zeitel, J. Lukomnik, T. S. Carey, A. E. Blank, and L. Newman(1993), *Impact of Socioeconomic Status on Hospital Use in New York City, Health,* 12:162-73; J. S. Weissman, C. Gatsonis, and A. M. Epstein (1992), *Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland, Journal* Association, 268:2388-94.

[8] J. Blustein, K. Hanson and S. Shea (1998), *Preventable Hospitalizations and Socioeconomic Status,* Health Affairs, 16:3, *177-189.*

ACSC studies reveal that significant differences in the ACSC hospitalization rates correlate with socio-economic variables (i.e., income, race\ethnicity, insurance status).' Accounting for case-severity, the relationship between income and preventable hospitalizations among Medicare beneficiaries is somewhat reduced but remains substantial and statistically significant.[10] When focusing principally on insurance status, ACSC hospitalizations are highest among Medicaid and uninsured populations. [11] Overall, health resources, such as physician supply and distribution, appear to have little influence on ACSC admission rates; however, when physician supply is one-fourth the national average or less, ACSC admission rates are notably and consistently higher. [12] Another recent ACSC analysis combined survey data (from patients and physicians) with hospitalization data to examine correlates of ACSC admissions; after controlling for prevalence of ACSCs, health care-seeking behavior and physician practice style, access barriers correlate with preventable hospitalizations.[13]

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[9] G. Pappas, W. C. Hadden, L.J. Kozak, and G.F. Fisher (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups, American Health,*** 87:811-816.

[10] J. Blustein, K. Hanson and S. Shea (1998), ***Preventable Hospitalizations and Socioeconomic Status,*** Health Affairs, 17: 177-189.

[11] J. S. Weissman, C. Gatsonis, and A. M. Epstein (1992), ***Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland,*** Journal of ***the A m e r i c a n, 268:2388-94.***

[12] H. Krakauer, I. Jacoby, M. Millman, and J. E. Lukomnik (1996), ***Physician Impact on Hospital Admission and on Mortality Rates in the Medicare Population,*** Health ***Services, 31:*** 191-211.

[13] A. B. Bindman, K. Grumbach, D. Osmond, M. Komaromy, K. Vranizan, N. Lurie, J. Billings, and A. Stewart (1995), ***Preventable Hospitalizations and Access to Health Care, Journal*** American Medical Association, 274:305-11.

ACSCs: A Performance Measure for Comparing Alternative Sources of Care

Since the mid-1960s, BPHC has supported over 600 community health centers (CHCs) to promote timely access to preventive and comprehensive primary care services. Over the past two decades, various studies suggest that CHCs and other HRSA/BPHC programs contribute to improved access (appropriately greater use of services) and improved outcomes (fewer comorbidities or negative health events). [14] Having a regular source of medical care -- either a specific provider or a specific site -- remains one of the most reliable and strongest predictors of access. [15]

This ACSC study, using Medicaid claims data::

- examines ACSC events -- hospitalizations and ambulatory care; and
- compares CHCs with other providers in their respective communities.

We explore *whether, and the extent to which, individuals who rely on BPHC-supported CHCs as their principal source of primary care are less likely to experience ACSC hospitalizations than individuals who rely on other providers of primary care, including clinics or office-based doctors.* We also profile and examine outpatient visits for ACSCs.

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[14] Studies of CHCs include: R.M. Hollister, B.M. Kramer, S.S. Bellin (1974), *Improving Access to **Health Care Among the Poor -- the Neighborhood Health Center Experience,*** Milbank Memorial Fund Quarterly, 54:47-82; ***S.S.*** Bellin, and H.J. Geiger (1972), Neighborhood Health Centers (Lexington, MA, Lexington Books); L.M Okada, and T.T.H. Wan (1978), ***The Impact of a Neighborhood Health Center on Patients' Behavior and Attitudes Relating to Health Care, Medical,*** 10:224-239; M.R. Gold, and R.G. Rosenberg (1974), ***Impact of Community Health Centers and Medicaid on the Use of Health Services,*** Public Health Reports 95:520-534; L.I. Hochheiser, K. Woodward, and E. Charney (1971), Use of ***Emergency Room Services by the Population of a Neighborhood Health Center, Health*** Services Reports. 89,1:D, I.Zwick (1972), ***Effect of Neighborhood Health Center on the Use of Pediatric Emergency Departments in Rochester, New York, The New England***, 285,3; M.S. Morehead, et. al. (1973), ***Some Accomplishments and Findings of Neighborhood Health Centers,*** Milbank Memorial Fund Quarterly, 50:287-420; ***S.*** Rosenbaum, and A. Divler (1992), ***Comparison between OEO Neighborhood Health Centers and Other Health Care Providers of Ratings of the Quality of Health Care,*** American Journal of Public. 61:1294-1306. B. Duggar, B. Balicki, A. Zuvekas (1981), ***A Literature Review of the Community and Migrant Health Centers Program***, Costs and Utilization Patterns for Comprehensive Health Bureau of Community Health Services, HAS/DHHS, Center for Health Policy Studies; Center for Heal&Policy Studies (1993), Health Medicaid of AFDC Recipients in New York and California Served Not Served by Selected Community Health Cente · ·nal Report, November, (HRSA Contract #240-90-0071).

[15] For example, recent findings were reported by the Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, April 17, 1998.

Research Questions

Our analysis addresses four research areas and related questions:

Comparative ACSC hospitalization rates. Are Medicaid recipients who rely on CHCs for primary care more likely or less likely to experience ACSC hospitalizations than a comparison group (i.e., non-user - patients who rely on other providers for primary care)?

Variations among CHC users. Are CHC users who rely almost exclusively on CHCs (i.e., over 80% of primary care services at CHC) more likely or less likely to experience ACSC' hospitalizations than the CHC "regulars" (i.e., those with between 51% to 80% of their primary care from a CHC)?

Implications of ACSC clusters. If there are observed differences in ACSC hospitalization rates between CHC users and non-users, are these differences concentrated in specific ACSCs or groupings of ACSCs, or are these differences evident across ACSCs?

ACSC ambulatory care visits, a preliminary examination. What aspects of ACSC ambulatory care differ across the study groups? What aspects of ACSC ambulatory care warrant further research?

Study Population and Other Defining Parameters

Study Population. The study sample encompasses:

- Medicaid beneficiaries who rely on CHCs for primary care (i.e., obtain over 50% of their primary care from a CHC) -- experimental group;
- Medicaid beneficiaries who do not use CHCs, randomly drawn from the same communities -- comparison group.

Prior ACSC research relied largely upon hospital discharge data sets. Consequently, ACSC studies examined hospitalizations and admission rates for ACSCs. In contrast, this study examines claims data -- State Medicaid Research Files (SMRF) -- for five states: Kentucky, Maine, Missouri, Pennsylvania, and Washington. Medicaid claims data are for calendar year 1992 (January 1, **1992** through December 3 **1, 1992). SMRF** data encompasses:

- inpatient services (i.e., hospitalizations);
- outpatient visits (i.e., professional visits, emergency room);
- clinical information (i.e., principal diagnosis); and
- demographics (e.g., age, gender, welfare status).

We restricted our analysis to an insured population -- Medicaid AFDC and AFDC-like groups. On average, one-third of CHC patients are covered by Medicaid. By focusing on Medicaid patients, we control for several forces which can influence access and care seeking behavior, for example, insurance status (directly), income (indirectly) and demographics affecting utilization rates and care patterns. [16]

Ambulatory Care Sensitive Conditions (ACSCs). Across major ACSC studies, there is a degree of overlap in the medical conditions qualifying as ACSCs and the accompanying codes (e.g., ICD-9 codes). For inpatient ACSC codes, we adopted a combination of ACSCs and accompanying codes from the lists of the ***Institute of Medicine***[17] and a recently published ACSC study." To extend our analysis to take into account ambulatory care experience, our consulting physician developed a list of ICD-9 codes for outpatient ACSC visits. We also examined ACSCs by two types of groupings: conditions (chronic, acute) and cohorts (children, adult). Chronic conditions are likely to require "medical management" over longer time-frames; chronic conditions include diabetes and asthma. Acute conditions are time-limited and require care when symptoms appear; with timely and appropriate treatment, the presenting conditions generally ameliorate. Acute conditions, for example, gastroenteritis or nutritional deficiencies can generally be treated effectively by primary care providers within outpatient settings.

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[16] For a more detailed set of definitions see Chapter 2 of ACSC Experience by Usual Source of Care, MDS Associates, 1998, and Evaluation of the Effectiveness and Impact of Community Health Centers - Interim Report, MDS Associates, Laguna Research Associates and Lovelace Institute, July 1997.

[17] M. Millman (ed), Access Institute of Medicine, 1993; J. Billings, et al., (1993), ***Impact of Socioeconomic Status on Hospital Use in New York City,*** Health Affairs, 12:162-173; Joel Weissman, et al. (1992), ***Rates of Avoidable Hospitalizations by Insurance Status in Massachusetts and Maryland,*** Journal of the American, 268:388-94; and Gregory Pappas, et al. (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups,*** American Journal ***of Public,*** 87:811-816.

[18] G. Pappas W.C. Hadden, L.J. Kozak and G.F. Fisher (1997), ***Potentially Avoidable Hospitalizations: Inequalities in hates between US Socioeconomic Groups,*** American Journal of Public Health 87:811-816.

Exhibit 1: ACSC Analysis -- Cluster Classifications

ACSCs	Inpatient & Outpatient Analysis		Chronic & Acute Clusters		Age-Cohort Clusters	
	Inpatient	Inpatient & Outpatient	Chronic	Acute	Children	Adult
1. Congenital syphilis	X			X	X	
2. Immunizations	X			X	X	
3. Grand mal/epileptic convulsions		X	X		X	X
4. ENT Infections		X		X	X	X
5. Tuberculosis		X		X	X	X
6. COPD		X	X		X	X
7. Bacterial Pneumonia		X		X	X	X
8. Asthma		X	X		X	X
9. Congestive Heart Failure		X	X		X	X
10. Hypertension		X	X		X	X
11. Cellulitis		X	X		X	X
12. Diabetes (A,B,C)		X	X		X	X
13. Hypoglycemia	X			X	X	X
14. Gastroenteritis/Dehydration		X		X	X	X
15. Kidney/Urinary Infection		X		X	X	X
16. Iron Deficiency Anemia	X			X	X	X
17. Nutritional Deficiencies	X			X	X	X
18. Failure to Thrive	X			X	X	
19. Pelvic Inflammatory Disease		X		X	X	X
20. Ruptured Appendix		X		X	X	X

NOTE: In some instances, making a chronic\acute distinction can be difficult and resultant mutually exclusive classifications can be somewhat arbitrary. For example, generally "chronic" conditions such as asthma can surface as an acute episode; alternatively, neglected "acute" conditions such as kidney or urinary infections can become recurrent, chronic conditions. Nevertheless, it was necessary to assign each condition to either the chronic or acute cluster, as shown in Exhibit 1.

ACSC Admissions - Relatively Rare Events. The study sample encompasses 48,739 Medicaid beneficiaries across five states; **16, 145** CHC-users and 32,594 individuals in the comparison group. During the 12-month study timeframe, there were 1,003 ACSC admissions; 857 individuals experienced an ACSC admission (less than two-percent of the study sample). However, nearly one-in-eight of those who had an ACSC admission experienced more than one ACSC admission (105 Medicaid beneficiaries).

Multivariate Analysis. Within the **multivariate analysis, the control variables** are: age, race/ethnicity, welfare status, location (state, urban/rural) and time-in-sample (number of months). Notably, 69-percent of the study sample had till-year eligibility -- 12 months-in-sample. The analysis encompassed several steps:

- Identification of the at-risk ACSC population, creating the study sample of unduplicated cases (individuals) who receive care, outpatient or inpatient, for one or more than one of the ACSCs.
- Comparison of ACSC hospitalization rates, by CHC-user status.
- Examination of ACSC outpatient visits (ER and professional visits), by CHC-user status.

Major Findings: ACSC Events and Profiles by Primary Source of Care

Our principal finding is that **Medicaid CHC-users experience significantly lower ACSC hospitalization rates than their counterparts, Medicaid beneficiaries who receive medical services from other providers of primary care.** To the extent that evidence of lower ACSC hospitalization rates signify access to primary care and access to timely and appropriate treatment for ACSCs, CHCs offer effective care and CHC-users benefit. Lower hospitalization rates also imply financial savings; lower hospitalization rates and timely and appropriate primary care underscore clinical value. This study indicates that relying on CHCs for primary care can make a difference in ACSC care patterns and ACSC care costs. This study also suggests that ACSC hospitalizations can serve as potential performance measures for monitoring access and comparing alternative sources of primary care.

ACSC Admissions. *Medicaid beneficiaries who were CHC users had lower ACSC admission rates -- on average, 22 percent lower than Medicaid beneficiaries who relied on other sources for primary care.* This relationship remains strong and significant when

controlling for population characteristics such as age, gender, race, ethnicity and residence. Medicaid beneficiaries who were CHC-users were also half as likely to experience a second or subsequent admission for an ACSC than comparison group. The likelihood of an ACSC admission varied somewhat by study state and age cohort. However, with regard to gender, ethnicity, welfare status or rural residence, there were no statistically significant differences in ACSC admission rates.

CHC-user status was statistically significant for admission rates among adults with either chronic ACSCs or acute ACSCs, and for children with chronic ACSCs. Children had comparable rates of admission for acute ACSCs regardless of their principal source of care.

ACSC Outpatient Visits. ***Medicaid beneficiaries who were CHC-users were 16 percent more likely than other Medicaid beneficiaries to experience outpatient visits for ACSC-associated conditions.*** Within the study population, this relationship holds for outpatient visits when examining ACSCs by clusters, chronic/acute status and age-cohorts.

Associated ACSC Visits. While a relatively low percent of any population, even low-income, is likely to experience an ACSC admission, the ***overwhelming majority (85-percent) of those who experience an ACSC admission also have outpatients visits for that same ACSC, either before their ACSC admission or after.*** Our analysis did not permit sequencing ACSC events to create episodes and thereby examine whether associated ACSC visits occurred before and/or after an ACSC hospitalization.

Our preliminary findings suggest that ***outpatient ACSC visits appear to be reasonably good markers for identifying the potential ACSC at-risk population.*** Ninety-five percent of the admissions for chronic ACSCs occurred among the study sample of Medicaid beneficiaries who had claims for outpatient visit(s) for the associated ACSC. Nearly eight-in-ten admissions for acute ACSCs occurred among the study sample Medicaid beneficiaries who had claims for associated ACSC.

Within the subsample of Medicaid beneficiaries who had visit(s) for ACSCs, we observed the same pattern of lower rates of ACSC admissions among CHC-users than the comparison group. The likelihood of an ACSC admission is slightly lower for CHC-users than the comparison group for the subsample of Medicaid beneficiaries with associated ACSC visits than the study sample as a whole.

ER Visits. Within the study sample who had ACSC outpatient visits, ***ER use was lower for CHC-users compared to their counterparts.*** Among those Medicaid beneficiaries who had chronic ACSCs, no statistically significant differences were evident for ER visits. Among Medicaid beneficiaries with acute ACSC conditions, CHC users were less likely, than the comparison group, to use the ER and were less likely to have an ER as their only source for outpatient ACSC care.

Linkages -- ACSC Outpatient and ACSC Inpatient Care. While ER use was lower among CHC-users, there was ***little difference between the two study populations in the number of outpatient visits to non-ER outpatient settings.*** CHC-users have lower admissions and fewer ER visits for ACSCs than the comparison group; with respect to outpatient visits, however, rates are similar. While ACSC admissions and ACSC ER use are lower are among CHC-users, the relationship with ambulatory care visits remains elusive. This study does not permit us to fully explore direct linkages between access to primary care for ACSCs and admissions for those same ACSCs. The data available from the CHC evaluation study did not permit us to create episodes of care, whereby we could examine the timing and sequence of ACSC outpatient and ACSC inpatient events. The timeframe was too short (i.e., 12-months) and the analytic files were not structured to permit examination of such linkages.

Research Opportunities. ***Further ACSC research with claims databases such as SMRF could explore differences in the sequencing and timing of ACSC visits, ER use and ACSC hospitalizations.*** Possible differences in morbidity and severity might also be addressed by incorporating case mix methods and software (e.g., ACGs, DCGs). Additional studies could explore various other factors that might influence ACSC care and utilization patterns, including for example, medical records research structured to address differences in the content of visits, delivery system comparisons to examine differences in the ways CHCs organize and provide care, and, surveys to surface differences in care-seeking behavior by CHC users and a comparison group of Medicaid beneficiaries.

ACSC Experience by Usual Source of Care: Comparing Medicaid Beneficiaries, CHC-Users and Comparison Group

JUNE 1998

MDS Associates

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FINAL REPORT
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ACSC EXPERIENCE **BY USUAL SOURCE OF HEALTH** CARE:
COMPARINGMEDICAID BENEFICIARIES WHO RELY ON **CHCs**
WITH MEDICAID BENEFICIARIES WHO RELY ON
OTHER **PRIMARY CARE PROVIDES**

ACKNOWLEDGEMENTS

This study builds on a substantial body of ACSC research, including the early studies by several of our consultants. Our study team benefited from the ACSC expertise and counsel of John Billings, JD, New York University; Joanne Lukomnik, MD, Columbia University; Marie Diener-West, PhD, Johns Hopkins University; and Ann Zuvekas, **DPA,** George Washington University. We also appreciate the talents of Stanley Moore in preparing the database for analysis, and Deborah Lewis-Idema in directing the CHC evaluation study so that it serves as a foundation for new avenues of ACSC research.

DEDICATION

With much sadness, we mourn the loss of Joanne Lukomnik, her robust spirit and her enduring commitment to advancing knowledge in ways that improve access to quality health care, especially by vulnerable, low-income and minority populations. This study bears her imprint, as she developed the companion outpatient codes for ACSCs and along the way, generously shared insights that inform and widen our vision.

ACSC EXPERIENCE BY USUAL SOURCE OF HEALTH CARE: COMPARING MEDICAID BENEFICIARIES WHO RELY ON CHCs WITH MEDICAID BENEFICIARIES WHO RELY ON OTHER PRIMARY CARE PROVIDES

TABLE OF CONTENTS

Chapter 1: INTRODUCTION

1. BPHC Mission -- Promote Access to Primary Care

Access to timely and appropriate primary care remains a problem within communities of low-income and minority populations. Recent research reports higher prevalence rates for serious, albeit treatable, chronic conditions, such as asthma, diabetes and hypertension, among low-income and minority populations, and the greater likelihood of complicating morbidities and potentially avoidable hospitalizations.'

Within the Health Resources and Services Administration (HRSA), the Bureau of Primary Health Care (BPHC) supports various programs that seek to facilitate access to timely primary care among the Nation's most vulnerable, minority, low-income, uninsured and Medicaid populations. Since the mid-1960s, BPHC has sponsored and supported, through several grant programs, over 600 community health centers (CHCs) to promote timely access to preventive and comprehensive primary care services, and thereby, reduce use of more costly hospital-based care (i.e., inpatient and emergency department services). Over the past two decades, various studies suggest that CHCs and other BPHC programs contribute to improved access (appropriately greater use of services) and improved outcomes (fewer comorbidities or negative health events).[2] Having a regular source of medical care -

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[1] A. Zuvekas, et. al. (1995), Identifying and Selecting Gaps in Morbidity and Mortality Rates for Low-Income and Minority Populations: LIterature Review, Bureau of Primary Health Care; M. Millman, (ed), (1993), Access to Health Care in America, Institute of Medicine, 103-124.

[2] Studies of CHCs include: R.M. Hollister, B.M. Kramer, S.S. Bellin (1974), ***Improving Access to Health Care Among the Poor -- the Neighborhood Health Center Experience,*** Milbank Memorial Fund Ouarterly , 54:47-82; S.S. Bellin, and H.J. Geiger (1972), Neighborhood Health Centers (Lexington, MA, Lexington Books); L.M Okada, and T.T.H. Wan (1978), ***The Impact of a Neighborhood Health Center on Patients ' Behavior and Attitudes Relating to Health Care,*** Medical Care, 10:224-239; M.R. Gold, and R.G. Rosenberg (1974), ***Impact of Community Health Centers and Medicaid on the Use of Health Services,*** Public Health Reports, 95:520-534; L.I. Hochheiser, K. Woodward, and E. Charney (1971), Use ***of Emergency Room Services by the Population of a Neighborhood Health Center,*** Health Services Reports, 89,1; D.I Zwick (1972), ***Effect of Neighborhood Health Center on the Use of Pediatric Emergency Departments in Rochester, New York, The New*** England Journal of Medicine, 285,3; M.S. Morehead, et. al. (1973), ***Some Accomplishments and Findings of Neighborhood Health Centers,*** Milbank Memorial Fund Quarterly, 50:287-420; S. Rosenbaum, and A. Divler (1992), ***Comparison between OEO Neighborhood Health Centers and Other Health Care Providers of Ratings of the Quality of Health Care,*** American Journal gf Public Health, 61:1294-1306. B. Duggar, B. Balicki, A. Zuvekas (1981), A ***Literature Review of the Community and Migrant Health Centers Program,*** Costs and Utilization Patterns for

- either a specific provider or a specific site -- remains one of the most reliable and strongest predictors of access.[3]

A recent BPHC-sponsored literature review recommended further examination of empirical markers or sentinel events for monitoring access and assessing health status.[4] A follow-up BPHC-sponsored consensus conference reviewed specific medical conditions and associated outcome or health status measures; consensus conference participants recommended that BPHC support analysis of ambulatory care sensitive conditions (ACSCs) as potential outcome measures for assessing CHC performance.'

ACSCs are medical conditions such as diabetes, asthma, hypertension or gastroenteritis for which timely, appropriate primary care can prevent or reduce the likelihood of hospitalizations. Hadley and Steinberg, similarly, define ACSCs as medical conditions where:

> . . timely and effective outpatient care can help reduce the risks of hospitalization either by (a) preventing the onset of an illness or condition; (b) controlling an acute episodic illness or condition; or (c) managing a chronic disease or condition.[6]

Comprehensive Health Center Users, Bureau of Community Health Services, HAS/DHHS, Center for Health Policy Studies; Center for Health Policy Studies (1993), Health Services Utilization and Costs to Medicaid of AFDC Recipients in New York and California Served and Not Served by Selected Community Health Centers: Final Report, November, (HRSA Contract #240-90-0071).

