

Trends in Tennessee Medicaid Acute Care: Use and Expenditures, 1974-1978

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Because person-level data are not currently available at the Federal level, many questions regarding the use and expenditures of Medicaid services remain unanswered. This article demonstrates the capability of State Medicaid Management Information Systems (MMIS) to provide data that can address a variety of Medicaid program issues at both the State and Federal levels. Using data from the Tennessee Medicaid files, we analyze MMIS data to demonstrate the utility of person-level statistics and to indicate methodologies useful for future analytic efforts, particularly in constructing utilization rates for policy and program management activities.

We extracted Medicaid data for this study from person-level enrollment and inpatient hospital claims files, maintained by the Tennessee Medicaid Agency, for the calendar years 1974 through 1978. We used enrollment files to analyze the changing composition of the enrolled population and enrollment turnover by basis of eligibility and demographic characteristics. Because the MMIS files contain unique recipient identifiers, it is possible to link enrollment and claims data at the person level. This linkage facilitates the study of trends in payments and utilization rates by eligibility group over time. The primary utilization measures used in this study are average covered length of stay and admissions and covered days of care rates per 1,000 Medicaid enrollees. We also provide Tennessee Medicare utilization statistics for comparative purposes. Expenditure measures include average annual payments per enrollee, payments per admission, and payments per covered day. We analyze various eligibility groups by demographic characteristics and level of enrollment turnover (the movement of persons on and off eligibility rolls) at both the State and sub-State levels. Finally, we present a series of diagnostic case-mix studies.

While total Tennessee Medicaid enrollment is declining, the number of disabled enrollees and the proportion of aged enrollees are increasing. Tennessee Medicaid average covered lengths of stay exhibit a downward trend, but covered days of care rates are increasing due to higher admission rates. Medicaid payments per enrollee increased drastically, primarily due to increases in average payments per day and, to a lesser extent, increased utilization. Medicaid utilization and expenditures are highly skewed toward aged and disabled enrollees and toward those with less than six consecutive quarters of enrollment. Similarly, whites exhibit a disproportionate use of inpatient services. Analyses of diagnostic case-mix indicate stable patterns for both AFDC and disabled enrollees over time. Differences in case-mix and length of stay between the two eligibility groups are consistent with the respective characteristics of these populations.

Background

In 1965, Congress passed legislation (Public Law 89-97) amending the Social Security Act to create the Medicare (Title XVIII) and Medicaid (Title XIX) programs. As an expansion of Medical Assistance for the Aged under the Kerr-Mills legislation, Medicaid was designed to provide access to health care for low income persons who are aged, blind, disabled, or members of families with dependent children. The program is financed jointly with Federal and State funds, but it is administered at the State level within broad Federal guidelines. The guidelines specify certain basic services, the extent of coverage, and minimum administrative requirements. Beyond these guidelines, the States have considerable flexibility to determine eligibility, coverage of additional services, duration of coverage, and administrative structure. As a result, Medicaid is not one program, but 54 different programs, reflecting alternative approaches of providing health care to many poor Americans.¹

Because the Medicaid program was expected to be smaller and less significant than Medicare, the latter received most of the initial attention from the press, planners, and administrators. Contrary to expectations, however, Medicaid has grown rapidly since its creation, both in number of recipients and in total expenditures, becoming highly visible at both the Federal and State levels. Indeed, Medicaid expenditures are both the largest (between 10 and 15 percent) and fastest growing (15 percent or more) component of many State budgets (Demkovich, 1981; Intergovernmental Health Policy Project, 1981). This has led to the recent development of State and Federal strategies to control Medicaid expenditures. Such strategies are particularly important to Federal policymakers because many encourage the substitution of Medicare-covered services for Medicaid services and permit greater variation among States in eligibility, coverage, and benefit provisions.

Understanding the dynamics of a changing Medicaid program presents a major challenge to policymakers and administrators. Collection and interpretation of program data are difficult because of the differences in Medicaid among States and the constantly changing character of the program even within a single State. The Medicaid program remains an enigma to this day because there are not adequate data at the national level to monitor and forecast program activities. As a result, national Medicaid policy has been, and continues to be, made on the basis of limited analysis and understanding.

¹Arizona does not have a Medicaid program. In addition to the remaining 49 States, the District of Columbia, Puerto Rico, the Virgin Islands, and Guam are recognized as Medicaid jurisdictions. While most jurisdictions have a single State agency to administer Medicaid, Massachusetts has two such agencies, one of which has sole responsibility for the blind.

MMIS person-level data represent one aspect of Medicaid research statistics. Additional data sets include: 1) aggregate Medicaid statistics reported both quarterly and annually by the States to the Federal government, 2) the 1980 National Medical Care Utilization and Expenditures Survey (NMCUES), 3) a proposed reporting system based on the Medicaid Quality Control (MQC) sample, and 4) a study of State Medicaid program characteristics.

Each of these additional data sets serves a purpose. Currently available aggregate Medicaid statistics trace gross expenditure and utilization patterns among the States at the national level. Data from the NMCUES survey and the MQC sample will provide information on Medicaid enrollees (income, education, employment status, family structure, and other data) that is not available from other sources. Knowledge of State program characteristics is required to interpret Medicaid utilization statistics in light of program differences among States or temporal changes within individual States.

The advantage of MMIS data is that claims and enrollment records for all types of services can be obtained at the person level. Therefore, because enrollment and claims records can be directly linked, MMIS data can be used to conduct small area analyses, track individual recipients over time, measure enrollment turnover, analyze diagnostic case-mix, and, most importantly, develop utilization rates for varying groups of Medicaid enrollees. These data provide the detail needed to examine the impact of proposed Medicaid policy changes, to construct actuarial forecasts, and to explain variations in utilization and expenditures across a variety of eligibility groups and demographic classes. While no one data source is adequate to describe all facets of the Medicaid program, this article illustrates that MMIS data can contribute significantly to a broader understanding of Medicaid program issues.

Medicaid Eligibility and Benefit Structure

Medicaid is designed to reduce financial barriers to health care for certain groups of indigent persons. The program is related to the welfare system in that primary eligibility for Medicaid benefits is extended to cash assistance recipients under the Supplemental Security Income (SSI)² and Aid to Families with Dependent Children (AFDC) programs. States may elect (under Section 1634 of Title XIX, as amended) to automatically extend Medicaid coverage to SSI recipients or (under Section 209b) to require that SSI recipients meet more restrictive standards that were already in effect prior to the implementation of the SSI program.

²SSI is a program of income support for low-income aged, blind, and disabled persons established by Title XVI of the Social Security Act. SSI replaced State welfare programs for the aged, blind, and disabled on October 30, 1972.

While the application of Medicaid eligibility rules is highly complex, there are two primary categories of Medicaid eligibles:

Categorically Needy Eligibles: These persons are eligible for Medicaid because they are eligible under the AFDC program or the SSI program for the aged, blind, and disabled. Approximately 75 percent of persons enrolled under categorically needy provisions receive cash assistance. The remaining 25 percent are eligible for Medicaid but not for cash assistance. For example, one type of person in this group is the 60 year old spouse of a 66 year old SSI recipient.

Medically Needy Eligibles: These persons are eligible because their incomes are slightly above the program standards for AFDC or SSI before their medical expenses are subtracted. After these expenses are deducted, however, they meet program standards. Coverage of these persons is optional for the States.

There are several other subsets of Medicaid eligibles, some overlapping both of these groups, that need to be considered in analyzing Medicaid statistics. Some of these are:

Spend-Down Eligibles: These are persons who do not immediately meet the medically needy requirements because their gross incomes are too high. Instead, they incur medical expenses until their net incomes (after deducting for medical expenses) fall below the medically needy standard. They are then covered by Medicaid for additional medical care.

Crossover Eligibles: These are Medicaid enrollees who are also enrolled in the Medicare program due to age or disability. Medicare is the primary payer of claims for these eligibles, with Medicaid supplementing their Medicare coverage.

Buy-In Eligibles: Although Medicare coverage for inpatient hospital services (Part A) is automatic for aged and disabled Medicare enrollees, coverage for Supplemental Medical Insurance (Part B) requires the payment of a monthly premium. Most States pay this premium for their Medicaid enrollees who are also covered under Medicare. These persons are called buy-in eligibles; the buy-in applies to Part B.

State-Only Eligibles: Many States offer special medical assistance programs, administered by the State agency but not funded by Federal Medicaid dollars. These State-only groups are established by State law, and care is covered using State funds only. These groups may include special medically indigent groups, war veterans, and others.

Since States have flexibility to establish welfare eligibility levels (AFDC and SSI), they also control income eligibility levels for Medicaid. Thus, individuals in identical circumstances are not necessarily treated identically across States. Moreover, not all of the poor are covered by Medicaid. In addition to income considerations, people must be in one of the designated groups (aged, blind, disabled, or a member of a

family with dependent children) to receive Medicaid. For example, in Tennessee it is estimated that only 33 percent of all persons living at or below poverty level received Medicaid in fiscal year 1979 (Muse, 1981); it is not known what additional percentage was eligible. Low-income persons who are not eligible for Medicaid include widows under age 65, non-elderly single persons, most two-parent families, and families with a father working at a low paying job (Davis, 1979).

Medicaid is financed from general revenues drawn in varying proportions from Federal, State, and (occasionally) local governments. To qualify for Federal matching payments, States must provide a number of basic services, including inpatient hospital care, to persons deemed Medicaid eligible. States may also provide a range of optional services for which they receive Federal matching payments (The Medicare and Medicaid Data Book, 1982). In addition to discretion over the kinds of additional services offered, within limits States are also allowed to determine the duration and/or amount of individual service coverage. Thus, the numbers of covered hospital days, covered skilled nursing facility days, and covered physician visits per individual vary across States.

The Tennessee Medicaid Program

We selected the Tennessee Medicaid program for these analyses because a consistent series of statistics on utilization (that is, claims) and on individual enrollment was available to establish a five-year trend. Tennessee provides coverage (under Section 1634) to categorically and medically needy individuals in the three SSI groups: Old Age Assistance (OAA), Aid to the Blind (AB), and Aid to the Permanently and Totally Disabled (APTD); to eligibles under Aid to Families With Dependent Children (AFDC); and to Foster Care Children (FCC). The FCC program extends (optional) Medicaid coverage to certain groups of children under age 21 who are financially needy according to AFDC standards but are not eligible for AFDC because they do not meet the definition of a dependent child. Since Tennessee elected to cover medically needy individuals in January 1974, the State also offers medically needy spend-down provisions. However, the State has no categorically needy spend-down provisions nor any State-only eligibles. Tennessee has a buy-in agreement for Medicare (Part B) premiums. Finally, the State has established a limit on inpatient hospital payments of 20 days per fiscal year during the study years.

Among the States, Tennessee ranked as the 16th largest in total Medicaid payments (\$332.7 million) and 19th with respect to recipient population (324,600) in fiscal year 1979 (The Medicare and Medicaid Data Book, 1982). During 1980, the MMIS system in Tennessee received certification. Because of its intermediate size and medically needy provisions, Tennessee represents both a manageable and interesting prototype study site.

Data, Methods, and Definitions

Because the purpose of this study is to use State Medicaid files to develop statistics for cross-sectional and longitudinal comparisons of State Medicaid programs, we conducted a variety of analyses. Analytic topics include enrollment trends, turnover in enrollment, utilization by eligibility group, turnover class, race, age, sex, and location, Medicaid payment variations and trends, and case-mix differences. Many of these analyses employ utilization rates in which the denominator is a suitable measure of program enrollment and the numerator a measure of short-stay hospital utilization, such as number of admissions or covered days. For comparative purposes, we also present Medicare statistics for aged and disabled beneficiaries.

Because the source data files did not contain Medicaid claims for all types of services, analyses are confined to an investigation of short-stay hospital statistics. Still, Medicaid inpatient hospital payments are extremely important, representing 28 percent of all Medicaid payments in the United States in 1978; moreover, Medicaid inpatient hospital payments grew at an average annual rate of 13 percent between 1973 and 1979 (Muse, 1981).

