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Potentially Avoidable Hospitalizations in North Carolina, 1997

by

Kathleen Jones-Vessey

ABSTRACT

Objectives: Research suggests that hospitalizations for certain health conditions may be preventable. This paper analyzes North Carolina resident hospital discharge records for potentially avoidable hospitalizations, including those for pneumonia, congestive heart failure, cellulitis, perforated or bleeding ulcer, pyelonephritis, diabetes with ketoacidosis or coma, ruptured appendix, malignant hypertension, hypokalemia, immunizable conditions, and gangrene.

Methods: North Carolina resident hospital discharge data for calendar year 1997 are used to examine differences in preventable hospitalization rates by diagnostic category, sex, age group, payer source, and county.

Results: Approximately 12 percent of all 1997 North Carolina resident hospital discharges are potentially avoidable, resulting in over \$740 million in hospital charges. Pneumonia and congestive heart failure are the two most common causes of preventable hospitalization, together accounting for 65 percent of all avoidable hospitalizations. Women have preventable hospitalization rates somewhat higher than the rates of men. Those ages 65 and over and those on Medicare account for over half of potentially avoidable hospitalizations. Sixty-one of North Carolina's one hundred counties have preventable hospitalization rates above the state average of 1,118 per 100,000 population. In addition, counties with the lowest per capita income levels have the highest avoidable hospitalization rates.

Conclusions: Potentially avoidable hospitalizations are a problem in North Carolina – especially for the state's poor, rural, and elderly populations. More emphasis should be placed on appropriate primary care interventions among lower income, rural, and aged populations to prevent their health problems from escalating to the point of requiring inpatient hospitalization.



Introduction

While many inpatient hospitalizations are for trauma emergencies or elective procedures, some hospitalizations might have been avoided if satisfactory primary care had been used or conditions had been diagnosed earlier. Research suggests that certain diagnoses in particular are often associated with problems in access to or use of primary care. Using diagnostic criteria established in previous research,^{1,2} this paper investigates potentially avoidable inpatient hospital discharges based on selected conditions listed as the principal/first-listed diagnosis. Using 1997 North Carolina hospital discharge data, this study examines demographic factors associated with these preventable hospitalizations.

Methods

Potentially avoidable hospitalizations are defined as hospitalizations that may have been averted if preventive primary care had been obtained before the illness progressed. For this report, the term potentially avoidable, avoidable, and preventable hospitalizations are used interchangeably to refer to hospitalizations for these conditions. Diagnostic categories correspond with criteria used in other state and national studies of avoidable hospital admissions.^{1,2} Diagnostic codes were verified using the *International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM)*.³ **Table 1** presents a complete list of the conditions used for this analysis and their corresponding ICD-9-CM codes.

To determine the number of avoidable inpatient hospitalizations, the 1997 North Carolina hospital discharge files were analyzed. The hospital discharge files contain information on all inpatient hospital stays from the state's 135 non-federal, short-stay general and specialty hospitals. Consistent with previous research using hospital discharge data, discharges for newborns and deliveries were excluded from this analysis,^{1,2,4} as were records for residents of other states.⁵ In addition, North Carolina residents discharged from out-of-state hospitals are not included in the North Carolina hospital discharge database. After these exclusions, the 1997 file contains 753,131 North Carolina resident discharges. It should be noted that the database does not have

Primary Diagnosis	ICD-9-CM Codes
Pneumonia	481-483, 485-486
Congestive Heart Failure	402.01, 402.11, 402.91, 428
Asthma	493
Cellulitis ¹	681, 682
Perforated or bleeding ulcer	531.0, 531.2, 531.4, 531.6 532.0, 532.2, 532.4, 532.6, 533.0-533.2, 533.4-533.6
Pyelonephritis ²	590.0, 590.1, 590.8
Diabetes with ketoacidosis ³ or coma	250.1-250.3, 251.0
Ruptured appendix	540.0-540.1
Malignant hypertension	401.0, 402.0, 403.0, 404.0, 405.0, 437.2
Hypokalemia ⁴	276.8
Immunizable Conditions ⁵	032, 033, 037, 045, 055, 072
Gangrene	785.4
¹ Inflammation or abscess of the skin. ² Kidney infection. ³ A profound insulin deficiency which results in the build-up of acids in the blood. ⁴ Potassium deficiency. ⁵ Diphtheria, whooping cough, tetanus, acute poliomyelitis, measles, and mumps.	

unique patient identifiers, therefore individuals with more than one hospital visit during the year were counted multiple times.