[3] For example, recent findings were reported by the Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report, April 17, 1998.

[4] A. Zuvekas, et al. (1995), Identifving and Selecting Gaps in Morbidity and Mortality Rates for Low-Income and Minority Ponulations: Literature Review, Bureau of Primary Health Care.

[5] A. Zuvekas, et al.(1996), Consensus Conference Report on Indicators for Monitoring Access and Gaps in Care Among Low-Income and Minority Ponulations, Bureau of Primary Health Care, Health Resources and Services Administration. Also, see M. Millman, Access to Health Care in America, Institute of Medicine, 103-124.

[6] J. Hadley and E. Steinberg (1993), Access to Care in the Medicaid Program: Construction of Indicators of Access to Care from Diagnoses and Procedures of Hospitalized People and Preliminary Statistical Results. Technical Report, Georgetown University.

A decade's worth of ACSC research suggests that ACSC hospitalizations reveal access problems -- a failure to obtain timely access to appropriate primary care for treatable medical conditions).[7]

2. Building Blocks -- Relevant ACSC Studies

A growing and valuable body of ACSC research builds on John Wennberg's small area analysis of hospitalization rates. Wennberg and colleagues focused attention on the wide variations in hospitalization rates across communities.[8] The small area analysis studies suggest that hospitalization rates reflect differences in practice patterns rather than differences in the underlying health status or disease prevalence across study populations.' John Billings and colleagues extended small area analysis concepts and methodology to identify medical conditions and corresponding sentinel health events that serve as access measures."

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[7] Key ACSC studies include: J. Billings (1989), Consideration of the Use of Small Area Analysis as a Tool to Evaluate Barriers to Access; J. S. Weissman, C. Gatsonis, and A. M. Epstein (1992), ***Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland,*** Journal of the American Medical Association, 268:2388-94; A.B. Bindman, K. Grumbach, D. Osmond, M. Komaromy, K. Vranizan, N. Lurie, J. Billings, and A. Stewart (1995), ***Preventable Hospitalizations and Access to Health Care,*** Journal of the American Medical Association, 274:305-11; J. Billings, G. M. Anderson, and L. S. Newman (1996), ***Recent Findings on Preventable Hospitalizations,*** Health Affairs, 15:239-49; G. Pappas, W.C. Hadden, L.J. Kozak, and G.F. Fisher (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates Between Socioeconomic Groups,*** American Journal of Public Health, 87:811-816.

[8] J. E. Wennberg and A. Gittelsohn (1973), ***Small Area Variations in Health Care Delivery,*** Science, 182: 1102; J. E. Wennberg (1984), ***Dealing With Medical Practice Variations: A Proposal for Action,*** Health Affairs, 3:6.

[9] For example: J. E. Wennberg and A. Gittelsohn (1975), ***Health Care Delivery in Maine: Patterns of Use of Common Surgical Procedures,*** Journal of Maine Medical Association, 66: 123; M. R. Chassin, R. Park, et. al. (1975), ***Variations in the Use of Medical and Surgical Services by the Medicare Population, New*** England Journal of Medicine, 314:285; J. E. Wennberg (1988), ***Population Illness Rates Do Not Explain Population Hospitalization Rates,*** Medical Care, 4:354.

[10] J.Billings (1990), Consideration of the Use of Small Area Analysis as a Tool to Evaluate Barriers to Access, Health Resources and Services Administration, Consensus Conference on Small Area Analysis, DHHS-HRSA-PE 91-1[A] (Washington: U.S. Department of Health and Human Services; J. Arnold, A. Zuvekas, J. Needleman, et. al. (1987), Incorporating Health Status Indicators into the Measurement of Medical Underservice, Lewin/ICF, prepared for Health Resources and Services Administration, Department of Health and Human Services.

The ACSCs constitute a set of medical conditions which can and should be treated within outpatient or ambulatory care settings. ACSCs serve as "markers" for monitoring access and possibly, quality of primary care for several medical conditions." A growing body of research suggests the potential value of ACSCs by:

- documenting variations in ACSC hospitalization rates that underscore access barriers; [12]
- identifying forces that influence ACSC hospitalization rates, for example, ACSC hospitalization rates are significantly higher in communities with low-income, minority and disadvantaged populations;[13]
- exploring the potential utility of ACSCs as performance measures, by comparing health plans or alternative sources of care, for profiling utilization, monitoring access or assessing quality of care. [14]

ACSC studies reveal that significant differences in the ACSC hospitalization rates correlate with socio-economic variables (i.e., income, race\ethnicity, insurance status)." Taking case-severity into account, the relationship between income and preventable

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[11] For example, see: M. Millman (ed), (1993), Access to Health Care in America, Institute of Medicine; J. Billings (1990), Consideration of the Use of Small Area Analysis as a Tool to Evaluate Barriers to Access, Health Resources and Services Administration, Consensus Conference on Small Area Analysis, DHHS-HRSA-PE 91-1[A] (Washington: U.S. Department of Health and Human Services; J. Arnold, A. Zuvekas, J. Needleman, et. al. (1987), Incorporating Health Status Indicators into the Measurement of Medical Underservice, Lewin/ICF, prepared for Health Resources and Services Administration, Department of Health and Human Services.

[12] J. Billings, G. M. Anderson, and L. S. Newman (1996), ***Recent Findings on Preventable Hospitalizations,*** Health Affairs, 15:239-49.

[13] J. Billings, G. M. Anderson, and L. S. Newman (1996), ***Recent Findings on Preventable Hospitalizations,*** Health Affairs, 15:239-49; J. Billings, and N. Teicholz (1990), ***Uninsured Patients in District of Columbia Hospitals,*** Health Affairs, 9:158-65; J. Billings, L. Zeitel, J. Lukomnik, T. S. Carey, A. E. Blank, and L. Newman (1993), ***Impact of Socioeconomic Status on Hospital Use in New York City,*** Health Affairs, 12:162-73; J. S. Weissman, C. Gatsonis, and A. M. Epstein (1992), ***Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland,*** Journal of the American Medical Association, 268:2388-94.

[14] J. Blustein, K. Hanson and S. Shea (1998), ***Preventable Hospitalizations and Socioeconomic Status,*** Health Affairs, 16:3, 177-189.

[15] G. Pappas, W. C. Hadden, L.J. Kozak, and G.F. Fisher (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups,*** American Journal of Public Health, 87:811-816.

hospitalizations among Medicare beneficiaries is somewhat reduced but remains substantial and statistically significant.[16] When focusing principally on insurance status, ACSC hospitalizations are highest among Medicaid and uninsured populations.[17] Overall, health resources, such as physician supply and distribution, appear to have little influence on ACSC admission rates (even less on admissions for non-ACSC conditions); however, when physician supply is one-fourth the national average or less, ACSC admission rates are notably and consistently higher.[18] Another recent ACSC analysis combined survey information (population and physicians) with hospitalization data to examine correlates of ACSC admissions; after controlling for prevalence of ACSCs, health care-seeking behavior and physician practice style, access barriers correlate with preventable hospitalizations.[19]

3. **ACSCs -- A Performance Measure for Comparing Alternative Sources of Care**

This BPHC-commissioned study:

- examines ACSCs as a performance measure for monitoring access and related outcomes, and
- compares CHCs with other providers in their respective communities.

Our research focuses on ACSCs such as asthma, diabetes and hypertension, and ACSC care patterns, such as ACSC hospitalization rates, to assess performance of alternative providers of primary care within a community. We explore ***whether, and the extent to which, individuals who rely on BPHC-supported CHCs as their principal source of primary care are less likely (or more likely) to experience ACSC hospitalizations than individuals who rely on other providers of primary care, including clinics or office-based doctors.*** We also profile and examine outpatient visits for ACSCs.

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[16] J Blustein, K. Hanson and S. Shea (1998), ***Preventable Hospitalizations and Socioeconomic Status,*** Health Affairs, 17:177-189.

[17] J.S Weissman, C. Gatsonis, and A. M. Epstein (1992), ***Rates of Avoidable Hospitalization by Insurance Status in Massachusetts and Maryland,*** Journal of the American Medical Association. 268:2388-94.

[18] H.Krakauer, I. Jacoby, M. Millman, and J. E. Lukomnik (1996), ***Physician Impact on Hospital Admission and on Mortality Rates in the Medicare Population,*** Health Services Research, 31:191-211.

[19] A. B. Bindman, K. Grumbach, D. Osmond, M. Komaromy, K. Vranizan, N. Lurie, J. Billings, and A. Stewart (1995), ***Preventable Hospitalizations and Access to Health tire,*** Journal of the American Medical Association, 274:305-l 1.

4. Parameters and Research Questions

The study populations were drawn from randomly selected study communities; individuals differ principally in terms of their choice of and reliance on specific sources for their primary care -- a CHC or another provider. The definition of a CHC patient was a person who used a CHC for over 50-percent of his/her primary care visits. Their counterparts, CHC non-users, did not have any CHC visits. We restricted our analysis to an insured population -- Medicaid AFDC and AFDC-like groups. On average, one-third of CHC patients are covered by Medicaid. By focusing on Medicaid patients, we control for several forces which can influence access and care seeking behavior, for example, insurance status (directly), income status (indirectly) and demographics affecting utilization rates and care patterns (e.g., younger, female, or prevalence of ACSCs among lower income populations).

Prior ACSC research, for the most part, relied upon hospital discharge data sets. Consequently, ACSC studies examined hospitalizations and admission rates for ACSCs. In contrast, this study examines claims data -- State Medicaid Research Files (SMRF) which are available for twenty-plus states. The SMRF offer data for analysis of:

- inpatient services (i.e., hospitalizations);
- outpatient visits (i.e., professional visits, emergency room);
- clinical information (i.e., principal diagnosis); and
- demographics (e.g., age, gender, welfare status).

Our analysis addresses four research areas and related questions:

1. **Comparative ACSC hospitalization rates.** Are Medicaid recipients who rely on CHCs for primary care more likely or less likely to experience ACSC hospitalizations than a comparison group (i.e., non-users, those relying on other providers for primary care)?

2. **Variations among CHC users.** Are CHC users who rely almost exclusively on CHCs (i.e., over 80% of primary care services at CHC) more likely or less likely to experience ACSC hospitalizations than the CHC "regulars" (i.e., those with between 5 1% to 80% of their primary care from a CHC)?

3. **Implications of ACSC clusters.** If there are observed differences in ACSC hospitalization rates between CHC users and non-users, are these differences concentrated in specific ACSCs or groupings of ACSCs, or are these differences evident across ACSCs?

4. **ACSC ambulatory care visits, a preliiinary examination.** What aspects of ACSC ambulatory care differ across the study groups? What aspects of ACSC ambulatory care warrant further research?

Chapter 2: METHODOLOGY

1. Data Sources

The principal data sources are the State Medicaid Research Files (SMRF) for five states: Kentucky, Maine, Missouri, Pennsylvania, and Washington. Medicaid claims data are for calendar year 1992 (January 1, 1992 through December 31, 1992).[20]

SMRF is a relatively new HCFA-supported research database that provides both person-level and claim-level data for Medicaid beneficiaries in twenty-plus states. For each state, the SMRF database offers five files:

- Person-Summary File,
- Inpatient File,
- Outpatient File,
- Long-Term Care File, and
- Prescription Drug File.

This study draws from the Person-Summary File for demographic and eligibility data and from the Inpatient and Outpatient Files for claims data on hospitalizations and ambulatory visits.

2. Sample Parameters

The study sample for this study encompasses:

- Medicaid beneficiaries who rely on CHCs for primary care (i.e., obtain over 50% of their primary care from a CHC) -- experimental group;

- Medicaid beneficiaries who do not use CHCs, randomly drawn from these CHC communities (i.e., same service areas) -- comparison group.

[20] SMRF data sets were initially obtained for another MDS Associates' study of CHC performance, *The Evaluation of the Effectiveness and Impact of Community Health Centers* (HRSA Contract #240-94-0054); a separate Data Release agreement with HCFA made these SMRF data available for this ACSC study.

Service Areas. Within each of the five study states, a stratified, random sample of CHCs was selected to reflect the nationwide urban/rural mix of CHCs (i.e., random selection of two urban centers and three rural centers per state).[21] The study communities were defined by the CHC's service area. Each CHC provided a list of zip codes that comprise its service area. The study sample encompasses 26 communities and correspondingly, 26 CHCs: five communities in Kentucky, Maine and Washington, four in Missouri and seven in Pennsylvania.

Eligibility. The sample was restricted to Medicaid beneficiaries who:

- resided in the zip codes defining a CHC's service area,
- were under age-65 years,
- met AFDC or AFDC-related criteria, and
- were continuously eligible for a minimum of six months.

The six months of continuous eligibility criterion was not applied to the newborn AFDC eligibles. Individuals with Medicare coverage and those who were institutionalized at any point during the one-year study period were excluded from the sample.

Among the resultant sample of Medicaid beneficiaries, the proportion of primary care visits to a CHC defined CHC-user status. We adopted the classification system that was developed for the CHC evaluation study.[22] Briefly, the study sample was drawn from an insured population -- everyone in sample is covered by Medicaid. Both CHC-users and the comparison group had at least one visit for primary care services (see sections on *Primary Cure Services* and *Visit Definition,* below). Whether these visits were to a CHC or another provider was used to classify Medicaid beneficiaries as CHC-users or a comparison group of "nonusers" (see section on User *Status Rules,* below).

Primary Care Services Defined as CHC-Type Services. The originating CHC evaluation study defined primary care services in terms of CHC-type services: medical

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[21] Within the originating CHC evaluation database, sample selection variations occurred after selection of SMRF states and the mix of the randomly selected CHCs in the first four states (Kentucky, Maine, Missouri and Washington). All of Maine's CHCs are rural; one Missouri CHC community had a substantial amount of prepaid Medicaid managed care and the presence of managed care created a very small comparison group and the remaining fee-for-service population were unusually high consumers of behavioral services (i.e., mental health and substance abuse treatment services). In Pennsylvania, seven communities\seven CHCs were selected to compensate for the loss of one community in Missouri and to balance the five Maine rural communities with several additional Pennsylvania urban communities.

[22] For a more detailed description of the CHC user classification system and related definitions, see Evaluation of the Effectiveness and Impact of Community Health Centers - Interim Report, MDS Associates, Laguna Research Associates and Lovelace Institute, July 1997.

services available at a typical CHC. In consultation with BPHC medical and clinical professionals familiar with health centers, each procedure code (primarily CPT-4 codes) was designated as either CHC-type or non-CHC services.[23]

Visit Definition. A visit is defined to encompass one or more CHC-type services that are received during a single day. The exceptions are specific services which merit or would generally occur as a separate visit (e.g., E&M office visit and E&M consultation would be logged as two visits). As part of the CHC evaluation study, each procedure code was reviewed to determine single visit designations. Each procedure, code-by-code, was reviewed to determine whether a procedure should always be considered a separate visit or could be combined with other professional services within a single visit. This exhaustive review and resulting designations were necessary to develop a consistent method for counting services that would appropriately accommodate the all-inclusive billing practices of some CHCs whereby a patient may see a mid-level and a physician on the same day but a CHC bills only one visit.[24]

User Status. CHC-user status was defined by whether and the extent to which an individual received CHC-type services from a CHC or another provider. Medicaid beneficiaries who received more than 50-percent of their CHC-type services from a CHC were defined as CHC-users. Their counterparts (non-CHC users are the comparison group) received at least one CHC-type visit but did not receive any care from a CHC. These determinations were made by reviewing each claim for CHC-type services to determine whether or not the CHC-type service was delivered by a CHC or another provider.*' Excluded from the sample and study are Medicaid beneficiaries:

- who received 50 percent or less of their CHC-type services from a CHC;
- who did not have at least one CHC-type visit;
- who received services from more than one CHC; or
- who received services from CHCs outside their service area.

A random sample was drawn from the residual Medicaid eligibles pool of non-CHC users in the zip code defined service area. Within each of the study communities, sampling rules

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[23] Each procedure code from the Physician's Current Procedural Terminology (1992) and other sources for identifying Medicaid procedure codes (e.g., sources for state-specific "local" codes) was designated as either CHC-type or non-CHC-type services.

[24] For a more detailed description of the methodology and related technical considerations, see Evaluation of the Effectiveness and Impact of Community Health Centers - Interim Report, MDS Associates, Laguna Research Associates, and The Lovelace Respiratory Research Institute, July 12, 1997.

[25] Inpatient physician visits were excluded from these determinations because of the variability in CHC physicians having inpatient admitting privileges and thus billing for inpatient visits.

yielded a randomly selected comparison group of non-users that is approximately twice the size of the CHC-user group.

CHC-users are also classified with regard to the extent of their use of CHCs for CHC-type services: ***near-exclusive users*** and ***regular users:***

- near-exclusives receive more than 80 percent of CHC-type services from CHCs;
- regulars receive between 51-80 percent of their CHC-type services from CHCs.

3. **Ambulatory Care Sensitive Conditions (ACSCs)**

Over the past decade, several major ACSC studies set forth several lists of medical conditions that qualify for ACSC-status: ***medical conditions that can, and should, be treated in ambulatory care settings, and*** *medical conditions* ***for which timely and appropriate primary care can prevent hospitalizations.*** Across major ACSC studies, there is a fair degree of overlap in the medical conditions qualifying as ACSCs and the accompanying rules (e.g., ICD-9 codes). While there is considerable consistency across studies, there are some differences:

- specific number of medical conditions qualifying as ACSCs;
- accompanying ICD-9 codes for each medical condition; and
- imposition of qualifying restrictions, for example, excluding ACSC events when specified surgical procedures occur during the ACSC hospitalization.

For this study, our ACSCs are drawn primarily from the Institute of Medicine list of ACS conditions, as presented in Access to Health Care in America (1993). Specified ICD-9 codes provide the necessary diagnostic information to identify ACSC events -- hospitalizations or ambulatory care visits. To accommodate limitations of the SMRF database (i.e., no surgical procedure codes), we restricted our qualifying specifications to ICD-9 codes, and did not take into account surgical procedures.[26]

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[26] We note that some qualifying restrictions proved to be unnecessary. For example, the Institute of Medicine guidelines for severe ENT infections call for excluding admissions for otitis media cases with myringotomy or insertion of tube (CPT-20.01). The recent literature indicates that most (over 80%) otitis media myringotomy/tube inserts are performed in ambulatory surgery settings. For example, see: Centers for Disease Control and Prevention, Advance Data. Vital Health Statistics, #283, 1/14/97; DiFranza, J.R. and Lew, R.R. (1996), ***Morbidity*** ***and Mortality in Children Associated with the Use of Tobacco Products by Other People,*** Pediatrics 97(4):560-568.

Inpatient - Hospital - Dx Codes. For inpatient events, we relied on the ICD-9 codes as reported in Access to Health Care in America and several published articles." There is no single consensus list with codes for specifying ACSCs. If we had adopted the more restrictive set of coding rules from the Institute of Medicine and Billings studies, we would have dropped three ACSCs from our study -- congestive heart failure, angina, and cellulitis -- because we are unable to identify surgical procedures during a specific inpatient stay. The Weissman and Pappas studies did not set forth surgical procedures as disqualifying events for congestive heart failure or cellulitis; angina was not examined in the Weissman or Pappas studies. Pappas and colleagues observed, after comparing results, that application of alternative ACSC coding rules such as Billings resulted in "*similar* ***relationships of potentially avoidable hospitalizations with area income and race and a similar proportion of hospitalizations that were excess.***"[28] Taking these findings into account, we opted for the broader set of ACSCs and the less restrictive codes. **Exhibit 1** presents the adapted set of inpatient codes for our study.

Outpatient - Ambulatory Care - Dx Codes. This study extends the scope of prior ACSC studies to examine ambulatory ACSC visits (i.e., either professional visits or emergency room visits). Prior studies, limited by their use of hospital discharge data sets, focused almost exclusively on ACSC hospitalizations. To extend our analysis to take into account ambulatory care experience, our consulting physician developed a list of ICD-9 codes for outpatient ACSC visits. **Exhibit 1** presents the ICD-9 codes for outpatient ACSC visits (applying to both professional or emergency room visits).

The outpatient analysis covers fewer ACSCs. Based on our consultant's recommendations, several ACSCs were excluded from the outpatient visit analysis:

- Congenital syphilis because we were unable to link mother and baby records for appropriate set of potential conditions;

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[27] M. Millman (ed), Access to Health Care in America, Institute of Medicine, 1993; J. Billings, et al., (1993), ***Impact of Socioeconomic Status on Hospital Use in New York City***, Health Affairs, 12: 162-173; Joel Weissman, et al. (1992), ***Rates of Avoidable Hospitalizations by Insurance Status in Massachusetts and Maryland,*** Journal of the American Medical Association, 268:388-94; and Gregory Pappas, et al. (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups,*** American Journal of Public Health, 87:811-816.

[28] G. Pappas, W.C. Hadden, L.J. Kozak and G.F. Fisher (1997), ***Potentially Avoidable Hospitalizations: Inequalities in Rates between US Socioeconomic Groups,*** American Journal of Public Health 87:811-816.

- Immunization-related preventable conditions, iron deficiency anemia, nutritional deficiencies and failure to thrive because related preventive and counseling services are often part of well-child care or routine physicals, and thus there were no unique or limited set of ICD-9 codes for designating visits that could be associated with these ACSCs.

- Hypoglycemia because, again, there are too many possible outpatient ICD-9 codes that could imply pertinent services.

