

**FORECASTING THE COST OF PHARMACEUTICAL SERVICES
FOR THE CITY OF AUSTIN MEDICAL ASSISTANCE PROGRAM**

BY

JOSE D. LARA

**An Applied Research Project (Political Science 5397)
Submitted to The Department of Political Science
Southwest Texas State University
In Partial Fulfillment
For the Requirements for the Degree of

Masters of Public Administration

(Spring 1995)**

FACULTY APPROVAL:

TABLE OF CONTENTS

| | |
|--|-----------|
| List of tables | 4 |
| Chapter 1 Background | 5 |
| Introduction | 5 |
| Research Purpose | 8 |
| Organization of Research | 9 |
| Chapter 2 Review of Review | 11 |
| Introduction | 11 |
| Health Care System | 12 |
| Financing Health Care Expenditures | 12 |
| System Components and Access to Care | 15 |
| Pharmacy Services | 17 |
| Forecasting | 19 |
| Conceptual Model | 22 |
| Demand Component | 22 |
| The Cost Component | 26 |
| Hypotheses | 29 |
| Conclusion | 32 |
| Chapter 3 Research Setting | 33 |
| Introduction | 33 |
| Background | 33 |
| Recent Developments | 34 |
| Program Benefits | 36 |
| Enrollment Types | 38 |
| Conclusion | 40 |
| Chapter 4 Methodology | 42 |
| Introduction | 42 |
| Data | 42 |
| Operationalization | 45 |
| Statistical Methods | 48 |
| Conclusion | 50 |
| Chapter 5 Analysis | 51 |
| Introduction | 51 |
| Aggregate Enrollment and Prescriptions | 51 |
| Enrollment by Age and Prescriptions | 52 |
| Trend Analysis of Enrollment | 54 |
| Conclusion | 55 |

| | |
|-----------------------------|-----------|
| Chapter 6 Conclusion | 56 |
| Introduction | 56 |
| Summary of Study | 56 |
| Findings | 57 |
| Future Research | 59 |
| Bibliography | 61 |

LISTS OF TABLES

| | |
|---|----|
| Table 1.1 Percent Change in Consumer Price Index for All Urban Consumers: 83-93... | 6 |
| Table 1.2 Enrollment in Medical Assistance Programs in Travis County..... | 8 |
| Table 2.1 National Health Expenditures by Source of Funds | 13 |
| Table 2.2 Factors in Pharmaceutical Cost..... | 29 |
| Table 2.3 Hypothesized Relationship between Enrollment and Prescriptions..... | 31 |
| Table 3.1 Medical Assistance Program Enrollment and Prescriptions | 38 |
| Table 3.2 City of Austin Medical Assistance Program Unduplicated Fiscal Year 93-4 Enrollment by Category | 40 |
| Table 4.1 Medical Assistance Program Enrollment by Category from October 1993 to December 1994..... | 43 |
| Table 4.2 Prescription records for private pharmacies | 43 |
| Table 4.3 Hypothesized relationships and Variable Measurements..... | 45 |
| Table 5.1 Simple Regression of Total Enrollment to Prescriptions..... | 52 |
| Table 5.2 Multiple Regression Analysis of Enrollment by Age and Prescriptions..... | 53 |
| Table 5.3 Projected Independent Variables | 54 |
| Table 6.1 Summary of Observed Relationships | 58 |
| Table 6.2 Projected Claims for Medications for 1995 | 59 |

CHAPTER 1 BACKGROUND

Introduction

Over the past two years, the nation has been debating health care funding for the uninsured and underinsured. While the federal government debates its role in the nation's health care system, local governments continue to play an important role in funding health care for the low income population. In some cases, local governments subsidize federal programs such as Medicare and Medicaid.

The debate over health care funding has once again risen to prominence due to increasing cost (Burner, et. Al 1992: 1). The increasing cost of health care programs for the poor has renewed the debate at the federal level. The Consumer Price Index indicates that inflation for medical care has consistently exceeded inflation for all items, as presented in Table 1.1. The high rate of change in the consumer price index for medical care services has caused increases in federal government health care expenditures. The percent change in the consumer price index for medical care services has decreased over the past four years. However, it still remains almost twice the percent change in the consumer price index for all items (see Table 1.1).

An examination of health care expenditures indicates that prescription drugs have had a higher rate of inflation than medical care professional services, as presented in Table 1.1. The percent change in the consumer price index for prescription drugs has exceed the percent change for professional services such as

physician and dental services, from 1983 to 1993. Prescription drugs inflation has kept pace with hospital services, which includes services such as hospital rooms, other inpatient services and outpatient services. Prescription drugs are a contributing factor in the cost of health care.

| Table 1.1 Percent Change in Consumer Price Index for All Urban Consumers: 83-93 | | | | | | |
|---|-----------|--------------------------------------|-----------------|--|---|-----------------------|
| Y e a r | All Items | All Items Less Medical Care | Medical Care | Medical Care Professional Services | Medical Care Hospital Services | Prescription Drugs |
| 83 | 3.2 | 2.9 | 8.7 | 7.2 | 11.4 | 11.0 |
| 84 | 4.3 | 4.1 | 6.2 | 7.1 | 8.6 | 9.6 |
| 85 | 3.5 | 3.4 | 6.2 | 6.2 | 6.3 | 9.5 |
| 86 | 1.9 | 1.6 | 7.5 | 6.4 | 6.0 | 8.6 |
| 87 | 3.7 | 3.5 | 6.6 | 6.6 | 6.9 | 8.0 |
| 88 | 4.1 | 3.9 | 6.5 | 6.7 | 9.4 | 7.9 |
| 89 | 4.8 | 4.6 | 7.7 | 6.4 | 11.5 | 8.7 |
| 90 | 5.4 | 5.2 | 9.1 | 6.6 | 10.9 | 10.0 |
| 91 | 4.2 | 3.9 | 8.7 | 6.2 | 10.2 | 9.9 |
| 92 | 3.0 | 2.7 | 7.4 | 6.1 | 9.1 | 7.6 |
| 93 | 3.0 | 2.7 | 6.0 | 5.1 | 8.4 | 3.9 |
| Source: U.S. Department of Labor, Bureau of Labor Statistics. | | | | | | |

The increase in health expenditures has given increased importance to multiyear forecasting. The federal government finances more than one-quarter of the United States health care expenditures (Burner, et. Al 1992: 1). However, local governments also feel the effects of the increasing costs of health care. Multi-year forecasting is critical in the budget process at the local government level (Forrester, 1991: 47). Forecasting is an important ingredient in planning for future fiscal years. Currently local governments utilize various methods of forecasting (Forrester, 1991:47). Due to the

complexity of the health care system, health care expenditures pose a special problem to local governments. Improved health care forecasting is becoming increasingly important at the local government level.

The trend of increasing health care expenditures is significantly important in Travis County. Travis County, as required by the State of Texas' Indigent Health Care Act, funds health care for the poor. Travis County fulfills this responsibility through one of two avenues. The county meets this requirement, first, through the operation of a health clinic system. Second, the county operates a Medical Assistance Program (MAP) known as the Rural Medical Assistance Program (RMAP). This program is similar to the State of Texas Medical Assistance Program (Medicaid).

Additionally, the trend in health care expenditures also has significant implications for the City of Austin. Just as Travis County operates clinics, the City also owns and operates a system of clinics. The City also operates a Medical Assistance Program known as MAP. The City of Austin Medical Assistance Program shares some similarities to RMAP and Medicaid.

A close look of health care programs in Travis County indicates that the City of Austin bears the largest burden, as presented Table 1.2. The City of Austin Medical Assistance Programs enrolled seventy-three percent of the total enrollment in local health care programs during Fiscal Year 1992-93 (the Fiscal Year begins in October). This percentage increased to seventy-seven percent in Fiscal Year 1993-94. The City of Austin Medical Assistance Program has consistently enrolled more individuals than the Travis County Rural Medical Assistance Program. The 1992 Lewin-VHI study

concluded that the variance, between the Medical Assistance Program and Rural Medical Assistance Program, was attributable to the clustering of low income families in urban areas.

| Table 1.2 Enrollment in Medical Assistance Programs in Travis County | | |
|--|---------|---------|
| Program | 1992-93 | 1993-94 |
| City of Austin Medical Assistance Program | 9,358 | 14,789 |
| Travis County Rural Medical Assistance Program | 3,411 | 4,464 |
| Source: City of Austin Health and Human Service Department. Unpublished. | | |

Research Purpose

The increasing cost of health care has special significance in the City of Austin and Travis County. The City of Austin and Travis County both finance large programs to address the health care needs of the uninsured in Travis County. The high cost of health care has required improved health care expenditure forecasting for the two local governments. Given the high percent change in the consumer price index for prescription services, forecasting for prescription services takes special importance.

The study seeks answers to the following questions:

1. *What are the major factors influencing the cost of the prescription services under the City of Austin's Medical Assistance Program?*
2. *What is the projected prescription service cost for the City of Austin's Medical Assistance Program?*

First, the study examines forecasting as used in health care planning. The examination focuses on the use of forecasting as a tool to identify key factors affecting expenditures. The analysis explains which elements affect the cost of the pharmacy

benefit. Additionally, the study explains to what degree the various elements affect the cost of the pharmacy benefit. The pharmacy benefit is chosen due to the particularly high rate of inflation for prescription services.