Data

Data Sources

The Medicaid data presented here were drawn from 1) enrollment files maintained by the Tennessee Medicaid agency on both an individual and a summary basis and 2) inpatient hospital claims processed by the State Medicaid fiscal agent, covering the calendar years 1974 through 1978. Summary enrollment data furnished raw counts of persons enrolled by year, as well as monthly counts for the 60 study months. Individual enrollment files contained a separate record for each person covered by Medicaid between 1974 and 1978 (a total of 785,366 people), including the person's recipient number, basis of eligibility (OAA, AB, APTD, AFDC, or FCC), county of residence, sex, race, birth and death dates, and number of days enrolled per month. The claims files provided information on recipient number, eligibility group, patient characteristics, date of admission, covered days, payment amount, diagnosis code, and surgical procedure code (if any) for each inpatient hospital claim during the study period. In addition, limited information was also available for Medicare/Medicaid crossover claims.

An important feature of the Tennessee data files is that both utilization and enrollment files contain unique recipient identifiers which facilitate a direct link between individual enrollment and claims records. This link permits study of trends in payments and utilization by eligibility group, development of utilization rates, and analysis of selected enrollee classes over time.

Medicare statistics in this article were developed from Medicare enrollment and hospital utilization files, part of the Medicare Statistical System maintained by the Health Care Financing Administration.

Data Limitations

Developing utilization statistics from a billing system rather than a medical records system presented several related problems in analysis. First, hospital stays are difficult to construct because the recorded admission date did not always match the "from date," or the first (covered) day. Since the discharge date was not specified, we used the "through date" (date of final covered day) as a proxy. In addition, covered days may be equal to or less than the actual length of stay for an individual, depending on whether the annual limit of 20 covered days (in Tennessee) has been reached.³ Thus, days covered by Medicaid, on which the covered days of care rate per 1,000 Medicaid enrollees and the average covered length of stay are based, may not strictly correspond to actual lengths of hospital stay. This could result in underestimates of total service used by Medicaid patients. Medicaid payments will be correctly estimated, however, because all covered days are known.

Second, "split billing" (two bills for the same stay) tends to distort average length of stay and admission statistics by some small amount. If, for example, an inpatient hospital stay extends over the start of a new Medicaid fiscal year (July 1) in Tennessee, two separate claims are required—one for each fiscal year. This shortens the apparent average length of stay and increases the apparent admission rate. However, split billings had little impact on calculated utilization measures, since a sample of all billings showed them to be extremely infrequent.

Split billings can also occur in the form of multiple or nested bills, that is, two or more claims submitted for a single inpatient stay. For instance, if an incorrect or partial bill was initially submitted, a second bill may have followed. Since multiple billing is reported to have occurred in less than 1 percent of all claims, we made no attempt to correct for this problem.

Another issue related to developing utilization rates involves crossover enrollees. Because some utilization of crossover patients is reimbursed by Medicare, Medicaid bills under-represent utilization involving crossover patients. To adjust for this, we excluded crossovers from the computation of utilization and reimbursement rates. Since crossover claims are flagged in the Medicaid claims file, we separated utilization and reimbursement for crossover enrollees, thereby adjusting the numerator. To construct a consistent denominator, some means of subtracting

³Less than 3 percent of all claims report the maximum of 20 covered days.

crossovers from the total enrollee count was required. Since Tennessee enrollment files did not specifically identify crossovers, we excluded all enrollees over age 65 (the age when aged Medicare coverage begins) from the OAA group and reduced disabled enrollment by 50 percent.⁴ As a result, the OAA group, composed primarily of crossovers, was excluded from all utilization analyses. Thus, utilization and reimbursement analyses were limited to the AFDC, AB, and APTD populations. However, we conducted enrollment analyses for all groups, including the aged.

Enrollment: Determining Population at Risk

The development of utilization rates based on consistent enrollment and utilization measures is one of the most difficult problems in analyzing the Medicaid experience (Clinkscale, 1979; O'Brien, 1979; Louis, 1977). While aggregate recipient counts (those who actually receive services) are readily available, there are few reliable statistics based on the number of Medicaid enrollees (those who *could* receive services). Medicaid enrollee counts are difficult to measure because States have not traditionally tracked movement into and out of the program. Further, there is no standard way of counting program enrollees that has been widely used for analyses and construction of use rates. While recipient-based utilization rates could be constructed, such rates might be biased, not accurately reflecting the propensity of various Medicaid eligibility groups to use health care services.⁵ In addition, existing aggregate recipient statistics will not support person-level analyses of the degree to which demographic characteristics influence use.

The simplest means of estimating Medicaid enrollment is to count all persons ever enrolled (PE) during a period, for example, per year. A disadvantage of this method, however, is that persons enrolled for only a portion of a year are overcounted in terms of their exposure to Medicaid coverage. Depending on the percentage of persons for whom this occurs, use rates

⁴While these adjustments are rather crude, they represented the best available means of adjusting the Tennessee enrollment counts for crossovers. About 5 percent of the total aged population, mostly retired Federal employees, are not covered under Medicare. So, for the aged, this adjustment slightly overstates the crossover population by removing a small number of aged enrollees over age 65 who are not covered by Medicare. However, the remaining number of OAA enrollees under age 65 is too small to support utilization analyses anyway. For the disabled, approximately 50 percent of all inpatient claims submitted between 1978 and 1980 were for crossover enrollees. We assumed that the number of claims per enrollee was the same for both crossovers and non-crossovers and applied the 50 percent factor to disabled enrollment.

⁵Bias exists because not all enrollees actually receive services. While recipient and enrollee-based measures often show similar patterns of movement, the ratio of recipients to enrollees varies across eligibility groups; thus the actual rate levels may vary significantly. The bias is least for those populations where nearly all enrollees are recipients.

will be more or less underestimated (to the extent that the denominator of the rate is overestimated).

A second method of estimating Medicaid enrollment eliminates this potential bias by calculating a "person-year-equivalent" (PYE). This method sums fractions of years of enrollment into yearly subtotals as follows:

$$PYE_y = \frac{\sum_{i=1}^n m_i}{12}$$

where PYE_y is the person-year-equivalent enrollment for year y

n is the number of enrollees

m_i is the number of months that person i was enrolled during year y .

The PYE method yields slightly lower estimates of enrollment than the "ever enrolled" method, although the trends in the two measures show close correspondence. Analysis demonstrated that the difference between the two measures was 5 percent or less for all eligibility groups over the study period. We used PYE since it is the theoretically preferred measure, and for some types of analyses a 5 percent bias in rates could be highly misleading. We calculated PYEs using months of enrollment from individual enrollment files.⁶

Enrollment Turnover: Measurement and Implications

Deviations between PYEs and simple enrollment counts are primarily a consequence of enrollment "turnover," the movement of persons on and off enrollment rolls. Rapid enrollment turnover makes it difficult to count enrollees and also poses a problem in interpreting utilization rates. Rapid turnover may change the socio-demographic characteristics (age, sex, race) and health status of those actually enrolled, affecting utilization measures based on these characteristics.

We developed measures of enrollment turnover based on "entry" and "exit" rates calculated quarterly for the AFDC and disabled groups.⁷ The "entry" rate

⁶Similar measures can be developed for other time periods, for example, person-quarter-equivalent enrollment (PQE).

⁷These groups should provide a good range of high and low levels of turnover, respectively, given the particular characteristics associated with each population. Low turnover rates are expected for the disabled population, since their eligibility status is frequently limited to permanently disabling conditions such as mental disorders and diseases of the circulatory system. Thus, their financial situations and, therefore, eligibility are not likely to change. The AFDC population, by contrast, is expected to be more employable, showing significantly greater turnover in response to changing labor market conditions.

is the proportion of new enrollees to total enrollees for any calendar quarter. Similarly, the "exit" rate measures the proportion of people who lose enrolled status to total enrollees for the quarter. Together these two factors account for the observed trends in enrollment. When they are equal, the enrollment levels are constant from one quarter to the next. When entry levels exceed exit levels, the enrolled population begins to grow; the converse is of course true. Even when enrollment appears to be constant, there may be a balance between equally high entry and exit rates, in which case the socio-demographic or program mix may vary over time.

Changes in eligibility group mix may significantly affect utilization rates. If medically needy and spend-down individuals are enrolled for Medicaid benefits only when they require medical care, reverting to unenrolled status after they receive treatment, their use rates per PYE should be relatively high. Thus, turnover by these individuals could significantly increase overall use rates.⁹

Unfortunately, neither medically needy nor spend-down status was identified on the enrollment files used for this study. Because such persons could not be identified, we made no attempt to adjust for potential medically needy or spend-down rates. Because the presence of medically needy or spend-down individuals in aggregate utilization and enrollment statistics could cause large fluctuations in use rates for populations whose turnover rate is high, future work should attempt to isolate these individuals.⁹

Utilization: Construction of Measures

We used three measures of Medicaid inpatient utilization in this study: admission rates (ADMR), covered days of care rates (CDOCR), and average covered length of stay (CLOS). The admission rate is a measure of access to hospital services and indicates the rate of entrance into the hospital system. The average covered length of stay is a measure of the amount of services received once a patient has been admitted. The covered days of care rate, the product of the two, serves both as an aggregate measure of total utilization and as a proxy for overall program expenditures for inpatient acute care hospital services.¹⁰

⁹Note, however, that total utilization is under-represented in the claims file for spend-downs, since these patients must first use personal resources for medical care before they can be enrolled in Medicaid.

¹⁰While the number of spend-downs is thought to be generally small (less than 5 percent of the national Medicaid population), their use levels may be sufficiently high to confound group comparisons.

¹¹The ability of the covered days of care rate to serve as a proxy for program expenditures depends on the assumption of constant service intensity. Should average service intensity vary as the total days of care change, the covered days of care rate may not be a satisfactory proxy for expenditures.

Both ADMR and CDOCR are calculated by dividing the appropriate utilization measure (that is, either admissions or covered days) by the corresponding number of enrollees, expressed in thousands. CLOS is obtained by dividing the total number of covered days by the number of admissions. The following analyses provide specific utilization statistics for beneficiary groups characterized by demographic factors, enrollment turnover class, and geographic area. We also constructed utilization rates to support diagnostic case-mix analyses.

Utilization and Payments

To address the issue of Medicaid program payments (expenditures), we discuss four Medicaid payment measures: average annual payments per enrollee, payments per admission, payment per covered day, and total Medicaid inpatient expenditures. We prepared these measures for each of the years 1974 through 1978 for the Medicaid enrollment groups AB, AFDC, APTD, and FCC. Because utilization and payments were not reported for crossovers and most of the OAA group are crossovers, utilization data were not available for the OAA group.

To explain the growth in total Medicaid inpatient expenditures, expenditures (E) are represented as the product of three factors:

$$E = \text{CDOCR} \cdot \text{NT} \cdot \text{PD}$$

where: NT = the number of Medicaid enrollees (in thousands)

PD = the average Medicaid payment per covered day (*per diem*) of inpatient hospital care.

Given this relationship, the percentage change in total Medicaid inpatient expenditures is equal to the sum of the percentage change in each of the three component factors separately, plus a multiplicative factor as follows:

$$\% \Delta E = \% \Delta \text{CDOCR} + \% \Delta \text{NT} + \% \Delta \text{PD} + I$$

where: % Δ E is the average annual percent change in total Medicaid expenditures

% Δ CDOCR is the average annual percent change in utilization (covered days of care rate)

% Δ NT is the average annual percent change in enrollment

% Δ PD is the average annual percent change in payments per day

I is the multiplicative factor (second order percentage changes).

Because the size of the multiplicative factor is small when calculations are based on average percent change, its effect can be distributed proportionally across the other factors. This ensures that the sum of the three remaining factors represents the total change in expenditures. Thus, this approach answers the question: "What proportion of growth in total Medicaid inpatient expenditures was caused by

change in a given component?" A similar approach has been employed to examine the components of Medicare expenditures (Helbing, 1980). Analysis of utilization rates is extended by partitioning covered days of care rates into admission rates and average covered length of stay through use of the formula: $CDOCR = ADMR \cdot CLOS$.