For this paper, avoidable hospitalizations were analyzed with regard to various demographic variables including sex, age, insurance/payer class, and county of residence. Prior research suggests that preventable hospitalizations may be more prevalent in areas where income is low.^{2, 6, 7, 8, 9} To examine whether this is true in North Carolina, 1997 estimated per capita personal income data supplied by North Carolina's Department of Commerce was used.¹⁰ Although race has been the subject of previous avoidable hospitalization studies,

race was not examined in this analysis due to incomplete reporting of race on the hospital discharge records in North Carolina.

Results

Table 2 presents the number of hospitalizations for each diagnosis, the hospitalization rate per 100,000 population, total days spent in the hospital, average length of stay, total hospital charges, average charge per stay, and the average charge per day. Charges indicate the amount billed by the hospital to the patient or the patient's insurance company. It should be noted that this figure does not indicate what is paid to the hospital, as negotiations regarding reasonable costs of services and discounts are not accounted for here. Length of stay is the number of days spent as an inpatient in the hospital for each principal/primary diagnosis.

Based on this method, 87,877 hospitalizations were potentially avoidable, representing 12 percent of all 1997 North Carolina inpatient hospitalizations. These hospitalizations accounted for \$741 million in hospital charges. The average avoidable hospitalization results in a stay of approximately six days and a charge of over \$8,400. Of all avoidable hospitalizations, pneumonia was the most common primary diagnosis, accounting for 34 percent of all preventable hospitalizations and over \$290 million in total charges. The average length of stay for pneumonia, of just under one week, was second only to gangrene (with an average length of stay of 9 days). Immunizable conditions resulted in the fewest hospitalizations, with only 51 total hospital discharges attributable to these diagnoses. In total, there were 1182.5 avoidable hospitalizations per 100,000 population in 1997. The avoidable hospitalization rate remained fairly stable during the period 1995 through 1997 – with a rate of 1154.4 per 100,000 in 1995 and a rate of 1161.0 per 100,000 in 1996.

Table 2
Avoidable Hospitalizations and Rates* by Condition, Charges and Length of Stay
North Carolina, CY 1997

Primary Diagnosis	Total Discharges	Discharge Rate*	Average Length of Stay	Total Hospital Charges	Average Charge per Stay	Average Charge per Day
Pneumonia	29,684	399.5	6.6	\$290,300,314	\$9,780	\$1,471
Congestive Heart Failure	27,260	366.8	5.8	\$247,251,985	\$9,070	\$1,566
Asthma	10,879	146.4	3.6	\$52,290,966	\$4,807	\$1,332
Cellulitis	5,932	79.8	5.5	\$38,831,757	\$6,546	\$1,194
Perforated or bleeding ulcer	3,728	50.2	5.4	\$35,975,088	\$9,650	\$1,798
Pyelonephritis	3,357	45.2	4.1	\$17,508,124	\$5,215	\$1,274
Diabetes with ketoacidosis or coma	3,452	46.5	4.4	\$23,093,192	\$6,690	\$1,511
Ruptured appendix	1,515	20.4	6.2	\$19,076,168	\$12,592	\$2,030
Malignant hypertension	1,255	16.9	5.6	\$9,990,083	\$7,960	\$1,434
Hypokalemia	573	7.7	4.0	\$3,101,740	\$5,413	\$1,338
Gangrene	191	2.6	9.4	\$3,022,131	\$15,823	\$1,675
Immunizable Conditions	51	0.7	5.8	\$353,303	\$6,928	\$1,202
TOTAL	87,877	1182.5	5.7	\$740,794,851	\$8,430	\$1,491

*Discharge rate is expressed per 100,000 population.

Most of the patients admitted to the hospital for potentially avoidable conditions were transferred directly from an emergency room (60 percent) and nearly all had “emergency” or “urgent” listed as the admission type (96 percent).

Table 3 presents 1997 avoidable hospitalizations and rates by sex. Pneumonia was the most common avoidable hospitalization diagnosis for both males and females – accounting for about a third of all avoidable hospitalizations for each sex. Comparing sex-specific hospitalization rates, women were more likely to enter the hospital suffering from congestive heart failure, asthma, pyelonephritis, malignant hypertension, and hypokalemia than their male counterparts. In contrast, discharge rates for cellulitis, perforated/bleeding ulcer, and ruptured appendix were higher among men. Men and women were almost equally likely to be hospitalized for pneumonia, diabetes with ketoacidosis or coma, immunizable conditions, and gangrene.