Second, this study examines the prescription drug program in the City of Austin Medical Assistance Program and its future cost. The analysis provides a mechanism to use in forecasting the cost of the pharmacy benefit. The forecasting mechanism utilizes predicted enrollment in estimating the future cost of the pharmacy benefit.

Organization of Research

Chapter two reviews the current literature regarding the health care system, forecasting and prescription services. The chapter focuses on the interrelationship of the health care system, forecasting and prescription services. Discussion focuses on the factors affecting prescription services. The factors affecting the utilization and cost of prescription services develop the conceptual framework that evaluates the relationship of variables affecting prescription utilization. The chapter develops hypotheses that test the factors affecting prescription services.

The research setting is the focus of the discussion in chapter three. This chapter introduces the City of Austin Medical Assistance Program. The discussion centers on the background of the program as well as recent developments. The chapter describes the different health services funded by the Medical Assistance Program, including the pharmacy service.

Chapter four discussed the methodology utilized in the project. The chapter defines the properties of the hypothesis developed in chapter two. The properties are operationalized. The chapter covers the reliability and validity of the data. Additionally, the chapter discusses and explains the appropriateness of the statistical methods utilized in the study.

Chapter five presents the results of the of the data analysis. The chapter focuses on the relationships between the conceptual model's elements. The analysis will consist of the results from statistical techniques introduced in chapter four in both tabular and narrative form.

The final chapter, Chapter Six, summarizes the conclusions drawn from the analysis. The chapter reviews the hypothesis developed in chapter two. The data analysis review determines if the study had accomplished the purpose of the research. The chapter discusses any limitations of the research that may exist. The study concludes with recommendations for future research.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The purpose of this chapter is to search for explanations for what affects the cost and utilization of prescription services. Discussion focuses on the makeup of the health care system and health care financing. Additionally, the chapter covers the role of prescription services in the health care system. Factors affecting utilization is the focus of the discussion. Discussion of health care service forecasting centers on the strengths and weaknesses of approaches to projections. The chapter concludes with the development of the conceptual model and the development of the hypotheses.

The health care system, prescription services and forecasting may be seemingly divergent topics, but the three are inextricably related. Key to effective health care forecasting, is the understanding of a particular element, and the element's role in the health care system. "An understanding of why patterns (in prescription services) have occurred, together with a reasoned confidence in their persistence, should be reached before any form of projection forecasting is used (MacStravic, 1984: 81)." A comprehension of these larger issues (health care system and the role of prescription services in the health care system) improves the forecast. An awareness of the health care system and prescription services, provide an organization with the tools for explaining why patterns of prescription utilization have occurred.

Health Care System

The system consists of conceptually three main categories: hospital care, non-emergency ambulatory care, and outpatient/specialty care. Hospital care services consist of short term care and long term care. Physicians, through individual offices, clinics and pharmacies deliver non-emergency ambulatory care. Hospitals or large specialty clinics deliver outpatient and specialty care.

Financing Health Care Expenditures

Nationally, the percentage of health care expenditures funded by public entities have grown over the last fifteen years as presented in Table 2.1. National health expenditures have increased from \$250.1 billion in 1980 to \$903.3 billion in 1993. This represents a 261.18 percent increase from 1980 to 1993, not adjusted for inflation. The trends also indicate that the source of funding is shifting the public sector from the private sector. In 1980, the public sector funded forty-two percent of the national health expenditures and the private sector funded fifty-eight percent. In 1993, the public sector funded forty-six percent of the national health expenditures and the private sector funded fifty-three percent. The enrollment increases in the Medicare (federally funded) and Medicaid (state and federally funded) programs is partially responsible for the shift in cost. Additionally, the increased cost of health is partially responsible for the shift in cost (Burner et al., 1992: 8).

The federal government estimates that health care expenditures do not deviate from past trends (see Table 2.1). By the year 2000, the federal government estimates that national health expenditures of \$1,739.8 billion. The shift to public funding of

health care expenditures will continue according to projections. In the year 2000, the public sector will fund fifty percent of the national health expenditures and the private sector will fund forty-nine percent.

| Table 2.1 National Health Expenditures by Source of Funds | | | | | | | |
|---|-------|-------|-------|-------|-------|---------|---------|
| Item | 1980 | 1990 | 1991 | 1992 | 1993 | 1995* | 2000* |
| Amount in billions | | | | | | | |
| Total | 250.1 | 666.2 | 736.5 | 819.9 | 903.3 | 1,101.9 | 1,739.8 |
| Private | 145.0 | 383.6 | 413.0 | 443.5 | 482.2 | 573.0 | 859.9 |
| Public | 105.2 | 282.6 | 323.5 | 376.5 | 421.1 | 528.8 | 879.9 |
| Federal | 72.0 | 195.4 | 223.2 | 258.9 | 290.0 | 366.1 | 617.5 |
| State/Local | 33.2 | 87.3 | 100.3 | 117.5 | 131.1 | 162.8 | 262.4 |
| Percent distribution | | | | | | | |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Private | 58.0 | 57.6 | 56.1 | 54.1 | 53.4 | 52.0 | 49.4 |
| Public | 42.0 | 42.4 | 43.9 | 45.9 | 46.6 | 48.0 | 50.6 |
| Public Expenditures Detailed ¹ | | | | | | | |
| Federal | 28.8 | 29.3 | 30.3 | 31.6 | 32.1 | 33.2 | 35.5 |
| State/Local | 13.3 | 13.1 | 13.6 | 14.3 | 14.5 | 14.8 | 15.1 |
| Source: Burner, et al. 1992: 14. * Projected with expected inflation. | | | | | | | |

Expectations are that shifts in public sector financing of national health expenditures continue. National health expenditures have become increasingly financed by the public sector, as presented in Table 2.1. State and local governments financed thirteen percent of the national health care expenditures, in 1980. By 1993, this percentage had increased. State and local governments financed fourteen percent of

¹ Public expenditures detailed breaks down the public percentage of health care expenditures. In 1990, federal health expenditures accounted for 29.3 percent of the total and state/local health care expenditures accounted for 13.1 percent of the total health care expenditures (29.3 + 13.1 = 42.4). The federal percentage and state/local percentage may not add up to the public percentage due to rounding.

the national health expenditures, in 1993. Although the change is only one percentage point, the change in expenditures is significant. State and local governments spent \$33.2 billion on health expenditures, in 1980. State and local governments spent \$131.1 billion on health expenditures, 1993. This represents an increase of 294.88 percent from 1980 to 1993, not adjusted for inflation. In 1991 and 1992, the annual percentage growth in state and local health expenditures exceeded most of the other funding sources presented. The annual percentage growth in state and local health expenditures were 14.9 percent and 17.2 percent in 1991 and 1992 respectively.

Projected national health expenditures indicate an increase in the share funded by state and local governments. By the year 2000, estimates project that state and local governments will finance 15.1 percent of the national health expenditures. Increased enrollment in Medicaid and increased cost drive the increase in health care expenditures (Burner, et al., 1992: 8).

Health care providers receive funding from multiple sources. Health care providers, such as hospital, clinics and pharmacies must work with multiple payors. Given the high cost of health care, health care providers receive the largest portion of their funding from a third party. Third party payors can be either a private insurance company or a publicly financed medical assistance program. The existence of multiple payors adds to the complexity of the health care system. The multiple third party payors do not use a standard scheme to render payment for services. Third party payors have some type of prearranged payment scheme with providers. Third party

payors structure prearranged schemes to the benefit individual third party payors, not the health care system.

System Components and Access to Care

As previously discussed, the system consist of three major components. The system consist of hospital services, non-emergency ambulatory care services, and outpatient/specialty services. The relationship among the three components is strong.

A change in one part of the system often affects other parts of the health care system. Inappropriate use of the emergency room is an example of how one part of the system affects another. In these cases the inappropriate use of the emergency room is due in part to the inability of non-emergency ambulatory care to meet the health needs of the public. There are four more identifiable reasons for inappropriate use of the emergency room (Lewin-VHI: 110):

- Uncertainty about the need for care,
- Ambulatory clinic wait/appointment delay times,
- Transportation difficulties/problems getting time off work, and
- Child care problems

The United States health care system is complex. It sometimes does not work. Due to constant failures in the system, Khan and Bhardway (1994: 61) refer to health care system as a non-system. All participants in the health care system eventually absorb any system failures, such as inappropriate use of the emergency room. In order for hospitals to compensate for profit losses in the emergency room, hospitals must raise rates. Profit losses result from individuals unable to pay for services or from fee

structures that are inadequate to recover the cost of providing services. System failures occur in any system, as might be expected. However, system failures in health care can have very costly effects for all participants, unbeknownst to the general public. It is the system's complexity that allows failures in the system to go unnoticed.

Access barriers to health care cause failures in the system (Khan and Bhardwaj, 1994: 61). Access is an elusive concept for many to grasp since it means different things to different people. Some health care providers may see access to health care only in their small corner of the system. Individuals may see access to health care as the ability to make a doctor's appointment within a day or two of calling the doctor's office. Access to health care is an important issue to understand since it is important for individuals to enter the health care system at the appropriate point (i.e. a physician's office for a common cold). One definition of access to health care is that it is the ability of the population, or a segment of the population, to obtain health services. Potential barriers to access could be "economic, temporal, locational, architectural, cultural, organizational and informational (Khan and Bhardwaj, 1994: 63)." These potential barriers could also become facilitators. Khan and Bhardwaj conceptualized access to health care in terms of supply and demand. Khan and Bhardwaj express supply in terms of the maximum ability of health care providers to provide service. Khan and Bhardwaj express health care demand in terms of potential need for health care. The potential need is defined by the demographics (age and gender) of the population.