Utilization and Enrollment Turnover Class

Because medically needy and spend-down individuals were not identified in the research files, tests relating use to enrollment turnover were based on the relationship of various periods of continuous enrollment to program utilization. We hypothesized that there is a negative correlation between utilization rates and duration of continuous enrollment. To test this hypothesis, we compared utilization rates for individuals in three enrollment turnover classes defined by length of continuous enrollment. The defined classes are: 1) long-term enrollment (12 consecutive quarters of enrollment over the 1975-1977 period); 2) intermediate-term enrollment (between six and 12 consecutive quarters); and 3) short-term enrollment (less than six quarters of continuous enrollment).¹¹ We conducted separate analyses for the AFDC and disabled eligibility groups.

Utilization by Location and Demographic Factors

LOCATION

To demonstrate the ability of MMIS data to support small area studies, we divided Tennessee into two geographic areas. While similar analyses could be conducted for any individual county or collection of counties, the geographic areas selected in this study correspond to the Professional Standards Review Organizations (PSROs) that were authorized in Tennessee as a result of the 1972 Social Security Amendments. Tennessee contained two PSRO areas as originally designated. The first area, known as the Memphis area in this report, is a group of twelve contiguous counties in southwestern Tennessee: Chester, Decatur, Fayette, Hardeman, Hardin, Haywood, Henderson, Lauderdale, McNairy, Madison, Shelby, and Tipton. The second area, known here as the Nashville area, consists of Tennessee's remaining 83 counties.

¹¹To properly count short-term enrollees, we examined two quarters of enrollment history immediately preceding and following the three year period. Individuals classified as short-term enrollees within the three year period but who had more than six quarters of enrollment in the five year period were excluded from the analysis. We followed a similar procedure for intermediate-term enrollees.

DEMOGRAPHIC FACTORS

Given the wide range of demographic and medical characteristics of persons covered under the different Medicaid eligibility groups, significant variation exists in the utilization patterns of each eligible group. Age (O'Brien, 1979), sex (Brook, 1978), race (Davis, 1975; Ruther and Dobson, 1981), and degree of urbanization (Feldstein, 1971; Gornick, 1977), have all been found to affect use. Thus, any meaningful interpretation of utilization across eligibility groups requires that such confounding factors be held constant.

Because age and sex distributions were relatively constant across the State, we limited intra-state comparisons (involving the two PSROs) to the extent of urbanization and racial differences. To test for the extent of these differences within eligibility group and across geographic (PSRO) areas, we first classified counties by degree of urbanization: urban (counties with a city of greater than 100,000 people); intermediate (counties with cities between 10,000 and 100,000 people); and rural (no city with a population of greater than 10,000). Second, we classified enrollees as white or non-white. We then calculated rates of admission and covered days of care for AFDC and disabled enrollees by degree of urbanization and race for each of the Tennessee PSROs. Finally, we determined the impact of both urbanization and racial differences by directly comparing weighted utilization rates between the two PSROs. We weighted urbanization/race utilization rates for the Nashville area according to eligibility proportions observed in the Memphis area. The weighting was done in two steps: first for the degree of urbanization alone and then by race and degree of urbanization jointly, to isolate the marginal impacts of urbanization and race.

The question of access to inpatient services by whites and non-whites was further explored by estimating a user rate (UR; Ruther and Dobson, 1981), defined as the number of hospitalized patients per thousand enrollees as follows:

$$UR = (PH/N) \times 1,000$$

where: PH = the number of persons hospitalized
N = the number of Medicaid enrollees.

User rate provides a basic, albeit imperfect, measure of initial access to health care. Disparity ratios in user rate are measured by computing the ratio of white to non-white user rates. Disparity ratios having a value greater (less) than one indicate that the proportion of whites entering the hospital at least once is greater (less) than that of non-whites.

Diagnostic and Case-Mix Analyses

We compared average covered length of stay over time among selected diagnoses. Tennessee Medicaid hospital claims data provided diagnostic information at the four-digit level, using the ICDA-8 coding system. Based on diagnoses that occur with relatively high frequency, we constructed 17 diagnostic categories for disabled recipients and 15 for AFDC recipients. "All other diagnoses," accounting for about 50 percent of all admissions, formed the residual category. We adjusted average length of stay for diagnostic case-mix by applying base period (1974) percentage weights of admissions to the ALOS of each diagnostic group. The case-mix adjustment assumes that the severity of illness within a diagnostic category remains fairly constant over time, while controlling only for changes in the proportion of admissions in each diagnostic group.

Analysis of diagnostic groups revealed two difficulties within the data base. First, because the State had two different fiscal agents during the study period, and the agents developed different coding schemes, it was impossible to separate normal deliveries from complications related to pregnancy. Therefore, both groups were reported together in a single diagnostic category. Second, analysis of pregnancy-related claims revealed a sharp increase in rates of covered days and length of stay between 1976 and 1977. This also was a data artifact resulting from a revised coding scheme introduced by the new fiscal agent. Despite the fact that nursery days for well-baby care were not covered at any time during the study period, this new coding scheme, instituted for administrative purposes, caused these days to be counted as part of total covered days in each pregnancy-related claim. To compensate for this problem, we subtracted nursery days from total covered days in all pregnancy-related claims, producing stable trends in length of stay for all of the study years.

Findings

Enrollment Trends

Over the 1974 to 1978 period, the Tennessee Medicaid program ranged in size from 389,468 enrollees at its peak in 1975 to 324,191 enrollees by 1978. (See Table 1.) As in other State Medicaid programs, AFDC constituted the largest single eligibility group, covering close to 60 percent of all enrollees. OAA and APTD were the next largest groups, accounting for 24 percent and 18 percent of Medicaid enrollees, respectively. The two remaining groups, Aid to the Blind (AB) and Foster Care Children (FCC), together ac-

counted for less than 1½ percent of all enrollees.

The overall decline in the number of Tennessee Medicaid enrollees is due to decreasing enrollment in the two largest programs, AFDC and OAA, after mid-1975. This decline occurred in spite of the steady growth in the number of enrolled individuals in two of the smaller programs, the disabled and FCC. This overall decline reflects the failure of the income criteria for eligibility to keep pace with inflation, thereby rendering an increasing proportion of the population ineligible. Alternatively, changing population patterns in Tennessee, changing economic circumstances, changing eligibility requirements, or changing rates of program participation (that is, the proportion of potential eligibles who are actually enrolled in the program) are other possible causes for declining enrollment. Given that these trends mirror national data, there is reason to believe that States intentionally do not update income criteria to keep pace with inflation, in an effort to tighten eligibility criteria and limit Medicaid expenditures.

Within Medicare, approximately nine out of every 10 enrollees in Tennessee is aged. (See Table 2.) While both the aged and disabled groups grew steadily, the disabled grew slightly faster.

Composition of the Enrolled Population

While overall enrollment was declining, the composition of the Tennessee Medicaid population changed over the study period. In 1974, 60.4 percent of all Tennessee enrollees were part of the AFDC program (Figure 1), and 15.3 percent were disabled. By 1978, AFDC enrollees represented a smaller proportion, 55.6 percent, and the disabled represented a larger proportion, 19.4 percent. Over the five year span, OAA remained a stable proportion of the entire population. The combined proportion of blind and FCC enrollees grew from 0.7 percent to 1.2 percent of the total population.

The changing composition of the Tennessee Medicaid population is most evident in the observed growth patterns for specific eligibility groups. Table 3 shows that enrollment declined steadily for the aged, blind, and AFDC groups. While there were initial large increases in disabled and FCC enrollment, declines for the other groups dominated to produce the overall downward trend. In contrast, Table 4 shows that both major components of Medicare enrollment grew steadily. While Tennessee aged Medicare enrollment grew in small steady increments, disabled enrollment grew more rapidly. However, disabled enrollment grew less rapidly in later years.

TABLE 1
Tennessee Medicaid Enrollment
by Eligibility Group, Sex, Race, and Age
(1974-1978)

Eligibility Group/Year	Number of Enrollees	Sex		Race		Age	
		Percent Female	Percent Non-White	Percent Under 18	Percent 18-49	Percent 50-64	Percent 65 and Over
OAA¹							
1974	81,823	68	30	0	0	0.3	99
1975	87,773	67	28	0	0	0.3	99
1976	83,056	68	28	0	0	0.2	99
1977	79,232	69	28	0	0	0.2	99
1978	76,913	69	27	0	0	0.1	100
AFDC							
1974	210,006	61	64	73	25	2	0
1975	236,240	61	63	71	27	2	0
1976	219,827	61	65	71	27	2	0
1977	196,959	62	64	71	27	2	0
1978	180,269	62	63	71	28	1	0
AB							
1974	1,765	46	34	5	40	39	16
1975	1,769	48	33	6	40	36	18
1976	1,681	49	37	7	40	34	19
1977	1,678	51	31	7	36	31	26
1978	1,713	53	30	7	33	27	33
APTD							
1974	53,161	56	31	7	37	49	10
1975	61,928	57	30	6	37	47	11
1976	62,308	58	30	6	36	44	13
1977	62,648	59	30	7	36	42	15
1978	62,952	60	30	7	35	41	17
FCC²							
1974	733	45	33	98	2	0	0
1975	1,758	45	27	94	6	0	0
1976	1,794	47	26	92	8	0	0
1977	1,988	46	26	92	8	0	0
1978	2,344	46	24	98	2	0	0
Total							
1974	347,488	62	51	45	21	9	25
1975	389,468	62	50	45	23	9	24
1976	368,666	62	50	44	22	9	25
1977	342,505	63	49	43	22	9	26
1978	324,191	63	48	42	23	8	27

¹Certain spouses under age 65 are enrolled under OAA.

²FCC enrollment records are in error if reported age is over 21.

TABLE 2
Tennessee Medicare Enrollment
by Medicare Status, Sex, Race, and Age
(1974-1978)

Medicare Status/Year	Number of Enrollees	Sex	Race	Age ¹			
		Percent Female	Percent Non-White	Percent Under 25	Percent 25-49	Percent 50-64	Percent 65 and Over
Aged							
1974	421,220	59	16	0	0	0	100
1975	433,026	59	16	0	0	0	100
1976	444,132	59	16	0	0	0	100
1977	455,468	60	16	0	0	0	100
1978	467,362	60	16	0	0	0	100
Disabled							
1974	48,281	34	17	3	31	66	0
1975	54,631	34	17	2	31	67	0
1976	60,450	36	16	3	31	67	0
1977	66,697	36	17	3	30	67	0
1978	71,089	37	16	2	30	67	0
Total²							
1974	469,501	56	16	0	3	7	90
1975	487,657	56	16	0	3	8	89
1976	504,582	56	16	0	4	8	88
1977	522,165	57	16	0	4	9	87
1978	538,451	57	16	0	4	9	87