Exhibit 1: Ambulatory Care Sensitive Conditions:
Diagnosis Codes for Identification of Inpatient and Outpatient Events

	INPATIENT ACSCs and ADMISSION CODES	**OUTPATIENT ACSCs and VISIT CODES**
	■ **[codes] = Institute of Medicine (1993);** ■ **<codes> = Weissman (1992)/Pappas (1997).**	**NA=Not Applicable/No Outpatient Analysis**
01.	**Congenital syphilis [090]** **Secondary** ***diagnosis for newborns.***	**NA**
02.	**Immunization-related and preventable [033, 037, 045, 320.0, 390, 391]** ***Hemophilus meningitis [320.2] age 1-5 only*** ***< 032.055.072 >***	**NA**
03.	Grand **mal/other** epileptic convulsions **[345]** plus: **convulsions "A" [780.3]** Age *0-5,* **convulsions "B" [780.3]** Age *> 5*	**345, 780.3** and additional codes for outpatient visits: 780.02, transient alteration of awareness; 780.1, hallucinations not associated with mental disorders, organic brain syndrome, visual hallucinations; 780.2, syncope and collapse; 781.0, abnormal involuntary movements; **V80.0,** special screening neurological conditions.
04.	Severe **ENT** infections **[382,** 462, 463, **465, 472.1]**	382,462, 463, 465,472.1 and additional codes for outpatient visits: **V80.3,** special screening for ear disease; 034.0, streptococcal sore throat; 381, nonsupportive otitis media; 384, **other** disorders of tympanic membrane; 388.6, otorrhea; 388.7, otalgia; 383, mastoiditis and related conditions; 473, chronic sinusitis; 474, chronic disease of the tonsils and adenoids; 475, peritonsillar abscess; 476, chronic laryngitis.

Exhibit 1: Ambulatory Care Sensitive Conditions:
Diagnosis Codes for Identification of Inpatient and Outpatient Events

INPATIENT ACSCs and ADMISSION CODES	OUTPATIENT ACSCs and VISIT CODES
■ [codes] = Institute of Medicine (1993); ■ <codes> = Weissman (1992)/Pappas (1997).	NA = Not Applicable/No Outpatient Analysis
05. Pulmonary tuberculosis [011] **Other tuberculosis [012-018]**	011, 012-018 plus additional codes for outpatient visits: 010, primary tuberculosis infection; 795.3, nonspecific reactions to TB skin test without active TB, positive culture findings; 795.5, nonspecific reaction to TB skin test without active TB; V74.1 screening for pulmonary TB; V71.2, observation for suspected TB; V01.1, contact with active TB.
06. Chronic obstructive pulmonary disease [491, 492, 494, 496] *Acute bronchitis (466.011 only with secondary diagnosis of 491, 492, 494, 496.*	491, 492, 494, 496 plus additional codes for outpatient Visits: V8 1.3, special screening for chronic bronchitis and emphysema.
07. **Bacterial pneumonia [481, 482.2, 482.3, 482.9, 483, 485, 486]** *Excludes cases with secondary diagnosis of sickle cell (282.6 and patients < 2 months.* <482>	481, 482, 482.2, 482.3, 482.9, 483, 485, 486
08. **Asthma [493]**	493
09. **Congestive heart failure [428, 402.01, 402.11, 402.91, 518.4]**	*428,* 402.01, 402.11, 402.91, 518.4
10. **Hypertension [401.0, 401.9, 402.0, 402.1, 402.9]** <403.0 404.0, 405.0, 437.2>	401.0, 401.9, 402.0, 402.1, 402.9, 403.0, 404.0, 405.0, 437.2
11. **Cellulitis [681, 682, 683, 686]**	681, 682, 683, 686
12. **Diabetes "A" with ketoacidosis or coma [250.1, 250.2, 250.3]** **Diabetes "B" [250.8, 250.9]** **Diabetes "C" [250.0]**	Diabetes "A" 250.1, 250.2, 250.3; diabetes "B" 250.8, 250.9; diabetes "C" 250.0; plus additional codes for outpatient visits: 250 all codes, for example, 250.5, diabetes with ophthalmic manifestations; 790.2, abnormal glucose tolerance test excludes complications of pregnancy, childbirth or puerperium.
13. **Hypoglycemia [251.2]** <251.0>	NA

Exhibit 1: Ambulatory Care Sensitive Conditions:
Diagnosis Codes for Identification of Inpatient and Outpatient Events

	INPATIENT **ACSCs** and ADMISSION CODES	OUTPATIENT ACSCs and VISIT CODES
	▪ **[codes] = Institute of Medicine (1993);** ▪ **<codes>= Weissman (1992)/Pappas (1997).**	**NA=Not Applicable/No Outpatient Analysis**
14.	**Gastroenteritis [558.9]** **Dehydration/volume depletion [276.5]** ***Examine principal and secondary Dx separately for dehydration.*** **<276.8hypokalemia>**	**558.9, 276.5, 276.8; plus additional codes for outpatient visits: 003.0 (salmonella gastroenteritis), 003.9, 004.0, 004.9, 005.0, 005.2, 005.3, 005.4, 005.8, 005.9** (food poisoning unspecified), 006.0 **(amoebic dysentery** with mention of abscess), **006.1, 006.9, 007,** 008, 009, **535.0, 535.5,** unspecified gastritis and **gastoduodinitis;** 564.8, other specified functional disorders of the intestine; 564.9, unspecified functional disorders of intestine; 306.4, psychogenic gastrointestinal.
15.	**Kidney/urinary infection [590, 599.0, 599.9]**	590, **599.0, 599.9;** plus additional codes for outpatient visits: 595.0, acute cystitis; 595.3, trigonitis; 595.4, cystitis with other diseases.
16.	**Iron deficiency anemia [280.1, 280.8, 280.9]** ***Age O-5 only; examine principal and secondary diagnoses separately.***	**280.1, 280.8, 280.9**
17.	***Nutritional* deficiencies [260, 261, 262, 268.0, 268.1]** ***Examine principal and secondary diagnoses separately.***	***260, 261, 262,* 268.0, 268.1**
18.	**Failure to thrive [783.4]** ***Age < 1 only.***	783.4
19.	**Pelvic inflammatory disease [614]** ***Females only.***	614 plus additional codes for outpatient visits: V73.88, other specified chlamydia disease; V73.98, unspecified chlamydia disease; V74.5, screening exam for venereal disease; 090-099, syphilis and other venereal diseases.
20.	**<Ruptured appendix 540.0, 540.1>**	**540.0, 540.1** plus additional codes for outpatient visits: 540.9, acute appendicitis without mention of peritonitis; 541, appendicitis, unqualified; 542, other appendicitis.

ACSC Clusters. **We also** examine ACSCs by two types of groupings: conditions (chronic, acute) and cohorts (children, adult). ACSC hospitalizations are comparatively rare events, and condition-by-condition analyses are virtually impossible without very large samples. Clustering ACSCs permits us to achieve greater statistical power. The designation of clusters also attempts to take into account important clinical dimensions of ACSCs and related care-seeking behaviors. As noted earlier, effective outpatient care can control an acute illness or condition and thus reduce risk of hospitalization; similarly, effective outpatient care should attempt to manage a chronic disease or condition, and thereby reduce likelihood of hospitalization. At this stage, our cluster-based analysis is formative and exploratory.

The clusters are defined as follows:

- Chronic conditions -- are those for which individuals are likely to require "medical management" by health professionals as evidenced by ambulatory care for treatment and medical services. Chronic conditions include, for example, diabetes and asthma.

- Acute conditions -- are those for which individuals are likely to seek care when symptoms appear; with timely and appropriate treatment, the presenting conditions generally ameliorate. Acute conditions, for example, gastroenteritis or nutritional deficiencies can generally be treated effectively by primary care providers and within outpatient settings.

Within the chronic-acute clusters there are conditions that are not necessarily exclusively chronic or acute. For example, "acute" conditions such as tuberculosis or ENT infections may require periodic treatment over extended periods of time; failure to obtain timely and effective treatment for some "acute conditions" such ENT infections or PID (pelvic inflammatory disease) can lead to chronic problems. However, for analysis, each of these conditions were assigned to only cluster -- chronic or acute.

The children-adult dimension presents another way to cluster conditions, and an opportunity to examine whether age influences ACSC treatment patterns. For example, exploring whether ACSC hospitalizations are comparatively more prevalent among children than adults. Three conditions -- congenital syphilis, immunization-related preventable conditions, and failure to thrive -- affect only children.

Exhibit 2 presents our ACSC classification scheme. **Exhibit 2** indicates the respective ACSCs by type of analysis, inpatient, outpatient or both. **Exhibit 2 also** denotes each of the ACSCs as a chronic ACSC or an acute ACSC, and by age (adults and/or children).

Exhibit 2: ACSC Analysis -- Cluster Classifications

ACSCs	Inpatient & Outpatient Analysis		Chronic & Acute Clusters		Age-cohort Clusters	
	Inpatient	Inpatient & Outpatient	Chronic	Acute	Children	Adult
1. Congenital syphilis	X			X	X	
2. Immunizations	X			X	X	
3. Grand mal/epileptic convulsions		X	X		X	X
4. ENT Infections		X		X	X	X
5. Tuberculosis		X		X	X	X
6. COPD		X	X		X	X
7. Bacterial Pneumonia		X		X	X	X
8. Asthma		X	X		X	X
9. Congestive Heart Failure		X	X		X	X
10. Hypertension		X	X		X	X
11. Cellulitis		X	X		X	X
12. Diabetes (A,B,C)		X	X		X	X
13. Hypoglycemia	X			X	X	X
14. Gastroenteritis/Dehydration		X		X	X	X
15. Kidney/Urinary Infection		X		X	X	X
16. Iron Deficiency Anemia	X			X	X	X
17. Nutritional Deficiencies	X			X	X	X
18. Failure to Thrive	X			X	X	
19. Pelvic Inflammatory Disease		X		X	X	X
20. Ruptured Appendii		X		X	X	X

NOTE: In some instances, making a chronic\acute distinction can be difficult and resultant mutually exclusive classifications can be somewhat arbitrary. For example, generally "chronic" conditions such as asthma can surface as an acute episode; alternatively, neglected "acute" conditions can become recurrent, chronic conditions. Nevertheless, it was necessary to assign each condition to either the chronic or acute cluster, as shown in Exhibit 2.

4. Demographics and Analytic Descriptors

The SMRF Person-Summary File and BPHC-CHC information offers several key demographic "control" variables for multivariate analysis of ACSC care patterns. Several of the demographics, such as age, were critical for establishing the children-adult clusters. The urban/rural distinction was important for taking into account, albeit only in a limited way, resource differences. Medicaid eligibility status and time (months of eligibility during the study frame) are critical variables for analysis of service utilization and care patterns.

The multivariate analysis incorporates several demographic characteristics, principally as control variables; variables and pertinent attributes are as follows:

- Age. Age was coded into six categories: less than 1, l-4, 5-14, 15-24, **25-44,** and **45-64.** Categorical variables were used to allow for nonlinearity in the relationship between age and ACSC admissions or visits.

- **Race/Ethnicity.** Race was coded white/nonwhite. All Hispanics were coded as nonwhite. Race/ethnicity was not available for the state of Maine, and based on the overall population of Maine, all Maine records were coded "white". [Analysis with alternative coding of the Maine data and other race/ethnicity classifications did not affect the results (i.e., ACSC hospitalizations by CHC-user status).]

- **Cash Assistance Status.** Sample was coded as receiving or not receiving cash assistance, as denoted in the Person-Summary File, during the Medicaid eligibility period.

- **Urban/rural.** Each record -- Medicaid beneficiary -- was coded as either urban or rural, based on the service area designation of the study CHCs. [The BPHC designates each CHC as either urban or rural for various reports and grant eligibility determinations.]

- **State.** Categorical variables denote each of the five states in the study frame.

- **Eligibility, Months-in-Sample.** As Medicaid beneficiaries enter and exit Medicaid as their financial status changes, *some* proportion of the sample is "eligible" for services (care) less than the twelve months of calendar year-1992. The time-in-sample is a potentially significant variable in examining utilization patterns. Months-in-sample was coded as four categorical variables: less than 6 months, 6-8 months, 9-11 months, and full year. [Alternative coding, including separate variables for each month of eligibility, did not materially change the results.]

It is important to observe, that 69-percent of the study sample had full-year eligibility or 12 months-in-sample. We conducted analyses for both the full-year subsample and the study sample, with study sample records coded for time-in-sample. Results for full-year subsample and study sample were similar; only when results were significantly different, the analysis discussion highlights such differences.

5. Bivariate and Multivariate Analysis

The SMRF database permits examination of outpatient Medicaid claims to identify a subset of Medicaid patients who have been treated for an ACSC, and, correspondingly, to examine their ACSC hospitalization rates and profile their ACSC outpatient visits. This study permits us to identify all of the Medicaid beneficiaries who received services for ACSCs -- either outpatient or inpatient care (or both). The analysis encompasses several steps:

- identify the at-risk ACSC population, creating the study sample of unduplicated cases (individuals) who receive care, outpatient or inpatient, for one or more than one of the ACSCs.
- examine and compare ACSC hospitalization rates, by CHC-user status.
- examine and compare ACSC outpatient visits (ER and professional visits), by CHC-user status.

Exhibits 3, 4 and 5 (see Chapter 3) profile the study sample, by CHC-user status and overall (entire study sample). Profile characteristics include:

- population demographics -- age, gender, race/ethnicity and welfare cash assistance status;
- geographic variables -- state and urban/rural designations;
- eligibility -- sample population by months-in-sample;
- ACSC events -- summary counts of ACSC events, by ACSC admissions and ACSC outpatient visits (emergency room visits and professional (physician office or clinic) visits);
- ACSC population -- summary ACSC hospitalizations, by analysis groups.

Chapter 3: ACSC EVENTS AND UTILIZATION PROFILE, BY MAJOR SOURCE OF PRIMARY CARE

1. Major Findings - Overview

Our principal finding is that **Medicaid CHC-users experience significantly lower ACSC hospitalization rates than their counterparts, Medicaid beneficiaries who receive medical services from other providers of primary care.** To the extent that evidence of lower ACSC hospitalization rates signify access to primary care and access to timely and appropriate treatment for ACSCs, CHCs offer effective care and CHC-users benefit. Lower hospitalization rates also imply financial savings; lower hospitalization rates and timely and appropriate primary care underscore clinical value. This study indicates that relying on CHCs for primary care can make a difference in ACSC care patterns and ACSC care costs. This study also suggests that ACSC hospitalizations can serve as potential performance measures for monitoring access and comparing alternative sources of primary care.

ACSC Admissions. ***Medicaid beneficiaries who were CHC users had lower ACSC admission rates -- on average, 22 percent lower than Medicaid beneficiaries who relied on other sources for primary care.*** This relationship remains strong and significant when controlling for population characteristics such as age, gender, race, ethnicity and residence. Medicaid beneficiaries who were CHC-users were also half as likely to experience a second or subsequent admission for an ACSC than nonusers. The likelihood of an ACSC admission varied somewhat by study state and age cohort. However, with regard to gender, ethnicity, cash assistance status or rural residence, there were no statistically significant differences in ACSC admission rates.

CHC-user status was statistically significant for admission rates among adults with either chronic ACSCs or acute ACSCs, and for children with chronic ACSCs. Children had comparable rates of admission for acute ACSCs regardless of their principal source of care -- CHCs or other providers of care.

ACSC Outpatient Visits. ***Medicaid beneficiaries who are CHC-users were 16 percent more likely than other Medicaid beneficiaries to experience outpatient visits for ACSC-associated conditions.*** Within the study population, this relationship holds for outpatient visits when examining ACSCs by condition clusters, chronic and acute and age-clusters, children and adults.

Associated ACSC Visits. While a relatively low percent of any population, even low-income, is likely to experience an ACSC admission, the ***overwhelming majority (85-percent) of those who experience an ACSC admission also have outpatients visits for that***

same ACSC, either before their ACSC admission or after. Our analysis did not permit sequencing ACSC events to create episodes and therefore examine whether associated ACSC visits occurred before and/or after an ACSC hospitalization.

Our preliminary findings suggest that ***outpatient ACSC visits appear to be reasonably good markers for identifying the potential ACSC at-risk population.***

- Ninety-five percent of the admissions for chronic ACSCs occurred among the study sample of Medicaid beneficiaries who had claims for outpatient visit(s) for the associated ACSC.

- Nearly eight-in-ten admissions for acute ACSCs occurred among the study sample Medicaid beneficiaries who had claims for associated ACSC.

Within the subsample of Medicaid beneficiaries who had visit(s) for ACSCs, we observed the same pattern of significantly lower rates of ACSC admissions among CHC-users than the comparison group.[29] The likelihood of an ACSC admission is slightly lower for CHC-users than the comparison group for the subsample of Medicaid beneficiaries with associated ACSC visits than the study sample as a whole.

ER **Visits.** Within the study sample who had ACSC outpatient visits, *ER use was* ***lower for CHC-users compared to their counterparts -- a comparison group who relied on other sources of care.*** Among the study sample of Medicaid beneficiaries who had chronic ACSCs, no statistically significant differences were evident for ER visits. Among study Medicaid beneficiaries who had acute ACSC conditions, CHC users were less likely, than the comparison group, to use the ER and were less likely to have an ER as their only source for outpatient ACSC care.

Linkages - ACSC Outpatient and ACSC Inpatient Care. While ER use was lower among CHC-users, there was ***little difference between the two study populations in the number of visits to non-ER outpatient settings.*** CHC-users evidence lower admissions and fewer ER visits for ACSCs than the comparison group; with respect to outpatient visits, however, rates are quite similar. The differences in ACSC hospitalization rates or emergency room use between CHC users and the comparison group are not matched by the hypothesized difference in outpatient visits during the study period. Consequently, our results do not support the hypothesized relationship: better access, timely and appropriate ambulatory care, as measured by more ACSC outpatient visits, would translate into lower admissions and lower ER use for these ACS conditions. While ACSC admissions and ACSC ER use are lower are among CHC-users, any relationship with ambulatory care, however, remains elusive.

[29] Analysis examines associated or linked ACSC events, with visits and admissions for the same ACSC.

It is important to observe, however, that ***this study does not offer a very good test for exploring direct linkages between access to primary care for ACSCs and admissions for those same ACSCs. The data available from the CHC evaluation study did not permit us to create episodes of care, whereby we could examine the timing and sequence of ACSC outpatient and ACSC inpatient events. The timeframe is too short (i.e., 12-months) and the analytic files were not structured to facilitate such linkages.***

Research Opportunities. ***Further ACSC research with claims databases such as SMRF could explore differences in the sequencing and timing of ACSC visits, ER use and ACSC hospitalizations.*** Possible differences in morbidity and severity might also be addressed by incorporating case mix methods and software (e.g., ACGs, DCGs). Additional avenues for studies could explore various other factors that might influence ACSC care and utilization patterns, including for example, medical records research structured to address differences in the content of visits, delivery system comparisons to examine differences in the ways CHCs organize and provide care, and, surveys to surface differences in care seeking behavior by CHC users and nonusers.

2. Guide to Analytic Sections

The remainder of report presents study results in greater detail, with separate sections focusing on:

- Descriptive statistics, study population
- ACSC events, admissions and ambulatory care visits
- ACSC hospitalizations
- Ambulatory ACSC visits - professional (office/clinic) and ER visits

Appendix A presents a companion analysis of the full-year sample -- a more restricted sample of those Medicaid beneficiaries who were eligible for the entire 12-month time frame. In the discussion which follows, this 12-month group is the reference group in the multivariate (logit) analysis.

3. Descriptive Statistics, Study Population

The study sample encompasses 48,739 Medicaid beneficiaries across five states. ***Within the study sample: 16,145 were classified as CHC-users, having a CHC as their usual source of care*** (i.e., over 50 percent of primary care visits to a CHC); and 32,594 ***were classified as a comparison group, with at least one professional visit and no CHC visit.*** **Exhibit 3** presents summary characteristics of the study populations.

Exhibit 3: Demographics & Characteristics -- Study Population, by CHC-User Status

	CHC-Users		Comparison Group		Study Population	
	Number	Percent	Number	Percent	Number	Percent
TOTAL	16,145	100%	32,594	100%	48,739	100%
AGE						
Less than l-year	2936	18.2	4612	14.1	7548	15.5
Ages l-4	3827	23.7	7126	21.9	10954	22.5
Ages 5-14	4084	25.3	9123	28.0	13207	27.1
Ages 15-24	2429	15.0	5561	17.1	7990	16.4
Ages 25-44	2608	16.2	5658	17.4	8266	17.0
Ages 45-64	261	1.6	513	1.6	774	1.6
GENDER						
Male	6168	38.2	12695	38.9	18863	38.7
Female	9977	61.8	19899	61.1	29876	61.3
RACE/ETHNICITY						
White	9342	57.9	21059	64.6	30401	62.3
Black	2855	17.7	7088	21.7	9943	20.4
Am. Indian/Alaskan Natives	67	0.4	246	0.8	313	0.6
Asian/Pacific Islander	230	1.4	418	1.3	648	1.3
Hispanic	3453	21.4	3136	9 . 6	6589	13.5
Unknown	198	1.1	647	2.0	845	2.0

MD&As a

Exhibit 3: Demographics & Characteristics -- Study Population, by CHC-User Status

	CHC-Users		Comparison Group		Study Population	
	Number	Percent	Number	Percent	Number	Percent
TOTAL	16,145	100%	32,594	100%	48,739	100%
CASH ASSISTANCE						
Non-Cash	5346	33.1	9922	30.4	15268	31.3
Cash	10799	66.9	22672	69.6	33471	68.7
RESIDENCE						
Urban	7640	47.3	15155	46.5	22795	46.8
Rural	8505	52.7	17439	53.5	25944	53.2
ELIGIBILITY & TIME IN SAMPLE						
Less than C-months	599	3.7	847	2.6	1446	3.0
6-8 months	2267	14.0	4151	12.7	6418	13.2
9-11 months	2488	15.4	4847	14.9	7335	15.0
12-months	10791	66.8	22749	69.8	33540	68.8
STATE						
Kentucky	2598	16.1	5232	16.1	7830	16.1
Maine	2482	15.4	4741	14.5	7223	14.8
Missouri	2617	16.2	6251	19.2	8868	18.2
Pennsylvania	4441	27.5	8744	26.8	13185	27.1
Washington	4007	24.8	7626	23.4	11633	23.9

Note: The 1997 national UDS data indicate racial/ethnic distribution across CHCs as follows: white, 35%, black, 26%; Hispanic, 31%; Asian, 3%; American Indian/Alaskan Native, 1%; and unknown, 4%. This study sample over-represents whites (62% compared with 35% for the overall CHC-user population).