Pharmacy Services

According to the Consumer Price Index, the increase in cost for prescription drugs has consistently exceeded even the increase in cost for all medical care services, as presented in Table 1.1. The Consumer Price Index for prescription services has exceeded the other major categories of medical care in four of the past eleven years. The Consumer Price Index for prescription services has exceed professional medical care services in ten of the past eleven years.

Recently President Clinton proposed extending prescription drug benefits to Medicare enrollees. Currently the Medicare program does not cover the cost of outpatient prescription drugs. The President's proposal has sparked renewed interest in estimating the cost of pharmaceutical services evident in studies completed by Schondelmeyer, Waldo, and Gianfrancesco. The renewed interest in pharmaceutical services not only focused on the cost of the service. Interest has also focused on the payment schemes governments and other third party payors use to render payments to pharmacies.

Prescription services in private insurance companies and government assistance programs, consist some basic components. The pharmacy benefit under a private insurance company or government assistance program is likely to consist of seven basic components.

The first component is eligibility. An individual must pass some sort of eligibility requirement. Insurance companies define eligibility as a the primary care individual insured or a dependent. Government assistance programs define eligibility according

to federal poverty guidelines. Individuals must be at a certain level of poverty before the individual may enroll in the government assistance program. Governments also add into their eligibility requirement, a test of the individual's net worth. For example, an individual must have less than \$2000 in assets to be eligible.

The second component of a pharmacy benefit is who may write a prescription. Insurance companies may allow only certain physicians to write prescriptions for their members. In most cases, government assistance programs do not limit prescriptions written by a list of approved physicians. Any physician may write a prescription for enrollee in a government assistance program. Recently, government assistance programs have experimented with Health Maintenance Organizations (HMOs). Some government programs have contracted with HMOs to provide service under the HMOs network of physicians. These experiments in essence restricted prescriptions to those written by physicians in the HMO network.

The third component of a pharmacy benefit is coverage of over-the-counter drugs. Over-the-counter medication coverage does not exist ordinarily (Blissenbach, 1990: 144).

The fourth component of the pharmacy benefit is the list of approved pharmacies. Only those pharmacies contracting with the health care program fill prescriptions. Insurance companies, and government assistance programs require their enrollees to use certain pharmacies which have contracted with the third party (insurance company or government program).

The fifth component of the pharmacy benefit is the formulary. The formulary is a list of drugs that the third party payor agrees to cover. The formulary component is seen as a cost control measure by third party payors.

The sixth component of the pharmacy benefit is the coverage for generic drugs. Insurance companies may require enrollees to choose generic drugs when available, over name brand medications. This is a cost control measure as well.

The final basic component of the pharmacy benefit is the existence of a copayment or deductible. Third party payors usually require enrollees to pay some level of copay or deductible for each prescription. A copay is where an enrollee pays a small flat fee for each prescription. A deductible is where an enrollee pays up to certain level for each prescription. The deductible may or may not cover the full price of the medication. The copay rarely covers the full price of the medication.

Forecasting

As a matter of financial management, Forrester recommends that state and local governments utilize some method of forecasting. Multi-year provides a means of establishing a "...framework for analyzing ... financial, and political needs...(Forrester, 1991: 47)." As has been discussed, health care expenditures have been steadily increasing over the last fifteen years. Forecasting health care expenditures are critical to state and local governments financial planning. Forecasting expenditures and revenue assist organizations to establish the decision context involved in budgeting expenditures (MacStravic, 1984: 1).

Organizations engaging in forecasting have various goals in forecasting. Some state and local governments may strive for precision in their forecast. The organization may strive to have a high confidence level in the forecast. State and local governments may want a high level of confidence from the outset that the forecast will be accurate within a certain range. For example, the state may want the forecast for total Medicaid expenditures to have a confidence level of plus or minus \$500,000. On the other hand, other state and local governments may strive for accuracy. Accuracy in the forecast is similar to precision, except accuracy determination comes after the provision of the services. Accuracy refers to the variance between actual experience and the estimate produced from the forecast (MacStravic, 1984: 13). A comparison of the actual cost to the forecasted cost determines the accuracy of a forecast.

Forecasts require specific elements in order to gain acceptance. The forecast must be explicit about the time frame of the forecast. If the forecast uses history, it should state clearly the historical time frame used (MacStravic, 1984: 13). Additionally, the forecast should have the type of technique clearly stated (ibid). The technique may be either naive or causal. The naive forecast is one where there is no attempt to determine why past experience happened the way it did. The causal forecast attempts to tie factors together in how the various factors affect utilization (ibid: 17).

The techniques used to forecast health care services do not differ greatly than those used to forecast other government services. MacStravic suggests that the best approach to forecasting, is to focus on change dynamics. The locality should determine how various factors have influenced past history and how those factors may or may not

change in the near future (MacStravic, 1984: 28). Forecasting health care services tend to be more reliable in the near future than long term forecast. Short term forecasts involve projecting out only one to two years in the future, whereas long term forecasting involves projecting five to ten years in the future. The health care system is too dynamic to predict how various factors may or may not change in the long term.

Projection techniques are naive in nature. Projection techniques rely solely on historical utilization to project future use of health care services (MacStravic, 1984: 39). However, given the simplicity of projections, elected officials and the general public easily understand naive techniques. MacStravic suggests that at least five periods are used in the projection of health care services. The key assumption in the naive forecast is that if any causal factors existed in the past, that those factors would remain the same during the forecast period. The short term forecast using projection techniques could gain acceptance from elected officials and the general public, since neither the officials nor public has information to the contrary, that would suggest significant changes in causal factors in the near future. Projection techniques have used linear extrapolation in the past in order to forecast. In addition to a short time frame, projections can gain improved acceptance by using various statistical techniques to smooth out wide fluctuations in health care utilization.

Causal forecasting techniques are more complex in nature. Causal forecasting attempts to document the interrelationships between the factors affecting utilization (MacStravic, 1984: 103). Linked factors cause ripple affects in other as related factors increase or decrease. Accuracy in the forecast improves with the use of causal

forecasting. However, due to its complexity, the forecast may be difficult to explain to elected officials and the general public. Localities engaging in causal forecasting should list out all assumptions on the interrelationship between factors. In doing so, the locality may win some support from elected officials for a causal forecast.

Conceptual Model

Conceptually, there are two determinants of the cost of pharmaceutical services covered by third party payors: demand for prescriptions and the cost of the pharmaceutical product. Third party payor pharmaceutical services are a singular program with an aggregate cost. The cost of the program is a function of all the prescriptions filled and the cost of the individual prescriptions filled. The future cost of the program is a function of future demand for prescriptions and the expected cost of the prescriptions.

Demand Component

Determining the future demand for prescription involves performing a demand analysis. The purpose of the demand analysis is to determine those factors that affect the utilization of services. At any point in time, there are many factors that would influence the use of prescription services by a program's enrollees. Given the size of the enrollment in various health care programs, it would be virtually impossible to determine the various factors affecting utilization for each individual. However, it is possible to determine the factors influencing the demand for groups of enrollees. Groups include enrollment populations with similar demographics. An understanding of

the factors affecting the demand for the various groups of enrollment, is critical in explaining variances between groups.

The economic definition of demand is the quantity of a good purchased at a given price. A demand curve comes from a table detailing the quantity of a given product purchased at a particular price. Economics has established that the demand curve usually slopes downward to the right. The demand for a product increases as the price of the product decreases, and vice versa. As the price of prescriptions drops, the quantity of prescriptions filled would increase (Harris et al., 1990:908; Reeder and Nelson, 1985:397). This fundamental concept is known as the law of demand.

Determination of product demand comes from multiple factors. It depends on the price of the good, as well as the price of alternative goods. Additionally, the taste of the individual plays a role, as well as the income of the individual. Movement along the demand curve comes from the price of the primary product. However, the demand curve for a product shifts under certain circumstances. One of five different factors causes a shift in demand, or a change in the relationship between price and quantity demanded (Ruffin and Gregory, 1988:70).

First, the prices of related goods could change the relationship of price and quantity for the primary good. Related goods can either be a substitute or complement. An example of a substitute for therapeutic drugs is physical therapy. The demand for medications could increase if the price of physical therapy increases. An example of a complement for therapeutic drugs (medication for diabetics) would be intravenous

needles. An increase in the price of a good would decrease the demand for its complement.

Second, the consumer's income could cause a shift in demand. Since a physician has determined the need for medication and has written the appropriate prescription, the enrollee's demand for the prescription may not be discretionary. Due to the nature of demand for prescriptions, a change in the consumer's income may not cause a significant shift in demand for prescriptions. However, prescriptions come in two varieties, generic and name brand. A dramatic change in an individual's income would cause a shift in demand for name brand medications (Smith, 1993:190).

