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SHIFTS IN HOSPITAL SERVICES AND RESOURCE USE TO METROPOLITAN AREAS IN MICHIGAN AND THE EAST NORTH CENTRAL STATES, 1980 to 1987

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Shifts in Hospital Services and Resource Use to
Metropolitan Areas in Michigan and the East North Central States,
1980 to 1987

By Robert D. Stevens¹

I. Introduction

Increasing concerns have been voiced about the plight of rural hospitals. Many, often fragmentary, reports are heard of the problems of rural hospitals. Notes about the closings of these hospitals, although few in number to date, add uncertainty about the continuing availability of rural hospital services. During this time of great change in the industry, how rapidly have changes occurred in rural and urban hospitals. How large has the negative impact been on rural hospitals? This report provides a summary of these changes with focus on the differences between urban and rural hospitals, which are generally smaller.

The American hospital system is undergoing considerable change due to a series of new forces. These include: major changes in hospital reimbursement arrangements from cost-based to fixed-price; greater numbers of prepaid health care organizations that make contracts with hospitals, including health maintenance organizations and preferred provider organizations; an increase in hospital chains, both non-profit and for profit; and increased use of high cost medical technology. A result has been increased competitive pressure on all hospitals and especially rural hospitals. To what extent has service available for rural citizens been reduced by these changes?

This paper first reviews the forces causing change in the U. S. hospital system. It then provides analyses of changes in rural and urban hospital resources, services, and variable resource use. It compares hospitals in Michigan and the East North Central States² from 1980 to 1987.

II. Forces Influencing Change in Hospital Use and Services

Perspective on current changes in the hospitals system is provided by a review of the forces influencing current hospital growth and change. The 1946 Federal Hill-Burton Hospital Survey and Construction act provided funds for building and expansion of community hospitals. Great increases in the numbers of hospital beds occurred in the following two decades in rural and urban areas. In Michigan, by 1973, this act had enabled a considerably higher number of acute care beds per capita to be available in parts of

¹ The author appreciates the useful comments on an earlier draft of Allan Schmid of the Department of Agricultural Economics and Laura Redoutey of the Michigan Hospital Association

² Wisconsin, Illinois, Michigan, Indiana, and Ohio.

northern Michigan and in the Upper Peninsula than in the more populous urban areas of southern Michigan (Stevens and Chapman, p. 23). With increasing per capita bed availability, hospital bed occupancy rates declined. The unnecessary costs of maintaining empty beds were among the factors that led Congress to enact the National Health Planning and Resource Development Act in 1974. Many of the state planning agencies operating under this act focussed on hospital bed reduction activities. In Michigan, for example, a 10 percent reduction in hospital beds was sought in the greater Detroit area.

Some years after passage of Medicare and Medicaid legislation in the late 1960s, to provide the elderly and the poor with better health care, increasing concern was raised in the 1970s first by Congress and later in the 1980s by large corporations about the rising costs of health care. Hospitals had continued to be reimbursed by the government and the health insurance industry on the basis of the costs they reported. Physicians were reimbursed on a fee-for-service basis with the fees largely determined by the physicians.

Paul M. Ellwood, a Minneapolis physician had for many years been pointing out that reimbursement of physicians on fee-for-service and cost reimbursement of hospitals penalized efficient providers. For providers who took more time and used more resources to obtain the same cure would be paid more. He called for modifications in the medical care industry that would change the economic incentives for hospitals and physicians. In parts of the nation some prepaid health care organizations had developed early, such as the well-known Kaiser-Permanente health maintenance organization in California which began during World War II. But in many parts of the country resistance to prepaid health care organizations, especially by the health care industry, prevented change. To overcome this resistance Congress in 1973 enacted legislation that aided the establishment of HMOs and mandated that larger businesses offer HMO coverage as one of the choices for their employees.

A fundamental recent stimulus of change in the hospital industry was the introduction of new reimbursement arrangements in 1983 by Medicare that shifted hospital payment from a cost basis to a fixed payment for the major diagnosis of each patient under the Diagnostic Related Grouping (DRG) system. This payment arrangement was a significant departure from previous cost-based reimbursement. This new arrangement provided hospital administrators and their staffs with greater incentive to pay attention to costs, especially extra days of hospital care that would not be paid for under the new reimbursement arrangements. Michigan Medicaid also began shifting to fixed fee reimbursement in 1985.

As will be seen below these changes in reimbursement have led to considerable drop in the average length of a hospital stay and reduced bed occupancy rates. Increasing financial stress on many hospitals is reported. To attempt to slow decreased utilization of fixed hospital resources many larger urban hospitals have sought to attract patients away from smaller rural hospitals through advertizing and encouraging rural physicians to refer patients to them. If rural patients with insurance shift to more costly urban hospitals with no change in quality of care, taxpayers and insurers incur greater costs without the patient receiving any increased benefit. Also the patient and family often incur increased costs due to the greater distances involved.

Finally, hospitals have increasingly joined together in larger groups, in various arrangements from becoming a part of large chains to simply making contracts for joint purchasing.

III. Previous Empirical Research and Sources of Data

The most generally accessible data about U. S. urban and rural hospitals is published annually by the American Hospital Association in Hospital Statistics based on its annual survey of hospitals. A general overview of small and rural hospitals in the United States using some of this data was presented in Profile of Small or Rural Hospitals, 1980-86 (1988). It lacks detail on the East North Central states and has none on Michigan. National data on urban and rural hospital costs and other data from 1981 to 1985 are available in U. S. Department of Health and Human Services (1988). Recent national data on hospital closings were presented in American Hospital Association (1989).

Previous work presenting information for Michigan Hospitals includes: Michigan Department of Public Health (1974) that provided health resource data on a county basis for 1972; Stevens and Chapman(1979) that includes rural changes in the distribution of acute and long-term care beds in Michigan counties, 1961-1977; and Michigan Department of Public Health (1980), which provides health facility information by county for 1977. Preceding publications in this series has data for 1974-1976.

Recent studies of Michigan hospital resources include the following three. The Michigan Hospital Association (1988 and 1987) focusses analysis on the eight districts of Michigan (the old health planning regions) for the 1981-86 period using primarily the American Hospital Association data. Some data are provided for smaller and rural hospitals. A previous paper by Stevens (1988) provided data for metropolitan and non-metropolitan counties on "Trends in Hospital Services and Resource Use in Michigan and in the East North Central States, 1974, 1980-1986" by employing the American Hospital Association data.

In this paper we seek to identify how much change in services and resources has occurred in rural and urban hospitals in Michigan and in the East North Central Region from 1980 to 1987. This information will provide insight about the impact of the new reimbursement arrangements and other forces on rural hospitals. Evidence of increasing rural hospital closures (see American Hospital Association 1989) support the worry that increased urbanization of hospital services will leave rural citizens poorly served. What evidence is there that rural hospital service availability is decreasing relative to urban hospital services? Are there policy implications of current trends in rural and urban hospital use? Is action needed now to assure that high quality hospital care at reasonable cost is assured for rural citizens?

Economic theory indicates the likely direction of changes in the hospital system under the increased competition caused by the new reimbursement arrangements. If hospitals obtain the same level of reimbursement for each diagnosis they will tend to seek those patients and provide those services that produce some surplus or at least break even.

And they will tend to stop providing services to categories of patients that cause losses in their hospital. Thus an important question for the rural hospital is what services and DRGs it can provide with equal quality, at equal or lower cost, compared with the nearest urban hospital. More generally, in what services does the rural hospital have a comparative advantage relative to a more distant urban hospital? As rural hospitals are smaller activities that are little affected by economies of scale are likely to be profitable.

Initial answers to these questions were obtained through analysis of the American Hospital Association data for the 1980-1987 period for Metropolitan and Non-Metropolitan areas in Michigan and the East North Central States (which includes Michigan). Because small changes in Metropolitan Statistical Area (MSA) designations were made between 1980 and 1983, results for this period are influenced a little by these MSA changes.³ However, as will be seen, the general trends are clear. In this paper, the terms non-metropolitan and rural, and metropolitan and urban are used synonymously for county groups.

County population data were obtained from the Bureau of the Census, County and City Data Books. The data used to deflate current dollars was the HCFA (Health Care Financing Organization) Hospital Market Basket Index.

IV. Changes in Rural and Metropolitan Hospital Resources in Michigan and in the East North Central States

A. Changes in the Stock of Hospital Resources

The stock of resources in an industry can be measured by the number of producing units and the average size of each unit. Size in hospitals and of the industry is commonly measured by inpatient beds. However, as bed numbers have been stable or declining recently, other measures of size such as total annual expenditures, help capture increases in hospital activity.

³ The American Hospital Association Data is based on definitions of Metropolitan Counties that change from time to time in the counties included MSAs for the 1980-87 period the dates of the designations are as follows:

<u>Year of Data</u>	<u>Date of MSA designation</u>
1980	Oct 1979
1981	Oct 1980
1982	Oct 1980
1983	June 1983
1984	June 1983
1985	June 1983
1986	June 1983
1987	June 1983

Rural and Urban Hospital Numbers. In the North Central States since 1980 the number of hospitals in Metropolitan areas has gradually declined (Table 1 and Figure 2). Non-metropolitan hospital numbers have also gradually declined. Note that in 1981 and 1982 the apparent increase in metropolitan and decrease in non-metropolitan hospitals was due to changes in Metropolitan Statistical Area designations. Between 1980 and 1987, in Michigan, the number of metropolitan hospitals declined more rapidly, with a reduction of 14 percent. However, in rural Michigan only four hospitals were closed during this period, leaving 75.

The Size of Hospitals as Measured by beds. In metropolitan areas in the East North Central States beds per hospital declined slightly to 281 in 1987. In Michigan beds per hospital increased a little to 268 in 1987 (Table 1 and Figure 1). In non-metropolitan counties the average bed number per hospital declined a little in the East North Central States to an average of 99 beds in 1987. In Michigan rural hospitals the decline in the number of beds has been more rapid from 93 to 84 in 1987. Since 1984 there has been a gradual decline in average beds per hospital in all groups of hospitals.

Size as Measured by Total Annual Expenses. Total annual expenses is not usually viewed as a stock concept. However, changes in expenses may better represent changing hospital service capacity than the quite limited bed measure of the stock of hospital resources. In 1987 in the North East Central States and in Michigan the average metropolitan hospital had more than 50 million dollars of business, while rural hospitals generated less than one fifth this level of annual expenses, some nine and one half million dollars (Table 1). Discounting for inflation over the seven year period studied rural hospitals increased their expenses by some 12 percent, while urban hospitals increased total expenses by about 40 percent (Figure 3). These deflated expense data show urban hospital size of business increasing more rapidly. Though most of the increase in rural hospital size has appeared since 1986.

B. Changes in Hospital Services

Changes in the quantity of hospital services provided can be measured using an overall indicator such as inpatient days or inpatient day equivalents. Measures would also be useful for the five major areas of inpatient service: obstetric and perinatal care; pediatric care; general medical; emergency medical; and surgical services. Measures of three of these areas are available from the American Hospital Association data base: births, emergency service visits and surgical operations performed. Outpatient visits are also indicated by counts of other hospital visits and outpatient day equivalents. How have the hospital services provided to rural and urban areas changed during this period of rapid industry adjustment?

Admissions Due to increased financial pressures from third party payers and pre-admission approval procedures there has been a general decline in admissions since 1980. In urban areas of the East North Central States there was a ten percent decline in admissions but in Michigan the decline was only 6 percent (Table 1 and Figure 4). In rural areas of the East North Central States and in Michigan inpatient admissions per hospital declined twenty six percent. In Michigan admissions per capita have also continued to

decline since 1980 to 131 per thousand persons in urban areas and to 98 per thousand persons in rural areas in 1987 (Figure 5). Part of the higher level of admissions per capita in urban areas is due to rural residents admissions to urban hospitals.

Length of Stay. Increased average length of stay could offset declines in admissions. This occurred from 1980 to 1982 when payment was based on costs. In 1983 limits on payment to hospitals based upon an average length of stay for each diagnostic related grouping began to be implemented by Medicare. Urban hospitals in the East North Central States responded by reducing average length of stay from 8.0 days in 1980 to 7.1 in 1987, a decline of 11 percent (Table 1 and Figure 6). In rural hospitals the decline in length of stay was smaller, with a 1987 average length-of-stay of 7.0 days. The 1987 data suggest that the decline in average length-of-stay may have ended.