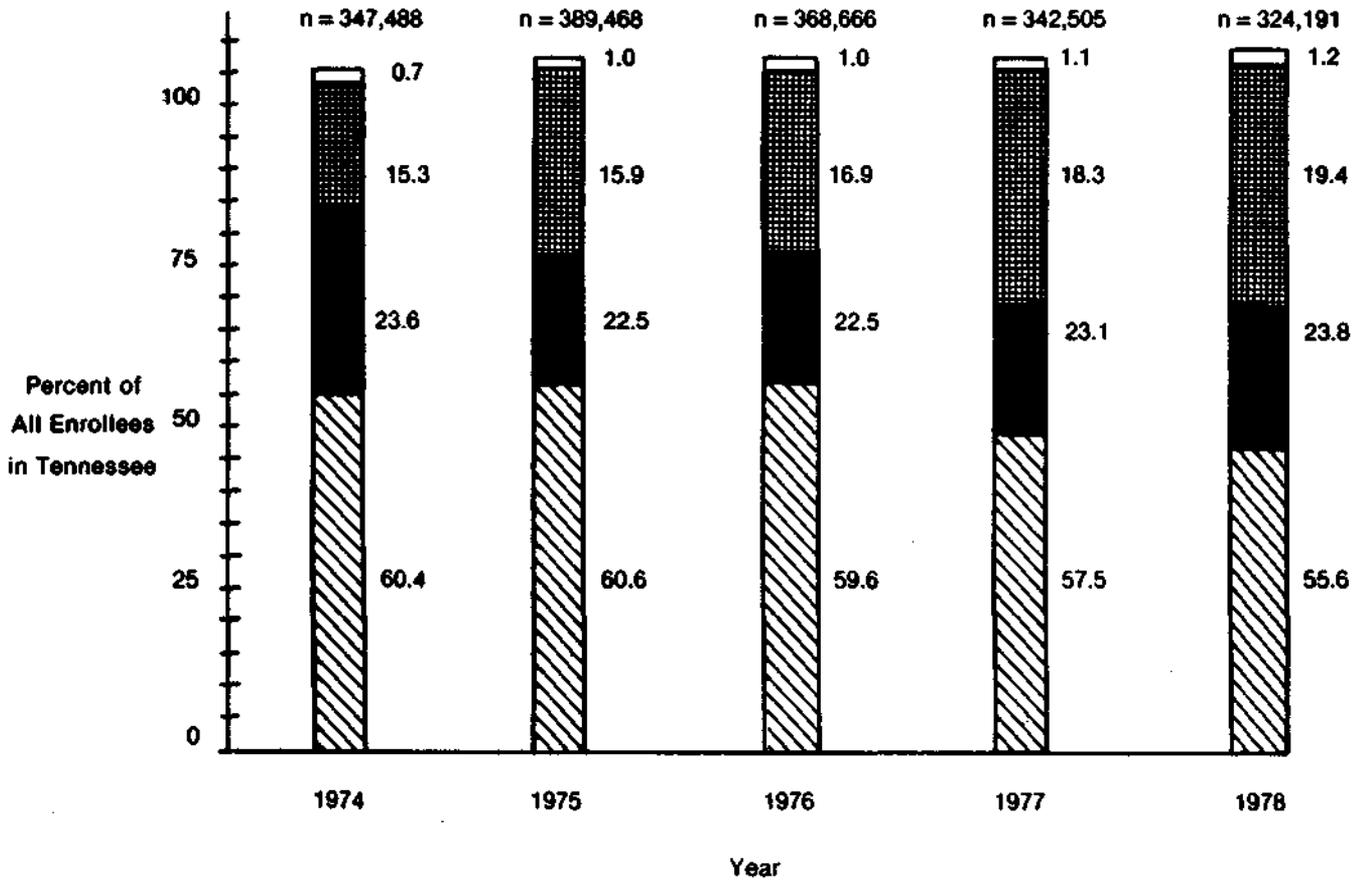
¹After age 65, disabled Medicare enrollees are automatically transferred to entitlement for the aged.

²Includes only aged and disabled Medicare enrollment.

TABLE 3
Percent Growth in Tennessee Medicaid Enrollment
by Eligibility Group and Year
(1974-1978)

Years	Eligibility Group					
	OAA	AFDC	AB	APTD	FCC	Total
1974-1975	+ 7.3	+ 12.5	+ 0.2	+ 16.5	+ 139.8	+ 12.1
1975-1976	- 5.4	- 6.9	- 5.0	+ 0.6	+ 2.0	- 5.3
1976-1977	- 4.6	- 10.4	- 0.2	+ 0.5	+ 10.8	- 7.1
1977-1978	- 2.9	- 8.5	+ 2.1	+ 0.5	+ 17.9	- 5.3
Net Change	- 6.0	- 14.2	- 2.9	+ 18.4	+ 219.8	- 6.7

FIGURE 1
Tennessee Medicaid Enrollment By Eligibility Group
(1974-1978)



-  AB and FCC
-  APTD
-  OAA
-  AFDC

TABLE 4
Percent Growth in Tennessee Medicare Enrollment
by Medicare Status and Year
(1974-1978)

Years	Medicare Status		
	Aged	Disabled	Total ¹
1974-1975	+ 2.8	+ 13.2	+ 3.9
1975-1976	+ 2.6	+ 10.7	+ 3.5
1976-1977	+ 2.6	+ 10.3	+ 3.5
1977-1978	+ 2.6	+ 6.6	+ 3.1
Net Change	+ 11.0	+ 47.2	+ 14.7

¹Includes only aged and disabled Medicare enrollment.

The observed changes in program composition were responsible for a moderate shift in the age distribution of the Tennessee Medicaid population. Figure 2 shows that the percentage of Medicaid enrollees under age 18 declined steadily, from 45 percent in 1974 to 42 percent in 1978. A corresponding increase, from 25 percent to 27 percent, was observed in aged Medicaid enrollment. The percentage in the intermediate age group (18-64) remained stable. Thus, the median age for all Medicaid enrollees increased in Tennessee.

Changes in program composition had no effect on the overall proportion of female enrollees, while there was a small decline in the proportion of non-white enrollees. Nationally, the proportion of females and non-white Medicaid recipients increased slightly, while the proportion of aged recipients declined slightly (Muse, 1981).

Demographic Characteristics of the Enrolled Population

The demographic characteristics of the Tennessee Medicaid and Medicare populations, presented earlier in Tables 1 and 2, show that for both aged and disabled groups, Medicaid has a higher proportion of non-whites and females than Medicare. Other observations are presented below.

SEX

OAA enrollees are predominantly female, which is not surprising given women's longer life expectancy. Worth noting, however, is the fact that, averaged over the five years, 58 percent of disabled enrollees are also female. In contrast, Medicare disabled persons are disproportionately male. Since there has historically been a larger proportion of male wage earners and Medicare is an earnings related program, the larger proportion of males is expected under Medicare.

RACE

Whites compose only about 35 percent of the AFDC program, although they represent approximately 84 percent of the Tennessee population (U.S. Department of Commerce, 1979). Within the other eligibility groups, whites represent a much larger proportion, constituting about 70 percent of OAA, AB, and APTD and 75 percent of FCC enrollment. Non-whites in all groups are overwhelmingly located in the Memphis area and account for a relatively small proportion of the enrollment in the Nashville area (Tables 11 and 12).

AGE

The age distribution of AFDC enrollees shows that most are children under 18 years of age. Another 27 percent of AFDC enrollees are between 18 and 49 years old; presumably many of these are young mothers. In the disabled group, the largest proportion of enrollees (49 percent in 1974; 41 percent in 1978) are between the ages of 50 and 64. Old age assistance holds true to expectations, with almost all enrollees age 65 and over. For the most part, these individuals are crossovers, receiving coverage under both Medicaid and Medicare.

These age and sex distributions of enrollees illustrate quite clearly that Medicaid provides medical care to four fundamentally different groups of poor individuals: children, young mothers, the blind or disabled, and the aged. As suggested earlier, the disparate nature of these groups has important implications for understanding the use of health care services under Medicaid. In particular, as we will note shortly, young mothers and children, covered under AFDC and FCC, have significantly lower levels of short-stay hospital use than do the blind and disabled.

Enrollment Turnover

Figure 3 shows quarterly rates for AFDC and the disabled. Solid lines refer to program entry rates, while dotted lines represent exit rates. As hypothesized, AFDC enrollees who are expected to be more employable, and hence subject to changing labor market conditions, show consistently greater turnover than disabled enrollees, especially after 1976 (8 percent versus 4 percent, on average). Entry and exit rates for the disabled are often between three to five percentage points lower than those for AFDC.

The Medicare disabled program shows a turnover of between 4 and 5 percent per quarter, making it comparable to the Medicaid disabled experience in Tennessee. Entry into the aged Medicare program averaged 2 percent, and the exit rate (due largely to deaths) was 1.5 percent.

FIGURE 2
Tennessee Medicaid Enrollment by Age
(1974-1978)

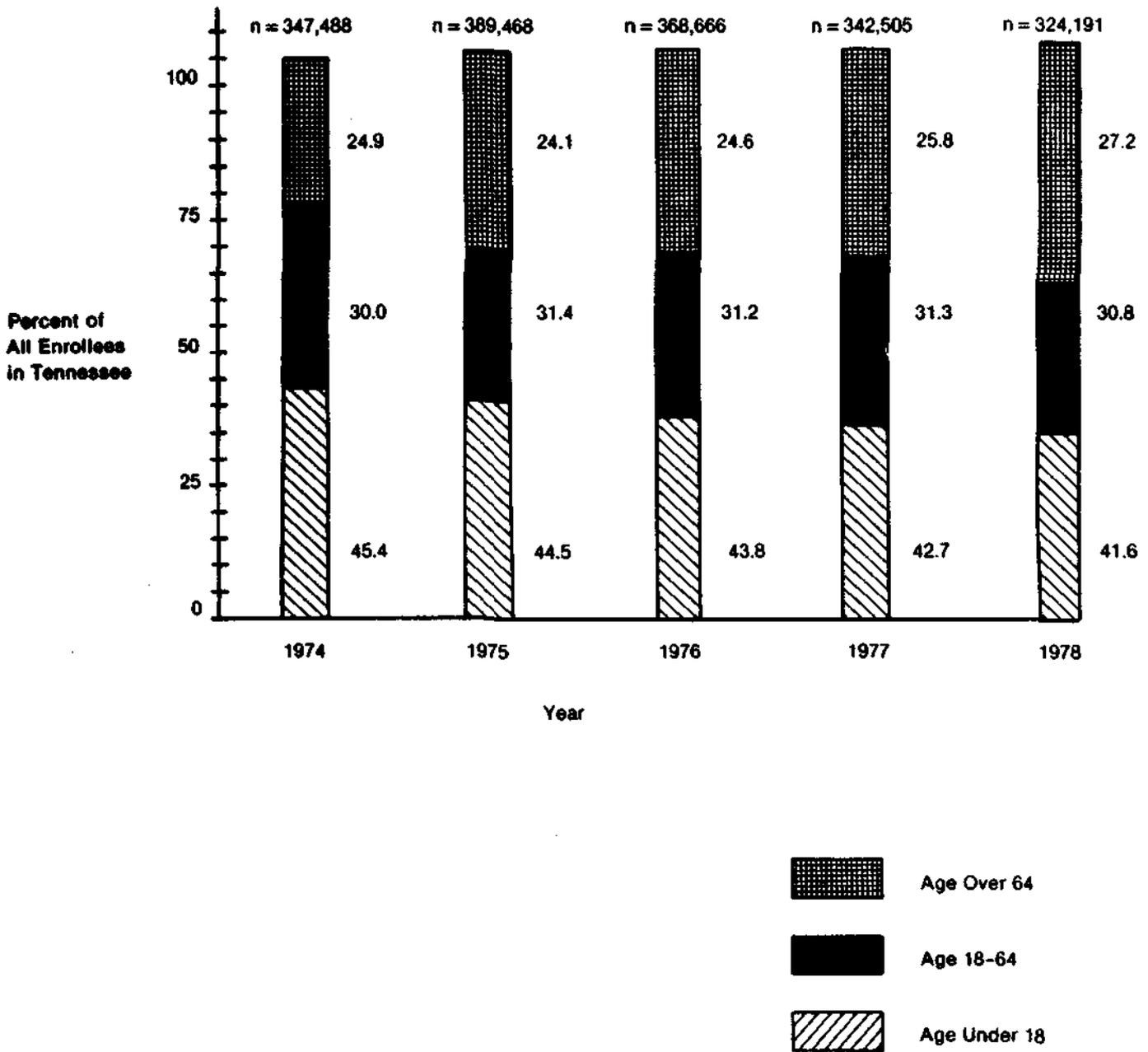
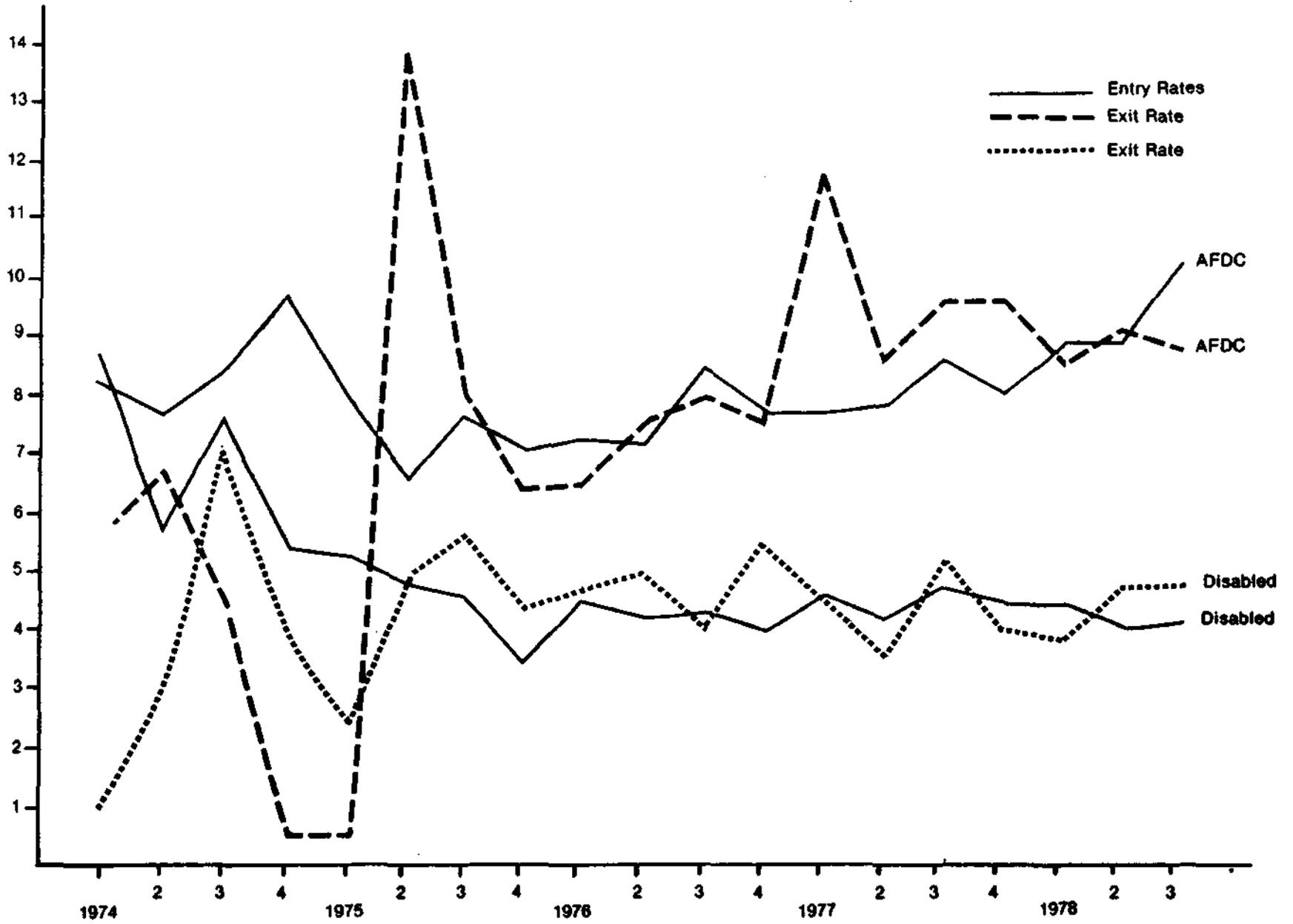