Third, consumer preferences cause a shift in demand. An individual may prefer the use of non-medicated health therapies. If a chronically ill individual grows weary of the use of medications, the demand for prescriptions would decrease. A chronically ill individual weary of medications would seek out alternative health services that are nonmedicated. Additionally, a change in the benefit package may make new medications available. Enrollees with a preference for the new medications would increase their demand for prescriptions (Schondelmeyer, 1990: 139).

Fourth, a change in expectations causes a shift in demand. If an individual expects to be disenrolled from a program, the individual may increase the utilization of services before the loss of the benefit. The demand for prescriptions would increase for individuals near the end of their enrollment period.

Fifth, the number of potential buyers causes a shift in demand. A large increase in program enrollment may change the number of the percentage of people in the

program who are likely to have a high demand for health services (Gianfrancesco et al., 1994: 114).

In health care services, several factors affects the demand for services. These factors influencing the demand for services are in six major areas: demographic, Psychographic, behavior, providers, insurance coverage, and the approach of the physician.

Demographic factors have the strongest influence in health care utilization (MacStravic, 1984: 115). The size of the population would have a positive impact and vice versa. *Additionally, the age mix has the second strongest influence on health care utilization (MacStravic, 1984: 115; Giagrancesco, 1994: 113; Kozma et al., 1990:969; Newman et al, 1992: 71).* Health services are in higher demand during our early years and decrease through the teenage years. Women of child bearing age tend to have a higher demand for health services (MacStravic, 1984: 115). The elderly population places the highest demand on health care services (ibid). In addition to age and total population, some other demographic factors include gender, ethnicity, occupation and health status.

Psychographic factors refer to the individual's state of mind. Individuals have stated that one reason for inappropriate use of the emergency room is due to the belief that health care was unneeded in the early stages of the illness (Lewin-VHI: 110). Additionally, individuals may perceive that services are not available.

Behavioral factors are certain habits' individuals have. The number of motorcycle riders in the area may have an impact of the number of emergency room

visit due to high rates. These behaviors have an indirect impact on the utilization of health care services. Dietary habits also affect health care utilization as well as the health status of the general population. Smoking and alcohol consumption also affects the health status of the general population.

Health care providers and their approach to the practice of medicine are also a factor in the utilization of health care services. The abundance or lack of health care services has an impact on health care utilization. The access that health care providers offer has an impact on utilization. Providers can restrict utilization either through the unwillingness to see indigent clients, or through the unwillingness to modify their office for the disabled, have an impact on utilization. Additionally, the approach to the practice of medicine, could either increase or decrease utilization by the general population.

Insurance coverage is another important factor. Insurance coverage is likely to increase the utilization of health care services (Gianfrancesco: 113). Individuals with insurance coverage would more willing to seek out services since if the services are affordable through insurance coverage. Individuals without health insurance or inadequate insurance will not seek out services until there is dire need for assistance. The cost of health care makes the its use prohibitive if an individual is without health insurance.

The Cost Component

The second component of the conceptual model for determining total cost of pharmacy programs, is the cost component. The cost of pharmaceuticals has been

rising faster and more consistently than other parts of the health care system (Gondnek, 1994: 1; Schondelmeyer, 1990: 131) as presented in Table 1.1.

The demand component stated that demand for prescriptions was the quantity an individual is willing to consume at a given price. The economic model of demand usually assumes that only two parties are in a transaction, the consumer and the producer. However, in health care, third parties play a critical role in demand with respect to price.

The existence of a third party breaks down the simple economic model of demand (Shields and Rice, 1989:25). Instead of the consumer covering the cost of the prescription, the third party covers most, if not the complete cost of the prescription. The existence of a third party in the economic decision causes violations of the economic law of demand. The enrollee (consumer) usually pays only a small copayment. The existence of the copayment does discourage use of services (Harris et al, 1990: 908; Reeder and Nelson, 1985: 401).

In health care, where the existence of third parties is dominant, the price a consumer is willing to pay, does not reflect the true cost of the product. Since the true cost of the product is not paid by the consumer, the consumer behaves as if the price is that of the copayment (if a copayment exist). A consumer enrolled in an insurance or government assistance program will not pay the retail price of the prescription. Instead the consumer would pay a small copayment. If a third party requires a copayment of \$3 per prescription, the consumer will demand prescriptions as if all prescriptions were only \$3 each.

Third party payors will seek methods to restrict demand for prescription services.

Third party payors have tried the following methods to control demand. Government assistance programs have limited the number of prescriptions that an enrollee may receive each month. Government programs, as well as insurance companies have established copayments. Third party payors have also have an established list of drugs (formulary) for their enrollees.

Third party payors have also sought out methods to control the cost of the prescriptions third parties pay. There are two factors influencing the price that third party health care organizations pay for pharmaceuticals. First, the ingredient cost represents the cost which local pharmacies pay for wholesale drugs. Large pharmacy networks negotiate with pharmaceutical manufacturers for discounts on raw drugs, therefore the ingredient cost paid by third party payors may not equal the true wholesale cost. The second component, is the dispensing fee. The dispensing fee covers the overhead cost of the pharmacy.

The ingredient cost of the drug has been increasing faster than the cost of the dispensing fee. This is due to the introduction of new drugs, as well as inflation (Schondelmeyer, 1990: 141). Additionally, it is due to reimbursement policies of health insurance companies and government programs. Third party payors have attempted to realize savings by freezing the dispensing fee. Freezing the dispensing fee has in turned lead to lower profit margins for local pharmacies. The large pharmacy networks have the size to negotiate significant discounts on the cost of raw drugs (ibid). State Medicaid programs have frozen dispensing fees for up to ten years at a time. Medicaid

programs are the largest consumer of pharmacy services (accounting for almost twenty percent of all retail prescriptions). Medicaid programs have made up for the frozen dispensing fee through the unusually high price Medicaid pays for the ingredient cost. As Medicaid (the largest consumer) pays a large price for ingredient cost, the ingredient cost inflated for all other consumers (Schondelmeyer, 142).

Hypotheses

| Table 2.2 Factors in Pharmaceutical Cost | | | |
|--|---|--|---|
| Author | Purpose of Research | Cost Per Prescription | Number of Prescriptions |
| Adams, et al. | Testing the adequacy of state payments to pharmacies | Estimated using a market basket and wholesale prices | Estimated by the size of the pharmacies in the region |
| Waldo | Estimating the cost of the Clinton proposal to expand Medicare to cover prescriptions | Adjusted for growth in the Consumer Price Index | Estimated using population demographics |
| Kreling | Testing the adequacy of third party payments to pharmacies | Estimated using a market basket and wholesale prices | not used |

The conceptual model for estimating the cost of pharmacy programs focuses on the total cost of the program. The total cost of the program is a function of demand and cost. Studies on the total cost of pharmacy programs have focused on these two components, as presented in Table 2.2.

Adams et al., studied the adequacy of the payments state programs were making to local pharmacies. The concern was that state programs were either over paying or under paying local pharmacies. Adams et al., estimated the cost per prescription using a market basket of commonly prescribed medications and average wholesale prices. The market basket consisted of a list of the most commonly prescribed medications. Adams et al., estimated the number of prescriptions demanded from the physical size of the pharmacies in a particular region. The study assumed that a pharmacy with a certain amount of square footage, could serve a certain amount of prescriptions.

Waldo studied a proposal from President Clinton to extend pharmacy benefits to Medicare enrollees. Waldo estimated the cost of prescriptions using the trends in the Consumer Price Index (CPI). The estimated number of prescriptions demanded was a function of the demographics of the Medicare population, as well as future Medicare enrollees.

Kreling studied the adequacy of payments to local pharmacies made by insurance companies. Kreling focused on the price paid for individual prescriptions rather than the total program. Kreling estimated the cost per prescription from a market basket of medications and wholesale prices for the medications. This data was compared with cost information from pharmacies. The two data sets were compared to determine if the payments made by insurance companies were adequate.

The estimated cost of pharmacy programs is function of demand for prescriptions and cost per prescriptions. The focus of this study are pharmacy

programs offered by third party payors. The demand for prescriptions in insurance and government assistance programs is determined the demographic makeup the population served by the third party. Third parties cover the cost of the prescriptions and subsequently price has little effect on the economic demand for prescriptions. The hypothesized relationships for the total cost of pharmacy programs are summarized in Table 2.4. It is hypothesized that aggregate enrollment in a third party payor program has a positive relationship to the number of prescriptions and cost per prescriptions. Each incremental increase in aggregate enrollment results in an increase in the number of prescriptions and total cost of the benefit. Additionally, it is hypothesize that enrollment, delineated by age, has a positive relationship to the number of prescriptions. Incremental increases in either aggregate elderly or aggregate non-elderly enrollment results in an increase in the number of prescriptions. Increases in the number of prescriptions lead to an increase in the total cost of the benefit.

| Table 2.3 Hypothesized Relationship between Enrollment and Prescriptions | | |
|--|---------------|-----------------------|
| Predictor Variables | Prescriptions | Cost per Prescription |
| Aggregate Enrollment | + | + |
| Elderly Enrollment | + | + |
| Non-Elderly Enrollment | + | + |

The conceptual model is summarized in the following equations:

$$\text{Total Cost} = f(\text{Demand for prescriptions, Cost per prescriptions})$$

where:

$$\text{Demand} = f(\text{Enrollment by age})$$

$$\text{Cost} = f(\text{Ingredient cost, dispensing fee})$$

Conclusion

This chapter has reviewed the literature on the health care system, pharmacy services and forecasting approaches. Although the three topics are seemingly unrelated, the topic areas are inextricably related. Each topic was discussed and related to the next. The factors influencing the cost of pharmacy services was discussed. A conceptual model and hypotheses were developed and summarized. The next chapter discusses the methodology used to test the relationships between enrollment in government assistance programs and the number of prescriptions demanded. The next chapter will also discuss the methodology used to determine the cost per prescription.