Inpatient Days per Hospital Admissions multiplied by length of stay shows the total number of inpatient days provided, an overall index of the quantity of inpatient services. The decline in both admissions and length of stay led since 1982 to a very rapid decrease in the average annual inpatient days of service per hospital (Table 1 and Figure 7). In the East North Central States in urban areas between 1983 and 1987 this decline was about 20 percent while in rural areas it was about 28 percent. In Michigan, urban hospitals succeeded in a slower decline (12 percent while rural hospitals suffered a greater decline (31 percent) in average inpatient days per hospital.

Inpatient Days per Capita. Michigan data indicate that inpatient days per capita in both urban and rural hospitals continue to decline from 1983 (Figure 8). Michigan average inpatient days per capita was 687 per thousand persons in 1987.

From the point of view of the consumer and third party payers the decline in hospital utilization has brought large savings. An example of the magnitude of the annual savings realized in Michigan is obtained by multiplying the average reduction in inpatient days per patient in all hospitals by the cost per day of hospital care, multiplied by the number of hospital admissions. Between 1983 and 1987 the average length of a hospital stay declined 0.7 days from 8.0 days. Total expenses per inpatient day equivalent were \$607 in 1987. With 1,147,764 hospital admissions in Michigan the reduction in costs to payors was \$488 Million in 1987. Despite this saving, more outpatient procedures and increased per capita use of hospital services has lead to a net increase in total hospital expenditures per capita. However, this increase would have been more rapid without the reduction in the average length of a hospital stay.

Hospital Bed Occupancy Rate. With only a slowly growing population the net effect of declines in admissions, length of stay and inpatient days was a precipitous decline over the four years from 1982 to 1986 in hospital capacity utilization as measured by bed occupancy rate. This rate is the average daily census divided by the average number of beds. In 1982 urban hospitals in Michigan and in the East North central states were at almost 80 percent occupancy (Figure 9). This dropped almost 15 percent to about 65 percent occupancy in 1987. Rural hospitals in Michigan and in the East North Central States had nearly 70 percent bed occupancy in 1980. This dropped some 15 percent to

about 53 percent occupancy rate in 1987. Increasing fixed costs per day of unoccupied beds is one important source of increased costs of hospital services.

We have examined changes in the total amount of services provided by hospitals over the 1980 - 1987 period. We now explore changes in particular hospital services.

Births per Hospital. Obstetric care has always been considered an important service for rural hospitals. But recent changes have reduced the role of rural hospitals in obstetric care. Because of the necessity of a minimum size in obstetric units, increasing medical liability costs that have reduced the number of physicians who will attend births, and the need to maintain the capability to perform caesarian sections on an emergency basis, rural hospitals with low obstetric admission rates are being forced to close these units. This causes transfer of births to metropolitan hospitals. Experience in the East North Central States and in Michigan since 1980 show this transfer (Figure 10). Since 1980 rural hospitals in both the East North Central states and in Michigan have experienced almost a 20 percent decline in births, while urban hospitals in the East North Central states experienced a small increase and urban hospitals in Michigan have unaccountably experienced a much larger 15 percent increase in births per hospital over 1980. These dramatic shifts show that rural people are bearing increasing costs for childbirth, especially in Michigan. This is due to the higher charges of urban hospitals and the greater out-of-pocket transportation and other costs that have to be paid by the family due to the greater distance to an urban hospital. As a large percent of births are uncomplicated and early identification and training of high-risk mothers is effective, it is unclear if the current shift of births to urban hospitals is desirable. A continued shift would both increase the threat to rural hospital survival and significantly reduce the availability of important health services to rural citizens.

Births per Hospital Admission. With the decline in the national birth rate and the decline in births in rural hospitals, how important is birthing for hospitals? Surprisingly, since 1984, even in rural hospitals, births per admission have increased somewhat (Figure 11). Any activity that represents 10 percent or more of admissions is important for a hospital.

Surgical Operations per Hospital. In non-metropolitan hospitals surgical procedures per hospital, including both inpatient and outpatient, have increased in both the North Central States and in Michigan since 1983. Interestingly all hospital groups studied have experienced increases in surgical operations, on the order of 10 percent over the seven year period (Figure 12). The latter has occurred despite greater numbers of operations in physicians offices and in other freestanding surgicenters. On a daily basis in 1987 rural hospitals averaged about 5 surgical operations per day, while urban hospitals averaged 18. Rural hospitals apparently have not lost out much in the growth in the number of operations, but urban hospital surgical charges are likely to have increased more rapidly due to the more complex surgical procedures carried out in these hospitals.

Surgical Operations Per Capita. Has the increase in surgical operations been due to increased surgical activity? Data on surgical operations per capita for Michigan indicates some increase in surgical operation per 1000 persons since 1974 but little change since 1983, during the years of increased economic pressure on hospitals (Table 4).

Surgical Operations Per Admission Surgical operations per admission have increased over the period in all hospital groups (Figure 13). It follows, therefore, that hospital admissions for non-surgical reasons have decreased considerably. As surgical procedures are often resource intense activities, an average increase in resource use (expenses) per inpatient day can be expected.

Emergency Visits. A central role of a rural hospital is to manage medical emergencies. In urban areas, there has been a continuing concern to reduce over-utilization of expensive emergency services for routine care. The data show that the efforts in the 1970s to reduce emergency service visits in urban areas were continuing to bear fruit until 1983 (Figure 14). When visits averaged about 55 per day in urban hospitals and 20 visits per day in rural hospitals (Table 1). Since 1985 emergency visits per day have increased appreciably in both rural and urban hospitals. Why, an increasing population?

Emergency Visits per Capita. Since 1984, Michigan has seen a puzzling increase in per capita emergency visits, in both rural and urban hospitals. Could this be due to lack of health insurance needed to go to a physicians office?

Emergency Visits per Admission. Emergency services are also becoming relatively more important as inpatient admissions slow down (Table 3).

Other Visits per Hospital. A major thesis in professional literature is the importance of diversifying a hospital's services, to both increase financial stability and better serve its community. Changes in the number of other visits (outpatient visits) is a measure of hospital diversification. Hospitals in the East North Central States and in Michigan have recently exhibited increasing diversification with increases in other visits ranging from 30 to 60 percent since 1980 (Figure 16). In Michigan, rural hospitals have experienced lower rates of other visits since 1980. In 1987, rural hospitals averaged about 50 other visits per day while urban hospitals averaged some 170 to 200 other visits per day.

Other Visits per Capita. Other visits per capital have increased somewhat to urban hospitals since 1980, with a 1987 increase of other visits at rural hospitals (Figure 17).

Others Visits in Inpatient Day Equivalents. Since 1981 there has been a 30 to 50 percent increase in the Inpatient Day Equivalents of outpatient services (Figure 18). Rural hospitals in Michigan have shown the greatest increase.⁴

Inpatient Day Equivalents per Hospital. If the inpatient day equivalents of outpatient services are added to inpatient days, after a long decline, 1987 saw an upturn in inpatient day equivalents provided in metropolitan hospitals (Figure 19). In Michigan, rural hospitals lost more and urban hospitals fewer inpatient day equivalents than their counterparts in the East North Central States.

⁴ The volume of outpatient services is obtained by multiplying the number of outpatient visits by the ratio of outpatient revenue per outpatient visits to inpatient revenue per inpatient day (Hospital Statistics, 1987, P.xii)

C. Changes in Variable Resource Use per Hospital

Have the reductions in inpatient services been associated with reductions in variable resource use? Or, have these resources been retained, thus increasing the intensity and cost of hospital services?

Nurses Employed per Hospital. In rural hospitals both in the East North Central States and in Michigan about the same number of nurses have been employed per hospital over the 1980-87 period (Figure 20). In urban hospitals nurse numbers per hospital increased through 1982, and since have been about the same, with some increase in 1987, despite the growing nurse shortage.

Nurses per Inpatient Day Equivalent. As inpatient days per hospital have declined while nurse numbers have remained steady the intensity of nurse use per inpatient day has increased (Figure 21). In all four categories of hospitals even with day equivalents of outpatient care included this is so. This increase partly explains the increasing cost of hospital care. It is also associated with the increased intensity of hospital care as length of stay has shortened and relatively more surgery has been performed.

Hospital Nurses Per Capita. Although more nursing services are being used per inpatient day, the number of hospital nurses per capita has declined somewhat since 1982 (Figure 22).

The Ratio of Registered Nurses to All Nurses. The increasing skill of hospital nurses is indicated by the ratio of registered nurses to all nurses. In Metropolitan hospitals registered nurses have increased from 70 to 80 percent of all nurses over the 1980-87 period. In Non-Metropolitan areas of the East North Central states the ratio has been a little lower increasing from 67 percent to 75 percent (Table 3). In rural areas of Michigan the ratio was even lower increasing from 59 percent to 68 percent over the period studied.

Other Personnel per Hospital. Reduction in variable costs might have been achieved through significant reductions in other personnel. In both rural and urban hospitals in the East North Central States and in Michigan the average number of other hospital personnel peaked in the 1982 and 1983 period (Figure 24) as hospitals adjusted to the effects of the more stringent reimbursement arrangements initiated by Medicare in 1983 and other factors. Other hospital personnel declined a little until 1985, but have since increased.

Total Personnel per Hospital. All hospitals experienced a decline in total personnel beginning in 1982 to 1985. In non-metropolitan hospitals total personnel numbers have remained about the same since then. However, in metropolitan hospitals both clinical and administrative personnel have recently increased (Figure 25). See also Figures 21 and 24.

Total Labor Expenses Per Inpatient Day Equivalent. Between 1980 and 1987 labor costs per inpatient day equivalent doubled in current dollars and increased about 30 percent in inflation adjusted dollars (Table 3).

Total Labor Expenses per Hospital. Despite some reduction in the number of personnel employed in the East North Central States and in Michigan, total payroll has continued upward in both rural and urban hospitals, with greater increases in urban hospitals (Table 7).

Ratio of Total Labor Expenses to Total Expenses. But has the increase in labor costs out-paced other costs so that hospitals have become more labor intensive? Table 3 demonstrates that since 1982 personnel costs in hospitals have decreased relative to total hospital expenses. Labor in 1987 represented about 55 percent of total costs. Thus, capital intensity instead of personnel intensity has increased in hospitals since 1980.

Total Labor Expenses per Employee. Total labor expenses per employee were somewhat lower in rural hospitals, as expected. For Michigan \$24,755 in rural hospitals per employee and \$29,236 in urban hospitals in 1987 with a similar but somewhat lower labor expense per employee in the East North Central States of \$22,478 and \$26,836 respectively (Table 3). Of particular interest is the fact that the total labor expenses per employee for rural hospitals in both Michigan and the East North Central states was only 15 percent less than in urban hospitals. When changes since 1980 in labor expenses per employee are examined, these expenses have increased more rapidly for rural hospitals than for urban hospitals. Starting in 1980 the index of total labor costs per employee increased 74 percent for rural hospitals in Michigan and 69 percent for urban hospitals. The comparative increases for the East North Central states were 71 and 63 percent. Thus rural hospital expenses per employee are moving closer to urban expenses per employee.

Deflated Total Hospital Expenses per Inpatient Day Equivalent. When deflated total expenses per inpatient day were examined metropolitan hospitals were seen to have experienced a 51 percent increase between 1980 and 1987 (Figure 26). Non-metropolitan hospitals had a slower 36 percent increase in expenses per inpatient day equivalent. Thus the intensity of resource use was somewhat less in rural hospitals. This is expected as they carry out fewer very complex medical procedures, have smaller amounts of specialized medical equipment, and have somewhat lower labor expenses per employee.

Deflated Total Hospital Expenses per Capita. How much of a real increase in per-capita expenditures have rural and urban hospitals experienced? In non-metropolitan areas of Michigan rural hospital expenditures in constant dollars in rural hospitals have hardly increased at all over the 1980-1987 period (Figure 27). However, average deflated hospital expenditures per capita in urban Michigan hospitals have increased from \$413 to \$537. Thus, all of the real increase in per capita expenditures in Michigan hospitals has occurred in the urban areas, some of this due to rural people being hospitalized more often in urban areas. Rural hospitals, therefore, have been dependent upon population growth alone during the 1980-87 period for increases in revenues, while urban hospitals have captured the real increase in expenditures per capita for hospital care.