Table 4 displays information on avoidable hospitalizations by age. Among avoidable hospitalizations for patients ages 0 to 14, asthma was the most common primary diagnosis, with a rate of 269.0 per 100,000 population, followed closely by pneumonia with a rate of 248.7 in 1997. It should be noted that the vast majority of the hospitalizations for immunizable conditions (45 out of 51) occurred among those 14 and under. Consistent with the general population, among those ages 15 to 44, pneumonia again had the highest rate. However, for those ages 45 to 64, the highest avoidable hospitalization rate was for congestive heart failure (379.6). Those ages 65 and older had the highest overall avoidable hospitalization rate for all conditions (4811.1) – amounting to over half of all cases. Among the 65 and over age group, congestive heart failure and pneumonia far surpassed the inpatient hospitalization rates for all other conditions.

Table 5 shows avoidable hospitalization discharge figures for major insurance categories: Health Maintenance Organizations, other private insurance, Medicare, Medicaid, and other government insurance. This table also includes those with no insurance, those who reported that they would be paying for their hospital costs themselves, and those whose hospitalization was billed to a charity. It should be noted that in some cases, charges which are initially billed as self-pay, indigent, or charity are subsequently paid by Medicaid.

Table 3 Avoidable Hospitalization Rates* by Condition and Sex North Carolina, CY 1997				
Primary Diagnosis	Female		Male	
	Number	Rate	Number	Rate
Pneumonia	15,506	404.9	14,178	393.6
Congestive Heart Failure	15,242	398.0	12,018	333.7
Asthma	6,726	175.7	4,153	115.3
Cellulitis	2,887	75.4	3,045	84.5
Perforated or bleeding ulcer	1,669	43.6	2,059	57.2
Pyelonephritis	2,842	74.2	515	14.3
Diabetes with ketoacidosis or coma	1,736	45.3	1,716	47.6
Ruptured appendix	589	15.4	926	25.7
Malignant hypertension	785	20.5	470	13.0
Hypokalemia	426	11.1	147	4.1
Immunizable Conditions	24	0.6	27	0.7
Gangrene	99	2.6	92	2.6
TOTAL	48,531	1267.4	39,346	1092.3
*Discharge rate is expressed per 100,000 population.				

Altogether, those on Medicare accounted for almost 60 percent of all avoidable hospitalizations. Pneumonia and congestive heart failure discharges among Medicare patients alone accounted for 47 percent of all potentially avoidable hospitalizations. This is consistent with the age-specific rates (see Table 4) which suggest that North Carolina’s elderly patients (ages 65 and over) have much higher avoidable hospitalization rates. Avoidable hospitalizations were also quite prevalent among those on Medicaid, who accounted for 13 percent of all discharges for potentially avoidable conditions. In sum, almost three-quarters of all avoidable hospitalizations were to patients on Medicaid or

Table 4
Avoidable Hospitalization Rates* by Condition and Age
North Carolina, CY 1997

Primary Diagnosis	Ages 0 to 14		Ages 15 to 44		Ages 45 to 64		Ages 65 & Up	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Pneumonia	3,789	248.7	3,104	92.7	5,755	355.5	17,036	1811.3
Congestive Heart Failure	70	4.6	1,091	32.6	6,144	379.6	19,955	2121.7
Asthma	4,098	269.0	2,938	87.7	2,196	135.7	1,647	175.1
Cellulitis	448	29.4	1,652	49.3	1,748	108.0	2,084	221.6
Perforated or bleeding ulcer	9	0.6	475	14.2	1,017	62.8	2,227	236.8
Pyelonephritis	470	30.9	1,509	45.1	599	37.0	779	82.8
Diabetes with ketoacidosis or coma	281	18.4	1,979	59.1	723	44.7	469	49.9
Ruptured appendix	343	22.5	632	18.9	346	21.4	194	20.6
Malignant hypertension	8	0.5	370	11.0	451	27.9	426	45.3
Hypokalemia	4	0.3	107	3.2	163	10.1	299	31.8
Immunizable Conditions	45	3.0	4	0.1	1	0.1	1	0.1
Gangrene	0	0.0	11	0.3	47	2.9	133	14.1
TOTAL	9,565	627.9	13,872	414.3	19,190	1185.5	45,250	4811.1

*Discharge rate is per 100,000 population. Rates based on small numbers (less than 20 cases) may be statistically unstable and should be interpreted with caution.