FIGURE 3
Tennessee Medicaid AFDC and Disabled Enrollment Turnover Rates (%)
(1974-1978)



As shown in Figure 3, exit rates apparently constitute the driving force behind quarterly variations in enrollment levels, since entry rates are generally quite stable. For instance, the low percentage of AFDC dropouts combined with relatively high entry rates explains the growing number of AFDC enrollees through 1974. In early 1975, a sharp increase in the dropout rate (from 0.5 to 13.7 percent), along with a falling entry rate, led to the significant decline in AFDC enrollment noted earlier. The disabled group also shows the same inverse relationship between entry and exit rates beginning in the first quarter of 1975, suggesting that the forces affecting AFDC enrollees also affected the disabled, although to a much lesser degree. Early 1975 appears to be a watershed period for both groups, since entry and exit rates which deviated significantly prior to that time stabilized thereafter with little subsequent change in size for either group. These findings suggest that the disabled use rate and cost projections will probably be more accurate than projections for the AFDC population, due to the greater enrollment stability of the former population.

Utilization Trends

Annual short-stay hospital utilization and payment measures are presented in Table 5 for four Medicaid groups and in Table 6 for the two major Medicare groups.¹² Within Medicaid, disabled use rates are by far the highest, followed by the blind and then AFDC. Since the case-mix of the blind and disabled is expected to be more severe than that of AFDC (where the most frequent diagnoses are pregnancy-related), this finding is not surprising. The shorter CLOS of between 2 and 2½ days for AFDC program recipients also reflects these case-mix and demographic differences. The variation in blind and FCC usage rates from year to year should be interpreted cautiously, given the small cell sizes on which these rates are based.¹³

¹²Recall that OAA is excluded from all analyses (except enrollment) because utilization was not included for Medicare/Medicaid crossovers.

¹³This example demonstrates that differential sampling rates are needed to answer some Medicaid questions. Both the blind and FCC populations are so small that they would never be adequately represented in a random sample at either the State or national level. The use of person-based data systems permits the selection of all (or at least a higher percentage of) utilization and enrollment records depending on the number of enrollees in each eligibility group.

Admissions, Covered Days, and Length of Stay

Rates of admission and covered days of care rose in all Medicaid groups over the five years. AFDC admission rates jumped from an annual rate of 142.1 per 1,000 PYEs in 1974 to 207.7 in 1978 (up 46 percent overall or 10.0 percent per year). Rates of covered days of care rose from 647.3 days to 896.0 days, an increase of 39 percent (or 8.5 percent per year). For the disabled group, admission rates increased at an annual rate of 10.2 percent between 1974 and 1978 (from 473.4 to 696.2 admissions per 1,000 enrollees), while rates of covered days of care rose 7.8 percent per year (from 3,428.2 to 4,630.4 days per 1,000 enrollees). The average annual increase in blind use was slightly lower, with admission rates rising 9.2 percent and covered days, 7.4 percent.

Comparable rates for disabled Medicare enrollees in Tennessee show much smaller increases over the same period: discharges per 1,000 enrollees rose only 3.2 percent annually, while covered days increased only 0.7 percent annually. Although use for disabled Medicaid recipients was much lower than that for disabled Medicare recipients in 1974, the rapid growth in Medicaid utilization rates closed the gap between the two levels by 1978. The increase in hospital use by Tennessee Medicaid recipients could be a result of more selective eligibility criteria; that is, while fewer people are being admitted to the program, those who become eligible may be in greater need of health care. An increase in the proportion of persons who qualify under spend-down provisions could magnify this tendency.

In two Medicaid programs, AB and APTD, average covered length of stay declined over the period (as did the Medicare lengths of stay), yet the average length of stay remained fairly constant for AFDC patients. The small number of claims may account for the irregular trend observed in average length of stay for FCC.

Utilization and Payments

Table 5 also presents trends in the average annual payment measures: 1) payment per enrollee, 2) payment per admission, 3) payment per covered day, and 4) total payments. Like utilization rates, these measures also increased, only more drastically. AFDC payments per enrollee were up 28 percent *per annum*, followed by the disabled at 27 percent and the blind at 26 percent. (Payment measures for the FCC program have little meaning due to the few observations in the early years.) Average payments per admission grew a little more than half as fast, 16 percent, 15 percent, and 15 percent for AFDC, APTD, and AB respectively, while payments per covered day rose by 17 percent, 18 percent, and 17 percent for the same three

TABLE 5
Tennessee Medicaid Short-Stay Hospital
Utilization and Payments by Eligibility Group
(1974-1978)

	Admissions per 1,000 PYEs (ADMR) ¹	Covered Days of Care per 1,000 PYEs (CDOCR) ¹	Average Covered Length of Stay (CLOS)	Average Payment per Enrollee	Average Payment per Admission	Payments per Covered Day	Total Payments \$ (Thousands)
AB							
1974	168.2	1,108.1	6.6	\$ 92	\$ 547	\$ 83	\$ 162
1975	167.9	1,154.6	6.9	111	661	96	196
1976	207.0	1,304.6	6.3	151	729	116	254
1977	212.2	1,365.4	6.4	179	844	132	300
1978	238.7	1,470.8	6.2	229	959	155	392
AFDC							
1974	142.1	647.3	4.5	\$ 56	\$ 394	\$ 88	\$11,760
1975	154.0	693.4	4.5	69	448	100	16,284
1976	174.7	776.1	4.4	90	515	117	19,800
1977	194.8	850.1	4.4	120	616	141	23,640
1978	207.7	896.0	4.3	149	717	167	26,820
APTD							
1974	473.4	3,428.2	7.2	\$280	\$ 591	\$ 82	\$ 7,420
1975	587.0	4,122.0	7.0	394	671	96	12,214
1976	648.0	4,426.6	6.8	498	769	113	15,438
1977	688.2	4,746.6	6.9	630	915	133	19,845
1978	696.2	4,630.4	6.5	720	1,034	159	22,680
FCC							
1974	—0—	—0—	—0—	\$ —0—	\$ —0—	\$ —0—	\$ —0—
1975	0.6	1.1	1.8	0.12	200	111	0.2
1976	16.1	145.5	9.1	20	1,242	138	36
1977	163.9	767.9	4.7	113	689	147	225
1978	164.7	672.0	4.1	118	716	175	276

¹We applied the 50 percent crossover adjustment to disabled enrollment for these statistics.

TABLE 6
Tennessee Medicare Short-Stay Hospital
Utilization and Reimbursement by Enrollment Status
(1974-1978)

	Admissions ¹ per 1,000 Enrollees	Total Days ¹ of Care per 1,000 Enrollees	Average Length of Stay	Average Reimburse- ment per Enrollee	Average ¹ Reimburse- ment per Admission	Reimburse- ment per Day	Total Reimburse- ment \$ (Thousands)
Aged							
1974	355.7	3,899.1	11.1	\$235	\$ 661	\$ 60	\$106,479
1975	361.8	3,896.1	10.7	298	824	77	139,702
1976	375.1	3,963.1	10.6	369	985	93	177,698
1977	388.5	3,977.8	10.3	415	1,069	104	204,093
1978	393.0	3,966.5	10.2	445	1,133	111	225,825
Dis- abled²							
1974	435.6	4,427.8	10.2	259	\$ 594	\$ 58	\$ 12,500
1975	459.1	4,577.0	10.0	332	722	72	18,121
1976	467.8	4,543.3	9.7	415	888	92	25,115
1977	481.8	4,575.5	9.5	463	962	101	30,907
1978	494.2	4,550.5	9.2	512	1,036	113	36,382

¹Aged enrollment is adjusted for patient origin and destination. Disabled enrollment is unadjusted.

²Discharges are used as a proxy for admissions for the disabled.

groups. Total Medicaid expenditures for the AB, AFDC, and disabled Medicaid programs were \$49.9 million in 1978,¹⁴ up from \$19.3 million in 1974, a 27 percent annual increase over a four year period. Total payment increases ranged from 32 percent per year for the disabled to 23 percent for AFDC.

Medicare reimbursements per enrollee in Tennessee were significantly higher than comparable Medicaid levels, except for the disabled. However, average annual rates of increase were smaller within Medicare, 17 percent for the aged and 19 percent for the disabled. Average reimbursements per admission were also higher for Medicare, although reimbursements for the two disabled programs were very similar. Between 1974 and 1978, reimbursements per admission grew by more than 70 percent for all groups. By contrast, Medicare reimbursements per covered day were considerably below those for the various Medicaid programs, particularly in the later years. Part of this difference may be due to Medicare deductibles and coinsurance which lower reimbursements relative to Medicaid, which requires no out-of-pocket expenditures. Also, since elderly patients often require longer periods of inpatient recuperation, their reimbursement per day tends to be lower because recuperative days are less costly than initial days. While Medicaid reimbursements per covered day are typically greater than Medicare *per diem* reimbursements, the average Medicaid payment per covered day is about \$30 to \$40 under the \$172 *per diem* reported in 1977 for all community hospitals in Tennessee (American Hospital Association, 1978). During 1977, Medicare reimbursements per covered day in short-stay hospitals were \$145 for aged beneficiaries (Helbing, 1981) and \$154 for the disabled (Silverman and Smith, 1981). Differences may be due to the lack of comparability among data sources, dissimilarities across population groups, varying patient case-mix and severity of illness, some degree of cost shifting among patient groups, and the fact that Medicaid payments do not represent the total cost of care delivered to Medicaid recipients.