Over two-thirds of the sample (69-percent, N= 33,540) were full-year eligibles (i.e., enrolled in Medicaid for 12-months of calendar year 1992). Within this full-year subsample, 10,791 relied on a CHC as their usual source of care, 22,749 relied on other providers for care. Within the study sample, 15-percent were eligible 9-11 months, 13-percent were eligible for 6-8 months. While most Medicaid beneficiaries with less than 6-months of eligibility were excluded from the study sample, newborns with less than 6-months of eligibility) were retained in the sample: less than 6-months of eligibility. The less than 6-months group accounts for 3-percent of the sample, including 1,445 newborns.

A CHC-user status comparison indicates:

- The CHC-users are slightly less likely to have been in the sample for 12-months (66.8 percent compared to 69.8 percent for nonusers ($p < 0.001$).
- CHC-users are younger than nonusers ($p < O.OOl$), with 41.9 percent of users under age-five, compared with 36.0 percent of the comparison group).
- CHC-users are more likely to be non-white (57.5 percent compared with 49.9 percent for the comparison group ($p < 0.001$), and less likely to receive cash assistance (66.9 percent compared with 69.6 percent of the comparison group, $p < 0.001$).
- There are no statistically significant differences with regard to gender ***or*** urban/rural residence: approximately 61-percent female, and 47-percent urban.[30]

4. **ACSC Events, Admissions and Visits**

Relatively Rare Events. ***ACSC admissions are comparatively infrequent events.*** Among the study population, there were 1,003 ACSC admissions over the 12-months. Less than two-percent of the study population experienced an ACSC admission (857 individuals or 1.76 percent of the study sample). ***Nearly one-in-eight of those who had an ACSC admission, however, experienced more than one ACSC admission*** *(105 Medicaid beneficiaries).* ***Those*** with multiple ACSC admissions within a relatively short period of time (12-months) merit further study.

[30] Compared with Kentucky, reference group, CHC-users are less likely to come from Missouri (16.2 percent compared with 19.2 percent, $p < 0.001$) and slightly more likely to come from Maine (15.4 percent compared with 14.6 percent, $p < 0.05$) or Washington (24.8 percent compared with 23.4 percent, $p < 0.001$).

Not Inconsequential Events. For the study population of AFDC Medicaid eligibles, *ACSC* ***admissions account for one-in-four of the non-maternity, non-behavioral hospital admissions.***[31] While ACSC admissions are comparatively rare (as they should be), they are nonetheless a sizeable proportion of Medicaid's non-maternity, medical admissions.

Exhibit 4 presents summary counts of ACSC admissions, by CHC-user status and other analysis subgroupings, and **Exhibit 5** presents summary counts of the Medicaid beneficiaries who experienced ACSC events, by ACSC clusters and specific ACS conditions. In summary, there were:

- 424 admissions for chronic ACSCs and 579 for acute ACSCs;
- **332** Medicaid beneficiaries (0.7 percent) had at least one admission for a chronic ACSC, and 544 Medicaid beneficiaries (1.1 percent) had been hospitalized for an acute ACSC.

Differences Across ACSC Admissions. Among these ACSC admissions:

- hospitalizations were most frequent for asthma (254 admissions), gastroenteritis/dehydration/hypokalemia (202 admissions), bacterial pneumonia (192 admissions), followed by convulsions (54 admissions), ENT infections (50 admissions), cellulitis (48 admissions), and diabetes (42 admissions);
- hospitalizations were far less frequent -- fewer than five admissions -- for immunization-related conditions, tuberculosis, hypoglycemia and iron deficiency anemia; and
- multiple admissions were somewhat more evident among the chronic ACSCs;

Children were somewhat more likely than adults to experience ACSC hospitalizations: 606 under the age-15 (1.9 percent) compared with 251 adults (1.5 percent). Rural and urban residents appear to be equally likely to experience ACSC admission (1.76 percent).

[31] Nationwide, nearly one-in-four births covered by Medicaid; Medicaid maternity admission rates, especially for AFDC Medicaid eligibles, are quite high compared with other groups, insured and uninsured populations.

Exhibit 4: ACSC Events Profile, By CHC-User Status

ACSC CATEGORIES	ACSC Hospitalizations (# Admissions)			ACSC Outpatient Visits (#Professional Visits & ER Visits)		
	Comparison Group	CHC-Users	Study Population	Comparison Group	CHC-Users	Study Population
TOTAL ACSCs	730	273	1003	55,586	28,727	84,313
Chronic ACSC	326	98	424	9,457	4,703	14,160
Acute ACSC	404	175	579	46,129	24,024	70,153
Pediatric ACSC	486	216	702	41,929	22,351	64,280
Adult ACSC	244	57	301	13,657	6,376	20,033
ACSC EVENTS BY RESIDENCE						
Rural	382	146	528	26,105	12,490	38,595
Urban	384	127	475	29,481	16,237	45,718
BY ACSC EVENTS BY DX CATEGORY						
1.Congenital Syphilis	6	1	7	*	*	*
2.Immunization-Related	1	0	1	*	*	*
3.Epileptic Convulsions	40	14	54	1,239	469	1,708
4.Severe ENT Infections	33	17	50	37,101	19,268	56,369
5.Pulmonary & Other TB	1	1	2	253	75	328
6.Chronic OPD	4	5	9	397	176	573
7.Bacterial Pneumonia	136	56	192	1,539	810	2,349
8.Asthma	198	56	254	4,564	2,061	6,625
9.Congestive Heart Failure	10	2	12	97	44	141
10.Hypertension	5	0	5	991	664	1,655

Exhibit 4: ACSC Events Profile, By CHC-User Status

ACSC CATEGORIES	ACSC Hospitalizations (# Admissions)			ACSC Outpatient Visits (#Professional Visits & ER Visits)		
	Comparison Group	CHC-users	Study Population	Comparison Group	CHC-Users	Study Population
11 .Cellulitis	33	15	48	1,168	634	1,802
12.Diabetes	36	6	42	1,001	655	1,656
13.Hypoglycemia	3	0	3	*	*	*
14.Gastroenteritis	139	63	202	4,346	2,326	6,672
15.Kidney/Urinary Infection	42	22	64	2,121	1,215	3,336
16.Iron Deficiency Anemia	1	1	2	.	*	*
17.Nutritional Deficiencies	0	0	0	*	*	*
18.Failure-to-Thrive	7	3	10	*	*	*
19.Pelvic Inflamm. Disease	30	6	36	682	288	970
20.Ruptured Appendix	5	5	10	87	42	129
INDIVIDUALS WITH ACSC EVENTS (Number and Percent of Study Population)						
Admissions	610 (1.9%)	247 (1.5%)	857			
Professional Visits				16,108 (49.4%)	8,767 (54.3%)	24,875
ER Visits				5,104 (15.7%)	2,399 (14.9%)	7,503

KEY: * Conditions are not in the ambulatory care visit portion of this study.

Exhibit 5: Mediiid Beneficiaries With an ACSC Hospitalization

	Comparison Group	CHC-Users	Study Population
# PERSONS WITH ACSC EVENT - CLUSTER	**610 (100%)**	**247 (100%)**	**847** (100%)
CHRONIC - ACUTE CLUSTER			
Chronic ACSCs	**248**	**84**	332
Acute ACSCs	**377**	**167**	544
AGE COHORT CLUSTER			
Pediatric ACSCs	**411**	**195**	606
Adult ACSCs	**199**	**52**	251
# PERSONS WITH ACSC EVENT BY RESIDENCE			
Rural	**287**	**114**	401
Urban	**323**	**133**	456
# PERSONS BY ACSC DX CATEGORY			
1. **Congenital Syphilis**	6	1	7
2. **Immunization-Related**	1	0	1
3. **Epileptic Convulsions**	30	14	44 (5.2%)
4. **Severe ENT Infections**	33	17	**50** (5.9%)
5. **Pulmonary & Other TB**	1	1	2
6. **Chronic Obstructive Pulmonary Disease**	4	2	6
7. **Bacterial Pneumonia**	125	54	179 (21.1%)
8. **Asthma**	150	48	198 (23.4%)
9. **Congestive Heart Failure**	8	2	10
10. **Hypertension**	**5**	0	***5***

Exhibit 5: Medicaid Beneficiaries With an ACSC Hospitalization

	Comparison Group	CHC-Users	Study Population
11. Cellulitis	33	14	47 (5.5%)
12. Diabetes	20	5	25
13. Hypoglycemia	3	0	3
14. Castroenteritis	131	62	193 (22.8%)
15. Kidney/Urinary Infection	42	21	63 (7.4%)
16. Iron Deficiency Anemia	1	1	2
17. Nutritional Deficiencies	0	0	0
18. Failure-to-Thrive	7	3	10
19. Pelvic Inflammatory Disease	29	6	35
20. Kuptured Appendix	5	S	10

Note: Percentages are shown for the ACSCs that account for more than five-percent of the Medicaid beneficiaries who had an ACSC hospitalization: asthma, bacterial pneumonia, kidney/urinary infection, iron deficiency anemia, severe ENT infections, diabetes, epiletic convulsions.

Cost Comparison - Expenditures for ACSC Admissions. Some differences in expenditures (average charges for ACSC hospitalizations) are evident. CHC-users averaged lower expenditures per ACSC admission than the comparison group; adults averaged substantially higher costs per ACSC admission than children.

- The cost of ACSC hospitalizations averaged $2,720, with the average cost about 7-percent lower for CHC-users than the comparison group ($2,585 and $2,771, respectively.)

- Adults were 29-percent more expensive than children, $3,228 compared to $2,502, and adults were more costly in both study samples, CHC-users and comparison group.

Outpatient ACSC Visits. As one would anticipate, outpatient visits for corresponding ACSCs are far more common than inpatient care. Within our study, there were 84,313 ACSC outpatient visits (spanning the 14 ACSCs in ambulatory ACSC subgroup) or an average of 1.7 ACSC visits per Medicaid beneficiary. However, ACSC visits were somewhat concentrated among half the study population: *56-percent (27,245) of the Medicaid beneficiaries had at least one ACSC outpatient visit; resulting in an average of three ACSC visits (3.1 visits).* Of these, 87-percent (73,118) were professional visits, encompassing visits to physician offices or clinics; 13-percent (11,195 visits) comprise ER visits (emergency rooms, emergency departments).

Comparisons by ACSC Groupings. There were substantially more ACSC visits for acute conditions (70,153 visits) than for chronic conditions (14,160). This reflects the very high proportion of ACSC visits attributable to ENT infections: 56,369 visits, two-thirds of ail ACSC outpatient visits and 80% of the acute ACSC outpatient visits. We examined the effect of excluding ENT infections from the analysis; results were similar, with ACSC admissions one-fifth less likely among CHC-users than the comparison group. We present findings that include ENT infections, as have other ACSC studies. **Exhibits 4** and 5 show other higher frequency ACSCs:

- gastroenteritis/dehydration/hypokalemia (6,672 visits);
- asthma (6,625 visits);
- kidney and urinary infection (3,336 visits);
- bacterial pneumonia (2,349 visits);
- cellulitis (1,802 visits);
- epilepsy/convulsive conditions (1,708 visits);
- diabetes (1,656 visits); and
- hypertension (1,655 visits).

Missing Data - Outpatient Visits. Diagnostic information was available for each inpatient stay. Diagnostic information, however, was missing from some outpatient claims, with 11-percent of the study sample having at least one outpatient claim without diagnostic information. Each of the Kentucky and Maine records provided outpatient diagnosis; only 34 Washington's outpatient claims were missing diagnosis. Missouri and Pennsylvania, on the other hand, account for the majority of the outpatient claims that lack the diagnosis data (34-percent and nearly 20-percent, respectively). Missing diagnostic information was more likely among the CHC-users in Missouri, 39-percent compared with 32-percent; but similr rates for the CHC-users and comparison group in Pennsylvania, 20-percent and 19-percent, respectively.

Visits without Dx Codes. The missing outpatient diagnostic information does not measurably affect the results pertaining to CHC-user status. To test the sensitivity of our findings to missing data, we conducted two outpatient visit analyses: (1) excluding missing Dx visits; and (2) treating the outpatient event as an ACSC visit. When missing data claims were treated as ACSC visits, there was a slight decline in the proportion of ACSC admissions without an associated ACSC outpatient visit, and correspondingly, the number ACSC visits increased and the proportion of Medicaid beneficiaries with an ACSC outpatient visit rose. The net effect, however, was minimal: the relative likelihood of either an ACSC outpatient visit or an ACSC admission for CHC-users and the comparison group were quite similar.

The results reported in our analysis exclude outpatient visits that lack diagnostic information.

5. ACSC Care Events, A Multivariate Analysis

CHC User-State Comparisons. CHC-users experienced significantly fewer ACSC hospitalizations than the comparison group. Within the study sample, 1.53 percent for CHC-users and 1.87 percent for comparison group experienced an ACSC admission. Across the study populations, the risk ratio for CHC-users to comparison group is 0.82 ($p < 0.01$); among the full-year subsample, the risk ratio was 0.83 ($p < 0.05$), with 1.62 percent of CHC-users compared with 1.95 percent of the comparison group experiencing an ACSC admission.[32]

The multivariate analysis (logit) indicates (Exhibit 6) that CHC-users were 22-percent less likely to experience an ACSC admission than the comparison group. The logit derived odds ratio for CHC-users was 0.78 ($p < 0.001$). Within the full-year subsample, the odds ratio for CHC-users was 0.79 ($p < 0.01$).

[32] For a more extensive analysis and discussion of the full-year subsample, see Appendix A.

EXHIBIT 6: ACSC ADMISSIONS

REGRESSION VARIABLES	Odds Ratio	Probability	95% CI Lower	95% CI Upper
CHC USER STATUS				
Yes - user ***	0.78	.001	0.671	0.906
No - Comparison		REFERENCE		
AGE				
Under age-l ***	2.86	0.000	2.294	3.569
Ages 1 to 4	1.23	0.069	0.984	1.541
Ages 5 to 14 ***	0.43	0.000	0.327	0.560
Ages 15 to 24	0.82	0.142	0.632	1.068
Ages 25 to 44		REFERENCE		
Ages 45 to 64*	1.66	0.038	1.29	2.688
GENDER				
Male	1.12	0.112	0.973	1.293
Female		REFERENCE		
RACE				
White	0.94	0.449	0.800	1.104
Non-White		REFERENCE		
URBANIZATION				
Rural	1.17	0.058	0.996	0.364
Urban		REFERENCE		
STATE				
Maiie *	0.74	0.027	0.565	0.967
Missouri	1.19	0.098	0.968	1.473
Pennsylvania	0.89	0.258	0.720	1.092
Washington ***	0.63	0.000	0.502	0.795
Kentucky		REFERENCE		
ELIGIBILITY (OBSERVATION TIME)				
Less than 6 Months ***	0.34	0.000	0.216	0.521
6 to 8 Months **	0.70	0.002	0.559	0.880
9 to 11 Months *	0.787	0.023	0.640	0.967
12 Months		REFERENCE		

EXHIBIT 6: ACSC ADMISSIONS

REGRESSION VARIABLES	Odds Ratio	Probability	95% CI Lower	95% CI upper
CASH ASSISTANCE STATUS				
Cash Assistance		REFERENCE		
No Cash Assistance *	0.82	0.016	0.701	0.964

N = 48,739
Log Likelihood = - 4131.7716

Significance levels: *** p < 0.001; ** p < 0.01; * p < 0.05

Logit Analysis - Taking Into Account Control Variables. The logit analysis controls for several demographic and population characteristics that can influence medical care utilization and care patterns: gender, age, cash assistance status (basis for Medicaid eligibility), residence (state, rural/urban community), and months-in-sample (i.e., Medicaid eligibility over the 12-month study period).

Eligibility or time-in-sample is an explanatory variable. The multivariate analysis shows that time (months of Medicaid eligibility and thus months-in-sample) is a factor in comparing ACSC admission rates and explaining differences. ACSC admission rates rise with time-in-sample, with more time, likelihood of ACSC admissions rises. The logit analysis indicates that individuals with less than six-months were one-third (0.34) as likely to have an ACSC admission compared with those who were 12-months in sample; 6 to 8 month eligibles were two-thirds (0.7) as likely and 9 to 11 eligibles were 80-percent as likely as full-year eligibles to have an ACSC admission. For a more detailed presentation of findings for the full-year eligibles, see **Appendix A.**

Age and cash assistance status also prove to be factors in explaining differences in ACSC admissions (see **Exhibit 6).**

- **Age.** Individuals under age-one were nearly three-times more likely to experience an ACSC admission than those ages 25 to 44 ($p < 0.001$); compared with ages 25 to 44, those ages 45 to 64 nearly twice (1.7 times) as likely to experience an ACSC admission ($p < 0.05$); those ages 5 to 14, a comparatively low use cohort, were nearly half-as-likely experience an ACSC admission ($p < 0.001$).

- **Cash Assistance.** Medicaid beneficiaries who received cash assistance were more likely than those not receiving cash assistance to experience an ACSC admission ($p < 0.05$).

On the other hand, geographic variables appear to be far less important in explaining differences. Similarly, gender and race/ethnicity are not factors. With respect to the geographic variables:

- **State.** With Kentucky as the reference, the probability of an ACSC was lower in Maine (0.74) and Washington (0.63); similar odds for Missouri and Pennsylvania ($p < 0.05$).

- **Urban/Rural.** For the study sample, the urban/rural distinction (odds ratio 1.16) was not statistically significant; however, within the full-year subsample, rural residents' higher likelihood of experiencing an ACSC admission was statistically significant (odds ratio of 1.32 ($p < 0.01$).

Multiple ACSC Admissions. While ACSC admissions are relatively rare events, some Medicaid beneficiaries experience more than one ACSC admission within a relatively short period of time (12-months or less time). For these Medicaid beneficiaries, rare events occur all too frequently. See **Exhibit 7** for a more detailed presentation of results, including:

- **CHC-User Status.** CHC-users, however, were half as likely to experience multiple ACSC admissions, compared with the comparison group that relied on other sources for primary care (odds ratio of 0.46, $p < 0.01$). This finding pertains to the analysis of multiple admissions for the entire study population as well as to a more restricted subsample of only those who had an ACSC admission (odds ratio is 0.55, $p < 0.05$) [see **Exhibit 8].**

- **Newborns and Infants.** Children under age-one were over twice as likely to experience multiple ACSC admissions (odds ratio of 2.66, $p < 0.01$).

- **Time-in-Sample.** Medicaid beneficiaries with less than nine months-in-sample were far less likely to experience multiple ACSC admissions than those who were in longer, notably the entire 12-months. This finding, not surprising, compels us to look more closely at the children under age-one who are most likely to experience multiple admissions,

The multiple admissions are highly concentrated among a relatively few individuals: 105 Medicaid beneficiaries had multiple ACSC admissions (20 CHC users and 85 nonusers); and, of these 84 had two ACSC admissions, 14 experienced three ACSC admissions, and seven people had four or more ACSC admissions within a relatively short time frame of 12-months or less.

EXHIBIT 7: MULTIPLE ACSC ADMISSIONS -- Study Population

	Odds Ratio	Probability	95% CI Lower	95% CI upper
CHC USER STATUS				
Yes - user**	0.46	0.002	0.281	0.742
No - Comparison		REFERENCE		
AGE				
Under age-l++	2.66	0.004	1.373	5.152
Ages 1 to 4				
Ages 5 to 14		NS		
Ages 15 to 24				
Ages 25 to 44		REFERENCE		
Ages 45 to 64*	3.68	0.012	1.330	10.177
ELIGIBILITY (OBSERVATION TIME)				
Less than 6 Months*	0.12	0.039	0.016	0.896
6 to 8 Months+	0.41	0.027	0.188	0.906
9 to 11 Months		NS		
12 Months		REFERENCE		
GENDER		NS		
RACE/ETHNICITY		NS		
URBANIZATION		NS		
STATE		NS		
CASH ASSISTANCE		NS		

N = 48,739
Log Likelihood = - 716.83785

Significance levels: *** p <0.001; ** p <0.01; * p <0.05

NS = Not Significant (see appendix, corresponding exhibit for statistics)

EXHIBIT 8: MULTIPLE ACSC ADMISSIONS - Medicaid Beneficiaries with One ACSC Admission

			Confidence Limits	
	Odds Ratio	Probability	Lower	Upper
CHC USER STATUS				
Yes - User	0.55	0,021	0.327	0.912
No - Comparison		REFERENCE		
OTHER VARIABLES		NS		

Key: NS = Not Significant (see appendix, corresponding exhibit for statistics)

N = 857
Log Likelihood = - 305.73458

Most of those with multiple ACSC hospitalizations are readmitted for the same ACSC. The most common ACSC for multiple admissions was asthma, with 44 beneficiaries (7 CHC-users and 37 comparison group). The other "heavy multiple hit" ACSCs include: bacterial pneumonia (10 beneficiaries with multiple admissions, 2 CHC-users and 8 comparison group); gastroenteritis, dehydration and hypokalemia (8 beneficiaries, 1 CHC-user and 7 comparison group); convulsions and epileptic conditions (6 beneficiaries, all comparison group); and diabetes (5 beneficiaries, 1 CHC-user and 4 comparison group). This ranking of multiple admission ACSCs warrants attention as such admissions call into question the quality of care, timeliness of treatments, follow-up care and other factors that threaten well-being and lead to repeat admissions for the same condition within a relatively short period of time. While we do not expect zero ACSC admissions, and we have not taken into account severity, more than one ACSC admission within a comparatively short time frame does warrant further exploration.

We should remain cautious in extrapolating from these data; we are now dealing with a very small subset of the sample and a very small number of cases from a study sample of nearly *50,000* Medicaid beneficiaries. However, our analysis of repeat ACSC admissions suggests some care linkage and post-discharge care problems may exist. If ACSC hospitalizations signal access barriers or less than adequate primary care, then these repeat ACSC admissions (for the same ACSC with months of prior admission) document woeful gaps and persistent failures of the health care system to link Medicaid beneficiaries to more appropriate and quality providers of primary care. The repeat admissions analysis also directs attention to conducting ACSC studies that use data sets which provide unique patient identifiers, date of service for claims and thus permit focusing more directly on episodes of care.