Table 5
Avoidable Hospitalizations by Payer
North Carolina, CY 1997

Payer	Total Discharges	Total Days Spent in Hospital	Average Length of Stay	Total Hospital Charges	Average Charge per Stay	Average Charge per Day
Health Maintenance Organization	3,702	15,954	4.3	\$26,151,559	\$7,064	\$1,639
Other Private ¹	15,627	68,473	4.4	\$108,147,147	\$6,921	\$1,579
Medicare	51,681	338,835	6.6	\$491,598,468	\$9,512	\$1,451
Medicaid	11,757	52,167	4.4	\$80,354,891	\$6,835	\$1,540
Other Government ²	826	3,718	4.3	\$5,974,762	\$5,544	\$1,286
Self-Pay/Indigent/Charity	4,284	17,657	4.1	\$28,568,023	\$6,669	\$1,618

¹Blue Cross; Commercial Insurance; State Employee's Health Plan; Administered Plans.

²CHAMPUS; Department of Environment, Health & Natural Resources; Workers Compensation.

*See Table 2 for 1997 totals.

Medicare, amounting to over 63,000 hospital stays and over \$571 million in hospital charges.

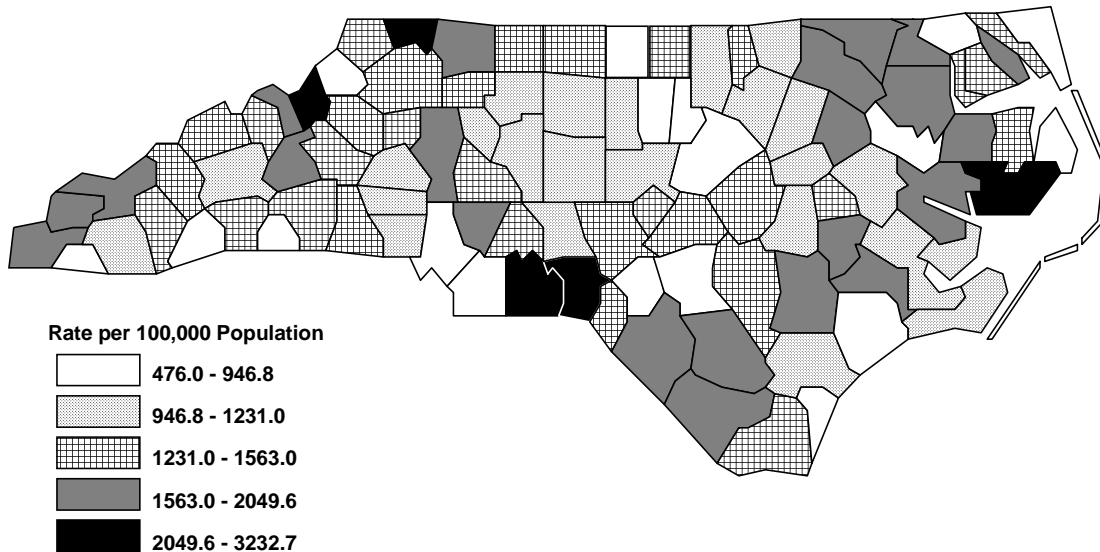
Most potentially avoidable hospital stays (75 percent) resulted in a routine discharge to home or self-care. However, approximately four percent of North Carolina's 1997 preventable hospital stays ended in death. Two conditions, congestive heart failure and pneumonia, account for nearly all of the reported deaths (93 percent).

Figure 1 displays avoidable hospitalization rates by patient's county of residence. More detailed county-level avoidable hospitalization information including rates, population figures, charges, and length of stay data is available in **Appendix A**. Of North Carolina's one hundred counties, 61 had avoidable hospitalization rates above the total state rate of 1182.5 per 100,000 population. Six counties had extremely high rates (above 2000 per 100,000): Richmond, Avery, Anson, Alleghany, Hyde, and Bertie.

Preventable hospitalization rates were higher in North Carolina's more rural counties. North Carolina's 100 counties were divided into two groups for purposes of this analysis: the 10 most urban counties and the 90 remaining more rural counties. These rural counties had an overall avoidable hospitalization rate of 1354 per 100,000 compared with 927 per 100,000 for more urban counties. It should be mentioned that hospitalization numbers and rates may be artificially low in counties adjacent to other states since some of these residents may go to hospitals in neighboring states for which we have no data. In addition, counties where military bases reside, such as Onslow and Cumberland, may have fewer reported hospitalizations and lower rates because the North Carolina hospital discharge database does not contain data for military or federal hospitals.