Table 7 shows that total Medicaid inpatient payments increased substantially for the blind, AFDC, and disabled groups. The average annual percentage increase was the greatest for the disabled, 32.3 percent, followed by the blind at 24.7 percent and AFDC at 22.9 percent. While total payments have been increasing, Figure 4 indicates that the rate of increase moderated significantly during the observation period. The rate of growth in total payments was greatest in 1975, at a level of 38.5 percent for AFDC and

64.4 percent for the disabled, but for each succeeding period, growth rates moderated to a low of 13.5 percent and 14.3 percent respectively, by 1978.

Table 7 also indicates the relative impact of utilization, enrollment, and payments per day on changes in total reimbursement. For each Medicaid group, increased payments per day were responsible for between two-thirds and three-quarters of the overall increase in total inpatient payments. This finding demonstrates the strong effect of inflation on increasing Medicaid expenditures. (The use of increased payments per day as a proxy for utilization overstates inflation's impact on total reimbursements to the extent that changes in the quality of services, intensity of service use, supply of medical resources, or technological change also occurred.) During the same period, increases in use accounted for between 26 and 39 percent of the increase in inpatient payments. Again, other underlying factors, such as patient demographics and severity of illness, may have also influenced trends.

Finally, while disabled enrollment increased slightly, the declining number of enrollees moderated the increase in total payments for blind and AFDC recipients. Thus, changes in the size of the Medicaid population are *not* a principal cause of increases in Medicaid expenditures, except for the disabled. Indeed, decreases in the AFDC population have reduced inpatient payments by about 18 percent below what they might have been otherwise.

By way of comparison, the Medicare program exhibited different trends. Table 8 shows that the small increase in days of care rates had a very minor effect on total reimbursement increases, for both the aged and disabled. For the aged population, where enrollment growth was small, changes in reimbursements per day represented about 84 percent of the total increase. In contrast, because disabled Medicare enrollment grew more rapidly, the effect was split: about two-thirds of the increase in Medicare reimbursements was caused by higher reimbursements per day, and one-third was caused by increased enrollment. It is clear that for both Medicare and Medicaid, inflation in payments per day is the dominant factor causing increased expenditures.

Partitioning days of care rates into admissions rates and covered length of stay (CDOCR = ADMR · CLOS) shows that increased covered days of care rates resulted from substantially higher admission rates and a slightly declining average length of stay within Medicaid. Admission rates grew at an annual average of 9 percent or more for each of three Medicaid groups, while average covered length of stay declined by a maximum of 2½ percent. Admission rates and length of stay exhibit similar trends for Medicare beneficiaries, except that Medicare admissions rates grew more slowly. Thus, for both Medicare and Medicaid, reimbursement increases attributable to increases in days of care were caused mainly by rising admission rates rather than higher average length of stay.

¹⁴This figure of \$49.9 million appears quite reasonable when compared with data from other sources for the Tennessee program (Medicaid/Medicare Management Institute, 1979, Table 23). The Tennessee Medicaid program reported general hospital expenditures of \$45.6 million in 1977, versus \$43.7 million calculated for the three programs using the Tennessee claims data base. Most of the discrepancy is probably due to the exclusion of over-65 disabled and OAA beneficiaries, a small portion of whom are not crossovers, from the calculations.

TABLE 7
Average Annual Percentage Change in Total Medicaid Inpatient Payments,
as Affected by Changes in Covered Days of Care Rates, Payments per Day, and
Enrollment in Tennessee, 1974-1978, by Eligibility Group

Eligibility Group	Average Annual Percent Change: Total Inpatient Payments	Influence of Causal Factors, as Percent of Total			
		Total	Utilization: (Covered Days per 1,000 Enrollees)	Enrollment	Payments per Day
Blind	+ 24.7	100	+ 31	- 3	+ 72
AFDC	+ 22.9	100	+ 39	- 18	+ 79
Disabled	+ 32.3	100	+ 26	+ 14	+ 60

TABLE 8
Average Annual Percentage Change in Medicare Inpatient Reimbursements,
as Affected by Changes in Total Days of Care Rates, Reimbursements per
Day, and Medicare Enrollment in Tennessee, 1974-1978, by
Medicare Status¹

Medicare Status	Average Annual Percent Change: Total Inpatient Reimbursements	Influence of Causal Factors, as Percent of Total			
		Total	Utilization: (Total Days per 1,000 Enrollees)	Enrollment	Reimbursements per Day
Aged	+ 20.7	100	+ 2	+ 14	+ 84
Disabled	+ 30.7	100	+ 2	+ 35	+ 63

¹Enrollment for Part A services only.

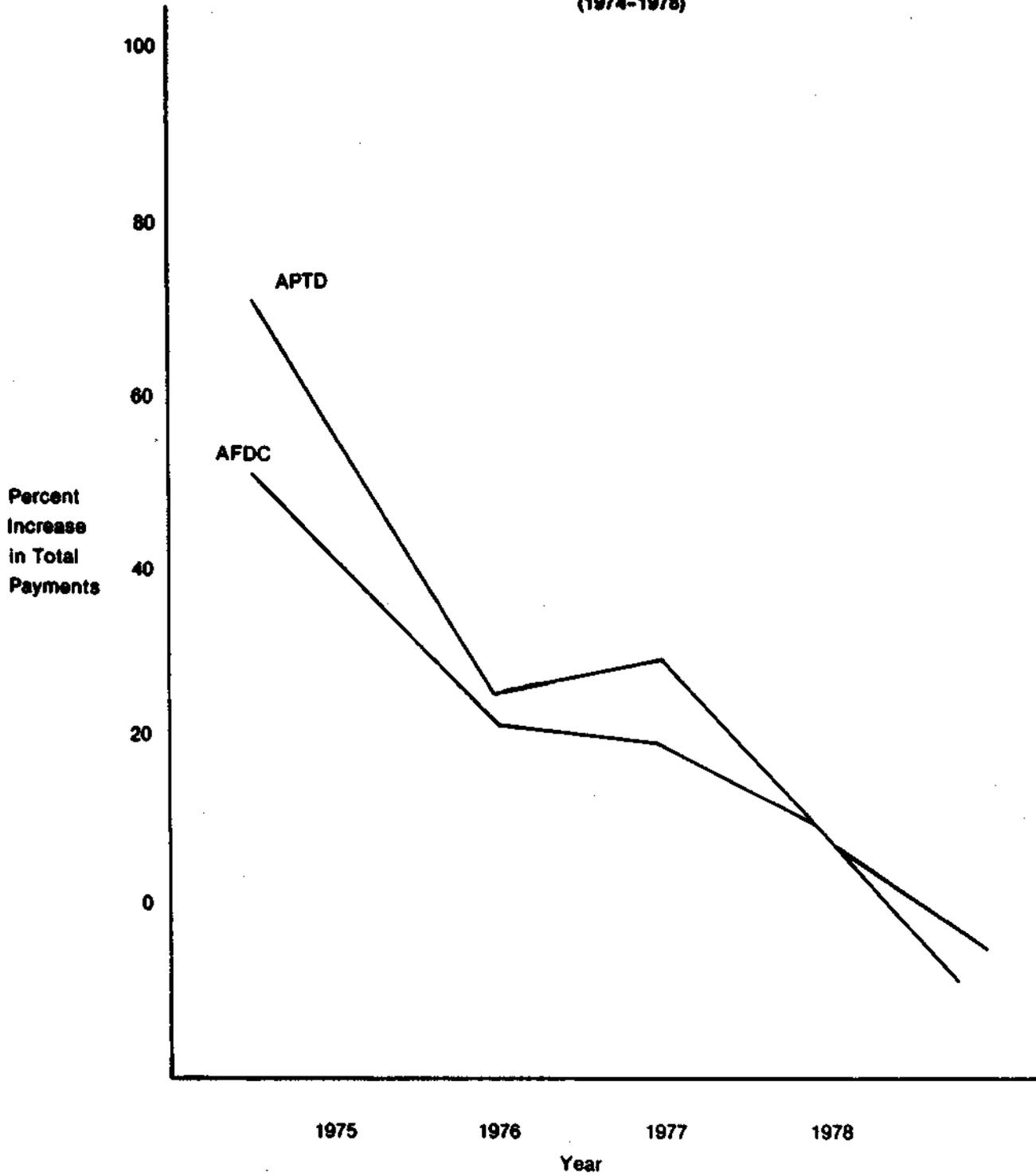
Table 9 summarizes the relationship of expenditures to eligibility group. While AFDC enrollees represent 83.5 percent of the non-aged Medicaid population, they are responsible for 52.3 percent of total covered days and 53.5 percent of inpatient payments. By way of contrast, disabled enrollees are only 14.6 percent of the non-aged population, yet account for 46.4 percent of total covered days and 45.2 percent of inpatient payments. These extremes are presumably due to differences in age, case-mix, and severity of illness.

TABLE 9
Tennessee Medicaid
Relationship of Enrollment, Inpatient Utilization,
and Payments by Eligibility Group
1978¹

Eligibility Group	Percent of Enrollees	Percent of Total Covered Days	Percent of Inpatient Payments
AFDC	83.5	52.3	53.5
AB	0.8	0.8	0.8
APTD	14.6	46.4	45.2
FCC	1.1	0.5	0.6
Total	100.0	100.0	100.0

¹We excluded aged Medicaid enrollees and applied the 50 percent crossover adjustment to the disabled enrollee count.

FIGURE 4
Tennessee Medicaid Annual Percent Increase in Inpatient Payments
for AFDC and the Disabled
(1974-1978)



These findings are consistent with aggregate national statistics reported by the States to HCFA. For the nation in 1978, disabled recipients were 11.7 percent of all recipients but were responsible for 28.6 percent of all payments. On the other hand, AFDC recipients (64.0 percent of all recipients) represented only 29.8 percent of all payments. The national data also show that non-cash recipients are responsible for a disproportionate share of total payments, given their share of the recipient population (Muse, 1981).

In sum, by 1978 Tennessee Medicaid was spending 159 percent more on inpatient hospital services for the three groups relative to 1974, with most of the increase coming from increased payments per day. Approximately two-thirds of this increase can be attributed to inflated hospital payments per day, while the remaining one-third is related to growth in use and (in the case of disabled) enrollment. Clearly, if payments per day had remained constant since 1974, Medicaid payments would have risen much less rapidly, assuming no offsetting increase in utilization.

Utilization and Enrollment Turnover

Table 10 shows quarterly utilization rates for enrollees grouped by enrollment turnover class (as defined by length of continuous enrollment) for the AFDC and disabled populations. Long-term enrollees are the largest class, constituting 47 percent of AFDC

TABLE 10
Tennessee Medicaid
Average Quarterly Utilization Rates per 1,000 Person-Quarter-Equivalent Enrollees by Enrollment Turnover Class and Eligibility Group (1975-1977)

Eligibility Group	Enrollment Turnover Class by Length of Continuous Enrollment		
	All 12 Quarters (Long-Term)	Between 6 and 12 Quarters (Intermediate-Term)	Less Than 6 Quarters (Short-Term)
AFDC			
Percent of Enrollees	(47%)	(43%)	(10%)
Percent of Payments ¹	(29%)	(51%)	(20%)
Admissions per 1,000 PQEs			
1975	39.2	50.7	51.1
1976	30.1	59.1	93.7
1977	41.5	73.6	141.2

TABLE 10(Continued)

Eligibility Group	Enrollment Turnover Class by Length of Continuous Enrollment		
	All 12 Quarters (Long-Term)	Between 6 and 12 Quarters (Intermediate-Term)	Less Than 6 Quarters (Short-Term)
Covered Days per 1,000 PQEs			
1975	149.5	219.9	317.8
1976	104.3	226.4	512.1
1977	128.7	257.2	626.0
Average Covered Length of Stay			
1975	3.8	4.3	4.7
1976	3.6	4.1	3.9
1977	3.0	3.5	4.3
Disabled			
Percent of Enrollees	(60%)	(31%)	(9%)
Percent of Payments ¹	(36%)	(37%)	(27%)
Admissions per 1,000 PQEs ²			
1975	81.6	135.2	135.2
1976	82.0	124.6	539.0
1977	68.8	160.2	409.0
Covered Days per 1,000 PQEs ²			
1975	465.8	770.2	861.0
1976	451.6	713.0	2721.6
1977	380.2	855.0	2820.0
Average Covered Length of Stay			
1975	5.9	5.9	6.3
1976	5.6	6.6	5.5
1977	5.5	5.8	6.1

¹Estimated percent of payments may actually be understated for the short- and intermediate-term groups, since average payment levels across all groups were used to produce these estimates. Because discontinuous groups are expected to have more severe illnesses and poorer health status, actual payments per day for these groups are probably higher than average.