Comparisons among CHC-Users. Building on the CHC evaluation definitions of CHC-users, we compared the near-exclusive users (those receiving 80 percent or more of their CHC-type services at CHCs) with regular users (those receiving 51 to 80 percent of their CHC-type services at CHCs). Preliminary findings from the CHC evaluation study indicates that regular users of CHCs have higher utilization profiles -- more inpatient and more outpatient events -- than near-exclusive users of CHCs.

This ACSC study surfaces a similar higher use profile for the regular CHC-users, compared with the near-exclusives. ***Among the ACSC study sample, regular CHC-users were 40-percent more likely to experience an ACSC admission than the near-exclusives*** ($p < 0.01$). [see **Exhibit 9]. The logit** analysis for the full-year subsample, yielded a comparable, statistically significant, odds ratio (1.44 or 44-percent more likely to experience an ACSC admission). Regular CHC-users may have yet to be defined clinical attributes that distinguish them from their counterparts, the near-exclusives, and these clinical attributes become manifest in service utilization rates or care patterns.

We observe the following statistically significant differences between regular and near-exclusives: near-exclusives were more likely to be under 15 (70-percent v. 60-percent); male (40-percent v. 33-percent); non-white (51-percent v. 48-percent); and non-cash Medicaid (34-percent v. 30-percent). Near-exclusives were more likely to be less than full-year eligibles (35-percent v. 28-percent).

The CHC evaluation highlights several hypotheses that might assist in explaining the higher use rates of regular CHC-users. For example: regular users may prefer or require more sources of care, particularly specialists; they may be referred to specialists by a CHC physician; they may doctor-shop; they may be "sicker" and thus require more care or care from a variety of primary care and specialists. The CHC evaluation will attempt to explain differences across CHC groups by controlling for case mix in the analysis of utilization and expenditures. The resulting case mix findings should be taken into account when designing future ACSC studies.

EXHIBIT 9: ACSC ADMISSIONS -- ONLY CHC USERS

REGULAR USERS AND NEAR EXCLUSIVE USERS OF CHCs

	Odds Ratio	Probability	Confidence Limits Lower	Upper
CHC USERS				
Regular User (51-80%))	1.40	0.016	1.065	1.836
Near Exclusive User (>80%)		REFERENCE		
AGE				
Ages <1	4.27	0.000	2.618	6.974
Ages 1 to 4	1.97	0.007	1.202	3.234
Ages 25 to 44		REFERENCE		
ELIGIBILITY (OBSERVATION TIME)				
Less than 6 Months	0.39	0.009	0.188	0.790
12-Months		REFERENCE		
OTHER VARIABLES		NS		

Key: NS = Not Siinifkant (see appendix, corresponding exhibit for statistics)

N = 16,145
Log Likelihood = - 1215.097

ACSC **Clusters - Profile.** A cluster-specific examination of ACSC admissions indicates that admissions for acute conditions occurred with greater frequency than admissions for chronic conditions, and that children (under age-15 are more likely to experience an ACSC admission than youth and adults. Within the study population, 0.68 percent had an admission for chronic conditions, and 1.12 percent had an admission for acute conditions; nearly two-percent (1.91%) of children experienced an ACSC admission, while youth and adults were one-quarter less likely than children to experience an ACSC admission (1.47 percent compared with 1.91 percent of the respective cohorts). Our analysis of ACSC clusters by CHC-user status indicates [see **Exhibit 10]**:

- ***Children CHC-users, compared with comparison group of children, had a lower ACSC admission rate for chronic ACSCs.*** For chronic conditions, children CHC-users were 26-percent less likely to experience an admission for a chronic ACSC than children in the comparison group (odds ratio at 0.74, $p < 0.05$) **[see Exhibit 10a]**. For acute ACSCs, admissions rates were similar (odds ratio of 0.94) between the two study groups [see **Exhibit 10c].**

- *Among adults, CHC-user status surfaces as significant for both chronic and acute ACSC admissions.*

Chronic ACSCs. Adult CHC-users were half as likely as adults in the comparison group to experience an hospitalization for a chronic ACSC (odds ratio of **0.46,** $p < 0.01$) **[see Exhibit 10b].** The overall adult admission rate for chronic ACSCs was 0.55 percent; **0.30** percent for CHC-users and 0.66 percent for comparison group. The resulting risk ratio was 0.45 (2-sided Fisher exact test $p = 0.002$).

Acute ACSCs. The Multivariate analysis, controlling for various demographics, shows that adult CHC-users are one-third less likely to experience an admission for an acute ACSC (odds ratio of 0.64, statistically significant at $p < 0.05$) [see **Exhibit 10d].** Among adults, the overall admission rate for acute ACSCs was 0.95 percent; for CHC-users, admission rate for acute ACSCs 0.68 percent compared with 1.0'7 percent for adults in the comparison group.

EXHIBIT 10: ACSC ADMISSIONS, BY ACSC CLUSTERS:
CHRONIC CHILDREN, CHRONIC ADULTS, ACUTE CHILDREN AND ACUTE ADULTS

Exhibit **10a:** ACSC ADMISSIONS FOR CHRONIC CONDITIONS -- CHILDREN **(N=31,709)**

Log Likelihood =-1338.0798	Odds Ratio	Probability	95% CI Lower	95% CI Upper
CHC USER Status - User	0.74	0.038	0.560	0.983
AGE - Under age-1	3.50	0.000	2.431	5.051
AGE-Ageslto4	2.11	0.000	1.512	2.922
GENDER - Male	1.60	0,001	I.224	2.075
URBANIZATION - Rural	0.67	0.012	0.493	0.916
ELIGIBILITY - <6 Months	0.09	0.001	0.227	0.382
ELIGIBILITY - 6-8 Months	0.54	0.016	0.323	0.892

Exhibit **10b:** ACSC ADMISSIONS FOR CHRONIC CONDITIONS -- ADULTS **(N=17,029)**

Log Likelihood = 1558.1419	Odds Ratio	Probability	CI Lower	CI Upper
CHC USER STATUS - User	0.46	0.004	0.271	0.787
AGE - Ages 15 to 24	0.58	0.022	0.369	0.924
AGE - Ages 45 to 64	2.88	0.001	0.1.559	5.307

EXHIBIT 10: ACSC ADMISSIONS, BY ACSC CLUSTERS:
CHRONIC CHILDREN, CHRONIC ADULTS, ACUTE CHILDREN AND ACUTE ADULTS

Exhibit 10c: ACSC ADMISSIONS FOR ACUTE CONDITIONS -- CHILDREN

Log Likelihood =-1927.8634	Odds Ratio	Probability	CI Lower	CI upper
AGE - Less than age-l	10.36	0.000	7.371	14.561
AGE - Ages 1 to 4	3.67	0.000	2.601	5.167
URBANIZATION - Rural	1.76	0.000	1.382	2.245
ELIGIBILITY - <6-Months	0.43	0.000	0.268	0.689
ELIGIBILITY - 6-8 Months	0.65	0.013	0.458	0.912

Exhibit 10d: ACSC ADMISSIONS FOR ACUTE CONDITIONS -- ADULTS

Log Likelihood = -899.4357	Odds Ratio	Probability	CI Lower	CI Upper
CHC USER STATUS - User	0.64	0.019	0.435	0.928
GENDER - Male	0.44	0.006	0.248	0.794

NOTES:

- Reference variables, with exception of age, same for logistic regression. Age reference variables adults is ages 2544, and for children, ages S-15.
- For more detailed information, see appendix for corresponding exhibits.

6. ACSC Population - Potentially At-Risk

The preceding analysis examines ACSC events among a study population selected to enable us to assess implications of having a CHC as the primary source of care on access by comparing ACSC hospitalization rates. The following analysis focuses on a subset of the study population: only those individuals, children and adults, who have documented evidence of an ACSC Dx as evidenced by an outpatient visit (professional visits and ER visits) for an ACSC-related condition. *This subset of the study population enables us to focus only on those who show some evidence of being at-risk for an ACSC hospitalization.*

The following discussion examines care patterns that deal exclusively with outpatient ACSC events and inpatient ACSC events. This profile examines what we will refer to as *"associated ACSCs" -- only those cases where a "match" exists between the diagnosis for outpatient and inpatient events* (as recorded on the Medicaid claims). In the process, we address several related research issues:

- first, delineate the population at-risk for a ACSC admission by identifying population with ACSC outpatient visit(s);

- second, examine whether the incidence of ACSC outpatient care differs by CHC-user status; and

- third, explore whether the lower ACSC admission rates among CHC-users are evident among the at-risk ACSC population defined by the presence of an associated ACSC outpatient visit.

This analysis focuses on 14 of the 20 ACSCs (see **Exhibits 1 and 2).** For these 14 **ACSCs, expert** consultants developed the corresponding list of ICD-9 codes for outpatient visits. First, we review the data to identify Medicaid beneficiaries with visits for these presenting ACS conditions. Second, we assess whether there are differences in associated ACSC admission rates, comparing CHC-user status. Third, we identify ACSC admissions with no evidence of associated ACSC outpatient visit(s), and again, assess whether differences exist between CHC-users and comparison group. We conclude with a preliminary analysis of ACSC outpatient visit patterns, contrasting CHC-users and comparison group.

Medicaid beneficiaries with ACSC **visits.** Ambulatory care for ACSCs is quite prevalent among the study populations. While ACSC hospitalizations are relatively rare events, ambulatory ACSC visits are quite common. Nearly 56-percent of the study population had at least one ACSC visit. If we exclude the most frequent outpatient ACSC, ENT conditions, 25-percent of the study population had an ACSC-associated outpatient visit. A slightly higher proportion of CHC-users than comparison group had visits for associated ACSCs: 62-percent compared with 59-percent, counting visits for ENT conditions; 26-percent compared with 24-percent, excluding ENT conditions.

CHC-user status appears to influence the extent of ambulatory care. While we have not been able to control for case mix or severity, we found that CHC-users are between 9-percent to 16-percent more likely to experience associated ACSC visits than comparison group.

- Overall, the logit regression analysis yields an odds ratio for CHC-users of 1.16 ($p < 0.001$). When excluding ENT conditions, the regression analysis yields an odds ratio for CHC-users is 1.13 ($p < 0.001$) [see **Exhibit 11].**

- If we count visits with missing diagnosis as visits for an ACSC, the proportion of Medicaid beneficiaries who qualify as having an ACSC visit increases, and the difference between CHC-users and comparison group in the likelihood of an ACSC visit narrows to about g-percent.

A somewhat greater presence of ACSC visits among CHC-users is observed for both chronic and acute conditions, and for both adults and children.

For acute condition visits, for example, about 40-percent of the adult CHC-users in contrast to 39-percent of comparison group had ACSC outpatient visits (odds ratio of 1.10, p C 0.05). Among children, 61-percent of CHC-users have a visit for an acute condition (versus 57-percent among comparison group); logit regression indicates that children CHC-users have a 16-percent greater likelihood of a visit than children in the comparison group (odds ratio of 1.16, $p < 0.001$).

For **chronic condition visits,** B-percent of adult CHC-users experience visits, compared 13-percent of the comparison group. The logit regression, with controls for other variables, estimates that a visit for a chronic ACSC was 20-percent more likely among adult CHC-users than among the comparison group ($p < .001$). Among children, nearly 10-percent of CHC-users experience visits for chronic conditions compared with g-percent of comparison group (odds ratio of 1.11, $p < 0.05$).

In summary, visits for conditions associated with ACSCs are relatively common (one-quarter of visits if we exclude ENT conditions). With regard to CHC-user status, regression analyses indicate that CHC-users are 9 to 16 percent more likely to experience ACSC visit(s), and these results hold for each of the ACSC clusters, for chronic and acute conditions, and for adults and children.

Defining At-Risk ACSC Population. Our analysis suggests that we can identify a potential at-risk ACSC population from claims data on ACSC visits. Overall, 85-percent of ACSC admissions occur with an associated ACSC visit (i.e., a visit for the same diagnostic group as the ACSC admission). With our database, however, we must note that we do not know whether the sequence of associated visits and admissions (i.e., whether visit(s) occur before or after an ACSC admission or both if there were several visits).

The likelihood of an individual without evidence of ACSC-associated outpatient visits having an ACSC admission is quite low (i.e., 0.58 percent, overall, 0.45 percent for acute ACSCs and 0.04 percent for chronic ACSCs). Admission rates with associated ACSCs (same ACSC for both admission and visit) are several-fold higher, for example, five-fold more evident overall, three-fold more evident for acute ACSCs and most evident among chronic ACSCs (i.e., greater than 12-fold difference of 6-percent compared with less than one-half of one-percent).

ACSC Admissions with Associated ACSC Visits. The regression analysis indicates that at-risk CHC-users were 23-percent less likely to experience an ACSC admission than the respective comparison group. [The odds ratio for CHC-users was 0.77, $p < O.Ol$), see **Exhibit 11].** The CHC-users with associated visits had an admission rate of 2.23 percent, while the corresponding comparison group had an admission rate of 2.83 percent.

It is important to observe that for the study population we obtained similar results (a 22-percent difference between CHC-users and comparison group). From a technical perspective, restricting our study population to the subsample at-risk marginally increases the

difference ***between the CHC-users and the comparison group. From a clinical perspective, we may be enhancing the validity of our analysis by focusing on a clinically defined at-risk population. And, as the latter number is substantially lower, achieving statistical significance requires greater power.***

For ACSC clusters, we found statistically significant differences between the CHC-users and the comparison group, including:

- **Children-Chronic ACSCs.** For children with visits for chronic ACSC conditions, the admission rate among CHC-users was 6.2 percent compared with 8.6 percent for comparison group (odds ratio of 0.63, $p < 0.01$).

- **Adult-Chronic ACSCs.** For adults with visits for chronic ACSCs, the admission rate was 1.9 percent for CHC-users and 4.9 percent for comparison group (odds ratio of 0.40, $p < 0.01$).

- **Adult-Acute ACSCs.** For adults with visits for acute ACSCs, the admission rate was for comparison group was twice the admission rate for the CHC-users -- three-percent compared with 1.4 percent (odds ratio of 0.45, $p < 0.001$).

However, for acute ACSC conditions, children with visits are equally likely to be admitted to the hospital regardless of CHC-user status.

ACSC Admissions without Associated ACSC Visits. Overall, U-percent of ACSC admissions occur without an associated ACSC visit. Our analysis indicates that ACSC hospitalizations without evidence of associated visits are a relatively small percent of ACSC hospitalizations, are more likely among the acute ACSCs than the chronic ACSCs, and are more likely to occur among adults than children,

- For acute conditions, 21-percent of the admissions (108 of 524) occur without associated visits; 5-percent of the admissions for chronic ACSCs (17 of 332) occur without associated visits ($p < 0.05$).

- As chronic conditions signal need and value of ongoing care, it is important to observe that only five-percent of the admissions for chronic ACSCs occur without evidence of complementary ambulatory care.

- Adults are more likely than children to have an ACSC admission without experiencing an associated ACSC visit. Nearly 23-percent of the adult ACSC admissions (57 of 250) lacked evidence of a corresponding outpatient visit. Nearly 12-percent of pediatric ACSC admissions (68 of 587) lacked evidence of any associated ACSC visits.

Within this analysis of outpatient visits, CHC-user status is not a distinctive force. Among CHC users who were admitted for ACSCs, nearly 14-percent had no associated visits; among comparison group, nearly 16-percent lacked evidence of associated visits (not statistically significant, p= 0.48). The corresponding admission rates are 0.49 percent for CHC users and 0.62 percent for comparison group (not statistically significant). A logit regression, controlling for utilization-related demographic variables, estimates an odds ratio 0.78 (CHC-users to comparison group); the confidence interval, however, is quite wide (0.52 to 1.17) and consequently, we cannot reject the null hypothesis (see **Exhibit 11).** We obtain similar results for the analysis of chronic and acute ACSC conditions and for the analysis of adult and children admissions. As the number of cases in these subgroups is very small, the power of this analysis, is low and consequently, our findings are suggestive but not conclusive.

ER Visits. Our database permits us to examine separately ER visits (i.e., hospital emergency departments). ERs can be viewed as less than adequate substitutes for other sources of primary care. ER visits for ACSC-associated conditions could be viewed as symptomatic of less than adequate access to primary care -- overall and with regard to ACSCs.

The CHC-user status correlates with lower use of emergency rooms for ACSC-associated conditions: CHC users are less likely than the comparison group to use an emergency room and had fewer ER visits. However, it is important to observe that Medicaid beneficiaries who had an ACSC admission were twice as likely to have gone to the ER, as compared with those who did not have an ACSC admission. This holds for acute ACSCs, chronic ACSCs and all ACSCs. Moreover, CHC-users were less likely than the comparison group to experience an ACSC admission.

With these patterns, our ER discussion proceeds with results from separate analyses of ER use by ACSC clusters (chronic and acute) and by admission status (ACSC admission or no evidence of ACSC admission). Findings include:

- **ER-Admission Linkages.** Over half of the individuals who had an ACSC admission also have an ER visit. Within our database, admissions from ER count as hospitalizations. Among those without an ACSC admission, the average number of ER visits was slightly lower (but statistically significant) among the CHC-users than the comparison group ($p < .001$). An episodes of care analysis would permit sequencing ACSC events and analysis of ACSC event patterns.

EXHIBIT 11: ACSC Admissions -- Likelihood of ACSC Outpatient Visits and Analysis of Individuals Who Had Associated ACSC Outpatient Visit(s) and Individuals Who Did NOT Have Associated ACSC Outpatient Visit

	Likelihood of ACSC Visits	ACSC Admissions - No Associated ACSC Visit	ACSC Admissions - With Associated ACSC Visit
	N = 48,739	N = 21,579	N = 27,160
	Odds Ratio	Odds Ratio	Odds Ratio
CHC USER STATUS-User	1.16 ***	NS	0.77 **
AGE Under age-1	4.30 ***	4.97 ***	1.69 ***
AGE Ages 1 to 4	2.25 ***	NS	NS
AGE Ages 5 to 14	1.10 **	0.28 **	0.44 ***
AGE- Ages 15 to 24	0.84 ***	NS	NS
AGE Ages 45 to 64	1.74 ***	3.43 *	NS
GENDER - Male	0.89 ***	NS	1.24 **
RACE - White	1.31 ***	NS	NS
URBANIZATION - Rural	1.19 ***	NS	NS
STATE- Maine	0.59 ***	NS	NS
STATE- Missouri	1.10 **	NS	1.25 *
STATE- Pennsylvania	NS	NS	NS
STATE Washington	1.39 ***	NS	0.59 ***
STATE- Kentucky		REFERENCE	
ELIGIBILITY (OBSERVATION TIME)			
TIME- Less than 6 Months	0.12 ***	0.22 **	NS
TIME- 6 to 8 Months	0.51 ***	NS	NS
TIME- 9 to 11 Months	0.73 ***	NS	NS
TIME- 12 Months		REFERENCE	
NO Cash Assistance	NS	NS	0.76 **

Siinifiince levels: *** p <0.001; ** p <0.01; * p <0.05

ACSC Outpatient Visits: ACSC ambuiatory visits encompass fourteen ACSC diagnostic groups. Analysis without ENT visits, yields similar results; CHC-users are more likely than comparison group to experience a ACSC Outpatient Visits, however, likelihood decreases slightly from 16-percent more likely to 13-percent.

- **No Significant CHC-User Effect.** Among those with an ACSC admission, there was an average of one ER visit; no statistically significant difference between CHC-users and comparison group. Persons with acute ACSCs, compared with chronic ACSC, are more likely to turn-up in the ER. However, controlling for ACSC admissions, there is no statistically significant difference between CHC-users and comparison group (overall, and for chronic or acute conditions).

Professional Visits. Professional visits refer to visits to non-ER settings, including doctors' offices, groups practices, clinics or CHCs. One of the assumptions that is key to ACSCs is that timely and appropriate access to care in these ambulatory care settings can reduce the need for and likelihood of experiencing an ACSC admission. Importantly, we find concurrent utilization trends. The average number of professional visits is five-fold greater for those who had an ACSC admission, when compared with those who did not experience an ACSC admission. This relationship holds for the CHC-users and the comparison group.

Additional findings regarding professional visits pertain to:

- **Study Population, by CHC-User Status.** CHC-users had 6-percent more professional visits for ACSC-associated conditions than comparison group, but these differences are quite small (1.56 and 1.47 respectively) albeit statistically significant. The analysis indicates that CHC-users had a somewhat higher average number of professional visits than the comparison group ($p < 0.05$).

- **ACSC Admission Status.** Among those without an ACSC admission, CHC-users averaged 1.48 visits and comparison group averaged 1.36 visits; the resulting regression estimated the difference at 0.09 more visits for CHC-users (95-percent confidence interval of 0.04 to 0.13, $p < 0.001$). However, the difference in the average number of professional visits for those with an ACSC admission was not statistically significant at the 0.05 level.

- **ACSC Clusters.** When visits for acute and chronic conditions are analyzed separately, differences are small and not statistically significant.

The patterns of professional visits observed for CHC-users and comparison group offer suggestive and formative evidence for further analysis. Our profile of professional ACSC visits can assist in fostering research that attempts to examine the linkages between ACSC outpatient and ACSC inpatient events. At this stage, we cannot, with our database, investigate whether stronger patterns could be discerned if we were able to examine episodes of care, and thus link chronologically ACSC professional visits and admissions. Our data do not allow analysis of the timing of care and the sequencing of ACSC events. Perhaps, CHC-users receive more professional visits, but we cannot isolate and count the professional visits prior to an ACSC admission; nor can we examine the level of professional visits over a spell of illness for those who are not hospitalized for their ACSC.

Chapter 4: IMPLICATIONS AND RESEARCH OPPORTUNITIES

1. Major Findings

Medicaid beneficiaries who are CHC-users had a 22 percent lower rate of ACSC admissions than a comparison group. This finding was even stronger when we controlled for various demographics in a multivariate analysis. The CHC-effect was evident and statistically significant when examining subgroups, notably: adults with chronic ACSCs; adults with acute ACSCs; and children with chronic ACSCs. CHC-users were also half as likely as the comparison group to experience repeat ACSC admissions (i.e., a second or subsequent ACSC admission).