Previous research on avoidable hospitalizations suggests that preventable hospitalizations may be more common among lower income populations.^{2, 6, 7, 8, 9} In order to investigate this, North Carolina's 100 counties

Figure 1
1997 Potentially Avoidable Hospitalization Rates by County of Residence



Note: Hospitalization rates may be artificially lower in counties adjacent to other states and in counties with a large military population. See text.

Table 6
1997 North Carolina Resident Avoidable Hospitalizations and Rates per 100,000 by Per Capita Personal Income* and County

1997 Per Capita Personal Income Level	1997 Avoidable Hospitalizations	1997 Population Total	1997 Avoidable Hospitalization Rate
Low: \$12,631 to \$17,479	12,269	841,843	1457.4
Medium: \$17,510 to \$19,146	14,033	971,506	1444.5
High: \$19,152 to \$20,649	22,369	1,833,288	1220.2
Very High: \$20,725 to \$30,541	39,206	3,784,524	1036.0
North Carolina: \$23,345	87,877	7,431,161	1182.5

County per Capita Income Levels:

Low Per Capita Income – Bertie, Brunswick, Caswell, Cherokee, Clay, Gates, Graham, Halifax, Harnett, Hertford, Hoke, Jackson, Madison, Martin, Montgomery, Northampton, Onslow, Perquimans, Richmond, Robeson, Swain, Tyrrell, Warren, Washington, and Yancey.

Medium Per Capita Income – Anson, Ashe, Beaufort, Camden, Chowan, Cleveland, Columbus, Edgecombe, Franklin, Granville, Greene, Hyde, Macon, McDowell, Mitchell, Pamlico, Pasquotank, Pender, Rutherford, Scotland, Stanly, Stokes, Vance, Watauga and Wayne.

High Per Capita Income – Alexander, Alleghany, Avery, Bladen, Burke, Caldwell, Carteret, Craven, Cumberland, Currituck, Dare, Davidson, Haywood, Johnston, Lenoir, Lincoln, Person, Randolph, Rockingham, Rowan, Sampson, Surry, Union, Wilkes and Yadkin.

Very High Per Capita Income – Alamance, Buncombe, Cabarrus, Catawba, Chatham, Davie, Duplin, Durham, Forsyth, Gaston, Guilford, Henderson, Iredell, Jones, Lee, Mecklenburg, Moore, Nash, New Hanover, Orange, Pitt, Polk, Transylvania, Wake and Wilson.

* North Carolina Department of Commerce, MIS Section

were stratified into four categories of 25 each based on per capita income levels: low, medium, high, and very high. As shown in **Table 6**, the highest overall preventable hospital discharge rate of 1457.4 per 100,000 population is found in counties with the lowest per capita income levels (counties with a per capita income of less than \$17,479 per year). Avoidable hospitalization rates

Other potentially avoidable hospitalizations worthy of future study might include those due to intentional and unintentional injuries or inpatient hospitalizations for certain psychiatric conditions. If additional diagnostic criteria were employed, North Carolina's preventable hospitalization rates would be even higher.

decline thereafter, with the lowest rate occurring in counties with the highest per capita income levels (1036.0 per 100,000). For county-specific per capita income figures, refer to Appendix A.

Discussion

Other analyses of avoidable hospitalizations have produced results similar to those presented here. For example, an analysis of the 1990 National Hospital Discharge Survey found that approximately 12 percent of all hospitalizations in the United States were potentially avoidable – the same percentage reported in this study (both studies excluded newborns and deliveries).² In addition, several studies have found hospitalization rates to be higher among residents of low-income areas and among the elderly – as was found in North Carolina.^{2, 6, 9}

Further investigation of potentially avoidable hospitalizations in North Carolina is warranted. Future analysis might reexamine the diagnostic criteria used in determining avoidable hospitalizations. This study uses a relatively conservative list of avoidable hospitalizations. Other research on avoidable hospitalizations has defined the diagnostic criteria more broadly to include diagnoses such as diabetes, failure to thrive, invasive cervical cancer, congenital syphilis, dehydration, or gastroenteritis.^{7, 8, 10}

Closer examination by age and race may also be appropriate. For instance, other studies have investigated in greater detail preventable hospitalizations among specific age groups, such as children or the elderly.^{8,11} Although several previous studies have examined preventable hospitalizations by race, analysis by race was not possible in this study due to missing data for race in North Carolina's 1997 hospital discharge files. Other research has found preventable hospitalizations to be more prevalent among members of racial minority groups.^{2,6}

Finally, one dilemma facing all hospitalization studies is that it is difficult to determine to what extent variations in hospitalization rates are a result of differential patterns of disease prevalence as opposed to variations in access to hospital care. However, the highest overall preventable hospitalization rates occurred in North Carolina's more rural counties, where access to hospital care is more limited. Therefore, it is likely that the higher preventable hospitalization rates in rural areas were due primarily to a higher prevalence of disease. Some hospitalizations for these diseases could be avoided if their seriousness were reduced through better primary care services.