²We applied the 50 percent crossover adjustment to disabled enrollment for these statistics.

enrollees and 60 percent of disabled enrollees.¹⁶ The smallest turnover class consists of short-term enrollees, those with less than six consecutive quarters of enrollment, accounting for less than 10 percent of the enrolled populations in both programs. As expected, utilization rates across turnover classes are inversely correlated with length of continuous enrollment history.¹⁶ Admission rates for short-term enrollees are between 1½ and three times higher than for the long-term enrollees within AFDC and between 1½ and six times as great for the disabled, suggesting a greater prevalence of acute episodes.¹⁷ Covered days rates for long-term enrollees range between 20 and 50 percent of corresponding rates for short-term enrollees in both programs. Utilization rates for intermediate-term enrollees tend to lie somewhere between the rates for short- and long-term enrollees. Average covered length of stay was consistently longer for short-term enrollees, indicating the probability of a more severe illness mix.

Quarterly utilization for short-term enrollees increased faster as well. Over the three years, admission rates for this group grew 29 percent, versus an actual decline of 4.4 percent for the long-term disabled. Similarly, the rates of covered days for short-term enrollees rose 18.5 percent and 34.6 percent for AFDC and the disabled respectively, while rates of covered days for long-term enrollees declined more than 3.8 percent in both programs between 1975 and 1977.¹⁸

Because admission rates and average length of stay were greater for short-term enrollees, their share of total expenditures was disproportionately large. Within AFDC, the short-term enrollees represented only 10 percent of the population, but they were responsible for 20 percent of all AFDC payments. Short-term disabled enrollees represented 27 percent of disabled payments but were only 9 percent of the disabled population. Long-term enrollees were a large segment of their respective populations, 47 percent for AFDC and 60 percent for disabled, but they accounted for only 29 percent and 36 percent of payments, respectively. Since utilization rates grew more rapidly for short-term enrollees, their share of total payments steadily increased for both the AFDC and disabled groups during each of the study years.

¹⁶This class of long-term enrollees and their respective rates should be comparable to the APTD-1 and AFDC-1 groups defined in the New Mexico EMCRO analysis (Brook, 1978). The rates for Tennessee's AFDC cohort include pregnancy-related admissions, however.

¹⁶Note that utilization is expressed in terms of person-quarter-equivalents rather than person-year-equivalents for this analysis.

¹⁷Two important caveats apply to this analysis. First, some rates may be particularly high due to small sample sizes, primarily for short-term enrollees. Second, the adjustment of disabled enrollment for crossovers (see footnote 4) may introduce bias in disabled utilization rates if crossovers were not proportionately distributed among the turnover classes.

¹⁸The overall upward trend in annual covered days rates for AFDC and disabled enrollees was shown in Table 5.

Utilization by Location and Demographic Factors

The next group of analyses discuss demographic differences between two geographic (PSRO) areas within Tennessee. Because there were no significant differences in the age or sex distribution of Medicaid enrollees across the two geographic areas, the discussion focuses on variations by race and degree of urbanization.¹⁹

The two Tennessee PSRO areas (Nashville and Memphis) differ markedly in degree of urbanization and in the racial composition of Medicaid enrollees, as shown in Table 11 for AFDC and Table 12 for the disabled. While over 80 percent of the AFDC enrollees in the Memphis area live in urban counties, only 41 percent of their Nashville counterparts are in urban areas. Disabled enrollees show a similar disparity, although the percentages in urban areas are uniformly lower (67 percent in Memphis versus 27 percent in Nashville). Racial differences are equally pronounced.

Over 90 percent of Memphis AFDC enrollees are non-white, but only 43 percent in the Nashville area are non-white. For the disabled, the percentages are 66 percent and 20 percent, respectively. In comparison, blacks composed 35 percent of the Memphis area total population in 1970 and only 9 percent of the Nashville area total population (U.S. Department of Commerce, 1977).

Tables 11 and 12 show systematic variations in utilization by race and location for admissions and covered days. Rural areas in each area exhibit notably greater rates of admission and covered days than urban areas. Rural AFDC admission rates were 41 percent and 21 percent higher in the Memphis and Nashville areas, respectively. Comparable rates for the disabled were 20 percent and 29 percent greater. However, urban/rural differences in covered days were much smaller (between 16 and 29 percent, depending on the area and eligibility group). This is consistent with the hypothesis that rural physicians have different admitting practices. (Rural patients are admitted more often than non-rural patients for less serious illnesses).

In rural and urban areas alike, AFDC admission rates of non-whites were only about 60 percent of those for whites. The higher AFDC admission rates for non-whites in intermediate areas constituted an exception to this tendency. Covered days rates of non-whites were also notably lower, ranging between 55 percent (rural) and 85 percent (intermediate) of the comparable rates for whites. Findings for the disabled group with respect to racial differences were less consistent, however. While non-whites generally had lower levels of use, disabled admission rates in both urban and intermediate counties were actually higher for non-whites, as were covered days rates in intermediate areas.

¹⁹As described earlier, counties were classified for level of urbanization as either urban, intermediate, or rural.

TABLE 11
Tennessee Medicaid AFDC Enrollment and
Utilization by PSRO, Degree of Urbanization, and Race
(1976)

Degree of Urbanization/Race ¹	Percent of Enrollees		User Rate (UR) ²		Re-admission Rate: Admissions per User (ADMU)		Admission Rate (ADMR)		Covered Days of Care Rate (CDOCR)	
	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville
Urban	81%	41%	101.3	143.7	1.19	1.24	120.5	178.2	527.9	844.9
White	4.7	13.8	173.4	175.1	1.22	1.25	211.5	218.9	783.5	943.1
Non-White	76.3	27.2	96.9	126.8	1.18	1.24	114.3	157.2	511.3	802.2
Intermediate	—	26	—	191.6	—	1.29	—	247.2	—	1010.8
White	—	18.6	—	186.7	—	1.29	—	240.8	—	1052.1
Non-White	—	7.4	—	203.8	—	1.31	—	267.0	—	901.5
Rural	19	33	134.2	193.4	1.27	1.29	170.4	216.4	635.3	1073.7
White	4.2	24.8	198.1	213.4	1.17	1.31	231.8	279.6	915.1	1175.7
Non-White	14.8	8.2	116.8	137.4	1.32	1.22	154.2	167.6	557.2	774.8
Total	100	100	107.7	172.9	1.21	1.27	130.3	219.6	548.8	966.0

¹Urban counties have cities of greater than 100,000 people. Intermediate counties have cities between 10,000 and 100,000. Rural counties have no cities with populations greater than 10,000. The Memphis area has no intermediate counties.

²The user rate (UR) counts the number of unduplicated recipients (users) per 1,000 Medicaid enrollees, while the admission rate (ADMR) counts the total number of admissions per 1,000 Medicaid enrollees. The quantities ADMR, UR, and ADMU, admissions per user, are related in the following way: ADMR = UR × ADMU.

TABLE 12
Tennessee Medicaid Disabled Enrollment
and Utilization by PSRO, Degree of Urbanization, and Race
(1976)

Degree of Urbanization/Race	Percent of Enrollees		User Rate (UR) ¹		Re-admission Rate: Admissions per User (ADMU)		Admissions Rate (ADMR)		Covered Days of Care Rate (CDOCR)	
	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville	Memphis	Nashville
Urban	67%	27%	375.2	375.8	1.51	1.4	566.8	526.2	3275.2	4324.8
White	16	17	381.2	355.6	1.34	1.35	510.8	480.0	3494.4	4197.6
Non-White	51	10	373.4	411.2	1.56	1.46	582.6	600.4	3005.4	4149.4
Intermediate	—	31	—	498.8	—	1.36	—	678.4	—	4652.0
White	—	27	—	488.2	—	1.38	—	673.8	—	4457.8
Non-White	—	4	—	591.8	—	1.21	—	716.0	—	4652.2
Rural	33	42	501.8	504.4	1.35	1.35	677.4	681.0	4225.2	5018.8
White	18	36	529.4	506.8	1.37	1.36	725.2	689.2	4427.2	4896.4
Non-White	15	6	472.6	483.0	1.32	1.26	623.8	608.6	3654.4	4735.0
Total	100	100	415.0	468.8	1.44	1.37	597.6	842.2	3588.8	4715.8

¹We applied the 50 percent crossover adjustment to disabled enrollment for these statistics.

To facilitate direct comparisons between the two geographic areas, we adjusted utilization rates for race and urbanization differences. Since age and sex differences were insignificant, we did not adjust for these variables. While AFDC use rates in the Nashville area remained higher than in Memphis, adjusting for urbanization reduced the difference from 78 percent to between 61 and 63 percent. The gap in admissions for the disabled, which was never as large, was also reduced from 48 to 35 percent. Simultaneously adjusting for urbanization and race closed the use rate gap even further, to between 45 and 50 percent for AFDC and between 19 and 21 percent for the disabled. Hence, race and urbanization contribute in roughly equal amounts to geographical differences in utilization rates. Even after these adjustments, however, there remains a sizable difference in rates of admission and covered days between the two areas.²⁰

Possible explanations for racial differences in use rates include personal choice of other types of services, differences in health status, and limited access to hospital services.²¹ User rates, defined as the number of distinct hospitalized patients per 1,000 enrollees, do vary systematically with race, particularly in the AFDC program. This is especially evident in Table 13, which presents annual user rates and disparity ratios for Tennessee. AFDC user rates for whites are significantly higher than for non-whites, as indicated by disparity ratios ranging between 1.51 and 1.85. Even when user rates are disaggregated by PSRO and urbanization (as in Table 11), rates for whites remain higher in both urban and rural areas. Similar findings were observed for Medicare beneficiaries (Ruther and Dobson, 1981).

In contrast, disabled user rates show no clear pattern in Table 12; while whites have greater user rates in rural counties, non-whites have higher rates in more urban areas. This is not surprising, since the racial composition of the two eligibility groups differs greatly. Table 13, however, suggests that a disparity exists in the disabled program as well, although to a much lesser extent than in AFDC. Part of the difference in disparity ratios between the AFDC and disabled groups may be due to the more severe disabled case-mix. Greater case-mix severity not only implies an inability to forgo medical treatment on the part of the patient, but also less physician discretion over whether to treat, especially in life-threatening situations.

²⁰It should be noted that inpatient utilization rates for the general population were consistently higher in Memphis than in Nashville between 1974 and 1978. During 1976, for example, the Memphis area had a rate of 1,938.6 inpatient general hospital days per 1,000 population. The Nashville area rate was 1,500.1.

²¹Since non-whites exhibit consistently longer lengths of stay after admission, it is unlikely that the lower admission rates for non-whites result from a less complex case-mix.

Another aspect of utilization, the re-admission rate (admissions per user) is presented in Table 11 for AFDC and Table 12 for the disabled. The AFDC rate ranged between 1.17 and 1.32 admissions per user, while the range for the disabled was between 1.21 and 1.56. Higher re-admission rates for the disabled attest to their more serious case-mix. Re-admission rates for whites and non-whites in both Medicaid groups are fairly comparable overall, suggesting that any racial disparities in admission rates can be largely attributed to differences in user rates, particularly for AFDC recipients.

Diagnostic and Case-Mix Analyses

To facilitate case-mix studies, we disaggregated the percent of admissions, average lengths of stay, and payments variables for specific diagnostic groups. These are presented in Tables 14 and 15 for AFDC and disabled recipients, respectively. About one-fifth of all AFDC admissions during 1974 were related to pregnancy and childbearing. Acute respiratory infections, hypertrophy of tonsils, and pneumonia were the next most prevalent AFDC diagnoses, accounting for 5 percent, 3.7 percent, and 3.2 percent of program admissions, respectively. Although lengths of stay varied among diagnoses, they were quite short on average, reflecting the uncomplicated nature of most AFDC health problems and the youth of AFDC recipients. Cholecystitis, diabetes, and sterilization had the longest lengths of stay, ranging from six to eight days, while mean stays for hypertrophy of tonsils, otitis media, and abortions were all less than three days. Among the disabled, ischemic heart disease was the most common diagnosis in 1974, followed by malignant neoplasms and diabetes. The top 16 diagnoses together comprise 50 percent of all disabled admissions, with no overall change between the study years.