CHAPTER 3 RESEARCH SETTING

Introduction

The following chapter introduces the City of Austin's Medical Assistance Program. The discussion centers on the program's history and recent developments. The chapter describes the different types of enrollment in the program. Additionally, the chapter describes the health services covered by the program. The discussion of health services focuses on pharmacy services.

Background

Travis County Texas, like most Texas counties, has a large population of individuals who do not have health insurance or have inadequate health insurance (Lewin-VHI, 1992). The state of Texas Health Care Indigent Act requires counties to provide for the health care needs of individuals who have no financial means of accessing health care services.

Travis County fulfills this responsibility either through its clinic system or through its medical assistance program. The county operates health clinics in Del Valle, Pflugerville, Jonestown, Oak Hill and Manor. The Travis County Health Department operates these clinics. The clinics are actually part of a larger system of clinics since the Travis County Health Department and City of Austin Health and Human Services Department is consolidated. The City of Austin also owns and operates five health clinics. The Travis County Human Services Department is managed separately from the Travis County Health Department. The human services department operates the

Rural Medical Assistance Program. This program acts as third party for individuals who do not have health insurance or have inadequate health insurance.

Although the City of Austin has no state mandate to meet the health care needs of the uninsured, the city addresses the needs of the poor. The City owns and operates a full service hospital, a system of clinics and operates a medical assistance program. The City of Austin's involvement in indigent health care goes back to the founding of the only local public hospital, Brackenridge. Initially, Brackenridge was jointly owned by the City of Austin and Travis County. However, at the turn of the century, the City of Austin became the sole owner of Brackenridge Hospital. In later years, neighborhood health clinics were established by Brackenridge.

A medical assistance program was later established to clearly state the financial responsibilities of individuals using Brackenridge and the clinics. The program specifically defined who was eligible for assistance. Individuals with limited financial means were not expected to compensate the city for health care services. Individuals with an adequate income, were expected to fully compensate the city for the use of health care services. Brackenridge Hospital initially operated the medical assistance program. In 1978, the program was moved from Brackenridge Hospital to the city health department.

Recent Developments

The City of Austin Medical Assistance Program has undergone some dramatic changes in recent years. The program management philosophy has changed. The

City of Austin improved the its enrollment procedures. The improved procedures lead to the large increases in enrollment the program experienced over the past two years. Additionally, expenditures increased and even outpaced the growth in enrollment.

Recently the City of Austin Medical Assistance Program adopted a managed care philosophy of providing health care. The driving force behind the movement to managed care approach is that manage care organizations had achieved lower overall costs (Wallack, 1991:28). Managed care organizations accomplished lower overall cost through a number of methods. The City of Austin Medical Assistance Program increased its focus on primary health care. MAP began encouraging enrollees to choose a primary care physician. MAP believes that improved access to primary care decreases the overall cost (hospital care, primary care and outpatient care) of its program.

MAP now states its cost in terms of Per Member Per Month (PMPM) Cost. MAP uses member and enrollee interchangeably. MAP conceptualizes program cost as the overall cost of health services. If MAP expends \$16 million over twelve months for an average monthly enrollment of 9,000, the per member per month cost is \$148 ($\text{PMPM} = \text{Average Cost per Month} / \text{Average Monthly Enrollment}$). The focus on aggregate cost, places emphases on a systems approach to health care. Rather than singling out a part of the health care system, MAP focuses on the appropriate use of the entire health care system. Appropriate use (using a primary care clinic instead of the emergency room for a common cold) lowers the total cost of health care. An office visit often cost

less than an emergency room visit. Therapeutic medications can treat illnesses before the illness escalates to the point of requiring expensive inpatient hospital services.

The City Medical Assistance Program uses the Per Member Per Month cost in its expenditure forecast. Per Member Per Month cost for prior periods are applied to the different types of health care services. If the Per Member Per Month cost for prescription services for the prior year was \$16 per member per month, the forecast is a function of projected monthly enrollment multiplied by \$16. The drawback to this approach is its lack of detail. As discussed in Chapter Two, projected demographics are an important factor of projecting future utilization and cost. However, the advantage of the current approach is its simplicity. The approach is easily explained to audiences unfamiliar with health care.

Program Benefits

The City of Austin Health and Human Services Department operates the city's medical assistance program. The program is simply known as the Medical Assistance Program or MAP. The program acts as a third party for the city's indigent population. Program benefits include physician services, hospital care, outpatient services, emergency care, home health services, durable medical equipment, prescription drug services and dental services.

The City Medical Assistance Program finances hospital care to the indigent population enrolled in the program. Enrollees can access emergency room service (with a copayment of \$10) at either Brackenridge Hospital, Seton Hospital, St. David's

Hospital or South Austin Hospital. Individuals enroll in special programs in order to use a hospital other than Brackenridge. Individuals pay a \$30 copayment for inpatient care.

MAP also finances outpatient care for individuals enrolled in the program.

Individuals use outpatient specialty care services either at the Sabine clinic (on the Brackenridge Hospital campus) or through one of physicians affiliated with PCA Health Plans of Texas or Seton Hospital. Enrollees pay a \$5 copayment of use of outpatient specialty services.

The program finances non-emergency ambulatory care for enrolled individuals. Enrollees can use either City of Austin health clinics, selected physician (affiliated with PCA Health Plans of Texas) offices or the Seton East Community Health Center. Individuals enroll in special programs to use PCA physicians or the Seton East Community Health Center. Individuals pay a \$5 copayment for an office visit.

In addition to office visits, MAP finances prescription services for enrollees. Individuals pay a \$3 copayment fee for prescription filled services. Individuals receive prescriptions at either a city health clinic, at the Seton East Community Health Center or at one of several private pharmacies. Enrollees who use a City of Austin physician are strongly encouraged to use the pharmacy located in one of the city health clinics. However, if the pharmacy in the clinic is not available, enrollees may use one of several private pharmacies located throughout the community. Several local private pharmacies contract with a prescription management company. The city contracts with the management company to coordinate prescription claims from private pharmacies. If the enrollee does not use a City of Austin physician, the enrollee must use one of the

private pharmacies. In recent years, prescription service cost of private pharmacies has outpaced enrollment as presented in Table 3.1.

| Table 3.1 Medical Assistance Program Enrollment and Prescriptions | | |
|--|---|---|
| Period | Enrollment eligible to use Private Pharmacies | Prescriptions under Pharmacy Network Contract |
| Oct-93 | 8305 | 2421 |
| Nov-93 | 8617 | 2438 |
| Dec-93 | 8897 | 2769 |
| Jan-94 | 9086 | 3325 |
| Feb-94 | 9146 | 3772 |
| Mar-94 | 9444 | 4571 |
| Apr-94 | 9542 | 4783 |
| May-94 | 9536 | 5341 |
| Jun-94 | 9452 | 5379 |
| Jul-94 | 9410 | 5538 |
| Aug-94 | 9412 | 5902 |
| Sep-94 | 9446 | 5713 |
| Oct-94 | 9369 | 5657 |
| Nov-94 | 9358 | 5568 |
| Dec-94 | 9331 | 5748 |
| Source: City of Austin Health and Human Services Department. Enrollment and contract records. Unpublished. | | |

Enrollment Types

MAP had experienced difficulty in fulfilling its mission to provide access to health care through its role as a third party payor. In 1992, a study was commissioned to exam options to improving access to health care (Lewin-VHI, 1993: 1). A number of inconsistencies in eligibility requirements were discovered between MAP and RMAP, as well as inefficiencies in the eligibility process. The 1992 Lewin study lead to later enrollment process improvements.

The City of Austin Medical Assistance Program has three major types of eligibility requirements. Individuals can qualify for assistance under one of the three following scenarios. First, permanent United States residents with family income at or below 100% of federal poverty guidelines can qualify. Second, families with at least one member who is either disabled and/or elderly (63 years or older), qualify if their income is either at or below 200% of federal poverty guidelines. Third, homeless, non-permanent U.S. residents and/or minors applying without an adult, qualify if their income is either at or below 40% of the federal poverty guidelines.

The City Medical Assistance Program enrolls individuals and families under different enrollment types. Enrollees who are undocumented workers and who are seeking legalization, enroll under SLIAG (State Legalization Impact Act Grant) category. Individuals or families who are potentially eligible for Medicaid in conjunction with Supplemental Security Income, enroll under the FC6 category. Non-permanent residents, homeless, and minors applying without an adult with an income less than 40% of the federal poverty level, enroll under CAP (Clinic Assistance Program). The Medicare category consists of individuals who are either on Medicare or have a family member on Medicare. Medicare enrollees seek MAP pharmacy and dental benefits since prescriptions and dental work is not covered by Medicare. Individuals with some other source of health insurance (inadequate insurance), enroll in the "MAP with Other Coverage" category. The PCA MCP (Managed Care Pilot) category consists of enrollees who choose to use PCA Health Plans of Texas physicians. Enrollees choosing to use Seton East Community Health Center, enroll under the Seton MCP

category. Individuals choosing to use City of Austin health care facilities enroll under the Comparison MCP category. MAP used this category to compare cost for City owned facilities to PCA Health Plans of Texas. Finally, all enrollees who do not fall into one of the aforementioned categories, enroll in the "MAP with No Other Coverage."