Conclusions

This analysis illustrates that potentially avoidable hospitalizations, especially those due to pneumonia, congestive heart failure, and asthma are a problem in North Carolina. Preventable hospitalizations occur more frequently among the state's most vulnerable citizens: the poor, the elderly, and residents of rural counties. Certainly all hospitalizations for conditions such as pneumonia and congestive heart failure can not be prevented and it may be expected that the elderly will have higher hospitalization rates due to physical declines associated with aging. Nevertheless, if even a fraction of these hospitalizations are for conditions that could have been avoided, they should be carefully scrutinized.

Increased efforts should be made at the state level to improve the health status of all North Carolina's citizens – regardless of age, income, or geographic region. This effort should focus on education of both physicians and consumers regarding symptoms, care, and treatment of health conditions such as diabetes, asthma, ulcers, and congestive heart failure. More emphasis should be

placed on appropriate primary care interventions among poor, rural, and aged populations to prevent health problems from escalating to the point of requiring inpatient hospitalization.

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Appendix A: 1997 Potentially Avoidable Inpatient Hospitalizations by County of Residence

	1997 Avoidable Discharges	1997 Population Total	1997 Avoidable Rate*	Average Hospital Stay in Days	Total Hospital Charges	Average Charge per Stay	1997 per Capita Income
NC TOTAL	87,877	7,431,161	1182.5	5.7	\$740,794,857	\$8,430	\$23,345
RURAL COUNTIES	60,188	4,443,432	1354.5	5.6	\$509,168,510	\$8,460	\$19,003
1 Alamance	1,405	119,820	1172.6	5.3	\$12,753,366	\$9,077	\$22,227
2 Alexander	456	31,078	1467.3	5.1	\$3,641,300	\$7,985	\$19,505
3 Alleghany	259	9,682	2675.1	4.6	\$1,620,247	\$6,256	\$19,568
4 Anson	647	23,854	2712.3	4.7	\$4,775,123	\$7,380	\$18,292
5 Ashe	349	23,596	1479.1	5.5	\$2,246,917	\$6,438	\$17,852
6 Avery	460	15,460	2975.4	5.5	\$3,248,935	\$7,063	\$20,143
7 Beaufort	753	43,400	1735.0	5.2	\$4,949,948	\$6,574	\$18,539
8 Bertie	415	20,248	2049.6	4.6	\$2,639,511	\$6,360	\$15,944
9 Bladen	492	30,314	1623.0	5.6	\$4,582,022	\$9,313	\$19,500
10 Brunswick	841	65,200	1289.9	4.9	\$7,359,579	\$8,751	\$17,305