V. Summary and Conclusions

Since World War II several significant changes have occurred in the United States that have affected the availability of hospital services in both rural and urban areas. These

changes include: the Hill-Burton Hospital Survey and Construction Act that greatly increased the supply of hospital beds, especially in rural areas; the federal Medicare and the federal-state Medicaid programs that greatly expanded the number of medical and hospital services the aged and the poor could obtain; legislation encouraging the development of prepaid health care organizations, including HMOs; and since 1983, the replacement by major third party payors of cost-based reimbursement for hospitals with fixed-fee reimbursement linked to the primary diagnosis of the patient's medical problem (DRGS)

Economic theory indicates that the change from cost based reimbursement to fixed fees would encourage hospitals (1) to reduce those services that caused the most loss which they have been cross-subsidizing and (2) to specialize more in the services that provide the highest net return. Of particular concern in these shifts is the possible effect of such actions on the availability and cost of hospital services to rural residents.

A. Fixed Hospital Resources

To summarize, the number of hospitals exhibited varied trends between 1980 and 1986. In the East North Central States, in metropolitan counties the number of hospitals increased and then decreased to below the number in 1980. In non-metropolitan areas of these states the number of hospitals has gradually declined. In Michigan, the number of hospitals in metropolitan areas has declined 14 percent since 1980, while rural hospital numbers decreased by 4 to 75 in 1987. When measured by bed numbers, the average size of a metropolitan hospital has increased a little since 1980 in both the East North Central States and in Michigan. While in non-metropolitan areas in both the East North Central States and in Michigan the size of hospital has decreased a little. This reduction could be due partly to earlier over-building in rural areas under the Hill-Burton program. If however total annual expenditures per hospital adjusted for inflation are used as an indicator of the stock of hospital services available, in Michigan there was an 28 percent increase in hospital stock in urban areas and a 4 percent increase in rural areas over the 1980-87 time period (Table 4).

B. Hospital Services

Changes in the quantity of hospital services that have been provided were examined by focussing on admissions, inpatient days, length of stay, and bed occupancy rate, as well as births, surgical operations, emergency service visits and other visits. Generally, similar patterns were found in the East North Central Region and in Michigan. Hospital admissions declined only a little while length of stay has declined significantly (by almost a day) since 1982. Inpatient days per hospital, therefore, have declined considerably between 1980 and 1987, by 20 percent in urban areas and 28 percent in rural areas in the East North Central States. This resulted also in a decline in bed occupancy rate in metropolitan hospitals from nearly 80 percent in 1980 to about 68 percent in 1987, and in non-metropolitan hospitals from about 70 percent in 1980 to 54 percent in 1987.

Turning to specific services, births per hospital show a clear divergence in trends between rural and urban hospitals with the numbers in non-metropolitan hospitals declining

and in metropolitan hospitals increasing. Surgical operations in all hospitals have increased since 1982. In both rural and urban hospitals an increasing focus on surgery is indicated by increases in the number of surgical operations per admission. In non-metropolitan hospitals the ratio increased from 44 percent in 1980 to nearly 60 percent in 1987 and in metropolitan hospitals from about 60 percent to 70 percent during the same time period.

Emergency service visits declined through 1983 in all hospital categories, but since 1985 they have, unaccountably, increased. Michigan data show that this represents increased use per capita. Changes in other visits per hospital indicate increased diversification from inpatient services in all four hospital categories. To conclude, emergency visits, surgery and other visits are becoming more important in all hospitals.

C. Variable Resource Use per Hospital

Examination of variable resource use focused on nurses and other salaried personnel. The ratio of registered nurses to all nurses has increased in all categories of hospitals. However, both all nurses employed per hospital and total personnel per hospital have remained fairly stable recently, so with declining inpatient days per hospital more nurses and other personnel resources are being used per day during the shorter patient stays. Therefore, as the Michigan data demonstrate, due to no increase in nurses per hospital their availability per capita has declined. Both total hospital payroll and total expenses have increased in all hospital categories, but at a considerably higher rate in metropolitan hospitals. As the ratio of payroll to total expenses has declined somewhat, the capital intensity of hospital care has increased.

D. Total Resource Use

Expenses per inpatient day and per inpatient day equivalent in real dollars have continued to increase with costs other than for personnel increasing more rapidly as indicated by the decline in the ratio of total labor expenses to total expenses (See Table 3). These expenses per inpatient day were greater in Michigan in both urban and rural areas than in the East North Central States.

When total expenditures per capita are deflated, the Michigan data show that per capita expenditures in rural hospitals have remained stable from 1980 to 1987 at about \$250 dollars per capita in 1980 dollars. However hospital expenditures per capita in urban counties increased from \$413 to \$537 in 1980 dollars. Part of this increase, of course, is due to greater numbers of rural people spending their health care dollars in urban hospitals.

E. Trends in Hospital Services and Resource Use in Non-Metropolitan Areas.

Some important shifts in services between non-metropolitan and metropolitan hospitals are demonstrated by these data. There has been a relative increase in births, surgical operations, and in other visits in metropolitan hospitals. In non-metropolitan hospitals total payroll per hospital has increased only slightly, while in metropolitan

hospitals it has increased much more rapidly. This partly explains why expenses per inpatient day equivalent have increased more rapidly in urban areas.

We need to know more about the causes of the shift of hospital services to urban areas, and about the services that rural hospitals can provide at high quality levels with equal or less cost, both to the patient and purchasers.

F. Changes in Rural Hospitals in Michigan

A few trends in changes in rural hospitals in Michigan stand out when comparisons were made with rural hospitals in the East North Central States. With respect to the stock of hospital resources, rural hospitals in Michigan have decreased in size somewhat more rapidly, when measured by beds, than have the rural hospitals in the other East North Central States.

Examination of changes in services offered by Michigan rural hospitals showed more rapid declines in three areas than in other East North Central States. Both inpatient days and inpatient day equivalents per rural hospital declined more rapidly in Michigan than in rural hospitals in the East North Central States. Part of this shift may have been due to the larger shift of births to urban hospitals in Michigan than in the East North Central States, caused in part by the high malpractice insurance rates in Michigan for physicians attending births. In addition Michigan rural hospitals have exhibited a lower level and slower increase in outpatient activity as indicated by the visits than rural hospitals in the East North Central States.

Turning to the use of variable resources in rural hospitals, the only area where Michigan rural hospitals show a appreciable difference is in the low ratio of registered nurses to all nurses, compared to rural hospitals in the East North Central States.

To conclude this analysis indicates that Michigan rural hospitals appear to be somewhat more stressed than those in other East North Central States due particularly to more rapid shifts of births to urban areas and greater declines in inpatient days.

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TABLE 1

Basic Hospital Data - Michigan and the E. N. Central States

Year	Hospitals	Beds	Admissions	Inpatient Days	Inpatient Day Equivalent
MICHIGAN					
Non-metro.					
1980	79	7,331	255,714	1,894,711	2,257,427
1981	73	6,440	228,293	1,669,653	1,968,853
1982	73	6,537	221,058	1,641,049	1,951,098
1983	80	6,974	229,857	1,689,371	2,023,658
1984	77	6,734	218,399	1,522,377	1,862,941
1985	77	6,763	202,964	1,376,064	1,775,045
1986	75	6,558	188,201	1,296,372	1,725,581
1987	75	6,306	178,465	1,249,311	1,726,629
Metro Ctys					
1980	126	32,252	1,191,799	9,432,653	10,984,186
1981	134	33,483	1,206,237	9,731,285	11,361,182
1982	132	33,236	1,181,605	9,561,965	11,227,726
1983	122	32,456	1,153,004	9,354,867	11,030,906
1984	118	32,069	1,111,530	8,631,071	10,380,050
1985	116	30,783	1,051,141	7,777,053	9,537,991
1986	112	29,851	1,000,128	7,250,042	9,180,076
1987	109	29,192	969,299	7,149,921	9,296,497
ENC STATES					
Non-metro.					
1980	371	39,730	1,382,364	9,991,309	11,559,773
1981	356	38,329	1,301,132	9,657,598	11,150,491
1982	356	38,542	1,263,731	9,497,170	10,993,401
1983	367	39,051	1,255,558	9,384,627	10,982,504
1984	362	38,230	1,196,017	8,446,163	10,106,620
1985	361	37,378	1,095,981	7,487,605	9,372,387
1986	358	36,294	1,021,791	7,119,264	9,235,413
1987	351	34,905	969,278	6,795,168	9,126,027
Metro Ctys					
1980	535	153,296	5,519,381	44,429,322	50,755,654
1981	548	157,187	5,568,210	45,330,188	51,746,631
1982	546	157,851	5,511,282	44,972,614	51,642,735
1983	533	157,515	5,439,696	43,356,999	49,919,450
1984	526	155,440	5,253,757	39,858,068	46,573,111
1985	523	150,809	4,990,931	36,065,083	43,051,058
1986	512	144,588	4,793,407	34,256,621	41,919,150
1987	501	140,674	4,671,041	33,394,144	41,716,931

Basic Hospital Data - Michigan and the E. N. Central States

Year	Occupancy Percent	Average Daily Census	Adjusted Average Daily Census	Average Stay Days	Surgical Operations
MICHIGAN					
Non-metro.					
1980	70.7	5,181	6,169	7.4	112,846
1981	71.0	4,572	5,398	7.3	104,417
1982	68.7	4,491	5,345	7.4	103,377
1983	66.4	4,630	5,546	7.3	109,175
1984	61.8	4,159	5,089	7.0	108,862
1985	55.7	3,766	4,863	6.8	110,922
1986	54.2	3,552	4,727	6.9	113,177
1987	54.3	3,425	4,732	7.0	120,453
Metro Ctys					
1980	80.2	25,867	30,143	7.9	735,731
1981	79.7	26,672	31,139	8.1	736,068
1982	78.8	26,198	30,761	8.1	748,113
1983	79.0	25,626	30,226	8.1	755,706
1984	73.6	23,598	28,375	7.8	738,404
1985	69.2	21,304	26,126	7.4	737,762
1986	66.5	19,862	25,147	7.2	732,280
1987	67.1	19,584	25,466	7.4	729,319
ENC STATES					
Non-metro.					
1980	68.7	27,312	31,591	7.2	610,219
1981	69.1	26,483	30,570	7.4	580,786
1982	67.5	26,011	30,113	7.5	581,435
1983	66.0	25,760	30,142	7.5	597,772
1984	60.4	23,077	27,616	7.1	600,914
1985	54.9	20,525	25,700	6.8	616,028
1986	53.7	19,508	25,303	7.0	605,695
1987	53.3	18,616	25,009	7.0	618,634
Metro Ctys					
1980	79.3	121,528	138,845	8.0	3,128,028
1981	79.0	124,238	141,819	8.1	3,204,372
1982	78.1	123,237	141,513	8.2	3,207,604
1983	75.4	118,788	136,782	8.0	3,248,271
1984	70.1	108,942	127,294	7.6	3,224,802
1985	65.5	98,793	117,935	7.2	3,234,463
1986	64.9	93,904	114,912	7.1	3,253,918
1987	65.0	91,490	114,295	7.1	3,273,462