Enrollment in the different groups is diverse and certain groups attract different age groups. Unduplicated enrollment for the 1993-94 Fiscal Year is presented in Table 3.2. This table captures enrollment data for all individuals who enrolled in MAP for any span of time. Some individuals enroll in MAP early in the year, disenroll and later re-enroll in the same year.

| Table 3.2 City of Austin Medical Assistance Program Unduplicated Fiscal Year 93-4 Enrollment by Category | | | |
|--|------------|-----------|------------|
| Category | Enrollment | % Over 65 | % Under 65 |
| SLIAG | 581 | 0.0 | 4.6 |
| FC-6 | 840 | 0.4 | 6.6 |
| CAP | 2535 | 2.6 | 19.7 |
| Medicare | 2984 | 91.0 | 7.9 |
| MAP w/no other coverage | 5476 | 3.2 | 42.9 |
| MAP w/other coverage | 161 | 1.1 | 1.0 |
| Comparison MCP | 1386 | 1.0 | 10.9 |
| PCA MCP | 638 | 0.7 | 4.9 |
| Seton MCP | 188 | 0.0 | 1.5 |
| Total | 14,789 | 100.0 | 100.0 |
| Source: City of Austin Health and Human Services Department. Enrollment records. Unpublished. | | | |

Conclusion

This chapter introduced the City Austin Medical Assistance Program. The chapter briefly discussed the history of program, as well indigent health care financing

in Travis County. Discussion covered program benefits and recent developments. Additionally, discussion briefly covered enrollment criteria and the different types of enrollment. The next chapter discusses the methodology used to analyze the data from the Medical Assistance Program.

CHAPTER 4 METHODOLOGY

Introduction

The following chapter discusses the methodology used to test the hypotheses presented in Chapter 2. First, the chapter describes the data and its source. The discussion reviews the strengths and weaknesses of the data. Second, the chapter discusses the conversion of the data into measurable predictor variables. Third, the following chapter explains the statistical techniques used in the analysis presented in Chapter 5.

Data

The study utilizes city records of the Medical Assistance Program. The study's unit of analysis is the prescription service offered by the City of Austin Medical Assistance Program. The data used for this analysis was obtained entirely from the City of Austin Health and Human Services Department. Internal, unpublished Medical Assistance Program reports detailing the enrollment in the Medical Assistance Program, are used. Table 4.1 presents the data for each enrollment category introduced in Chapter 3. In addition to enrollment data, internal, unpublished MAP reports on the prescriptions, are used. The prescription data came from the City of Austin. The City maintains records on the contract the city currently holds with a private firm that manages the prescription claims from multiple private pharmacies located throughout Austin. The data is presented in Table 4.2.

Table 4.1 Medical Assistance Program Enrollment by Category from October 1993 to December 1994.

| Period | MAP with no other Coverage | SLIAG | FC6 | CAP | Medicare | MAP with other Coverage | Comparison MCP | PCA MCP | Seton MCP |
|--------|----------------------------|-------|-----|------|----------|-------------------------|----------------|---------|-----------|
| Oct-93 | 3035 | 248 | 824 | 1003 | 2458 | 111 | 276 | 350 | 39 |
| Nov-93 | 3110 | 276 | 811 | 1074 | 2520 | 104 | 343 | 379 | 70 |
| Dec-93 | 3140 | 281 | 754 | 1072 | 2575 | 110 | 397 | 568 | 93 |
| Jan-94 | 3035 | 299 | 699 | 1136 | 2634 | 108 | 466 | 709 | 94 |
| Feb-94 | 2920 | 313 | 620 | 1198 | 2639 | 116 | 610 | 730 | 94 |
| Mar-94 | 2927 | 324 | 719 | 1250 | 2675 | 119 | 741 | 689 | 85 |
| Apr-94 | 3001 | 336 | 646 | 1279 | 2685 | 111 | 849 | 635 | 77 |
| May-94 | 3062 | 331 | 641 | 1249 | 2676 | 105 | 911 | 561 | 63 |
| Jun-94 | 3059 | 322 | 633 | 1297 | 2688 | 108 | 937 | 408 | 72 |
| Jul-94 | 3134 | 315 | 625 | 1281 | 2698 | 108 | 928 | 321 | 111 |
| Aug-94 | 3141 | 312 | 640 | 1304 | 2702 | 103 | 898 | 312 | 148 |
| Sep-94 | 3192 | 319 | 646 | 1349 | 2713 | 104 | 821 | 302 | 147 |
| Oct-94 | 3224 | 271 | 675 | 1326 | 2714 | 103 | 777 | 279 | 131 |
| Nov-94 | 3376 | 211 | 590 | 1354 | 2718 | 105 | 747 | 257 | 126 |
| Dec-94 | 3481 | 168 | 571 | 1352 | 2724 | 102 | 744 | 189 | 105 |

Source: City of Austin Health and Human Services Department. Enrollment records. Unpublished.

Table 4.2 Prescription records for private pharmacies

| Period | Monthly Cost | Prescriptions | Average Claim |
|--------|--------------|---------------|---------------|
| Oct-93 | 53,416 | 2,421 | 22.06 |
| Nov-93 | 56,163 | 2,438 | 23.04 |
| Dec-93 | 64,064 | 2,769 | 23.14 |
| Jan-94 | 80,696 | 3,325 | 24.27 |
| Feb-94 | 93,345 | 3,772 | 24.75 |
| Mar-94 | 118,545 | 4,571 | 25.93 |
| Apr-94 | 119,265 | 4,783 | 24.94 |
| May-94 | 146,217 | 5,341 | 27.38 |
| Jun-94 | 150,194 | 5,379 | 27.92 |
| Jul-94 | 145,245 | 5,538 | 26.23 |
| Aug-94 | 152,801 | 5,902 | 25.89 |
| Sep-94 | 156,472 | 5,713 | 27.39 |
| Oct-94 | 155,737 | 5,657 | 27.53 |
| Nov-94 | 154,842 | 5,568 | 27.81 |
| Dec-94 | 160,247 | 5,748 | 27.88 |

Source: City of Austin Health and Human Services Department. Contract records. Unpublished.

The time frame of the data used was from October 1993 to December 1994. City records on prescriptions were unreliable for the period prior to 1993. The City obtained prescription data from the contractor for the period prior to October 1993. A review of the data indicated some discrepancies between the contract data and expenditure information maintained in the City's financial system. Although the City did not have records on the prescriptions paid prior to October 1993, the City did have the financial records of the payment made to the contractor. As discussed in Chapter 3, the City of Austin Medical Assistance Program offers prescription services to its enrollees either through City of Austin health clinic pharmacies or through one of several private pharmacies. The private pharmacy data is singled out due to the high growth in expenditures for the contract (see Table 3.1).

The availability of data for prescriptions cause two distinct weaknesses in the study. First, the short time frame only provides fifteen cases to perform the analysis. DiLeonardi and Curtis recommend that the at least thirty cases are used in order to achieve statistical stability. This study uses regression analysis (described in a later section). The recommended number of cases of regression analysis is ten cases for each variable. Second, the prescription reports do not contain detailed records of the medications used by the clients. In previous studies, analysts used a list of commonly prescribed medications to perform the cost analysis. The reports on the prescriptions offer only the average cost per prescription for each month.

Operationalization

The data collected was already in a measurable form. The interval enrollment data and prescription data dovetailed well into the hypothesized relationship between enrollment and prescriptions. The following section explains the development of the dependent and independent variables. Table 4.3 summarizes the variables and hypothesized relationships.

| Table 4.3 Hypothesized relationships and Variable Measurements | | | |
|--|-------------|---|--|
| Predictor Variable | Hypothesis* | Measurement | Data Source |
| Dependent Variable | | | |
| Prescriptions | | Aggregate Claims from private pharmacies | City of Austin Health and Human Services Depart. |
| Independent Variables | | | |
| Aggregate Enrollment | + | Total Medical Assistance Program Enrollment with the exception of the Seton MCP category | City of Austin Health and Human Services Depart. |
| Elderly Enrollment | + | Medical Assistance Program enrollment in the Medicare category | City of Austin Health and Human Services Depart. |
| Non-Elderly Enrollment | + | Total Medical Assistance Program Enrollment with the exception of the Seton MCP and Medicare categories | City of Austin Health and Human Services Depart. |
| * relationship to the dependent variable | | | |

The purpose of the research is to determine what factors affect the number of prescriptions filled in the City of Austin Medical Assistance Program. The focus of the study is the prescriptions filled by private pharmacies. The dependent variable therefore is the aggregate claims placed by private pharmacies. This study uses aggregate

prescription data for two reasons. First, the data is available in an aggregate form. Second, the enrollment data is also aggregate.