11 Burke	1,099	83,143	1321.8	5.5	\$10,131,195	\$9,219	\$19,267
12 Cabarrus	1,924	116,502	1651.5	5.7	\$17,909,733	\$9,309	\$23,334
13 Caldwell	1,042	74,728	1394.4	4.7	\$8,223,075	\$7,892	\$19,152
14 Camden	96	6,308	1521.9	6.8	\$1,108,874	\$11,551	\$18,000
15 Carteret	695	59,057	1176.8	6.6	\$5,843,802	\$8,408	\$19,958
16 Caswell	105	22,059	476.0	4.9	\$878,809	\$8,370	\$16,620
17 Catawba	1,294	129,540	998.9	6.1	\$13,184,813	\$10,189	\$23,480
18 Chatham	504	45,130	1116.8	5.5	\$5,208,629	\$10,335	\$22,041
19 Cherokee	417	22,416	1860.3	3.8	\$2,759,861	\$6,618	\$15,238
20 Chowan	192	14,219	1350.3	5.5	\$1,740,326	\$9,064	\$18,459
21 Clay	72	8,066	892.6	4.3	\$423,674	\$5,884	\$16,964
22 Cleveland	1,392	90,650	1535.6	6.3	\$12,619,346	\$9,066	\$19,050
23 Columbus	1,024	51,942	1971.4	5.9	\$9,690,360	\$9,463	\$18,347
24 Craven	1,007	88,475	1138.2	6.0	\$8,763,488	\$8,703	\$20,573
25 Currituck	108	16,571	651.7	7.0	\$1,362,120	\$12,612	\$19,654
26 Dare	197	27,394	719.1	6.5	\$2,197,423	\$11,154	\$20,611
27 Davie	360	31,192	1154.1	5.7	\$3,059,759	\$8,499	\$25,256
28 Duplin	761	44,080	1726.4	6.2	\$7,089,390	\$9,316	\$22,528
29 Edgecombe	959	55,396	1731.2	5.3	\$7,750,880	\$8,082	\$17,510
30 Franklin	523	43,487	1202.7	5.7	\$5,632,487	\$10,770	\$17,546
31 Gates	86	9,914	867.5	5.7	\$704,005	\$8,186	\$16,042
32 Graham	121	7,504	1612.5	4.5	\$874,391	\$7,226	\$15,067
33 Granville	489	42,802	1142.5	5.2	\$3,947,421	\$8,072	\$18,145
34 Greene	224	17,651	1269.0	5.3	\$1,604,643	\$7,164	\$17,732
35 Halifax	1,004	55,841	1798.0	6.7	\$10,405,259	\$10,364	\$16,446
36 Harnett	1,158	81,358	1423.3	5.2	\$8,916,601	\$7,700	\$16,772
37 Haywood	737	51,267	1437.6	5.5	\$6,059,627	\$8,222	\$19,203
38 Henderson	1,107	79,148	1398.6	5.3	\$8,302,156	\$7,500	\$23,564
39 Hertford	431	21,916	1966.6	4.7	\$2,564,512	\$5,950	\$16,619
40 Hoke	190	28,882	657.8	5.2	\$1,822,465	\$9,592	\$12,631
41 Hyde	140	5,280	2651.5	4.5	\$939,898	\$6,714	\$17,962
42 Iredell	1,815	109,261	1661.2	5.4	\$17,551,438	\$9,670	\$21,713
43 Jackson	429	29,142	1472.1	5.0	\$2,817,487	\$6,568	\$17,122
44 Johnston	1,363	103,181	1321.0	5.8	\$11,819,405	\$8,672	\$20,236
45 Jones	161	8,988	1791.3	5.9	\$1,482,128	\$9,206	\$21,364
46 Lee	756	48,369	1563.0	5.8	\$7,605,791	\$10,061	\$22,376
47 Lenoir	1,121	59,038	1898.8	6.0	\$9,048,098	\$8,071	\$19,889
48 Lincoln	617	57,896	1065.7	6.1	\$7,180,162	\$11,637	\$19,863
49 Macon	430	27,664	1554.4	4.9	\$3,160,379	\$7,350	\$18,809