Basic Hospital Data - Michigan and the E. N. Central States

Year	Emergency Visits	Other Visits	Total Outpat'nt Visits	Bassin'ts
MICHIGAN				
Non-metro.				
1980	611,745	1,110,113	1,721,858	775
1981	517,385	883,281	1,400,666	699
1982	481,032	1,194,438	1,675,470	699
1983	513,132	1,057,433	1,570,565	741
1984	528,537	984,375	1,512,912	735
1985	532,816	1,066,529	1,599,345	728
1986	550,947	1,169,832	1,720,779	695
1987	578,358	1,330,737	1,909,095	671
Metro Ctys				
1980	2,915,366	5,426,148	8,341,514	2,578
1981	2,752,259	6,036,383	8,788,642	2,563
1982	2,538,132	9,032,901	11,571,033	2,534
1983	2,542,323	6,841,592	9,383,915	2,523
1984	2,414,732	6,757,228	9,171,960	2,498
1985	2,284,239	6,532,128	8,816,367	2,459
1986	2,424,552	7,636,534	10,061,086	2,374
1987	2,581,468	7,858,475	10,439,943	2,338
ENC STATES				
Non-metro.				
1980	2,888,213	4,397,100	7,285,313	4,052
1981	2,699,429	4,130,515	6,829,944	3,787
1982	2,590,743	5,440,621	8,031,364	3,730
1983	2,649,988	4,770,165	7,420,153	3,722
1984	2,618,660	4,774,380	7,393,040	3,693
1985	2,577,595	5,340,079	7,917,674	3,641
1986	2,683,298	5,794,941	8,478,239	3,505
1987	2,838,636	6,681,766	9,520,402	3,441
Metro Ctys				
1980	11,652,492	22,377,187	34,029,679	11,347
1981	11,528,877	23,516,679	35,045,556	11,347
1982	10,741,976	31,270,036	42,012,012	11,089
1983	10,747,579	26,466,362	37,213,941	11,029
1984	10,349,957	26,266,518	36,616,475	10,947
1985	10,298,177	27,526,656	37,824,833	10,894
1986	10,665,671	29,563,577	40,229,248	10,584
1987	11,029,584	31,458,069	42,487,653	10,396

Basic Hospital Data - Michigan and the E. N. Central States

Year	Births	Regist. Nurses	Licensed Practical Nurses	Other Salaried Personnel	Total Personnel
MICHIGAN					
Non-metro.					
1980	24,813	3,395	2,318	12,599	18,346
1981	21,295	2,905	2,205	11,666	16,819
1982	20,661	3,110	2,095	13,452	18,714
1983	20,894	3,346	2,188	12,289	17,860
1984	19,874	3,319	2,003	11,814	17,165
1985	20,427	3,308	1,833	11,300	16,466
1986	19,754	3,465	1,689	11,170	16,382
1987	19,272	3,364	1,577	11,265	16,277
Metro Ctys					
1980	115,754	21,802	8,937	75,473	107,407
1981	117,638	22,173	8,773	83,301	115,414
1982	115,286	23,731	9,028	90,171	124,130
1983	111,202	24,994	8,727	82,881	117,724
1984	109,776	25,162	7,683	78,286	112,391
1985	113,994	25,084	6,436	76,310	108,955
1986	114,335	24,972	5,756	77,677	109,742
1987	114,714	25,762	5,492	78,534	111,412
ENC STATES					
Non-metro.					
1980	128,209	17,922	8,980	63,666	90,677
1981	117,335	16,224	8,621	63,600	88,639
1982	114,740	17,063	8,347	72,187	97,750
1983	110,595	17,923	8,388	63,675	90,121
1984	108,129	17,531	7,361	60,023	85,007
1985	107,656	17,495	6,680	57,569	81,827
1986	103,331	18,193	6,330	57,377	82,066
1987	99,180	18,515	6,167	58,170	83,003
Metro Ctys					
1980	520,129	104,106	34,529	342,000	485,733
1981	520,712	106,405	35,235	369,970	517,423
1982	516,726	113,969	35,101	406,787	560,612
1983	505,287	118,658	33,212	367,968	524,691
1984	499,476	117,649	28,403	353,372	504,144
1985	506,358	117,115	24,498	348,286	495,230
1986	503,444	120,979	21,793	347,421	494,654
1987	505,117	123,945	20,220	355,904	505,042

Basic Hospital Data - Michigan and the E. N. Central States

Year	Interns and Residents	Payroll (Thous'ds)	Total Labor Expenses (Thous'ds)	Total Expenses (Thous'ds)
MICHIGAN				
Non-metro.				
1980	41	226,993	260,414	449,125
1981	43	231,550	266,236	456,743
1982	17	257,065	299,540	512,234
1983	23	293,793	343,723	583,279
1984	14	302,544	354,679	601,971
1985	12	307,575	366,037	630,222
1986	27	320,981	379,998	656,797
1987	26	340,487	402,945	707,169
Metro Ctys				
1980	2,769	1,584,071	1,862,898	3,090,131
1981	2,944	1,889,904	2,220,101	3,696,616
1982	3,120	2,119,158	2,517,512	4,187,499
1983	3,214	2,303,041	2,750,170	4,631,097
1984	2,908	2,454,448	2,932,778	4,966,938
1985	3,120	2,456,636	2,944,091	5,109,623
1986	3,053	2,553,279	3,051,810	5,498,618
1987	2,758	2,740,099	3,257,256	5,987,594
ENC STATES				
Non-metro.				
1980	79	1,042,916	1,192,961	2,106,247
1981	70	1,133,634	1,304,772	2,287,916
1982	91	1,281,751	1,488,158	2,598,463
1983	85	1,409,372	1,650,991	2,897,225
1984	79	1,437,805	1,695,193	2,998,563
1985	80	1,449,979	1,716,558	3,090,139
1986	65	1,510,537	1,780,333	3,252,534
1987	81	1,587,887	1,865,776	3,436,482
Metro Ctys				
1980	10,465	6,887,561	7,974,103	13,507,699
1981	11,721	8,106,568	9,448,441	16,014,782
1982	11,673	9,180,080	10,822,396	18,339,300
1983	11,969	9,907,419	11,774,233	20,173,830
1984	12,145	10,336,762	12,333,623	21,206,040
1985	12,015	10,469,511	12,536,242	22,080,360
1986	12,429	10,787,112	12,853,082	23,428,101
1987	12,142	11,451,048	13,553,299	25,091,298

TABLE 2

Per Hospital Ratios - Michigan and the E. N. Central States

	Beds Per Hosp.	Admissions Per Hosp.	Inpat. Days Per Hosp.	Inpat. Day Equi/Hosp	Surg. Oper Per Hosp.
MICHIGAN					
Non-metro.					
1980	93	3,237	23,984	28,575	1,428
1981	88	3,127	22,872	26,971	1,430
1982	90	3,028	22,480	26,727	1,416
1983	87	2,873	21,117	25,296	1,365
1984	87	2,836	19,771	24,194	1,414
1985	88	2,636	17,871	23,053	1,441
1986	87	2,509	17,285	23,008	1,509
1987	84	2,380	16,657	23,022	1,606
Metro Ctys					
1980	256	9,459	74,862	87,176	5,839
1981	250	9,002	72,622	84,785	5,493
1982	252	8,952	72,439	85,059	5,668
1983	266	9,451	76,679	90,417	6,194
1984	272	9,420	73,145	87,967	6,258
1985	265	9,062	67,044	82,224	6,360
1986	267	8,930	64,733	81,965	6,538
1987	268	8,893	65,596	85,289	6,691
ENC STATES					
Non-metro.					
1980	107	3,726	26,931	31,158	1,645
1981	108	3,655	27,128	31,322	1,631
1982	108	3,550	26,677	30,880	1,633
1983	106	3,421	25,571	29,925	1,629
1984	106	3,304	23,332	27,919	1,660
1985	104	3,036	20,741	25,962	1,706
1986	101	2,854	19,886	25,797	1,692
1987	99	2,761	19,359	26,000	1,762
Metro Ctys					
1980	287	10,317	83,045	94,870	5,847
1981	287	10,161	82,719	94,428	5,847
1982	289	10,094	82,367	94,584	5,875
1983	296	10,206	81,345	93,658	6,094
1984	296	9,988	75,776	88,542	6,131
1985	288	9,543	68,958	82,316	6,184
1986	282	9,362	66,907	81,873	6,355
1987	281	9,323	66,655	83,267	6,534

Per Hospital Ratios - Michigan and the E. N. Central States

	Emerg. Vis. Per Hosp.	Other Vis. Per Hosp.	Births Per Hosp.	Nurses Per Hosp.	T. Prson'l Per Hosp.
MICHIGAN					
Non-metro.					
1980	7,744	14,052	314	72	232
1981	7,087	12,100	292	70	230
1982	6,589	16,362	283	71	256
1983	6,414	13,218	261	69	223
1984	6,864	12,784	258	69	223
1985	6,920	13,851	265	67	214
1986	7,346	15,598	263	69	218
1987	7,711	17,743	257	66	217
Metro Ctys					
1980	23,138	43,065	919	244	852
1981	20,539	45,048	878	231	861
1982	19,228	68,431	873	248	940
1983	20,839	56,079	911	276	965
1984	20,464	57,265	930	278	952
1985	19,692	56,311	983	272	939
1986	21,648	68,183	1,021	274	980
1987	23,683	72,096	1,052	287	1,022
ENC STATES					
Non-metro.					
1980	7,785	11,852	346	73	244
1981	7,583	11,603	330	70	249
1982	7,277	15,283	322	71	275
1983	7,221	12,998	301	72	246
1984	7,234	13,189	299	69	235
1985	7,140	14,792	298	67	227
1986	7,495	16,187	289	69	229
1987	8,087	19,036	283	70	236
Metro Ctys					
1980	21,780	41,827	972	259	908
1981	21,038	42,914	950	258	944
1982	19,674	57,271	946	273	1,027
1983	20,164	49,655	948	285	984
1984	19,677	49,936	950	278	958
1985	19,691	52,632	968	271	947
1986	20,831	57,741	983	279	966
1987	22,015	62,791	1,008	288	1,008

Per Hospital Ratios - Michigan and the E. N. Central States

	Payroll Per Hosp. (Thousands)	T. Expenses Per Hosp. (Thousands)	T. Expenses /Inpat'nt Day Equivalent	Ratio Labor Expense to T. Expense
MICHIGAN				
Non-metro.				
1980	2,873	5,685	199	0.58
1981	3,172	6,257	232	0.58
1982	3,521	7,017	263	0.58
1983	3,672	7,291	288	0.59
1984	3,929	7,818	323	0.59
1985	3,994	8,185	355	0.58
1986	4,280	8,757	381	0.58
1987	4,540	9,429	410	0.57
Metro Ctys				
1980	12,572	24,525	281	0.60
1981	14,104	27,587	325	0.60
1982	16,054	31,723	373	0.60
1983	18,877	37,960	420	0.59
1984	20,800	42,093	479	0.59
1985	21,178	44,048	536	0.58
1986	22,797	49,095	599	0.56
1987	25,139	54,932	644	0.54
ENC STATES				
Non-metro.				
1980	2,811	5,677	182	0.57
1981	3,184	6,427	205	0.57
1982	3,600	7,299	236	0.57
1983	3,840	7,894	264	0.57
1984	3,972	8,283	297	0.57
1985	4,017	8,560	330	0.56
1986	4,219	9,085	352	0.55
1987	4,524	9,791	377	0.54
Metro Ctys				
1980	12,874	25,248	266	0.59
1981	14,793	29,224	309	0.59
1982	16,813	33,588	355	0.59
1983	18,588	37,850	404	0.58
1984	19,652	40,316	455	0.58
1985	20,018	42,219	513	0.57
1986	21,069	45,758	559	0.55
1987	22,856	50,082	601	0.54

TABLE 3

Other Hospital Ratios - Michigan and the E. N. Central States

	T. Labor Expenses/ Inpt.Day-Eq.	Surg. Oper. per Day	T. Expens./ Hosp. Deflated (Thousands)	Ratio-Regist'd Nurses to All Nurses
MICHIGAN				
Non-Metro				
1980	0.115	3.9	5,685	0.59
1981	0.135	3.9	5,622	0.57
1982	0.154	3.9	5,700	0.60
1983	0.170	3.7	5,498	0.60
1984	0.190	3.9	5,628	0.62
1985	0.206	4.0	5,664	0.64
1986	0.220	4.1	5,905	0.67
1987	0.233	4.4	6,236	0.68
Metro Ctys				
1980	0.170	16.0	24,525	0.71
1981	0.195	15.1	24,786	0.72
1982	0.224	15.6	25,770	0.72
1983	0.249	17.0	28,627	0.74
1984	0.283	17.2	30,304	0.77
1985	0.309	17.5	30,483	0.80
1986	0.332	18.0	33,105	0.81
1987	0.350	18.4	36,331	0.82
ENC STATES				
Non-Metro				
1980	0.103	4.5	5,677	0.67
1981	0.117	4.5	5,774	0.65
1982	0.135	4.5	5,929	0.67
1983	0.150	4.5	5,954	0.68
1984	0.168	4.6	5,964	0.70
1985	0.183	4.7	5,924	0.72
1986	0.193	4.6	6,126	0.74
1987	0.204	4.8	6,475	0.75
Metro Ctys				
1980	0.157	16.1	25,248	0.75
1981	0.183	16.1	26,257	0.75
1982	0.210	16.1	27,286	0.76
1983	0.236	16.7	28,544	0.78
1984	0.265	16.8	29,025	0.81
1985	0.291	17.0	29,217	0.83
1986	0.307	17.5	30,855	0.85
1987	0.325	18.0	33,123	0.86