Outpatient ACSC visits appear to be reasonably good markers for identifying the population at-risk for ACSC admissions -- very good markers for chronic conditions and slightly less so for acute conditions. Notably, 95-percent of the admissions for chronic ACSCs occurred among Medicaid beneficiaries who had associated ACSC visits; nearly 80-percent of the admissions for acute ACSCs occurred among Medicaid beneficiaries who had associated ACSC visits. There were no statistically significant differences between CHC-users and comparison group in the ACSC admission rates when there were no associated ACSC visits.

Medicaid CHC-users were 16-percent more likely than the comparison group to experience outpatient visits for ACSC-associated conditions, either office visits (visits to the CHC, physician office or other outpatient setting) or visits to emergency rooms. Among the Medicaid beneficiaries with ACSC visits, those most at-risk for ACSC hospitalization, similar (albeit somewhat stronger) patterns surface. Among those with ACSC outpatient visits, ER use was lower for CHC-users than the comparison group. However, average number of professional ACSC visits to other outpatient (ambulatory care) settings were comparable for CHC-users and comparison group.

2. Limitations and Caveats

The ability to generalize beyond the study population can be viewed as a limitation imposed by the comparatively short eligibility timeframe of 12-months in the source database, generated for the CHC evaluaton study and used in this study.

Restricted Sample. The study sample is drawn from Medicaid beneficiaries, primarily AFDC and AFDC-related groups. Thus, our study population is principally an insured population of largely low-income women and children.

The sampling methodology is governed by a separate CHC evaluation study. The five states were a convenience sample. The 26 communities were randomly selected, state-by-state, from a sampling frame of CHC communities; within each state, a stratified random sample was drawn to obtain requisite mix of urban/rural communities.

Despite these caveats, studies that compare alternative Medicaid providers can inform Medicaid policies and assist in shaping incentives to direct Medicaid beneficiaries to more effective primary care providers. Prior ACSC studies found that lower income populations, Medicaid and non-Medicaid, experienced higher rates of ACSC hospitalizations. If CHCs can reduce ACSC hospitalizations, Medicaid agencies are more likely to be show interest in CHCs as preferred Medicaid providers. As Medicaid moves towards managed care and limited provider networks expands, performance comparisons will become more valuable. This study certainly advances exploration of the CHC effect(s) and possible implications for access, care quality and related costs.

Selection Bias, Care-Seeking Preferences. The data from the SMRF Person Summary File captures several major demographic variables for utilization comparisons. However, utilization patterns are influenced by other person-specific characteristics that are not conveniently catalogued in claim records. Additional data collection instruments and resources would be required to more fully explore selection bias, care-seeking preferences or health status as forces influencing the observed differences between CHC-users and the comparison group in the direction and magnitude of observed ACSC events.

Episodes of Care. The available database forced us to examine ACSC events. We were not able to create episodes of care, to link ACSC events or to sequence ACSC events by time of care. Consequently, we are unable to assess care patterns or to examine the impact of timely ACSC outpatient visits on admissions. The 12-month timeframe of our database is far too short for creating care episodes (e.g., temporal linking of associated ACSC ambulatory visits with hospitalizations and temporal designation of ACSC visits as pre- and post-ACSC hospitalizations).

Our study begins to examine ambulatory ACSC visits in a limited way. Much of the ACSC literature assumes a straightforward relationship between access to care and the risk of ACSC hospitalization(s). Our analysis suggests that aggregate measures of total visits for ACSC-associated conditions is not sufficient for understanding the more complex relationship between access to outpatient care and ACSC hospitalizations. The logical next step is analysis of ACSC care episodes to examine pre- and post ACSC hospitalizationpatterns, and thus ascertain more concretely whether and the extent to which CHCs reduce the incidence of

ACSC hospitalizations by providing timely and appropriate ambulatory care for specific ACSCs.

ACSCs and SMRF Data. SMRF data offer sufficient detail for identifying ACSCs and creating person-based records for further ACSC studies. The sampling frame could be expanded by the number of states (currently 26 are available) or the number of communities in the study states. As noted above, the time frame can be extended by linking several years of SMRF data for each of the study states.

If ACSC events, particularly ACSC admissions, are regarded as suitable measures for assessing provider performance, as some suggest, SMRF offers a large, longitudinal database. And, as Medicaid moves more aggressively into managed care, it becomes even more important to identify large, longitudinal databases for assessing, comparing and monitoring provider performance.

2. **Directions for Further Research**

This study suggests the value and potential utility of ACSCs to measure provider performance, in particular, to examine and compare the "usual sources of care" or alternative primary care providers. This study also shows that CHC-users can benefit from their reliance on CHCs, as CHC-users are less likely than a randomly selected comparison group to be hospitalized for conditions that should be treated effectively in outpatient settings.

Nonetheless, several other avenues warrant some consideration, if necessary data become available. Future studies could attempt to design strategies necessary for capturing relevant data, generating new data or analyzing exisiting data, for examining the various forces that influence access, care patterns and health status. For example:

- timing and sequence of ACSC events;
- case mix differences between study groups;
- content of ACSC and other primary visits;
- organizational influences on access and care patterns;
- contrasting care-seeking behaviors and preferences of CHC-users and a comparison group of non-users; and

- community resources, including availability of doctors, clinics and hospitals, and non-financial access measures.[33]

[33] Community practice patterns and community resources, including the availability of specialists and referral sources, may influence variations in the number or type of ACSC hospitalizations across communities, states or regions. In addition to controls for state and rural/urban areas, we introduced controls for state and service areas. The regression analysis which introduces service area controls for each community indicates the introduction of service area dummy variables does not affect or change the results. Krakauer and colleagues similarly found that community health resources is not a powerful variable in ACSC studies. A preliminary regression analysis found a modest (16-percent) increase in the odds of experiencing an ACSC admission in rural areas; however, this result was not statistically significant. A joint test of the state and service area dummies finds them to be statistically significant ($p < 0.001$). When the state and area dummies are removed from the regression, the pseudo-R^2 declines from 0.0352 to 0.0433. The explanatory contribution of service area on ACSC admission is significant but rather modest. Specific area resources might explain some portion of the variations in ACSC admission rates, but developing appropriate measures or proxies are likely to prove difficult. Some data sets are only available for large areas. The Area Resource File, for example, offers only county-level data for crude measures of physicians and hospitals. Service areas tend to be smaller in some cases, and multi-county (usually portions of several counties). Other datasets, such as the AHA survey or telephone directories might allow for geocoding (e.g., Geographic Information System) the area's hospitals or physicians with greater precision. However, various other factors and non-resource barriers can influence access to a local physician or hospital (e.g., language, cultural preferences, negative experiences with local providers).

APPENDIX A: ANALYSIS AND FINDINGS FOR THE FULL-YEAR SAMPLE

AMBULATORY CARE SENSITIVE CONDITIONS STUDY

FINAL REPORT SECTION: ACSC HOSPITALIZATIONS FOR THE FULL YEAR SAMPLE

December 1997

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FULL YEAR SAMPLE

Research Question 1: ACSC Hospitalizations, CHC Users and Non-Users Comparison

There were 33,540 Medicaid beneficiaries from the CHC service areas in the full year sample. Of these, 10,791 were individuals whose usual source of care was a CHC (i.e., used a CHC for more than 50 percent of their primary care services). The control population was a random sample of 22,749 persons who had no reported visits to a CHC.

Examination of the distribution of the CHC user and non user populations by age, gender, race, cash assistance status and urbanization of residence (see Table 1) indicated statistically significant differences in the two groups for age, race and cash assistance status. CHC users as compared to the control group had a larger percentage of children under age 5, smaller percentages in the **5-44** age groups, and a slightly larger percentage in the **45-64** age group. Compared to non users, the CHC user population was comprised of fewer whites, blacks, American Indian/Alaskan Natives, and Asian/Pacific Islanders but more Hispanics and persons of unknown race. CHC users had a larger distribution of Medicaid eligibles who did not receive cash assistance. A larger proportion of CHC users lived in urban areas than non users, but the difference was not statistically significant at conventional levels. Also not statistically significant was any difference in gender between the two groups.

With respect to having an ACSC hospital admission, 1.62 percent of the CHC users had an ACSC admission. The ACSC admission rate for non users was 1.95 percent. This difference was statistically significant at $\rho = .038$.

The multivariate analysis examines whether being a CHC user has a significant impact on the likelihood of having an ACSC hospitalization controlling for age, gender,

race, cash assistance status, urbanization and state. Table 2 presents the results of the logistic regression. CHC users were significantly less likely than non users to have an ACSC hospitalization. The odds of such a hospitalization were 0.79 to 1 for CHC users as compared to non users.

Significant control variables that increase the likelihood of having an ACSC hospitalization included being male rather than female (odds of 1.23 to 1) and living in a rural area rather than an urban area (odds of 1.32 to I). Newborns less than one year old were significantly more likely to have an ACSC hospitalization (odds of 2.86 to I) than those aged 25-44, but persons in the age groups 5-14 and 15-24 were less likely relative to those aged 25-44 (odds of 0.37 to 1 and 0.73 to 1, respectively) to have such a hospitalization. Two of the states, Maine and Washington, had a significantly smaller likelihood (odds of 0.61 to 1 and 0.56 to I) of an ACSC admission relative to the reference state of Kentucky.

Some individuals had more than one ACSC admission. Table 3 shows the results of a logit regression that estimated the effect of being a CHC user on having multiple ACSC admissions. CHC users had much smaller odds of having more than one ACSC admission than non users (0.46 to I). Also significantly affecting the odds of having multiple ACSC admissions was being male (odds of 1.58 to 1) and being in the <1 year age group (odds of 3.09 to 1) or 45-64 age group (odds of 4.99 to 1) as compared to the 25-44 age group.

Research Question 2: ACSC Hospitalizations, Near Exclusive User vs. Regular User Comparison

Of the 10,791 individuals who used CHCs for more than 50 percent of their primary care services, 7,708 or 71 percent used CHCs for more than 80 percent of their primary care and 3,083 or 29 percent used CHCs for between 51 percent and 80 percent of their primary care. Examination of these two groups indicated significant

difference with respect to age, gender, race and urbanization (see Table 4). There was no significant difference between these near exclusive and regular user groups with respect to cash assistance status.

With respect to age, near exclusive users had more beneficiaries in the 1-4 and 5-14 age groups and less in the three age groups 15 years and over (15-24, 25-44, 45-64). There was a significantly larger percentage of men and a larger percentage residing in urban areas among the near exclusive users as compared to the regular users. The near exclusive users group had a smaller percentage of whites and Hispanics and a larger percentage of blacks than the regular users.

A smaller percentage of the near exclusive users, as compared to the regular users, had an ACSC hospitalization (1.44 percent versus 2.08 percent). This difference was significant at $\rho = .018$.

When differences between the near exclusive and regular users were examined in a multivariate model, controlling for age, gender, race, cash assistance, urbanization and state, near exclusive users had only 0.69 the likelihood of an ACSC admission compared to the regular users. Control variables in the model that were significant related to having an ACSC admission were: being male (odds of 1.40 to I), living in a rural area (odds of 1.58 to I), and being age <1 (odds of 5.49 to 1) or age l-4 (odds of 1.99 to 1) as compared to age 25-44. Two of the states, Maine and Washington, had less than half the odds of having an ACSC admission as compared to Kentucky the reference state.

Table 1

CHC Users vs. Non Users: χ^2 Analysis of Differences for the Full Year Sample

Variable	Categories	χ^2	Significance
Age	<1, 1-4, 5-14, 15-24, 25-44, 45-64	111.183	.001
Gender	Female, Male	.672	.412
Race	White, Black, American Indian/Alaskan Native, Asian/Pacific Islander, Hispanic, Other	542.814	.001
Cash Assistance	Yes, No	4.685	.030
Urbanization	Urban, Rural	3.799	.051

Table 2

CHC Users vs. Non Users: Logit Regression of Having an ACSC Admission for the Full Year Sample

	Parameter	Probability	Odds Ratio	Confidence Limits	
				Lower	Upper
CHC User					
No	Ref	Ref	Ref	Ref	Ref
Yes	-0.240	0.008	0.787	0.657	0.938
Gender					
Female	Ref	Ref	Ref	Ref	Ref
Male	0.210	0.017	1.234	1.038	1.466
Race					
Non-White	Ref	Ref	Ref	Ref	Ref
White	-0.057	0.556	0.944	0.781	1.142
Cash Assistance					
Yes	Ref	Ref	Ref	Ref	Ref
No	-0.125	0.203	0.883	0.727	1.067
Urbanization					
Urban	Ref	Ref	Ref	Ref	Ref
Rural	0.279	0.003	1.322	1.099	1.589
Age					
<1	1.049	0.000	2.855	2.191	3.737
1-4	0.115	0.384	1.122	0.868	1.458
5-14	-1.002	0.000	0.367	0.269	0.499
15-24	-0.317	0.047	0.728	0.531	0.994
25-44	Ref	Ref	Ref	Ref	Ref
45-64	0.210	0.497	1.234	0.639	2.174
State					
Kentucky	Ref	Ref	Ref	Ref	Ref
Maine	-0.496	0.002	0.609	0.441	0.836
Missouri	0.174	0.164	1.190	0.933	1.524
Pennsylvania	-0.019	0.875	0.981	0.775	1.248
Washington	-0.587	0.000	0.556	0.416	0.741
Intercept	-3.905				
Number in Sample	33,540				
-2 Log Likelihood	5846.388				

Table 3

CHC Users vs. Non Users: Logit Regression of Having More Than One ACSC Admission for the Full Year Sample

	Parameter	Probability	Odds Ratio	Confidence Limits	
				Lower	Upper
CHC User					
No	Ref	Ref	Ref	Ref	Ref
Yes	-0.787	0.005	0.455	0.254	0.766
Gender					
Female	Ref	Ref	Ref	Ref	Ref
Male	0.459	0.050	1.583	1.002	2.517
Race					
Non-White	Ref	Ref	Ref	Ref	Ref
White	-0.065	0.798	0.937	0.568	1.543
Cash Assistance					
Yes	Ref	Ref	Ref	Ref	Ref
No	0.139	0.583	1.149	0.690	1.861
Urbanization					
Urban	Ref	Ref	Ref	Ref	Ref
Rural	-0.205	0.425	0.815	0.488	1.341
Age					
<1	1.127	0.005	3.085	1.426	7.090
1-4	0.345	0.377	1.412	0.675	3.171
5-14	-0.515	0.231	0.598	0.259	1.425
15-24	-0.498	0.337	0.608	0.206	1.644
25-44	Ref	Ref	Ref	Ref	Ref
45-64	1.608	0.004	4.990	1.543	14.173
State					
Kentucky	Ref	Ref	Ref	Ref	Ref
Maine	0.164	0.725	1.178	0.467	2.961
Missouri	0.414	0.268	1.513	0.741	3.267
Pennsylvania	0.550	0.117	1.734	0.899	3.613
Washington	-0.434	0.337	0.648	0.260	1.572
Intercept	-6.304				
Number in Sample	33,540				
-2 Log Likelihood	1114.259				

Table 4

CHC Near Exclusive vs. Regular Users: χ^2 Analysis of Differences for the Full Year CHC User Sample

Variable	Categories	χ^2	Significance
Age	<1, l-4,5-14, 15-24, 25-44, 45-64	175.092	.001
Gender	Female, Male	47.384	.001
Race	White, Black, American Indian/Alaskan Native, Asian/Pacific Islander, Hispanic, Other	83.53 1	.001
Cash Assistance	Yes, No	.045	.832
Urbanization	Urban, Rural	4.632	.03 1

Table 5

CHC Regular vs. Near Exclusive Users: Logit Regression of Having an ACSC Admission for the Full Year CHC User Sample

	Parameter	Probability	Odds Ratio	Confidence Limits	
				Lower	Upper
CHC User Status					
Regular	Ref	Ref	Ref	Ref	Ref
Near Exclusive	-0.365	0.024	0.694	0.508	0.957
Gender					
Female	Ref	Ref	Ref	Ref	Ref
Male	0.338	0.036	1.403	1.023	1.928
Race					
Non-White	Ref	Ref	Ref	Ref	Ref
White	0.005	0.982	1.005	0.681	1.478
Cash Assistance					
Yes	Ref	Ref	Ref	Ref	Ref
No	-0.095	0.593	0.910	0.638	1.280
Urbanization					
Urban	Ref	Ref	Ref	Ref	Ref
Rural	0.458	0.010	1.581	1.115	2.242
Age					
<1	1.703	0.000	5.493	3.104	10.300
1-4	0.685	0.024	1.985	1.121	3.720
5-14	-0.429	0.219	0.651	0.331	1.312
15-24	0.120	0.746	1.127	0.543	2.337
25-44	Ref	Ref	Ref	Ref	Ref
45-64	0.195	0.797	1.215	0.190	4.367
State					
Kentucky	Ref	Ref	Ref	Ref	Ref
Maine	-0.652	0.028	0.521	0.287	0.924
Missouri	-0.116	0.645	0.891	0.544	1.459
Pennsylvania	-0.233	0.288	0.792	0.518	1.224
Washington	-0.589	0.026	0.555	0.327	0.926
Intercept	-4.463				
Number in Sample	10,791				
-2 Log Likelihood	1665.071				

APPENDIX

SAS LOGIT RUNS

The LOGISTIC Procedure

Data Set: USER.ACSC202
Response Variable: ACSCHOSP ACSC Hospitalization
Response Levels: 2
Number of Observations: 33540
Link Function: Logit

Response Profile

Ordered Value	ACSCHOSP	Count
1	1	618
2	0	32922

Simple Statistics for Explanatory Variables

Variable	ACSCHOSP	Mean	Standard Deviation	Minimum	Maximum
CHC_USER	1	0.283172	0.450904	0	1.000000
	0	0.322459	0.467425	0	1.000000
	Total	0.321735	0.467149	0	1.000000
AGE_0000	1	0.281553	0.450121	0	1.000000
	0	0.093281	0.290830	0	1.000000
	Total	0.096750	0.295622	0	1.000000
AGE_0104	1	0.304207	0.460443	0	1.000000
	0	0.254389	0.435524	0	1.000000
	Total	0.255307	0.436040	0	1.000000
AGE_0514	1	0.124595	0.330527	0	1.000000
	0	0.316050	0.464940	0	1.000000
	Total	0.312522	0.463528	0	1.000000
AGE-1524	1	0.108414	0.311155	0	1.000000
	0	0.149080	0.356172	0	1.000000
	Total	0.148330	0.355432	0	1.000000
AGE-4564	1	0.019417	0.138099	0	1.000000
	0	0.016159	0.126090	0	1.000000
	Total	0.016219	0.126320	0	1.000000
MALE	1	0.448220	0.497714	0	1.000000

	0	0.385760	0.486782	0	1.000000
	Total	0.386911	0.487050	0	1.000000
WHITE	1	0.618123	0.486240	0	1.000000
	0	0.614695	0.486675	0	1.000000
	Total	0.614758	0.486660	0	1.000000
NOCASH	1	0.262136	0.440152	0	1.000000
	0	0.233613	0.423135	0	1.000000
	Total	0.234138	0.423465	0	1.000000
RURAL	1	0.533981	0.499248	0	1.000000
	0	0.510206	0.499903	0	1.000000
	Total	0.510644	0.499894	0	1.000000
ME	1	0.110032	0.313184	0	1.000000
	0	0.154881	0.361797	0	1.000000
	Total	0.154055	0.361007	0	1.000000
MO	1	0.263754	0.441024	0	1.000000
	0	0.186501	0.389517	0	1.000000
	Total	0.187925	0.390658	0	1.000000
PA	1	0.309061	0.462481	0	1.000000
	0	0.287710	0.452702	0	1.000000
	Total	0.288104	0.452886	0	1.000000
WA	1	0.132686	0.339510	0	1.000000
	0	0.208341	0.406128	0	1.000000
	Total	0.206947	0.405123	0	1.000000

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	6163.133	5876.388	.
SC	6171.554	6002.696	.
-2 LOG L	6161.133	5846.388	314.745 with 14 DF (p=0.0001)
Score	.	.	366.287 with 14 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio

INTERCPT	1	-3.9048	0.1500	677.5955	0.0001	.	.
CHC USER	1	-0.2398	0.0910	6.9521	0.0084	-0.061764	0.787
AGE-0000	1	1.0491	0.1361	59.4359	0.0001	0.170992	2.855
AGE 0104	1	0.1151	0.1323	0.7568	0.3843	0.027672	1.122
AGE-0514	1	-1.0022	0.1575	40.4780	0.0001	-0.256114	0.367
AGE-1524	1	-0.3168	0.1598	3.9328	0.0474	-0.062087	0.728
AGE-4564	1	0.2103	0.3097	0.4612	0.4971	0.014649	1.234
MALE	1	0.2102	0.0880	5.6998	0.0170	0.056446	1.234
WHITE	1	-0.0571	0.0969	0.3474	0.5556	-0.015329	0.944
NOCASH	1	-0.1246	0.0979	1.6205	0.2030	-0.029085	0.883
RURAL	1	0.2788	0.0939	8.8173	0.0030	0.076839	1.322
ME	1	-0.4955	0.1628	9.2683	0.0023	-0.098624	0.609
MO	1	0.1742	0.1252	1.9373	0.1640	0.037530	1.190
PA	1	-0.0191	0.1215	0.0247	0.8752	-0.004765	0.981
WA	1	-0.5871	0.1472	15.9054	0.0001	-0.131138	0.556

Association of Predicted Probabilities and Observed Responses

Concordant = 67.0%	Somers' D = 0.386
Discordant = 28.4%	Gamma = 0.404
Tied = 4.5%	Tau-a = 0.014
(20345796 pairs)	c = 0.693