The prescription data was available as total claims and average cost per claim. The aggregate claims for the months from October 1993 through December 1995 were available. Additional detail was not available. In the studies reviewed in chapter two, past studies have focused on either a specific market basket of drugs. The market basket consisted of a number of the most mentioned prescription drugs. The availability of only aggregate data has already been identified as a weakness. In addition to the aggregate claims information, the average price for claims was available. Again, prior studies have used more specific data on the price of individual drugs. This element of the data has already been identified as a weakness.

The enrollment data for the Medical Assistance Program came from the City of Austin. Categories separate different types of program enrollment. Aggregate enrollment by category was available for the period of October 1993 through December 1995. The categorization of enrollment may provide a strength to the study. The categories provide some information on the age mix of the total enrollment. Table 4.1 breaks down the enrollment according to categories. However, there is one weakness to the data. The reported enrollment data does not separate enrollment by age. In chapter two, past studies indicated that age was the strongest indicator of health care utilization.

The dependent variable in this study was the aggregate number of claims per month. The first purpose of this study is determining which factors affect the number of

prescriptions. Therefore, the dependent variable is represented by the aggregate number of claims.

The enrollment data for the Medical Assistance Program required little conversion into independent variables. Three larger categories of enrollment encompass data from the other categories. The first hypothesis assumes a relationship between total enrollment and prescriptions. As discussed in Chapter 3, the enrollment category, "Seton MCP," holds enrollees who use the Seton East Community Health Center. These enrollees must use the pharmacy located at the Seton East Community Health Center. Therefore, all categories, with exception of Seton MCP, are summed to create the first independent variable, total aggregate enrollment.

The second and third independent variables provide a measure to test the relationship of enrollment, categorized by age, to the number of prescriptions. As discussed, there is a weakness in the reported enrollment data. Enrollment categories with similar age characteristics, are grouped, according the annual enrollment report (see Table 3.2).. The Medical Assistance Program defines elderly as those individuals over the age of 65. However, enrollment data delineated age groups where the oldest group are for individuals over the age of 65. Table 3.2 indicates that the Medicare enrollment category holds 91% of the enrollees over the age of 65. The Medicare enrollment category is the independent variable measuring elderly. The sum of all other enrollment categories, except for the Seton MCP category, is the independent variable measuring non-elderly.

Statistical Methods

The data and variable measurements provided in this chapter operationalize the conceptual model developed in Chapter 2. The following section describes and explains the statistical methods used in the testing of the hypothesis. The techniques used that test the hypotheses include simple regression, multiple regression and the method of least squares. The following discussion focuses on the why the methods chosen are appropriate, and what information is expected from each method.

Regression analysis is appropriate under certain assumptions according to DiLeonardi and Curtis. If the data and study meet certain assumptions, regression analysis should provide the ability to determine how much one or several independent variables affects one dependent variable. The assumptions laid out by DiLeonardi and Curtis follow. The data and measures used in the study are placed against each assumption to determine appropriateness of regression.

Regression analysis is appropriate if the research question asks what factors influence a dependent variable (DiLeonardi and Curtis: 105). The research question of this study seeks to find which factors most influence the dependent variable, prescriptions. Regression analysis indicates the relative importance of one or multiple independent variables to one dependent variable. The regression analysis method answers the research question.

Additionally, regression analysis is appropriate if data is an interval or ration level data. The data and measures used in the study are ratio level data. The data used is ratio since the distance between two values of enrollment or prescriptions can be

expressed as a ratio. The distance between the data is either equal or some fraction of equal (for example, twice the distance or half the distance). Regression analysis operates under the same assumptions of least squares. Therefore, the data and measures meet the requirements of regression analysis.

Regression analysis does have its limitations. Regression analysis works on the assumption that history will repeat itself. Regression analysis does not factor in major shifts in use. The regression analysis results do not indicate if history will repeat itself or not, it simply assumes that history will repeat itself. Another drawback to regression is that its use in forecasting is limited. The regression results require forecasted independent variables, in order to be a forecasting tool. This study attempts to meet this limitation by using the least squares method to forecast the independent variables.

Additionally, the analysis makes use of coefficients of determination and variance analysis. The variance analysis seeks to test how close the regression analysis is to predicting the historical values. Forecasting advocates predictability in its methods. The R^2 measures the strength of the relationship between the independent variable(s) and the dependent variable. It is a measure of explained variance. The higher the value of R^2 , any variances in the model between actual and predicted values are explained. In multiple regression, the multiple R measures the correlation between the dependent and independent variables (DiLeonardi and Curtis, 1992: 122). The F statistic measures the significance of the regression equation. The F statistic's determines whether or not the R^2 happened by chance (DiLeonardi and Curtis, 1992: 125).

The purpose of the study centers on determining the factors that affect the number of prescriptions. Beta coefficients determine the relative importance one independent variable has on the dependent variable. The analysis also produces the test statistic (t), which assesses the significance of the beta coefficient. It is possible to have high significance for the regression equation but the individual independent variable may have little or no significance.

Conclusion

This chapter discussed the data and measures used in this study. The chapter reviewed the data for strengths and weaknesses. The data was transformed into measurable variables to test the hypothesis. Additionally, the statistical methods used in the study were discussed for the appropriateness of their use. The following chapter presents the results from the data analysis.

CHAPTER 5 ANALYSIS

Introduction

As discussed in the previous chapter, statistical methods are used to analyze the variables defined in Chapter 4. The following chapter presents the regression analysis that test each hypothesis. The results indicate the acceptance or dismissal of the hypothesis using the results from the regression analysis. Additionally, forecasted prescriptions are presented using forecasted data for the independent variables.

Aggregate Enrollment and Prescriptions

The results from the simple regression are presented in Table 5.1. The table reports that there is a positive relationship between total Medical Assistance Program (MAP) enrollment and the number of prescriptions. The adjusted R^2 for the model indicates that seventy-four percent of the variance is explained. While the adjusted R^2 is positive and relatively strong, it is not as strong as a forecast would require. In addition to the overall regression equation, the independent variable is also significant. The t-statistic of 6.42 has a p-value (probability of chance) of 2.28E-05 (also expressed as $p \leq .001$).

The results from the simple regression support the model's basic principles; the hypothesis that total enrollment influences changes in the number of prescriptions. There is a very high level of correlation between enrollment and prescriptions.

The beta coefficients indicate the level of importance enrollment has on aggregate claims (prescriptions). The results indicate that if the change in aggregate enrollment is zero, that aggregate claims would be -24,326.91. This figure is rather unusual due the nature of the data. The large disparity between total enrollment and total claims (see Tables 4.1 and 4.2) require that the change in claims start at an extremely low figure if the change in enrollment is zero. An incremental change in enrollment of one enrollee would result in 3.14 additional claims for the program.

| Table 5.1 Simple Regression of Total Enrollment to Prescriptions | | | |
|--|---------------|-------------|---------|
| | b coefficient | t-statistic | p-value |
| Intercept (constant) | -24,326.91 | -5.39 | ** |
| Total MAP Enrollment | 3.14 | 6.42 | ** |
| Multiple R | 0.87 | | |
| R ² | 0.76 | | |
| Adjusted R ² | 0.74 | | |
| Standard Error | 658.07 | | |
| F statistic | 41.18 | | |
| Significance F | ** | | |
| Observations | 15.00 | | |
| ** significant at the $p \leq .001$ level | | | |

Enrollment by Age and Prescriptions

Table 5.2 presents the results from the multiple regression of enrollment grouped by age and prescriptions. The R² for the model indicates that eighty-six percent of all variances are explained. The Multiple R indicates a strong relationship between prescriptions and Medical Assistance Program (MAP) enrollment grouped by age (multiple R of 0.93). Here the appropriate test statistic is the F statistic. Johnston

indicates that the F statistic "...provides a test of the overall relation, that is, a test of the whether $X_2, X_3, X_4, \dots, X_k$ (predictor variables, which in this study are elderly and non-elderly enrollment) exercise any influence upon Y (the dependent variable, which in this study is the number of prescriptions)." The F statistic reveals that the relationships between prescriptions and enrollment by age did not happen by chance. The probability that the relationships happened by chance is significant at the $p \leq .001$ level.

Table 5.2 Multiple Regression Analysis of Enrollment by Age and Prescriptions

| | b coefficient | t-statistic | p-value |
|----------------------------|---------------|-------------|---------|
| Intercept (Claims) | -36,513.44 | -6.70 | ** |
| Elderly MAP Enrollment | 16.10 | 3.66 | ** |
| Non-elderly MAP Enrollment | -0.25 | -0.21 | * |
| Multiple R | 0.93 | | |
| R ² | 0.86 | | |
| Adjusted R ² | 0.84 | | |
| Standard Error | 520.77 | | |
| F statistic | 37.26 | | |
| Significance F | ** | | |
| Observations | 15.00 | | |

* not significant
 ** significant at the $p \leq .001$ level

The analysis results indicate a strong relationship between the number of claims and the number of enrollees in MAP who have Medicare. As discussed in Chapters 3 and 4, the Medicare enrollment category has the bulk of the elderly Medical Assistance Program population. The analysis indicates that an increase in the Medicare group causes an increase of 16.10 claims for medications. An increase in all other Medical

Assistance Program categories (as defined in the previous chapter) causes a decrease in the number of claims for medications.