Other Hospital Ratios - Michigan and the E. N. Central States

	Tot. Exp./ Inp-Day Equi Deflated (\$)	Ratio-Total Labor Exp./ T. Expenses	Emergency Visits/ Admission	Total Labor Expenses per Employee (\$)
MICHIGAN				
Non-Metro				
1980	199	0.58	2.39	14,195
1981	208	0.58	2.27	15,829
1982	213	0.58	2.18	16,006
1983	217	0.59	2.23	19,245
1984	233	0.59	2.42	20,663
1985	246	0.58	2.63	22,230
1986	257	0.58	2.93	23,196
1987	271	0.57	3.24	24,755
Metro Ctys				
1980	281	0.60	2.45	17,344
1981	292	0.60	2.28	19,236
1982	303	0.60	2.15	20,281
1983	317	0.59	2.20	23,361
1984	344	0.59	2.17	26,094
1985	371	0.58	2.17	27,021
1986	404	0.56	2.42	27,809
1987	426	0.54	2.66	29,236
ENC STATES				
Non-Metro				
1980	182	0.57	2.09	13,156
1981	184	0.57	2.07	14,720
1982	192	0.57	2.05	15,224
1983	199	0.57	2.11	18,320
1984	214	0.57	2.19	19,942
1985	228	0.56	2.35	20,978
1986	237	0.55	2.63	21,694
1987	249	0.54	2.93	22,478
Metro Ctys				
1980	266	0.59	2.11	16,417
1981	278	0.59	2.07	18,261
1982	288	0.59	1.95	19,305
1983	305	0.58	1.98	22,440
1984	328	0.58	1.97	24,464
1985	355	0.57	2.06	25,314
1986	377	0.55	2.23	25,984
1987	398	0.54	2.36	26,836

TABLE 4

Per Capita Hospital Ratios - Michigan, 1974, 1980-87.

	Surgical Operations Par Capita	Deflated Total Expenses Per Capita (1980 Dollars)
Non-Metro		
1974	56	
1980	63	222
1981		
1982	58	234
1983	61	248
1984	61	242
1985		
1986	63	245
1987	66	257
Metro Ctys		
1974	86	
1980	98	413
1981		
1982	102	464
1983	104	479
1984	101	491
1985		
1986	100	506
1987	99	537

File:RDStevens,MEHRU80S

Figure 1

Number of Hospitals, 1980-1987

Metro and Non-Metro, Mich. and E. N. C. States

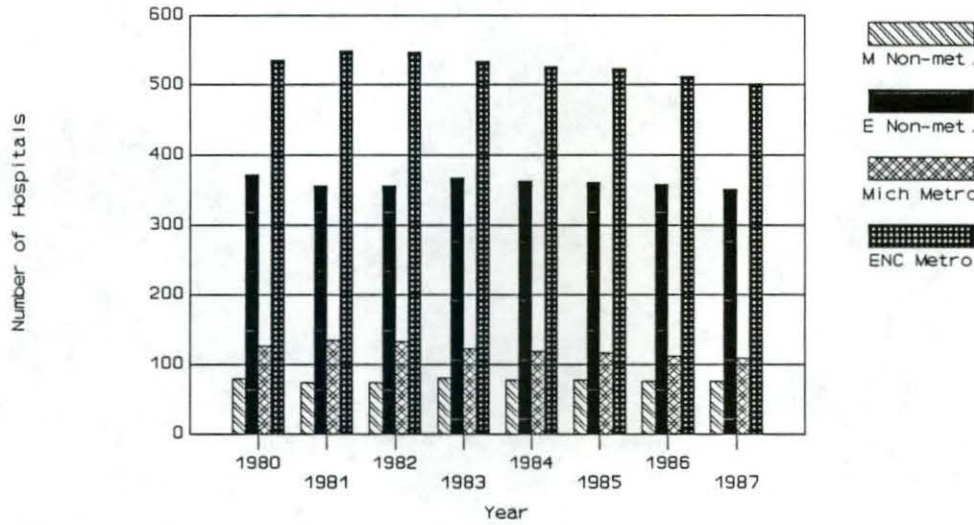


Figure 2

Beds per Hospital, 1980-1987

Metro and Non-Metro, Mich. and E. N. C. States

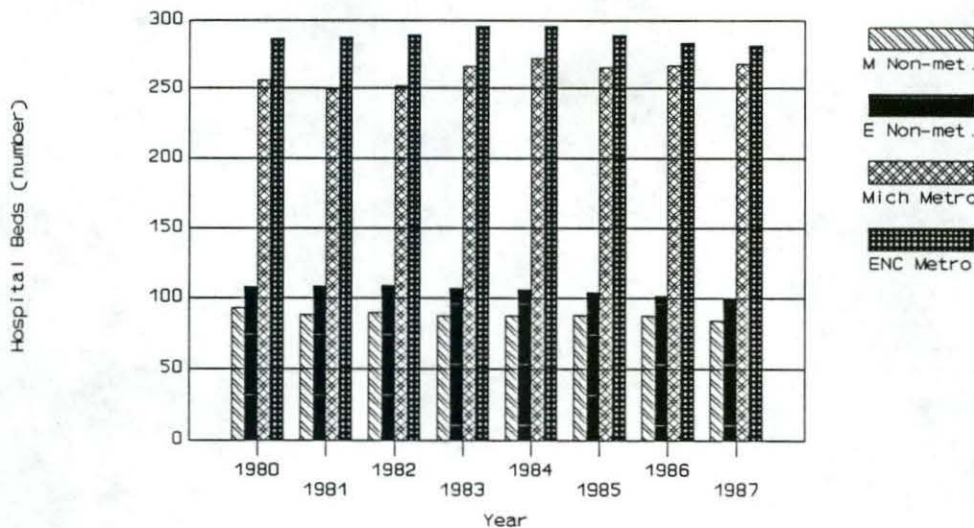


Figure 3

Deflated Total Expenses, 1980-1987
Hospitals in Mich. and E. N. C. States

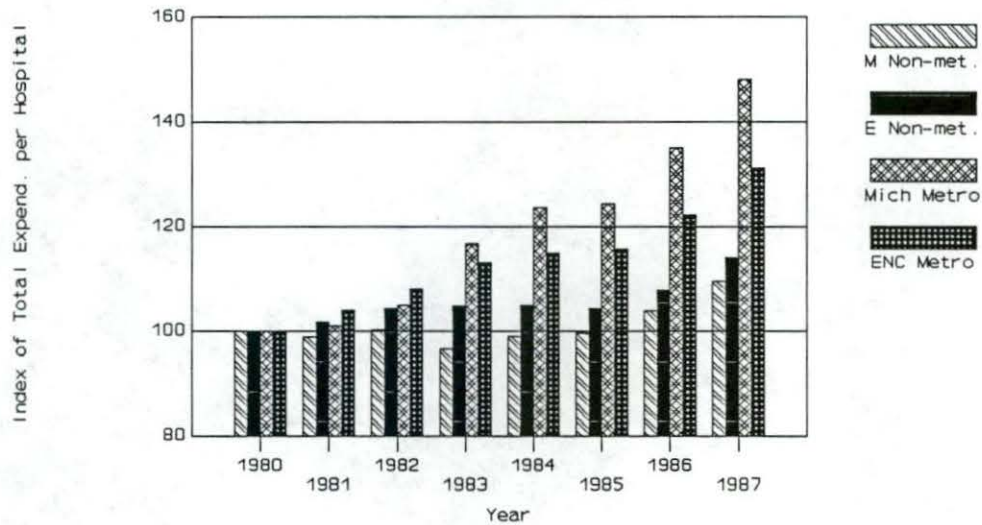


Figure 4

Admissions per Hospital, 1980-1987
Metro and Non-Metro, Mich. and E. N. C. States

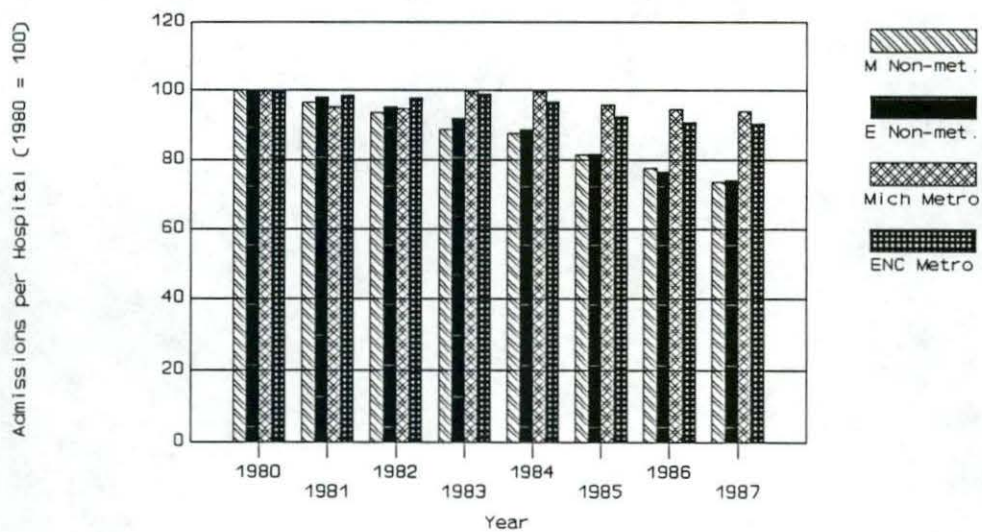


Figure 5

Admissions per Capita, 1974, 1980-1987

Metro and Non-Metro Hospitals in Michigan

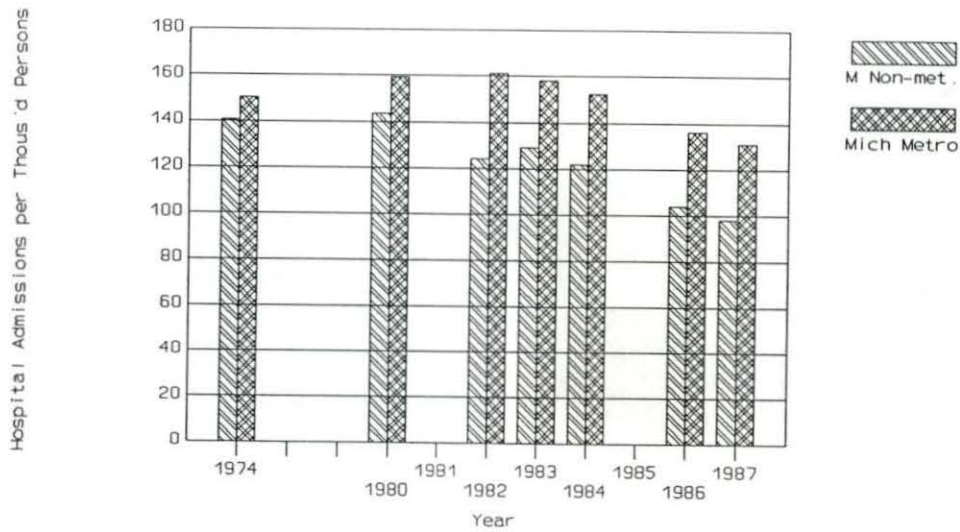


Figure 6

Length of Hospital Stay, 1980-1987

Metro and Non-Metro, Mich. and E. N. C. States

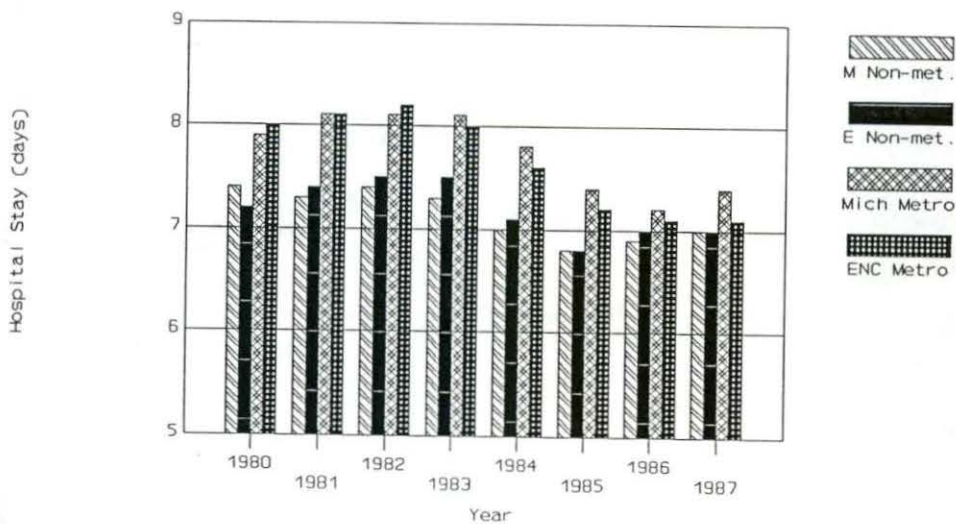


Figure 7

Inpatient Days per Hospital, 1980-1987
 Metro and Non-Metro, Mich. and E. N. C. States