Conditional Odds Ratios and 95% Confidence Intervals

			Profile Likelihood Confidence Limits	
Variable	Unit	Odds Ratio	Lower	Upper
CHC USER	1.0000	0.787	0.657	0.938
AGE-0000	1.0000	2.855	2.191	3.737
AGE-0104	1.0000	1.122	0.868	1.458
AGE-0514	1.0000	0.367	0.269	0.499
AGE-1524	1.0000	0.728	0.531	0.994
AGE-4564	1.0000	1.234	0.639	2.174
MALE	1.0000	1.234	1.038	1.466
WHITE	1.0000	0.944	0.781	1.142
NOCASH	1.0000	0.883	0.727	1.067
RURAL	1.0000	1.322	1.099	1.589
ME	1.0000	0.609	0.441	0.836
MO	1.0000	1.190	0.933	1.524
PA	1.0000	0.981	0.775	1.248
WA	1.0000	0.556	0.416	0.741

Conditional Odds Ratios and 95% Confidence Intervals

			Wald Confidence Limits	
Variable	Unit	Odds Ratio	Lower	Upper
CHC USER	1.0000	0.787	0.658	0.940
AGE-0000	1.0000	2.855	2.181	3.728

AGE_0104	1.0000	1.122	0.866	1.454
AGE_0514	1.0000	0.367	0.270	0.500
AGE-1524	1.0000	0.728	0.533	0.996
AGE-4564	1.0000	1.234	0.673	2.265
MALE	1.0000	1.234	1.038	1.466
WHITE	1.0000	0.944	0.781	1.142
NOCASH	1.0000	0.883	0.729	1.070
RURAL	1.0000	1.322	1.099	1.589
ME	1.0000	0.609	0.443	0.838
MO	1.0000	1.190	0.931	1.521
PA	1.0000	0.981	0.773	1.245
WA	1.0000	0.556	0.417	0.742

The LOGISTIC Procedure

Data Set: USER.ACSC202
Response Variable: ACSCHSP2 ACSC Hospitalization > one
Response Levels: 2
Number of Observations: 33540
Link Function: Logit

Response Profile

Ordered Value	ACSCHSP2	Count
1	1	84
2	0	33456

Simple Statistics for Explanatory Variables

Variable	ACSCHSP2	Mean	Standard Deviation	Minimum	Maximum
CHC_USER	1	0.190476	0.395035	0	1.000000
	0	0.322065	0.467275	0	1.000000
	Total	0.321735	0.467149	0	1.000000
AGE_0000	1	0.261905	0.442312	0	1.000000
	0	0.096335	0.295055	0	1.000000
	Total	0.096750	0.295622	0	1.000000
AGE_0104	1	0.321429	0.469830	0	1.000000
	0	0.255141	0.435947	0	1.000000
	Total	0.255307	0.436040	0	1.000000
AGE-0514	1	0.166667	0.374916	0	1.000000
	0	0.312889	0.463676	0	1.000000
	Total	0.312522	0.463528	0	1.000000
AGE_1524	1	0.071429	0.259086	0	1.000000
	0	0.148523	0.355623	0	1.000000
	Total	0.148330	0.355432	0	1.000000
AGE_4564	1	0.059524	0.238024	0	1.000000
	0	0.016111	0.125903	0	1.000000
	Total	0.016219	0.126320	0	1.000000

MALE	1	0.523810	0.502432	0	1.000000
	0	0.386567	0.486970	0	1.000000
	Total	0.386911	0.487050	0	1.000000
WHITE	1	0.583333	0.495968	0	1.000000
	0	0.614837	0.486641	0	1.000000
	Total	0.614758	0.486660	0	1.000000
NOCASH	1	**0.297619**	0.459957	**0**	1.000000
	0	0.233979	0.423365	0	1.000000
	Total	0.234138	0.423465	0	1.000000
ME	1	**0.119048**	0.325790	**0**	1.000000
	0	0.154143	0.361091	0	1.000000
	Total	0.154055	0.361007	0	1.000000
MO	1	0.250000	0.435613	0	1.000000
	0	0.187769	0.390533	0	1.000000
	Total	0.187925	0.390658	0	1.000000
PA	1	0.392857	0.491319	0	1.000000
	0	0.287841	0.452763	0	1.000000
	Total	0.288104	0.452886	0	1.000000
WA	1	0.107143	0.311152	0	1.000000
	0	0.207198	0.405304	0	1.000000
	Total	0.206947	0.405123	0	1.000000
RURAL	1	0.452381	0.500717	0	1.000000
	0	0.510790	0.499891	0	1.000000
	Total	0.510644	0.499894	0	1.000000

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1176.055	1144.259	
SC	1184.476	1270.566	
-2 LOG L	1174.055	1114.259	59.797 with 14 DF (p=0.0001)
Score			68.170 with 14 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio

INTERCPT	1	-6.3042	0.4562	190.9444	0.0001	.	
CHC USER	1	-0.7873	0.2792	7.9534	0.0048	-0.202776	0.455
AGE-0000	1	1.1267	0.4049	7.7412	0.0054	0.183632	3.085
AGE-0104	1	0.3449	0.3907	0.7793	0.3774	0.082911	1.412
AGE-0514	1	-0.5147	0.4297	1.4351	0.2309	-0.131539	0.598
AGE-1524	1	-0.4982	0.5187	0.9224	0.3368	-0.097627	0.608
AGE-4564	1	1.6075	0.5522	8.4750	0.0036	0.111954	4.990
MALE	1	0.4592	0.2341	3.8465	0.0498	0.123300	1.583
WHITE	1	-0.0650	0.2540	0.0655	0.7981	-0.017436	0.937
NOCASH	1	0.1385	0.2520	0.3021	0.5826	0.032335	1.149
ME	1	0.1637	0.4654	0.1238	0.7250	0.032589	1.178
MO	1	0.4144	0.3741	1.2268	0.2680	0.089252	1.513
PA	1	0.5504	0.3513	2.4548	0.1172	0.137431	1.734
WA	1	-0.4337	0.4514	0.9229	0.3367	-0.096861	0.648
RURAL	1	-0.2051	0.2569	0.6374	0.4246	-0.056519	0.815

Association of Predicted Probabilities and Observed Responses

Concordant	= 56.8%	Somers' D	= 0.390
Discordant	= 17.7%	Gamma	= 0.524
Tied	= 25.5%	Tau-a	= 0.002
(2810304 pairs)		c	= 0.695

Conditional Odds Ratios and 95% Confidence Intervals

			Profile Likelihood Confidence Limits	
Variable	Unit	Odds Ratio	Lower	Upper
CHC USER	1.0000	0.455	0.254	0.766
AGE-0000	1.0000	3.085	1.426	7.090
AGE-0104	1.0000	1.412	0.675	3.171
AGE-0514	1.0000	0.598	0.259	1.425
AGE-1524	1.0000	0.608	0.206	1.644
AGE-4564	1.0000	4.990	1.543	14.173
MALE	1.0000	1.583	1.002	2.517
WHITE	1.0000	0.937	0.568	1.543
NOCASH	1.0000	1.149	0.690	1.861
ME	1.0000	1.178	0.467	2.961
MO	1.0000	1.513	0.741	3.267
PA	1.0000	1.734	0.899	3.613
WA	1.0000	0.648	0.260	1.572
RURAL	1.0000	0.815	0.488	1.341

Conditional Odds Ratios and 95% Confidence Intervals

			Wald Confidence Limits	
Variable	Unit	Odds Ratio	Lower	Upper
CHC_USER	1.0000	0.455	0.263	0.787

	Total	0.017515	0.131185	0	1.000000
MALE	1	0.508571	0.501361	0	1.000000
	0	0.381688	0.485824	0	1.000000
	Total	0.383746	0.486320	0	1.000000
WHITE	1	0.622857	0.486062	0	1.000000
	0	0.590901	0.491691	0	1.000000
	Total	0.591419	0.491594	0	1.000000
NOCASH	1	0.302857	0.460812	0	1.000000
	0	0.240392	0.427342	0	1.000000
	Total	0.241405	0.427955	0	1.000000
ME	1	0.114286	0.319071	0	1.000000
	0	0.169744	0.375425	0	1.000000
	Total	0.168844	0.374632	0	1.000000
MO	1	0.217143	0.413484	0	1.000000
	0	0.163056	0.369434	0	1.000000
	Total	0.163933	0.370232	0	1.000000
PA	1	0.302857	0.460812	0	1.000000
	0	0.294367	0.455779	0	1.000000
	Total	0.294505	0.455841	0	1.000000
WA	1	0.148571	0.356686	0	1.000000
	0	0.203466	0.402595	0	1.000000
	Total	0.202576	0.401938	0	1.000000
RURAL	1	0.554286	0.498471	0	1.000000
	0	0.502072	0.500019	0	1.000000
	Total	0.502919	0.500015	0	1.000000

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	1791.735	1695.071	
SC	1799.022	1804.368	
-2 LOG L	1789.735	1665.071	124.664 with 14 DF (p=0.0001)
Score		.	155.365 with 14 DE (p=0.0001)

Analysis of Maximum Likelihood Estimates

full year persons
Near-exclusive user: chc2user = 1
Regular user : chc2user = 0
state & rural (not weighted by area)

The LOGISTIC Procedure

Data Set: USER.ACSC202
Response Variable: ACSCHOSP ACSC Hospitalization
Response Levels: 2
Number of Observations: 10791
Link Function: Logit

Response Profile

Ordered Value	ACSCHOSP	Count
1	1	175
2	0	10616

Simple Statistics for Explanatory Variables

Variable	ACSCHOSP	Mean	Standara Deviation	Minimum	Maximum
CHC2USER	1	0.634286	0.483012	0	1.000000
	0	0.715618	0.451141	0	1.000000
	Total	0.714299	0.451769	0	1.000000
AGE_0000	1	0.365714	0.483012	0	1.000000
	0	0.108610	0.311163	0	1.000000
	Total	0.112779	0.316337	0	1.000000
AGE-0104	1	0.331429	0.472077	0	1.000000
	0	0.275245	0.446659	0	1.000000
	Total	0.276156	0.447116	0	1.000000
AGE_0514	1	0.120000	0.325894	0	1.000000
	0	0.299642	0.458123	0	1.000000
	Total	0.296729	0.456837	0	1.000000
AGE_1524	1	0.085714	0.280745	0	1.000000
	0	0.135173	0.341925	0	1.000000
	Total	0.134371	0.341067	0	1.000000
AGE_4564	1	0.011429	0.106597	0	1.000000
	0	0.017615	0.131553	0	1.000000

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-4.4628	0.3435	168.7604	0.0001		
CHC2USER	1	-0.3654	0.1614	5.1252	0.0236	-0.091005	0.694
AGE 0000	1	1.7034	0.3040	31.4049	0.0001	0.297091	5.493
AGE-0104	1	0.6854	0.3039	5.0869	0.0241	0.168957	1.985
AGE-0514	1	-0.4287	0.3484	1.5136	0.2186	-0.107964	0.651
AGE-1524	1	0.1195	0.3683	0.1052	0.7457	0.022462	1.127
AGE-4564	1	0.1949	0.7581	0.0661	0.7971	0.014098	1.215
MALE	1	0.3383	0.1615	4.3897	0.0362	0.090711	1.403
WHITE	1	0.00459	0.1975	0.0005	0.9815	0.001245	1.005
NOCASH	1	-0.0948	0.1772	0.2864	0.5926	-0.022378	0.910
ME	1	-0.6523	0.2970	4.8237	0.0281	-0.134729	0.521
MO	1	-0.1156	0.2509	0.2124	0.6449	-0.023599	0.891
PA	1	-0.2326	0.2189	1.1284	0.2881	-0.058452	0.792
WA	1	-0.5891	0.2639	4.9831	0.0256	-0.130553	0.555
RURAL	1	0.4583	0.1779	6.6386	0.0100	0.126331	1.581

Association of Predicted Probabilities and Observed Responses

Concordant = 70.4%	Somers' D = 0.458
Discordant = 24.6%	Gamma = 0.482
Tied = 5.0%	Tau-a = 0.015
(1857800 pairs)	c = 0.729

Conditional Odds Ratios and 95% Confidence Intervals

Variable	Unit	Odds Ratio	Profile Likelihood Confidence Limits Lower	Upper
CHC2USER	1.0000	**0.694**	0.508	0.957
AGE 0000	1.0000	5.493	3.104	10.300
AGE-0104	1.0000	1.985	1.121	3.720
AGE-0514	1.0000	0.651	0.331	1.312
AGE-1524	1.0000	1.127	0.543	2.337
AGE-4564	1.0000	1.215	0.190	4.367
MALE	1.0000	1.403	1.023	1.928
WHITE	1.0000	1.005	0.681	1.478
NOCASH	1.0000	0.910	0.638	1.280
ME	1.0000	0.521	0.287	0.924
MO	1.0000	0.891	0.544	1.459
PA	1.0000	0.792	0.518	1.224
WA	1.0000	0.555	0.327	0.926
RURAL	1.0000	1.581	1.115	2.242

Conditional Odds Ratios and 95% Confidence Intervals

Variable	Unit	Odds Ratio	Wald Confidence Limits Lower	Upper

AGE 0000	1.0000	3.085	1.395	6.823
AGE-0104	1.0000	1.412	0.656	3.036
AGE-0514	1.0000	0.598	0.257	1.387
AGE-1524	1.0000	0.608	0.220	1.679
AGE-4564	1.0000	4.990	1.691	14.729
MALE	1.0000	1.583	1.000	2.504
WHITE	1.0000	0.937	0.570	1.542
NOCASH	1.0000	1.149	0.701	1.882
ME	1.0000	1.178	0.473	2.933
MO	1.0000	1.513	0.727	3.151
PA	1.0000	1.734	0.871	3.452
WA	1.0000	0.648	0.268	1.570
RURAL	1.0000	0.815	0.492	1.348

APPENDIX B: EXHIBITS - COMPANION **LOGIT** TABLES

Exhibit 4: ACSC Events Profile, by CHC-User Status

a. ACSC Admissions

full samp	state and chc_user 1=user: KY Nonuser	KY User	KY Total	ME Nonuser	ME User	ME Total	MO Nonuser	MO User	MO Total
Any ACSC	117	53	170	100	35	135	193	59	252
Chronic ACSC	47	20	67	45	17	62	93	21	114
Acute ACSC	70	33	103	55	18	73	100	38	138
Pediatric ACSC	81	45	126	56	20	76	150	51	201
Adult ACSC	36	8	44	44	15	59	43	8	51
rural	57	29	86	100	35	135	84	20	104
urban	60	24	84				109	39	148
BY ACSC									
1	0	0	0	0	0	0	1	0	1
2a	0	0	0	0	0	0	0	0	0
2b	0	0	0	0	0	0	0	0	0
3	5	5	10	4	2	6	12	1	13
4	10	4	14	3	1	4	8	8	16
5	1	0	1	0	0	0	0	1	1
6	2	1	3	0	4	4	1	0	1
7	23	11	34	12	2	14	44	18	62
8	25	8	33	24	8	32	61	17	78
9	2	0	2	0	1	1	3	0	3
10	1	0	1	0	0	0	2	0	2
11	9	5	14	3	0	3	7	3	10
12	3	1	4	14	2	16	7	0	7
13	2	0	2	0	0	0	0	0	0
14	22	11	33	23	11	34	29	6	35
15	8	3	11	5	3	8	12	2	14
16	0	0	0	0	0	0	0	1	1
17	0	0	0	0	0	0	0	0	0
18	0	1	1	2	0	2	3	1	4
19	3	2	5	8	0	8	3	1	4
20	1	1	2	2	1	3	0	0	0

full samp	PA Nonuser	PA User	PA Total	WA Nonuser	WA User	WA Total	Total Nonuser	Total User	Total Total
Total	200	78	278	120	48	168	730	273	1003
Chronic ACSC	96	31	127	45	9	54	326	98	424
Acute ACSC	104	47	151	75	39	114	404	175	579
Pediatric ACSC	127	65	192	72	35	107	486	216	702
Adult ACSC	73	13	86	48	13	61	244	57	301
rural	87	33	120	54	29	83	382	146	528
urban	113	45	158	66	19	85	348	127	475
BY ACSC									
1	5	1	6	0	0	0	6	1	7
2a	1	0	1	0	0	0	1	0	1
2b	0	0	0	0	0	0	0	0	0
3	11	0	11	8	6	14	40	14	54
4	9	3	12	3	1	4	33	17	50
5	0	0	0	0	0	0	1	1	2
6	1	0	1	0	0	0	4	5	9
7	36	15	51	21	10	31	136	56	192
8	65	23	88	23	0	23	198	56	254
9	3	1	4	2	0	2	10	2	12
10	1	0	1	1	0	1	5	0	5
11	8	5	13	6	2	8	33	15	48
12	7	2	9	5	1	6	36	6	42
13	0	0	0	1	0	1	3	0	3
14	32	16	48	33	19	52	139	63	202
15	8	7	15	9	7	16	42	22	64
16	1	0	1	0	0	0	1	1	2
17	0	0	0	0	0	0	0	0	0
18	2	1	3	0	0	0	7	3	10
19	9	2	11	7	1	8	30	6	36
20	1	2	3	1	1	2	5	5	10

Exhibit 4: ACSC Events Profile, by CHC-User Status
b. ACSC Associated Outpatient Visits -- Professional and Emergency Room

full samp	state and chc_user 1=user: KY Nonuser	KY User	KY Total	ME Nonuser	ME User	ME Total	MO Nonuser	MO User	MO Total
All ACSCs	9439	4681	14120	5830	4183	10013	10669	5803	16472
Chronic ACSCs	1278	769	2047	1166	821	1987	2060	725	2785
Acute ACSCs	8161	3912	12073	4664	3362	8026	8609	5078	13687
Pediatric	7367	3713	11080	4565	2890	7455	8399	5049	13448
Adult	2072	968	3040	1265	1293	2558	2270	754	3024
Urban	4968	1937	6905				4809	3649	8458
Rural	4471	2744	7215	5830	4183	10013	5860	2154	8014
BY ACSC									
3 1	198	99	297	152	53	205	265	65	330
4	6600	3107	9707	3808	2770	6578	6665	4190	10855
5	61	24	85	3	0	3	15	9	24
6	86	43	129	45	64	109	72	8	80
7	267	141	408	114	103	217	439	245	684
8	499	356	855	583	303	886	1145	460	1605
9	11	7	18	1	11	12	25	1	26
10	154	105	259	95	149	244	161	43	204
11	182	86	268	103	112	215	218	103	321
12	148	73	221	187	129	316	174	45	219
14	753	326	1079	339	236	575	904	412	1316
15	354	257	611	311	215	526	420	157	577
19	123	56	179	71	27	98	147	54	201
20	3	1	4	18	11	29	19	11	30

full samp	state and chc_user 1=user: PA Nonuser	PA User	PA Total	WA Nonuser	WA User	WA Total	Total Nonuser	Total User	Total Total
All ACSCs	13737	6253	19990	15911	1807	23718	55586	28727	84313
Chronic ACSCs	2645	1213	3858	2308	1175	3483	9457	4703	14160
Acute ACSCs	11092	5040	16132	13603	6632	20235	46129	24024	70153
Pediatric	9629	4732	14361	11969	5967	17936	41929	22351	64280
Adult	4108	1521	5629	3942	1840	5782	13651	6316	20033
Urban	7934	3382	11316	8394	3522	11916	26105	12490	38595
Rural	5803	2811	8674	7517	4285	11802	29481	16237	45718
BY ACSC									
3	326	66	392	298	186	484	1239	469	1708
4	9109	3936	13045	10919	5265	16184	37101	19268	56369
5	30	8	38	144	34	178	253	75	328
6	104	41	145	90	20	110	397	176	573
7	250	126	376	469	195	664	1539	810	2349
8	1297	583	1880	1040	359	1399	4564	2061	6625
9	37	23	60	23	2	25	97	44	141
10	387	160	547	194	207	401	991	664	1655
11	240	121	361	425	212	637	1168	634	1802
12	254	219	473	238	189	427	1001	655	1656
14	1073	629	1702	1277	723	2000	4346	2326	6672
15	458	253	711	578	333	911	2121	1215	3336
19	159	76	235	182	75	257	682	288	970
20	13	12	25	34	7	41	87	42	129

Exhibit 5: Medicaid Beneficiaries With an ACSC Hospitalization

full samp	KY Nonuser	KY User	KY Total	ME Nonuser	ME User	ME Total	MO Nonuser	MO User	MO Total
Any ACSC	105	49	154	73	30	103	164	55	219
Chronic ACSC	43	19	62	25	12	37	74	19	93
Acute ACSC	66	32	98	50	18	68	92	37	129
Pediatric	72	41	113	46	19	65	126	47	173
Adult	33	8	41	27	11	38	38	8	46
Urban	53	22	75				91	35	126
Rural	52	27	79	73	30	103	73	20	93
BY ACSC									
1	0	0	0	0	0	0	1	0	1
2a	0	0	0	0	0	0	0	0	0
2b	0	0	0	0	0	0	0	0	0
3	3	5	8	3	2	5	10	1	11
4	10	4	14	3	1	4	8	8	16
5	1	0	1	0	0	0	0	1	1
6	2	1	3	0	1	1	1	0	1
7	23	11	34	10	2	12	41	18	59
8	23	8	31	17	8	25	48	15	63
9	2	0	2	0	1	1	2	0	2
10	1	0	1	0	0	0	2	0	2
11	9	4	13	3	0	3	7	3	10
12	3	1	4	2	1	3	5	0	5
13	2	0	2	0	0	0	0	0	0
14	19	11	30	21	11	32	27	6	33
15	8	3	11	5	3	8	12	2	14
16	0	0	0	0	0	0	0	1	1
17	0	0	0	0	0	0	0	0	0
18	0	1	1	2	0	2	3	1	4
19	3	2	5	7	0	7	3	1	4
20	1	1	2	2	1	3	0	0	0

full samp	PA Nonuser	PA User	PA Total	WA Nonuser	WA User	WA Total	Total Nonuser	Total User	Total Total
Any ACSC	162	70	232	106	43	149	610	247	857
Chronic ACSC	74	25	99	32	9	41	248	84	332
Acute ACSC	94	46	140	75	34	109	377	167	544
Pediatric	105	57	162	62	31	93	411	195	606
Adult	57	13	70	44	12	56	199	52	251
Urban	87	40	127	56	17	73	287	114	401
Rural	75	30	105	50	26	76	323	133	456
BY ACSC									
1	5	1	6	0	0	0	6	1	7
2a	1	0	1	0	0	0	1	0	1
2b	0	0	0	0	0	0	0	0	0
3	11	0	11	3	6	9	30	14	44
4	9	3	12	3	1	4	33	17	50
5	0	0	0	0	0	0	1	1	2
6	1	0	1	0	0	0	4	2	6
7	30	14	44	21	9	30	125	54	179
8	46	17	63	16	0	16	150	48	198
9	2	1	3	2	0	2	8	2	10
10	1	0	1	1	0	1	5	0	5
11	8	5	13	6	2	8	33	14	47
12	6	2	8	4	1	5	20	5	25
13	0	0	0	1	0	1	3	0	3
14	31	16	47	33	18	51	131	62	193
15	8	7	15	9	6	15	42	21	63
16	1	0	1	0	0	0	1	1	2
17	0	0	0	0	0	0	0	0	0
18	2	1	3	0	0	0	7	3	10
19	9	2	11	7	1	8	29	6	35
20	1	2	3	1	1	2	5	5	10