Of the top 14 to 16 diagnoses for AFDC and the disabled, eight were common to each, including diarrheal disease, diabetes, and pneumonia. Lengths of stay within the common diagnoses are a day or two longer for the disabled, no doubt due to their age and medical complications. For the categories unique to each group, mean stays are notably longer for the disabled: neoplasms, 8.7 days; hypertension, 7.2 days; ischemic heart disease, 7.5 days, and convulsions, 7.1 days, compared to AFDC diagnoses: otitis media, 2.8 days; hypertrophy of tonsils, 2.1 days; deliveries, 3.2 days, and concussions, 3.4 days. Comparing high frequency diagnoses and lengths of stay between the two groups emphasizes the greater severity of the disabled case-mix. While most AFDC patient conditions do not require long hospital stays, disabled conditions, such as neoplasms and heart disease, are notably more complex and likely to recur, thus requiring intensive medical intervention.

TABLE 13
Tennessee Medicaid AFDC and Disabled User
Rates and Disparity Ratios
(1974-1978)

Group/Race	Year				
	1974	1975	1976	1977	1978
AFDC					
User Rate					
White	143.4	161.6	194.3	234.8	258.6
Non-White	95.1	101.8	115.0	145.6	139.8
Disparity Ratio (W/NW)	1.51	1.59	1.69	1.61	1.85
Disabled					
User Rate					
White	350.2	401.6	468.8	629.2	603.6
Non-White	274.6	340.8	424.8	502.2	491.0
Disparity Ratio (W/NW)	1.28	1.18	1.10	1.25	1.23

Average payments per admission also reflect the less serious nature of AFDC problems relative to the disabled. In 1974 for instance, AFDC payments per admission ranged from \$161 for hypertrophy of tonsils to \$628 for cholecystitis, with a mean of \$394. The largest group, delivery-related diagnoses, had a fairly low cost per admission (\$299), as did abortion, otitis media, and acute respiratory infections. Payments per disabled admission, by contrast, averaged \$591, ranging from a low of \$362 (acute respiratory infections) to a high of \$745 (cholecystitis) in 1974. Heart disease and malignant neoplasms proved very expensive as well, costing the disabled program more than \$700 per admission. Due to longer covered stays, both total payments and payments per admission were significantly higher in the disabled program than in AFDC, even within similar diagnostic categories. Payments per day in the two programs were more comparable, however.

Changes in diagnostic case-mix over time were limited. For AFDC, pregnancy-related diagnoses increased from about 21 percent of admissions in 1974 to almost 28 percent by 1978. Most of the increase apparently came at the expense of "other diagnostic categories," although a few of the top 15 diagnoses show notable declines as well (for example, acute respiratory infections, down from 5 percent to 3 percent and hypertrophy of tonsils, down from 3.7 percent to 2.4 percent). Another noteworthy longitudinal shift in AFDC case-mix was an increase in sterilization, up 2½ percent. Diagnostic mix for the disabled showed even greater stability. Ischemic heart disease declined slightly, but was completely offset by the rise in importance of "other heart diseases."

Lengths of stay in both programs generally fell over the period, with the greatest declines appearing for the disabled. In this group, heart disease (except ischemic), cholecystitis, respiratory symptoms, and convulsions had decreases in lengths of stay of one full day or more, while the remaining diagnostic categories showed somewhat smaller declines. Average lengths of stay in the residual group, consisting of all other diagnoses, fell one-half of a day. Declines in AFDC lengths of stay were of lesser magnitude, usually on the order of half a day or less. In several diagnostic groups, including pregnancy-related admissions and diarrheal disease, lengths of stay increased slightly from 1974 to 1978. Overall, however, lengths of stay for AFDC declined.

To estimate the impact of temporal changes in case-mix on average length of stay, we calculated adjusted measures on an annual basis. Adjusting for case-mix had a negligible effect on average inpatient length of stay. Lengths of stay for AFDC recipients remained relatively stable between 1974 and 1978, while disabled lengths of stay fell about half a day. Since case-mix changes over time in the disabled program were minimal, we expected a null finding. Although some shifts in diagnostic case-mix had occurred in the AFDC program, these shifts evidently had no effect on average length of stay overall.

TABLE 14
Tennessee Medicaid Percent of AFDC Admissions,
Average Covered Lengths of Stay, Payments per Admission, Payments per Day,
and Total Payments by Diagnostic Group
(1974 and 1978)

Diagnostic Group	Percent of Total Admissions		Average Covered Length of Stay		Payments per Admission		Payments per Day		Total Payments \$(Thousands)	
	1974	1978	1974	1978	1974	1978	1974	1978	1974	1978
1. Delivery and Complications of Pregnancies	20.7	27.7	3.2	3.3	\$299	\$ 614	\$ 92	\$185	\$1,857	\$6,297
2. Acute Respiratory Infection (Except Influenza)	5.0	3.0	3.4	3.2	255	451	75	140	395	508
3. Hypertrophy of Tonsils and Adenoids	3.7	2.4	2.1	2.2	161	326	75	150	177	288
4. Pneumonia	3.2	3.2	5.5	5.2	441	776	78	145	424	916
5. Bronchitis, Emphysema, and Asthma	2.3	3.3	4.6	4.1	370	608	80	144	252	736
6. Diarrheal Disease	2.2	2.7	4.1	4.4	301	659	71	143	194	645
7. Kidney and Urinary Disease	2.1	2.8	4.9	4.6	428	692	83	149	270	712
8. Disease of Stomach, Esophagus, and Duodenum	1.8	1.9	5.0	4.7	369	667	71	138	197	469
9. Otitis Media	1.5	1.7	2.8	2.6	239	402	86	154	110	225
10. Abortions	1.4	1.2	2.6	2.5	241	403	94	173	99	178
11. Cholecystitis and Gall Bladder Disorders	1.1	1.1	7.8	7.9	628	1,251	79	155	205	497
12. Diabetes	0.8	0.8	6.6	6.5	539	1,038	79	160	129	307
13. Concussions	0.6	0.6	3.4	2.6	299	415	86	156	50	97
14. Sterilization	0.2	2.6	6.2	6.0	652	745	103	132	31	705
15. All Other Diagnoses	53.4	45.1	5.3	5.0	459	854	86	173	7,370	14,244

TABLE 15
Tennessee Medicaid Percent of Disabled Admissions,
Average Covered Lengths of Stay, Payments per Admission, Payments per Day,
and Total Payments by Diagnostic Group
(1974 and 1978)

Diagnostic Group	Percent of Total Admissions		Average Covered Length of Stay		Payments per Admission		Payments per Day		Total Payments \$ (Thousands)	
	1974	1978	1974	1978	1974	1978	1974	1978	1974	1978
1. Ischemic Heart Disease	8.5	5.3	7.5	6.9	\$569	\$1040	\$76	\$147	\$476	\$1169
2. Malignant Neoplasms	6.3	6.1	8.7	7.4	738	1272	87	165	411	1483
3. Diabetes	4.4	4.5	7.5	6.8	578	1015	77	145	289	1013
4. Diseases of Esophagus, Stomach, and Duodenum	3.7	3.7	6.4	6.1	470	825	72	134	202	671
5. Bronchitis, Emphysema, and Asthma	3.1	4.4	6.2	5.7	440	764	71	134	154	742
6. Pneumonia	3.1	3.2	7.6	7.3	538	1015	71	137	183	713
7. Acute Respiratory Infections (Except Influenza)	2.8	1.1	5.3	5.1	362	674	69	130	116	158
8. Urinary Diseases	2.7	3.7	7.1	6.7	568	1050	80	154	181	842
9. Other Heart Diseases	2.5	5.1	7.9	6.7	728	1013	88	149	202	1098
10. Essential Benign Hypertension	2.1	2.0	7.2	6.3	548	983	76	150	122	433
11. Other Respiratory Diseases	2.1	1.0	6.9	6.6	518	1002	76	146	109	230
12. Diarrheal Disease	2.0	1.9	5.3	5.2	595	1024	69	128	91	290
13. Cholecystitis and Gall Bladder Disorders	2.0	1.7	9.4	8.4	745	1214	78	143	164	464
14. Respiratory Symptoms	1.7	2.1	6.4	5.2	414	608	78	128	589	913
15. Convulsions	1.4	1.6	7.1	5.1	638	843	84	159	109	304
16. Abdomen and Lower G.I. Tract Symptoms	1.2	2.1	6.2	5.5	496	809	78	139	69	372
17. All Other Diagnoses	50.4	50.5	7.3	6.8	598	1019	82	150	3962	11,785

Discussion

In the past, attempts to determine utilization and payment rates for the Medicaid program have been hampered by an inability to collect comprehensive, accurate service data and link it with an identified enrolled population. This study demonstrates that MMIS enrollment and claims data can effectively be used to describe Medicaid trends and support analytic data requirements at both the State and Federal level. Further, the link between enrollment and claims information, provided by these data, permits analysis of turnover, classes of enrollees, sub-state areas, and diagnostic case-mix that was limited until now. While the findings presented in the report have limited general applicability beyond Tennessee, certain methodological and empirical issues and patterns developed in this work will be extremely useful in future research and program analysis.

Medicaid is a heterogeneous program covering the gamut of the population in terms of age, sex, and health status. Use and payment rates reflect this diversity. Analysts must therefore proceed carefully when comparing Medicaid with other public and private insurance programs. Also, as use rates vary so dramatically by eligibility group (for example, low for AFDC, high for the disabled), it is important to take relative enrollee group mix into consideration when making comparisons among programs. This can be done either by applying constant weighting factors or, even better, developing group by group comparisons. Further complicating the analysis and comparison of Medicaid programs is the presence (or absence) of a medically needy program and spend-down provisions. Since medically needy and spend-down enrollees are more likely to be short-term program participants with atypically high levels of utilization and payments, it is important that analyses be disaggregated by enrollment status. Where enrollment status (that is, medically needy or spend-down) is unknown, length of continuous enrollment is a suitable basis for disaggregation.

Trends in Medicaid use showed strong upward movements in both admission rates and covered days of care rates across all major eligibility groups. This finding suggests that attempts to reduce admission rates, either through review or pre-certification, will have a greater impact in controlling usage than would length of stay review. To the extent that certain routine care could be treated in less expensive settings, either in surgical centers or on an ambulatory basis, Medicaid inpatient utilization could be significantly reduced. Certain frequent Medicaid diagnoses may be candidates for these alternative settings.

Further, significant differences in utilization persisted within Tennessee despite adjustments for the

degree of urbanization and demographic mix of the Medicaid population. Although these differences may represent regional differences in the practice of medicine, certain strategies such as the increased use of ambulatory care in rural areas may reduce overall use. While disparity in user rates existed between whites and non-whites in the AFDC group, more in-depth analyses are required to explain the observed differences.

Gaining control of the rapidly increasing level of Medicaid expenditures is clearly the most critical problem that State and Federal officials must face. Inflation in the price of medical services is responsible for much of the increase, but increases in utilization rates also aggravate the problem. If, as observed in Tennessee, the trends persist toward an older Medicaid population and a higher proportion of disabled enrollees, the level of expenditures per enrollee is likely to increase. This increase is expected to be magnified if the proportion of short-term enrollees (for example, spend-downs) increases as well, since these patients represent above average expenditure levels. Another factor which may compound the problem is the substantial number of persons who are eligible for Medicaid but have never been enrolled. These individuals, if enrolled, could add significantly to the level of Medicaid expenditures in the future. A further burden could be placed on Medicaid as other State programs are either reduced or eliminated. Finally, strategies to control Medicaid utilization and expenditures must be weighed in a broad context, considering potential effects of Medicaid reductions in shifting costs to Medicare, other evolving State programs, and remaining sectors of the health community.

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