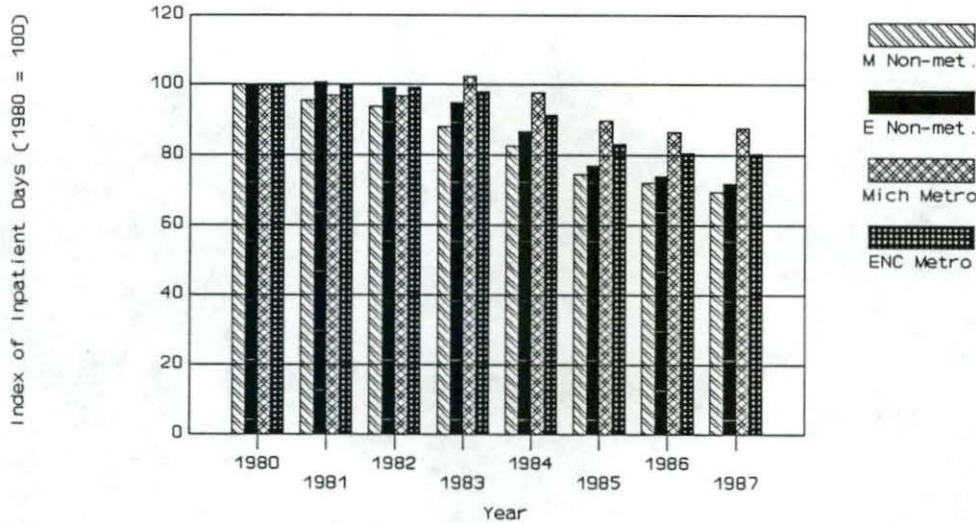


Figure 8

Inpatient Days per Capita, 1974-1987
 Metro and Non-Metro Hospitals in Michigan

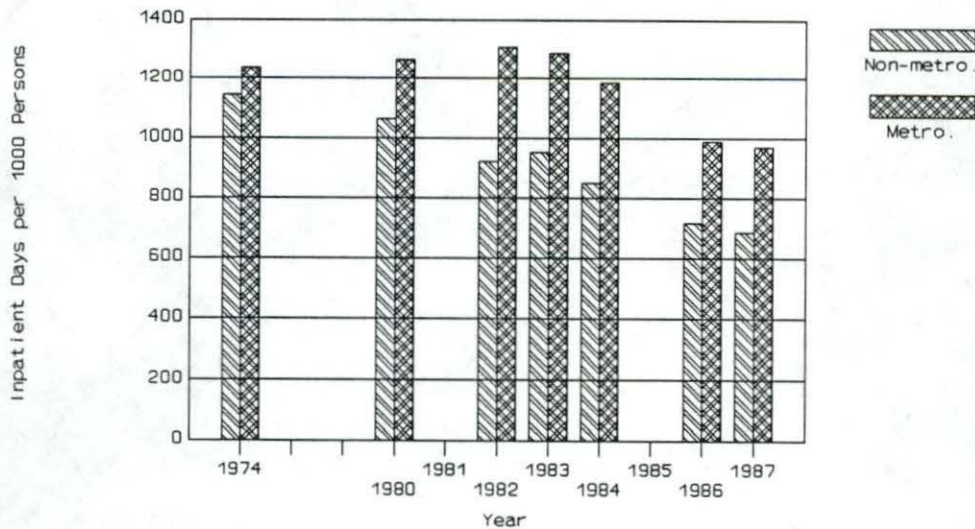


Figure 9

Hospital Bed Occupancy Rate, 1980-1987

Metro and Non-Metro, Mich. and E. N. C. States

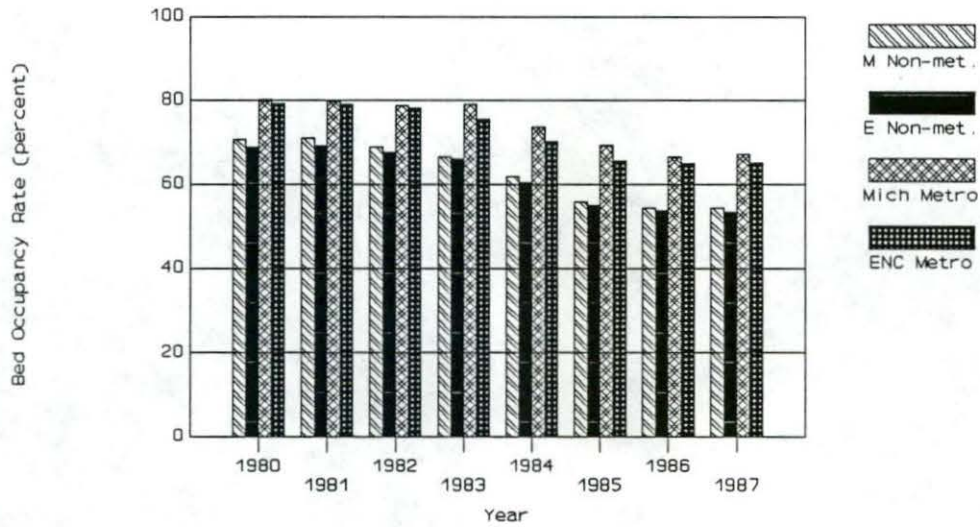


Figure 10

Births per Hospital (Index), 1980-7

Metro and Non-Metro, Mich. and E. N. C. States

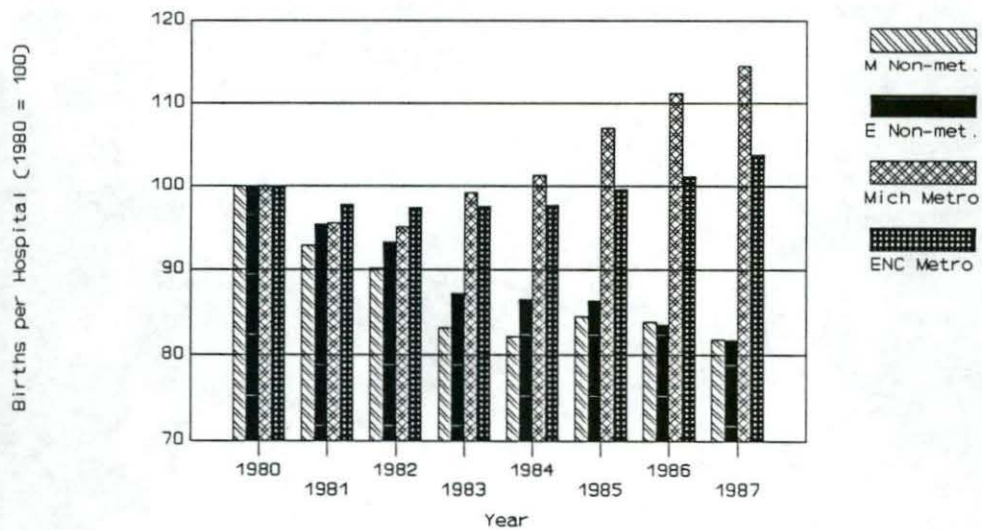


Figure 11

Births Per Hospital Admission

Metro and Non-Metro, Mich. and E. N. C. States

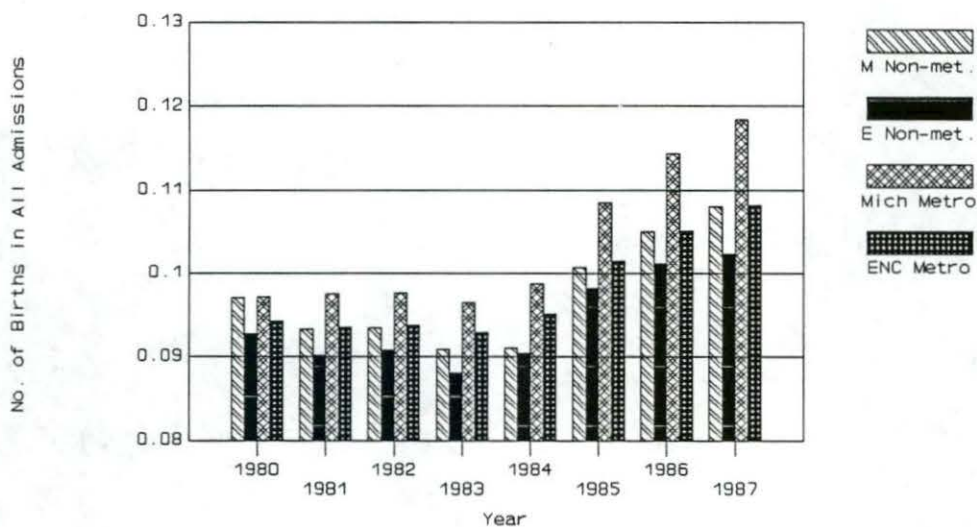


Figure 12

Surgical Operations per Hospital

Metro and Non-Metro, Mich. and E. N. C. States

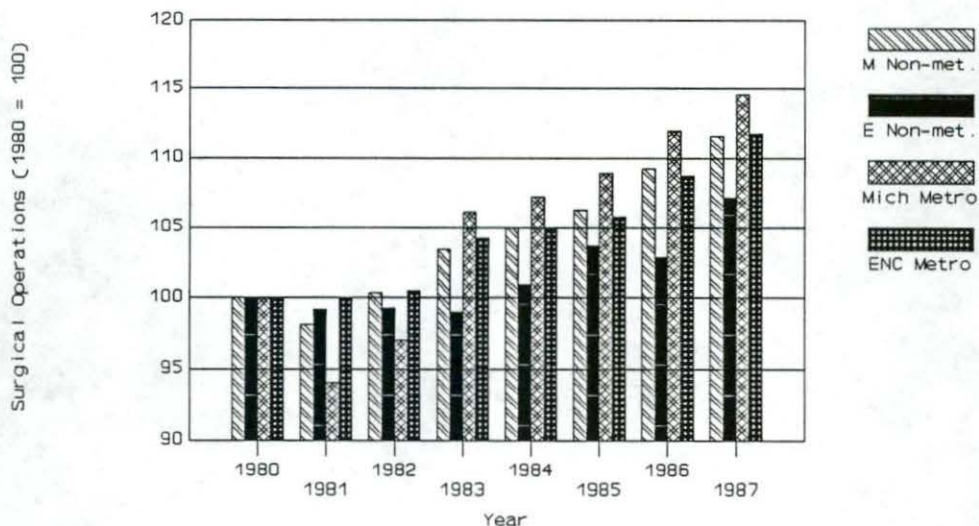


Figure 13