Exhibit 6: ACSC Admissions

Logit Estimates

Number of obs = 48739
chi2(17) = 341.60
Prob > chi2 = 0.0000
Log Likelihood = -4131.7716 Pseudo R2 = 0.0419

i_adm	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.7797349	.0597447	-3.247	0.001	.671006	.9060822
age-00	2.861282	.3227587	9.320	0.000	2.293736	3.569259
age-0104	1.23161	.1408584	1.821	0.069	.9842875	1.541078
age 0514	.427436	-0586431	-6.195	0.000	.3266545	.5593114
age-1524	.8214117	.1099909	-1.469	0.142	.6318021	1.067925
age_4564	1.663219	.4072997	2.078	0.038	1.029205	2.687801
male	1.121751	.0811946	1.587	0.112	.9733854	1.292731
whiteME	.9398681	.077033	-0.757	0.449	.8003891	1.103653
nocash	.822079	-0669449	-2.406	0.016	.7008048	.9643397
rural	1.165002	.0936896	1.899	0.058	.995114	1.363893
ME	.7387536	-1012868	-2.208	0.027	.5646712	.9665038
MO	1.19396	.1278051	1.656	0.098	.9679981	1.472668
PA	-8868998	-0941138	-1.131	0.258	.7203588	1.091944
WA	-6314247	-0741367	-3.916	0.000	.5016266	.7948087
elg_le6	.3353896	-0750836	-4.880	0.000	.2162674	.5201253
elg 6 8	-7013386	.0813379	-3.059	0.002	.5587396	.8803311
elg 9 11	.7871486	.0827243	-2.277	0.023	.6406205	.9671918

Exhibit 7: Multiple ACSC Admissions -- Study Population

Logit Estimates — Number of obs = 48739
chi2(17) = 62.25
Prob > chi2 = 0.0000
Log Likelihood = -716.83785 — Pseudo R2 = 0.0437

i_adm2	Odds Ratio	Robust std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.4564568	.1132337	-3.161	0.002	.2806993	.7422634
age_00	2.659401	.8974057	2.899	0.004	1.372615	5.15251
age-0104	1.324398	.4360069	0.853	0.393	.6946932	2.524897
age-0514	.6064933	.2246753	-1.350	0.177	.293426	1.253584
age-1524	.7253435	.2987666	-0.780	0.436	.3235464	1.626114
age-4564	3.678253	1.909844	2.508	0.012	1.329461	10.17671
male	1.436005	.2934842	1.771	0.077	.9620362	2.143486
whiteME	.977732	-2231877	-0.099	0.921	.6250509	1.529411
nocash	.919712	.2260355	-0.341	0.733	.5681382	1.488846
rural	.8160265	.192884	-0.860	0.390	.5134591	1.296888
ME	1.517242	.6230781	1.015	0.310	.6784158	3.393231
MO	1.802029	.6073964	1.747	0.081	.9307943	3.48875
PA	1.618227	.5233743	1.488	0.137	.8584997	3.050275
WA	.7627723	-2958634	-0.698	0.485	.3566414	1.631391
elg_le6	.1189359	.1225	-2.067	0.039	.015798	.8954109
elg_6_8	.4126065	.1655507	-2.206	0.027	.1879348	.9058678
elg_9_11	.6882179	.2201205	-1.168	0.243	.3676856	1.288176

Exhibit 8: Multiple ACSC Admissions --Medicaid benficiaries with At Least One Admission

Logit Estimates

Number of obs = 857
chi2(17) = 23.92
Prob > chi2 = 0.1217
Pseudo R2 = 0.0408

Log Likelihood = -305.73458

i_adm2	Odds Ratio	Robust std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.5461514	.1427376	-2.314	0.021	.3272277	.9115406
age-00	.9583039	.3750541	-0.109	0.913	.4450063	2.063671
age-0104	1.147597	.4424735	0.357	0.721	.5390084	2.443335
age-0514	1.516993	.646093	0.978	0.328	.658345	3.495534
age-1524	.8932876	.3952173	-0.255	0.799	.3753135	2.126123
age 4564	2.886132	1.645681	1.859	0.063	.9439708	8.824167
-male	1.344349	.31362	1.268	0.205	.8510154	2.123669
whiteME	1.048685	.2602331	0.192	0.848	.6447894	1.705581
nocash	1.040017	.2661365	0.153	0.878	.629827	1.717354
rural	.6768137	.1704441	-1.550	0.121	.4131506	1.10874
ME	2.355931	1.013244	1.992	0.046	1.014089	5.473298
MO	1.580504	.5774339	1.253	0.210	.7723438	3.2343
PA	1.928966	.6823987	1.857	0.063	.9642733	3.858771
WA	1.376763	.5798293	0.759	0.448	.6030765	3.143013
elg_le6	.310657	.3245493	-1.119	0.263	.040088	2.407396
elg 6.8	.5365022	.22789	-1.466	0.143	.2333494	1.233492
elg 9 11	.8166878	.2920839	-0.566	0.571	.4051619	1.646204

Exhibit 9: ACSC Admissions -- Only CHC users
Regular Users and Near Exclusive Users of CHCs

Logit Estimates — Number of obs = 16145; chi2(17) = 118.74; Prob > chi2 = 0.0000; Log Likelihood = -1215.097; Pseudo R2 = 0.0489

i_adm	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
REGuser	1.398536	.1943008	2.414	0.016	1.06516	1.836253
age_00	4.273046	1.067979	5.811	0.000	2.618143	6.973996
age-0104	1.972023	.4978114	2.690	0.007	1.202368	3.234348
age-0514	.6673146	.1944017	-1.388	0.165	.3770154	1.181142
age-1524	1.165556	.3394631	0.526	0.599	.6586044	2.062728
age-4564	1.722419	.9427824	0.993	0.321	.5891497	5.03561
male	1.193916	.1643263	1.288	0.198	.9116275	1.563616
whiteME	1.16401	.1909673	0.926	0.355	.8439342	1.605479
nocash	.8875113	.1306959	-0.810	0.418	.6650051	1.184466
rural	1.246081	.1899827	1.443	0.149	-9242058	1.680057
ME	.6396716	.1586151	-1.802	0.072	.3934507	1.039977
MO	.9256508	.1956108	-0.366	0.715	.6117433	1.400636
PA	.8086128	.1536848	-1.118	0.264	.5571362	1.173599
WA	.5536771	.1191581	-2.747	0.006	.3631345	.8442005
elg_le6	.3852392	.1411652	-2.603	0.009	.187854	.7900245
elg_6_8	.6599047	.1476769	-1.857	0.063	.4255934	1.023217
elg_9_ll	.7834554	.1544763	-1.238	0.216	.5323291	1.153051

Exhibit 10: ACSC Admissions, by ACSC Cluster
Exhibit 10a: Admissions for Chronic Conditions -- Children

Logit Estimates — Number of obs = 31709
chi2(14) = 106.15
Prob > chi2 = 0.0000
Log Likelihood = -1338.0798 — Pseudo R2 = 0.0452

ick_adm	Odds Ratio	Robust std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.741527	.1067111	-2.078	0.038	.5592846	.9831529
age_00	3.504343	.6537425	6.722	0.000	2.431158	5.051263
age-0104	2.105279	.3520582	4.452	0.000	1.516933	2.921817
male	1.593579	.214777	3.457	0.001	1.223634	2.07537
whiteME	.9096315	.140121	-0.615	0.539	.6725819	1.230229
nocash	.8417149	.1290806	-1.124	0.261	.6232031	1.136843
rural	.6721293	.1062804	-2.513	0.012	.4930111	.9163237
ME	.988644	.2767468	-0.041	0.967	.5711718	1.711249
MO	1.395835	.2698167	1.725	0.084	.9556427	2.038789
PA	.9413655	.1856814	-0.306	0.759	.6395308	1.385655
WA	.4802527	.1164149	-3.026	0.002	.2986315	.772332
elg_le6	.0931371	.0670606	-3.297	0.001	.0227112	.3819488
elg_6_8	.5370428	.1390324	-2.401	0.016	.3233297	.8920153
elg_9_11	.7349317	.1566395	-1.445	0.148	.4839788	1.116009

Exhibit 10: ACSC Admissions, by ACSC Cluster
Exhibit 10b: Admissions for Chronic Conditions -- Adults

Logit Estimates

Number of obs = 17029
chi2(13) = 50.24
Prob > chi2 = 0.0000
Log Likelihood = -558.14191
Pseudo R2 = 0.0418

icA_adm	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
user	-4620835	.1255195	-2.842	0.004	-2713324	.7869358
age-1524	-5836496	.1368589	-2.296	0.022	.3686001	.9241637
age-4564	2.876364	.8990174	3.380	0.001	1.558827	5.307498
male	1.018259	.2851127	0.065	0.948	.5881958	1.762767
whiteME	.7647948	.1832211	-1.119	0.263	.4782152	1.223113
nocash	.5614489	.1677298	-1.932	0.053	.3126212	1.008328
rural	1.422753	.3306477	1.517	0.129	.9022159	2.243617
ME	.6209087	.243305	-1.216	0.224	.2880592	1.338362
MO	1.047466	.3453366	0.141	0.888	.5489202	1.998805
PA	.9959562	-3005664	-0.013	0.989	.5512631	1.799375
WA	.423264	.1557661	-2.336	0.019	.2057591	-8706899
elg 6 8	1.25912	.3673407	0.790	0.430	.7107785	2.230489
elg 9 11	-9685804	-3049758	-0.101	0.919	.5225392	1.795364

Exhibit 10: ACSC Admissions, by ACSC Cluster
Exhibit 10c: Admissions for Acute Conditions -- Children

Logit Estimates

Number of obs = 31709
chi2(14) = 266.51
Prob > chi2 = 0.0000
Log Likelihood = -1927.8634 Pseudo R2 = 0.0696

iak_adm	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.9422739	1036731	-0.540	0.589	-7594938	1.169042
age_00	10.36047	i-799053	13.464	0.000	7.371766	14.56086
age-0104	3.665999	.6418014	7.421	0.000	2.601199	5.166674
male	1.061599	.1097846	0.578	0.563	.8668299	1.300131
whiteME	.9346808	.1157609	-0.545	0.585	.7332319	1.191476
nocash	.823857	.0965462	-1.653	0.098	.6547886	1.036579
rural	1.761701	.2179209	4.578	0.000	1.382417	2.245045
ME	.5578743	.1149289	-2.833	0.005	.3725448	.8353995
MO	1.061415	.1656297	0.382	0.702	.7817336	1.441159
PA	.7915184	.1243673	-1.488	0.137	.5817227	1.076976
WA	.549185	.0972088	-3.386	0.001	.3881961	.7769375
elg_le6	.4298512	.1035917	-3.503	0.000	.26803	.689371
elg_6 8	.6463877	.1134305	-2.487	0.013	.4582697	.9117274
elg_9_ii	-8202058	.1245923	-1.305	0.192	.6090069	1.104647

Exhibit 10: ACSC Admissions, by ACSC Cluster
Exhibit 10d: Admissions for Chronic Conditions -- Adults

Logit Estimates

Number of obs = 17029
chi2(13) = 16.00
Prob > chi2 = 0.2493
Log Likelihood = -899.43571
Pseudo R2 = 0.0124

iaA_adm	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.6356655	.1229347	-2.343	0.019	.4351213	.928639
age-1524	1.011045	.1632039	0.068	0.946	.7368324	1.387306
age-4564	1.031048	.4097977	0.077	0.939	.4731104	2.24696
male	.4443501	.1318266	-2.734	0.006	.2484259	.7947923
whiteME	1.199659	.220774	0.989	0.323	.8363936	1.720699
nocash	.7114549	.154472	-1.568	0.117	.464872	1.088833
rural	.9385326	.1742525	-0.342	0.733	.6522456	1.350478
ME	1.158269	.3479828	0.489	0.625	.6428063	2.087079
MO	1.058305	.2979142	0.201	0.840	.6095321	1.837491
PA	1.02421	.2640516	0.093	0.926	.6179325	1.697608
WA	1.178409	-3023092	0.640	0.522	.7127356	1.948334
elg_6_8	.853296	.2184295	-0.620	0.535	.5166618	1.409266
elg_9_11	.8531035	.2038558	-0.665	0.506	.5340727	1.362709

Exhibit 11: ACSC Events
Exhibit lla: Likelihood of ACSC Visit

Logit Estimates — Number of obs = 48739
chi2 (17) =3887.47
Prob > chi2 = 0.0000
Log Likelihood = -31285.158 — Pseudo R2 = 0.0645

Oi_amb	Odds Ratio	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
user	1.164921	.023942	7.427	0.000	1.118928	1.212804
age_00	4.295157	.1710165	36.605	0.000	3.972716	4.643769
age-0104	2.254385	.0720654	25.429	0.000	2.117473	2.400149
age-0514	1.099126	.0327402	3.173	0.002	1.036794	1.165206
age-1524	.8420122	.0270674	-5.349	0.000	.7905978	.8967702
age-4564	1.739949	.1381903	6.974	0.000	1.489129	2.033015
male	.8922393	.0187543	-5.425	0.000	.8562284	.9297648
whiteME	1.310001	.0295484	11.971	0.000	1.253349	1.369214
nocash	.9905238	-0217447	-0.434	0.664	.9488088	1.034073
rural	1.187989	.0261014	7.840	0.000	1.137917	1.240265
ME	.58928	.0213287	-14.611	0.000	.5489247	.632602
MO	1.097932	.0357629	2.868	0.004	1.030029	1.170312
PA	.9644985	.0291793	-1.195	0.232	.9089707	1.023418
WA	1.389222	.0431381	10.587	0.000	1.307195	1.476397
elg_le6	.1208978	.0078006	-32.745	0.000	.1065361	.1371954
elg_6_8	.5084768	.0154349	-22.281	0.000	.4791072	.5396467
elg_9_11	.7281493	.0203687	-11.341	0.000	.6893021	.7691858

Exhibit 11: ACSC Events

Exhibit llb: ACSC Admission Among Those with No Associated Visits

Logit Estimates

Number of obs = 21579
chi2(17) = 102.96
Prob > chi2 = 0.0000
Log Likelihood = -725.71767 Pseudo R2 = 0.0557

Oi adm	Odds Ratio	Robust std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.7783917	.1635215	-1.193	0.233	.5156809	1.174939
age-00	4.96565	1.460434	5.449	0.000	2.790175	8.837324
age-0104	1.433322	.4464288	1.156	0.248	.7784397	2.639142
age-0514	.283695	.1170983	-3.052	0.002	.1263306	.6370812
age-1524	1.371554	.3934458	1.101	0.271	.7816928	2.406522
age-4564	3.426936	1.726109	2.445	0.014	1.276925	9.197007
male	.8018828	.1607954	-1.101	0.271	.5412849	1.187944
whiteME	1.022256	.221477	0.102	0.919	.6685628	1.563064
nocash	1.261309	.2514037	1.165	0.244	.8534153	1.864158
rural	1.153206	.2564731	0.641	0.522	.7457606	1.783258
ME	.9400847	.3033752	-0.191	0.848	.4994309	1.769533
MO	.7500913	.2291925	-0.941	0.347	.4121233	1.365215
PA	.830593	.2294462	-0.672	0.502	.483336	1.42734
WA	.5914074	.1926964	-1.612	0.107	.3122788	1.120033
elg_le6	.2179537	.1089376	-3.048	0.002	.0818308	.5805127
elg_6_8	.7568192	.1974108	-1.068	0.285	.4539024	1.261891
elg_9_11	.7459665	.2028109	-1.078	0.281	.4378219	1.270987

Exhibit 11: ACSC Events
Exhibit llc: ACSC Admission Among Those with Associated Visits

Logit Estimates

Number of obs = 27160
chi2(17) = 106.79
Prob > chi2 = 0.0000
Log Likelihood = -3197.5202
Pseudo R2 = 0.0297

Oi_adm	Odds Ratio	Robust std. Err.	z	P>|z|	[95% Conf.	Interval]
user	.7674409	.0641417	-3.167	0.002	.6514824	.9040391
age_00	1.687069	.2112416	4.177	0.000	1.319933	2.156322
age-0104	.9248217	.116112	-0.622	0.534	.7230844	1.182843
age-0514	.4419316	.0651013	-5.543	0.000	.3311035	.5898564
age-1524	.7721383	.1198314	-1.666	0.096	.5696308	1.046638
age-4564	1.21021	.3416413	0.676	0.499	.6959326	2.104526
male	1.242246	.1001312	2.691	0.007	1.06071	1.454852
whiteME	.8748595	.0808909	-1.446	0.148	.7298521	1.048677
nocash	.7594396	.0687428	-3.040	0.002	.6359813	.906864
rural	1.148466	.1021622	1.556	0.120	.9647158	1.367216
ME	.7857697	.1227945	-1.543	0.123	.5784629	1.06737
MO	1.258544	.1463761	1.977	0.048	1.002002	1.580769
PA	.8758849	.1035723	-1.121	0.262	.6946939	1.104334
WA	.5904218	.075473	-4.122	0.000	.4595727	.758526
elg_le6	.4911668	.1808879	-1.931	0.054	.2386419	1.010907
elg_6_8	.7692709	.1057473	-1.908	0.056	.5875833	1.007138
elg_9_11	.8911483	-1020844	-1.006	0.314	.711937	1.115471

Exhibit 12: Emergency Room Visits, CHC-Users and Comparison Group (Nonusers)

	% with ER Visit		Logit Regression			
					95% Confidence Interval	
	User	Nonuser	Odds Ratio	p	Lower	Upper
Acute Conditions						
No Admission	24.8%	27.9%	0.85	<0.001	0.80	0.91
Admission	60.4%	56.4%	1.13	0.58	0.73	1.76
All	25.5%	28.5%	0.85	<0.001	0.80	0.91
Chronic Conditions						
No Admission	14.7%	16.7%	0.89	0.17	0.75	2.70
Admission	51.3%	57.2%	0.85	0.60	0.45	1.57
All	16.3%	19.5%	0.81	0.01	0.70	0.95
All Conditions						
No Admission	24.5%	27.6%	0.85	<0.001	0.80	0.90
Admission	63.2%	60.5%	1.12	0.54	0.78	1.60
All	25.4%	28.7%	0.84	co.00 1	0.80	0.90

Exhibit 13: Average Number of ER Visits, CHC-Users and Comparison Group (Nonusers)

	ER Visits		Logit Regression			
			User Visits Less Nonuser Visits		95% Confidence Interval	
	User	Nonuser		p	Lower	Upper
Acute Conditions						
No Admission	0.35	0.40	**-0.05**	**<0.001**	-0.07	-0.03
Admission	1.15	0.98	0.14	0.26	-0.10	0.39
All	0.36	0.41	-0.04	**<0.001**	-0.06	-0.02
Chronic Conditions						
No Admission	0.19	0.20	-0.02	**0.29**	-0.05	0.01
Admission	0.86	1.20	-0.18	0.31	-0.54	0.17
All	0.22	0.28	-0.06	co.01	-0.09	-0.02
All **Conditions**						
No Admission	0.35	0.40	**-0.05**	<0.00 1	-0.06	-0.03
Admission	1.29	1.29	**-0.00**	0.97	-0.23	0.22
All	0.38	0.43	**-0.05**	**<0.001**	-0.07	-0.03

Exhibit 14: Only ER Visits for ACSC Outpatient Care

	% with Only ER Visit		Logit Regression			
					95% Confidence Interval	
	User	Nonuser	Odds Ratio	p	Lower	Upper
Acute Conditions						
No Admission	8.1%	10.9%	0.76	<0.001	0.69	0.84
Admission	4.0%	3.9%	0.85	0.78	0.29	2.52
All	8.1%	10.7%	0.77	<0.001	0.70	0.84
Chronic Conditions						
No Admission	7.1%	8.6%	0.83	0.10	0.67	1.05
Admission	1.3%	4.7%	0.84	0.12	0.03	2.91
All	6.8%	8.3%	0.83	0.10	0.67	1.04
All Conditions						
No Admission	7.2%	9.8%	0.75	<0.001	0.68	0.82
Admission	1.3%	3.3%	0.33	0.09	0.09	1.18
All	7.1%	9.6%	0.75	<0.001	0.68	0.83

Exhibit 15: Average Number of Outpatient Professional Visits

	Average # Professional Visits		Logit Regression			
			User Visits Less Nonuser Visits		95% Confidence Interval	
	User	Nonuser		p	Lower	Upper
Acute Conditions						
No Admission	1.25	1.17	0.04	0.02	0.01	0.09
Admission	5.56	4.69	0.73	0.10	-0.13	1.59
All	1.29	1.21	0.05	0.02	0.01	0.09
Chronic Conditions						
No Admission	0.24	0.20	0.04	<0.001	0.02	0.06
Admission	6.02	7.92	-0.91	0.26	-2.5 1	0.69
All	0.27	0.26	0.01	0.44	-0.01	0.03
All Conditions						
No Admission	1.48	1.36	0.09	<0.00 1	0.04	0.13
Admission	7.00	7.33	-0.27	0.59	-1.27	0.73
All	1.56	1.47	0.06	0.02	0.01	0.10