*Rates are per 100,000 population. Hospitalization rates and numbers may be artificially lower in counties adjacent to other states, as some of these residents seek hospital care in neighboring states.

Appendix A: 1997 Potentially Avoidable Inpatient Hospitalizations by County of Residence

	1997 Avoidable Discharges	1997 Population Total	1997 Avoidable Rate*	Average Hospital Stay in Days	Total Hospital Charges	Average Charge per Stay	1997 per Capita Income
50 Madison	166	18,330	905.6	5.4	\$1,151,722	\$6,938	\$16,601
51 Martin	477	25,628	1861.2	5.3	\$3,841,939	\$8,054	\$16,951
52 McDowell	482	39,424	1222.6	5.7	\$3,957,586	\$8,211	\$17,769
53 Mitchell	294	14,729	1996.1	4.8	\$1,631,139	\$5,548	\$17,633
54 Montgomery	264	24,473	1078.7	5.8	\$2,687,354	\$10,179	\$17,105
55 Moore	998	69,502	1435.9	6.3	\$10,146,809	\$10,167	\$26,239
56 Nash	892	87,101	1024.1	6.3	\$8,659,620	\$9,708	\$20,725
57 New Hanover	1,369	146,601	933.8	5.6	\$13,877,491	\$10,137	\$22,886
58 Northampton	386	20,800	1855.8	6.2	\$3,430,531	\$8,887	\$16,951
59 Orange	671	107,253	625.6	4.4	\$5,723,578	\$8,530	\$27,247
60 Pamlico	125	11,973	1044.0	5.2	\$1,006,785	\$8,054	\$17,821
61 Pasquotank	623	34,519	1804.8	6.5	\$6,676,391	\$10,717	\$18,739
62 Pender	400	37,208	1075.0	5.5	\$3,728,128	\$9,320	\$18,276
63 Perquimans	149	10,900	1367.0	6.3	\$1,602,049	\$10,752	\$16,034
64 Person	440	32,920	1336.6	4.5	\$2,881,322	\$6,548	\$19,805
65 Pitt	1,288	124,395	1035.4	5.6	\$9,266,180	\$7,194	\$20,800
66 Polk	154	16,393	939.4	6.0	\$1,647,925	\$10,701	\$25,288
67 Randolph	1,335	121,550	1098.3	5.9	\$11,074,234	\$8,295	\$20,566
68 Richmond	1,476	45,658	3232.7	4.7	\$11,495,260	\$7,788	\$16,481
69 Robeson	1,962	112,704	1740.8	6.6	\$19,730,235	\$10,056	\$15,918
70 Rockingham	1,253	89,156	1405.4	5.7	\$8,559,857	\$6,831	\$19,215
71 Rowan	1,607	122,774	1308.9	5.6	\$13,269,576	\$8,257	\$19,834
72 Rutherford	771	59,396	1298.1	6.3	\$6,425,680	\$8,334	\$18,340
73 Sampson	694	52,650	1318.1	5.4	\$5,591,258	\$8,057	\$20,649
74 Scotland	514	35,004	1468.4	4.9	\$4,361,767	\$8,486	\$17,784
75 Stanly	850	55,131	1541.8	4.9	\$6,751,564	\$7,943	\$19,146
76 Stokes	588	42,848	1372.3	6.3	\$4,098,075	\$6,970	\$18,948
77 Surry	1,234	66,834	1846.4	5.5	\$8,879,329	\$7,196	\$20,064
78 Swain	221	11,994	1842.6	4.8	\$1,334,398	\$6,038	\$14,278
79 Transylvania	246	27,845	883.5	5.2	\$1,757,113	\$7,143	\$20,863
80 Tyrrell	48	3,672	1307.2	6.5	\$620,805	\$12,933	\$16,189
81 Union	975	106,119	918.8	4.8	\$7,204,864	\$7,390	\$19,706
82 Vance	592	40,981	1444.6	5.4	\$4,930,533	\$8,329	\$18,423
83 Warren	180	18,140	992.3	6.5	\$1,704,724	\$9,471	\$14,766
84 Washington	259	13,297	1947.8	5.2	\$1,867,379	\$7,210	\$17,479
85 Watauga	373	40,862	912.8	5.7	\$2,584,596	\$6,929	\$17,629
86 Wayne	1,203	113,182	1062.9	5.5	\$7,772,033	\$6,461	\$17,798
87 Wilkes	889	63,105	1408.8	5.4	\$5,382,685	\$6,055	\$19,285
88 Wilson	846	68,724	1231.0	6.1	\$7,846,005	\$9,274	\$21,120
89 Yadkin	461	35,199	1309.7	5.2	\$2,764,437	\$5,997	\$19,162
90 Yancey	206	16,349	1260.0	4.4	\$1,044,696	\$5,071	\$15,719
URBAN COUNTIES	27,689	2,987,729	926.8	5.8	\$231,626,347	\$8,365	\$23,904
1 Buncombe	1,866	191,122	976.3	5.5	\$13,188,104	\$7,068	\$23,013
2 Cumberland	2,321	295,255	786.1	5.2	\$25,028,522	\$10,784	\$19,556
3 Davidson	1,507	140,442	1073.0	6.0	\$12,302,359	\$8,163	\$20,061
4 Durham	1,872	197,710	946.8	5.2	\$17,677,687	\$9,443	\$24,497
5 Forsyth	3,090	287,160	1076.1	6.6	\$23,784,535	\$7,697	\$28,004
6 Gaston	1,876	180,082	1041.7	5.8	\$16,058,356	\$8,560	\$21,598
7 Guilford	4,152	383,186	1083.5	6.5	\$30,515,893	\$7,350	\$26,726
8 Mecklenburg	5,551	608,567	912.1	5.0	\$45,200,101	\$8,143	\$30,541
9 Onslow	1,206	147,352	818.4	5.8	\$10,886,368	\$9,027	\$16,184
10 Wake	4,248	556,853	762.9	6.3	\$36,984,422	\$8,706	\$28,858

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State of North Carolina
Department of Health and Human Services
State Health Director

A. Dennis McBride, M.D., M.P.H.

Division of Public Health

Ann F. Wolfe, M.D., M.P.H., Director

State Center for Health Statistics

John M. Booker, Ph.D., Director

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Department of Health and Human Services
State Center for Health Statistics
1908 Mail Service Center
Raleigh, NC 27699-1908
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