Surgical Operations Per Admission

Metro and Non-Metro, Mich. and E. N. C. States

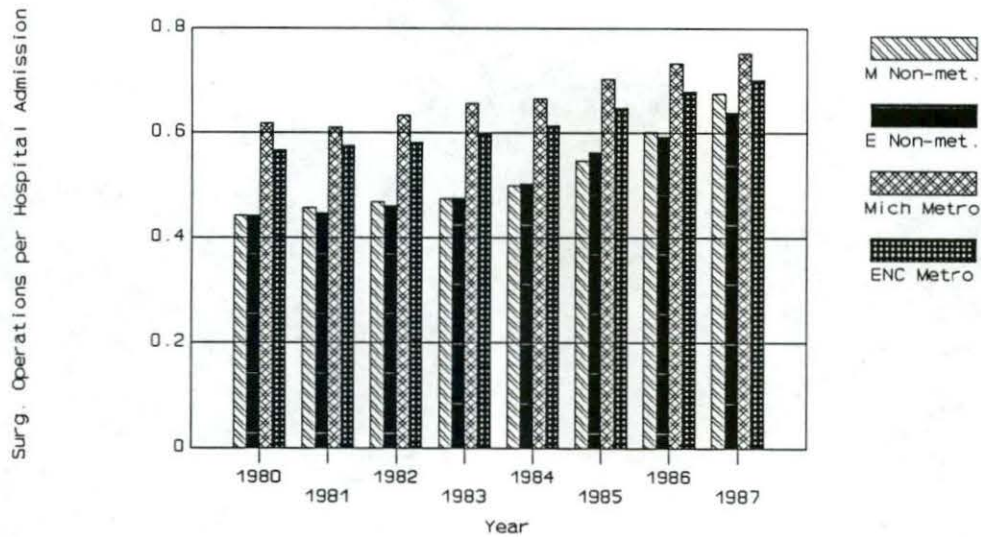


Figure 14

Surgical Operations per Capita, 1974-87

Metro and Non-Metro Hospitals in Michigan

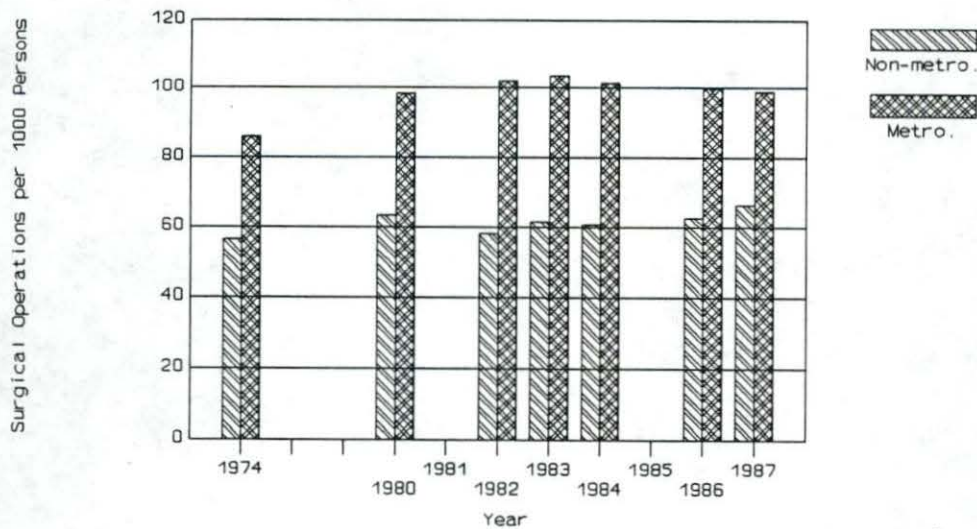


Figure 15

Emergency Service Visits Per Hospital
 Metro and Non-Metro, Mich. and E. N. C. States

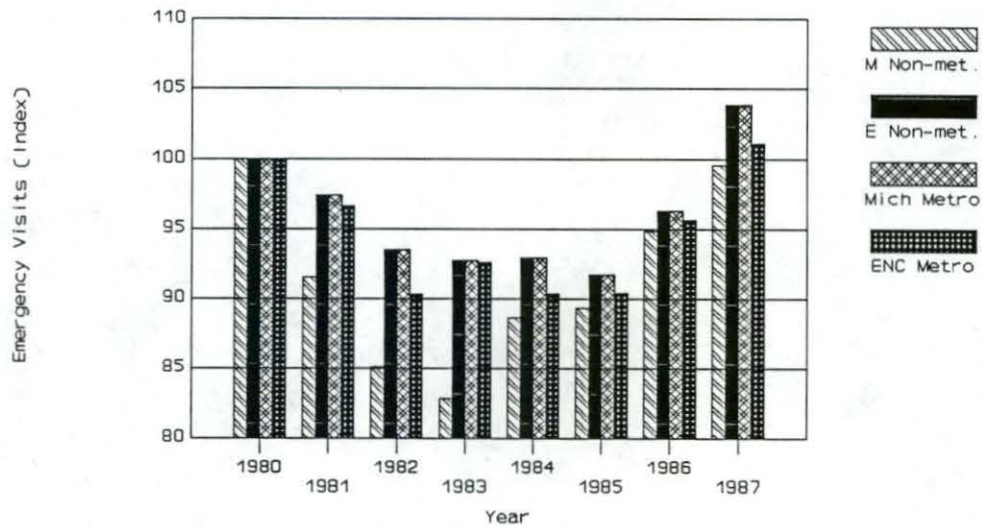


Figure 16

Emergency Visits per Capita, 1974-1987
 Metro and Non-Metro Hospitals in Michigan

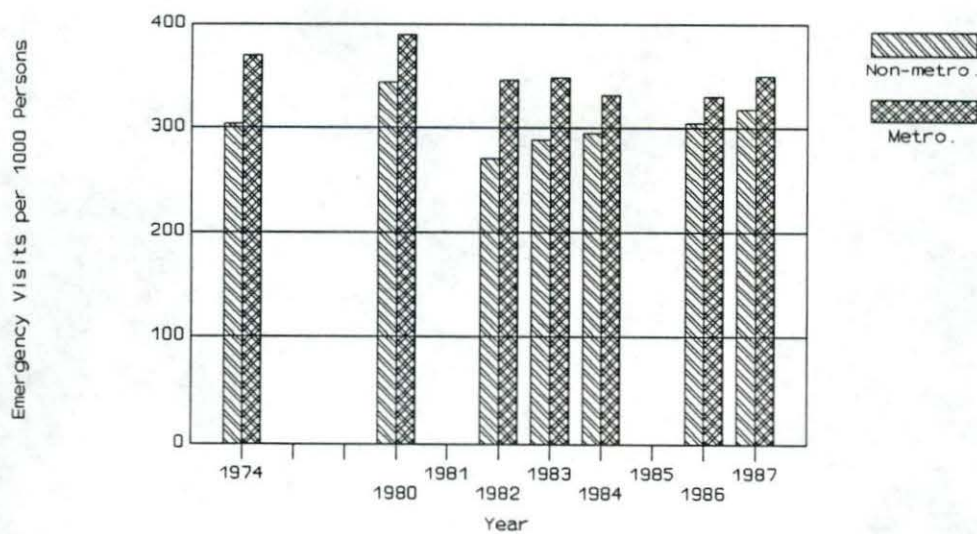


Figure 17

Other Visits per Hospital
 Metro and Non-Metro, Mich. and E. N. C. States

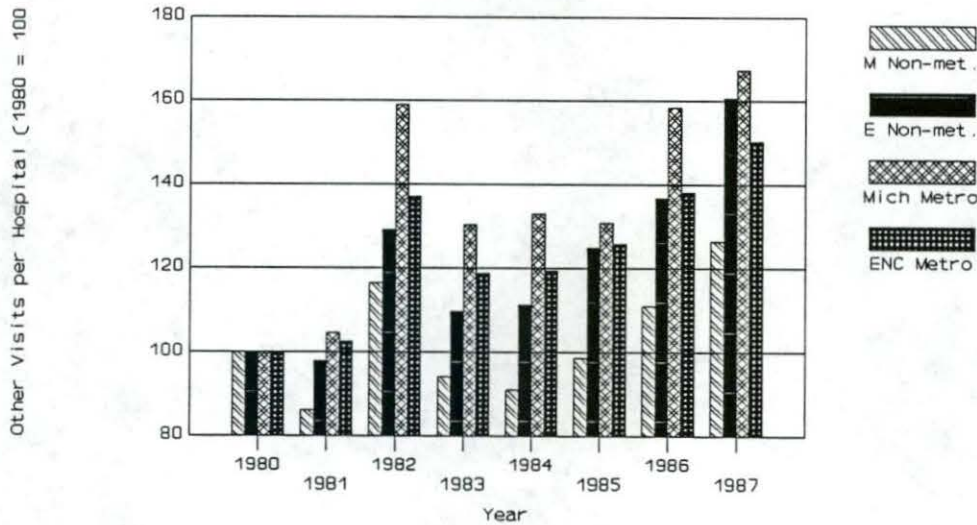


Figure 18

Other Visits per Capita, 1974, 1980-87
 Metro and Non-Metro Hospitals in Michigan

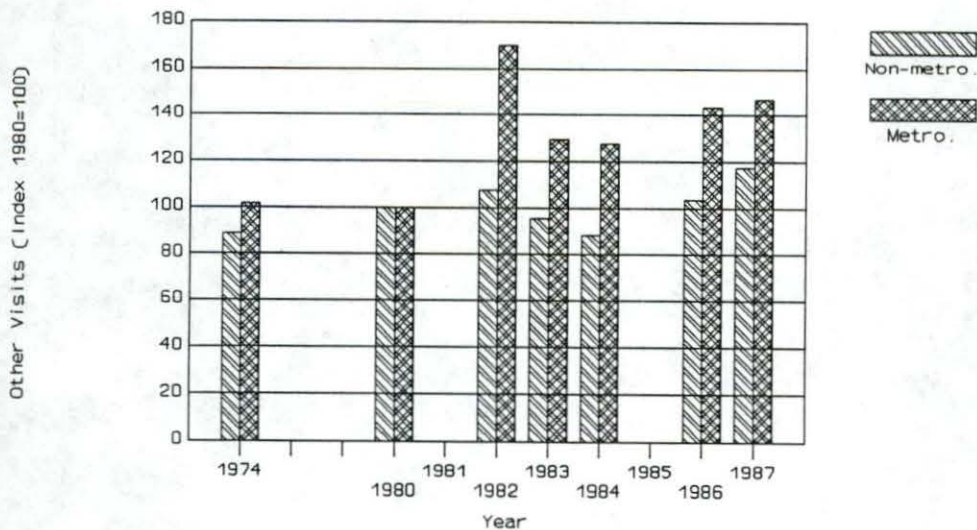


Figure 19

Other Visits in Inpatient Day Equivalents

Metro & Non-Metro, Mich. and ENC States, 1980-87

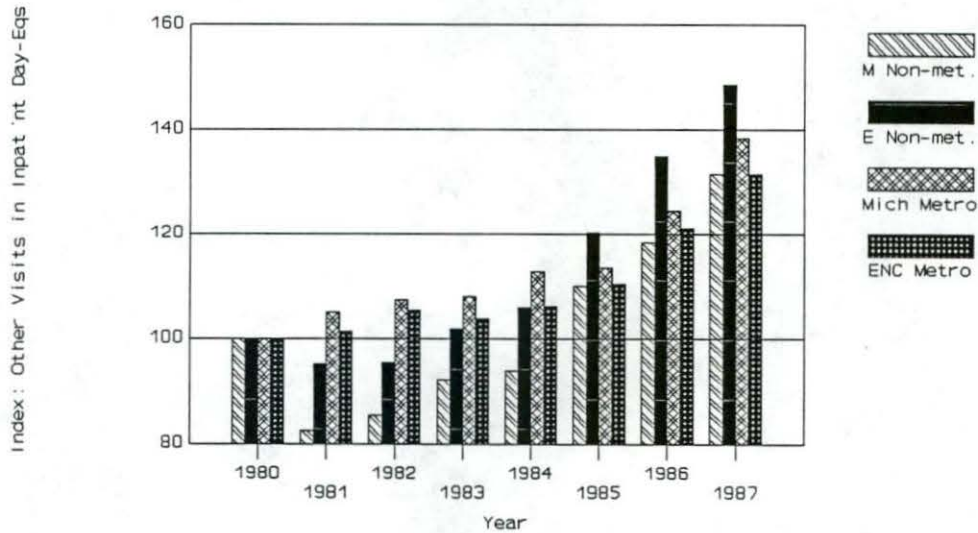


Figure 20

Inpatient Day Equivalents Per Hospital

Metro & Non-Metro, Mich. and ENC States, 1980-87

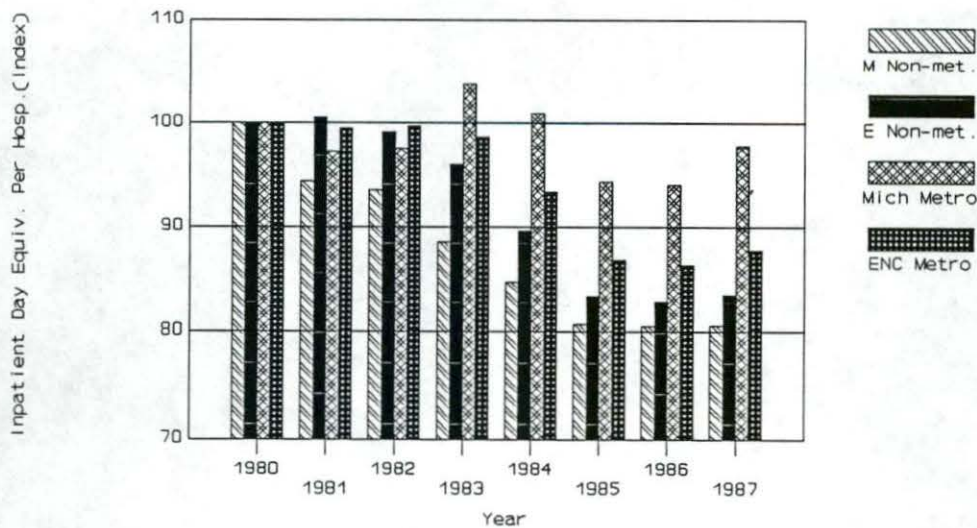


Figure 21

Nurses per Hospital, 1980-1987

Metro and Non-Metro, Mich. and E. N. C. States

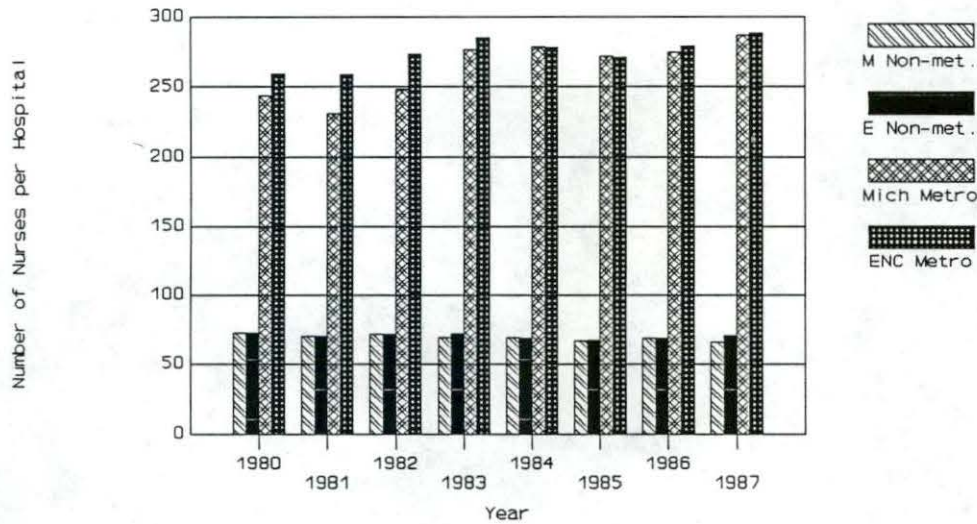


Figure 22

Nurses Per Inpatient Day Equivalent

Metro & Non-Metro, Mich. and ENC States, 1980-87

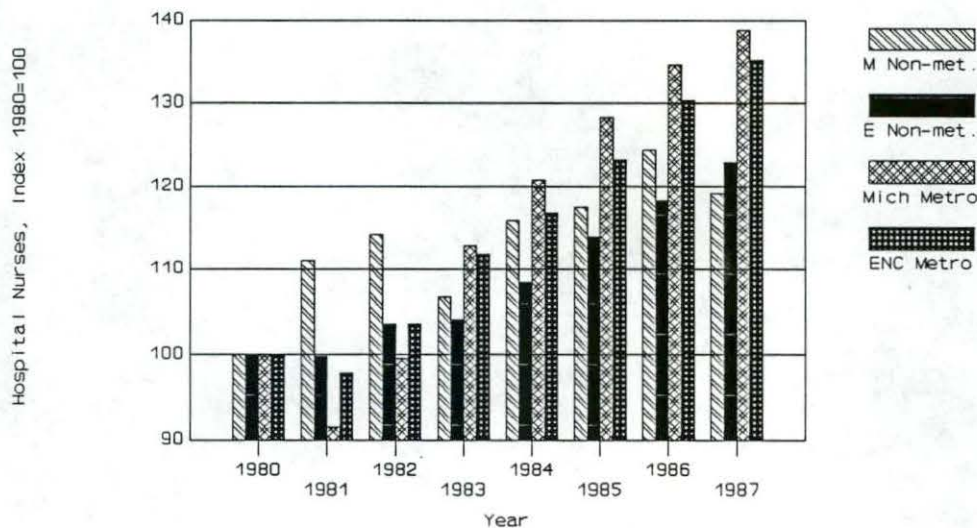


Figure 23

Hospital Nurses per Capita, 1974-1987

Metro and Non-Metro Hospitals in Michigan

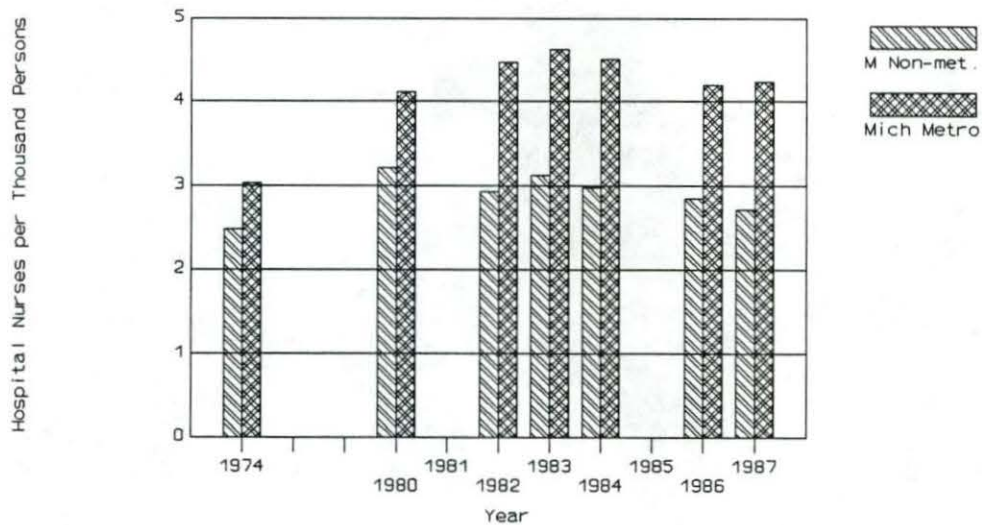


Figure 24

Other Salaried Personnel Per Hospital

Metro & Non-Metro, Mich. and ENC States, 1980-87

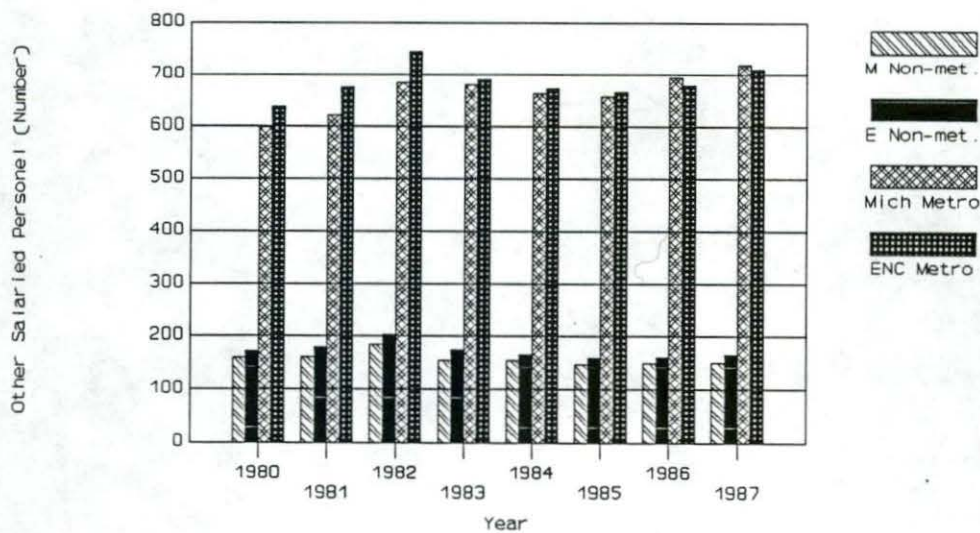


Figure 25

Personnel per Hospital

Metro and Non-Metro, Mich. and E. N. C. States

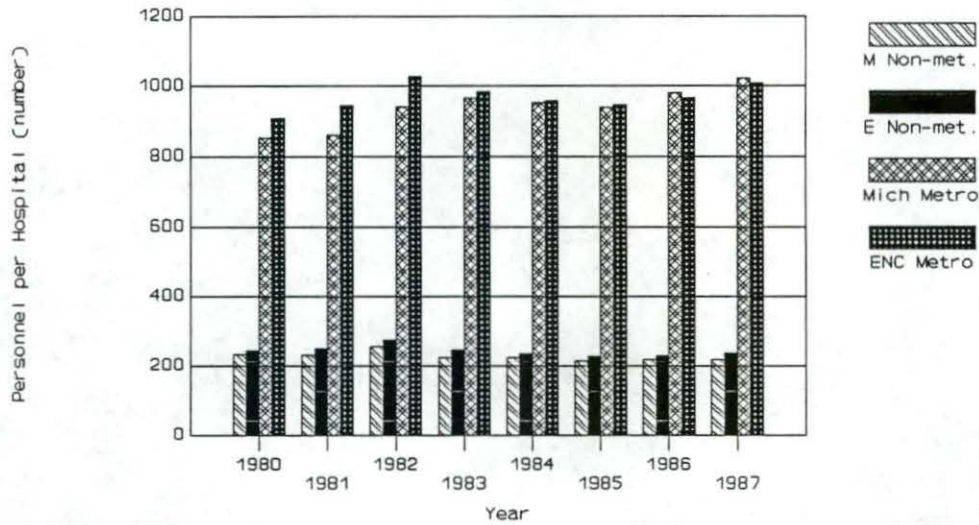


Figure 26

Deflated Expense Per Inpat. Day Equiv't

Metro & Non-Metro, Mich. and ENC States, 1980-87

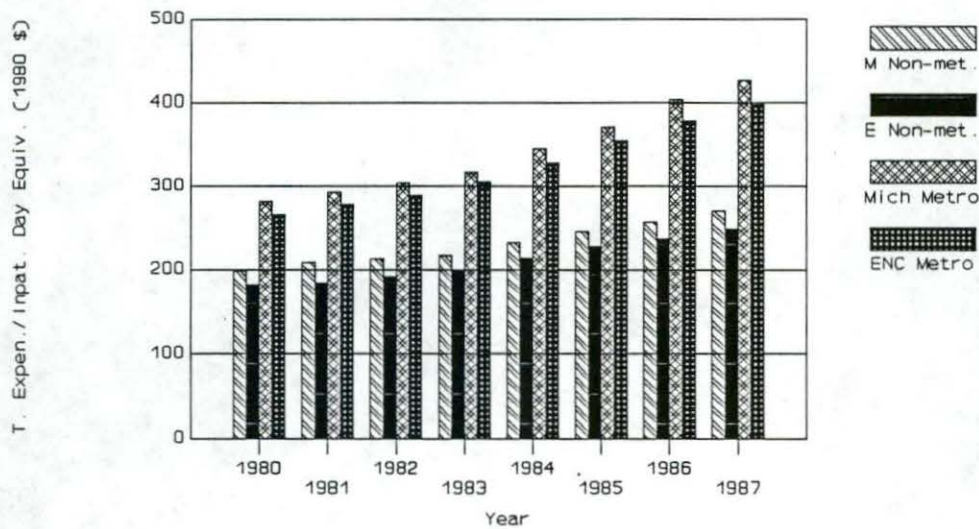


Figure 27

Total Expenses/Capita, 1980-7 (Deflated)
 Metro and Non-Metro Hospitals in Michigan