Trend Analysis of Enrollment

Table 5.3 Projected Independent Variables

| Period | Non-Elderly MAP Enrollment (a) | Elderly MAP Enrollment (b) |
|--------|-----------------------------------|-------------------------------|
| Jan-95 | 6905 | 2777 |
| Feb-95 | 6947 | 2793 |
| Mar-95 | 6989 | 2808 |
| Apr-95 | 7031 | 2823 |
| May-95 | 7073 | 2839 |
| Jun-95 | 7115 | 2854 |
| Jul-95 | 7157 | 2870 |
| Aug-95 | 7199 | 2885 |
| Sep-95 | 7241 | 2900 |
| Oct-95 | 7283 | 2916 |
| Nov-95 | 7325 | 2931 |
| Dec-95 | 7367 | 2946 |

projection = $\beta_0 + \beta_1 x$

where

x = independent variable

β_0 = y-intercept of the line

β_1 = slope of the line

a. Non-elderly enrollment is the dependent variable and time is the independent variable

b. Elderly enrollment is the dependent variable and time is the independent variable

One of the weaknesses of regression analysis is its immediate use as a forecasting tool. Projections require that the independent variables are forecasted. Projected values for the indecent variables multiplied by the beta coefficients should result in a precise forecast.

Trend analysis of enrollment data projects future values for the independent variables. The least squares methods results in the forecast illustrated in Table 5.3. The trends in past enrollment categories are projected to increase significantly if the past trends continue. The weakness in this forecast is the assumption that historical trends will repeat. Recent changes in the enrollment process are partially responsible for the increase in enrollment. Trend analysis does not take into account the large increase recently experienced. City of Austin employees who screen individuals for eligibility expect enrollment growth to slow down and level off at or near its current level.

Conclusion

This chapter presented the results from the analysis of the variables defined in the previous chapter. The two regressions resulted in the predicted positive relationships. The number of claims for medication (prescriptions) is dependent on the number of individuals enrolled in the Medical Assistance Program. Additionally, age, as expected, is an important factor in utilization. This chapter also presented the results of the trend analysis of enrollment in the Medical Assistance Program. In the following chapter, the findings are further discussed and the following chapter identifies future research areas.

CHAPTER 6 CONCLUSION

Introduction

The following chapter summarizes the findings from the study. The original purpose of the study and hypothesis are reviewed. The chapter reviews the different steps of the study. This chapter also identifies future research areas.

Summary of Study

The purpose of this study was two fold. The first goal was to determine the major factors influencing the cost of the pharmacy benefit under the City of Austin's Medical Assistance Program. The second goal was to provide a forecast for the pharmacy benefit under the City of Austin's Medical Assistance Program.

The research setting described the program that was the focus of the study. The City of Austin initiated the program to meet the needs of the indigent population living within the city limits. It has experienced some success in recent years in increasing enrollment and thereby increasing access to health care to the indigent.

The literature review provided possible explanation that developed the conceptual model. A keen understanding of the health care system is critical to understanding the historical data used in forecasting. Some forecasting techniques assume that past trends will continue, whereas other techniques do not. Forecasters without a good understanding of the health care system could not evaluate rather or not the assumption that past trends would continue.

The data used in this study were aggregate in nature. The nature of the data offered both strengths and weaknesses. The aggregate claims had a weakness due to the lack of detail available for the various types of drugs. However, the categories of enrollment offered some strengths since some age groups were related to certain enrollment groups.

Findings

The study tested the relationship between enrollment in the City of Austin Medical Assistance Program and the number of prescriptions filled by private pharmacies contracting with the City of Austin. The study had three hypotheses, as presented in Table 6.1. The analysis indicated, as expected, that aggregate enrollment is related to the increase in the number of prescriptions. The probability that enrollment caused changes in prescriptions was significant, thus indicating an important factor had not been left out of the regression equation. The findings also indicated support of the hypothesis that elderly enrollment had a positive relationship to the number prescriptions. The probability that elderly enrollment affected prescriptions was the only predictor variable that was significant. However, there was not support for the hypothesis that non-elderly enrollment had a positive relationship to prescriptions. Here, the p-value was also not significant. The relationship was negative given the strong positive relationship of elderly enrollment to prescriptions. The large increase in

prescriptions associated with an increase in elderly enrollment offset any increase resulting from an increase in non-elderly enrollment.

| Table 6.1 Summary of Observed Relationships | | | | |
|---|-------------|----------|---|----------|
| Predictor Variable | Hypothesis* | Observed | Measurement | P-Value |
| Prescriptions | | | Aggregate Claims from private pharmacies | |
| Aggregate Enrollment | + | + | Total Medical Assistance Program Enrollment with the exception of the Seton MCP category | 2.28E-05 |
| Elderly Enrollment | + | + | Medical Assistance Program enrollment in the Medicare category | .00326 |
| Non-Elderly Enrollment | + | (-) | Total Medical Assistance Program Enrollment with the exception of the Seton MCP and Medicare categories | .84045 |
| () not significant | | | | |

The second purpose of the study was the forecast of future cost for prescription services offered under the City of Austin Medical Assistance Program. Trend analysis on enrollment provided the required forecast for the independent variables. Forecasted claims for the next twelve months (see Table 6.2) are a function of projected enrollment the beta coefficients presented in Table 5.2. The cost of the program is not forecasted due the unavailability of data on the price of common medications. Previous studies used a market basket of commonly prescribed medications and the wholesale prices of the drugs to forecast the cost per prescription. Although, the cost per prescription is not available, the forecast for prescriptions is particularly useful as a planning tool. The

Consumer Price Index for All Consumers for prescription drugs has consistently been double the inflation for goods other than medical care. One could assume that the cost of the program will increase exponentially given the trends in the Consumer Price Index for prescription services.

| Table 6.2 Projected Claims for Medications for 1995 | | | |
|--|--------|-------------------------|--|
| Period | Claims | Medicare MAP Enrollment | MAP Enrollment in all other categories |
| Jan-95 | 6489 | 2777 | 6905 |
| Feb-95 | 6726 | 2793 | 6947 |
| Mar-95 | 6963 | 2808 | 6989 |
| Apr-95 | 7199 | 2823 | 7031 |
| May-95 | 7436 | 2839 | 7073 |
| Jun-95 | 7673 | 2854 | 7115 |
| Jul-95 | 7910 | 2870 | 7157 |
| Aug-95 | 8146 | 2885 | 7199 |
| Sep-95 | 8383 | 2900 | 7241 |
| Oct-95 | 8620 | 2916 | 7283 |
| Nov-95 | 8857 | 2931 | 7325 |
| Dec-95 | 9093 | 2946 | 7367 |
| Claims = -36,513.4+(Medicare MAP *16.1)+(MAP Enrollment all other categories*0.25) | | | |

Future Research

Given the weakness with cost data for claims, the need for future research should focus on addressing this weakness. The literature reviewed discussed the various factors influencing cost. Future research should attempt to estimate the average cost per claim taking into consideration inflation of prescription drugs. Information on wholesale prices should be analyzed for changes in prices, then factored in with dispensing fee information. The potential does exist for developing an accurate forecasting tool if the assumptions for cost per claim can be strengthened.

In conclusion, the research offered valuable insight into the impact age has on the number of prescriptions. However, the forecast is weak, due the limitations in the data. As would be expected, the strongest relationship to claims existed with the elderly enrolled in the Medical Assistance Program. There was a negative relationship of non-elderly enrollment to prescriptions. Past studies have indicated that the non-elderly have a lesser need for health services. However, it does not seem logical that an increase in enrollment (albeit an increase in non-elderly enrollment) would result in a decrease in the number of claims.

BIBLIOGRAPHY

- Adams, Kathleen, D. Kreling and Kathleen Gondek. 1994. "State Medicaid Pharmacy Payments and their Relation to Estimated Costs." *Health Care Financing Review*. 15(3): 25-42.
- Blissenback, Henry. "Pharmaceutical Services in Managed Care." *The Managed Health Care Handbook*. 1990.
- Burns, Linda A. 1991. "Financial issues in ambulatory care" *Topics in Health Care Finance*. 17(3): 53-65.
- Burner, Sally, D. Waldo and D. McKusick. 1992. "National Health Expenditures Projections Through 2030." *Health Care Financing Review*. 14(1): 1-29.
- DiLeonardi, Joan and Patrick Curtis. 1992. *What to Do When the Number Are In: A user's guide to statistical data analysis in the human services*. Nelson-Hall. Chicago, Illinois.
- Enthoven, Alain C., 1993. "Why Managed Care Has Failed To Contain Health Costs." *Health Affairs*, (Fall). pp. 27-43.
- Forrester, John. 1991. "Multi-Year Forecasting and Municipal Budgeting." *Public Budgeting and Finance*. 11(Summer): 47-61.
- Fossett, James, Chang Choi and John Peterson. "Hospital Outpatient Services and Medicaid Patient's Access to Care." *Medical Care*. 29(10): 964-976.
- Gianfrancesco, Frank; Arthur Baines and David Richards. 1994. "Utilization Effects of Prescription Drug Benefits in an Aging Population." *Health Care Financing Review*. 15(3): 113-126.
- Gondek, Kathleen. 1994. "Prescription Drug Payment Policy: Past, Present, and Future." *Health Care Financing Review*. 15(3): 1-7.
- Harris, Brian; Andy Stergachis and Douglas Ried. 1990. "The Effect of Drug Co-Payments on Utilization and Cost of Pharmaceuticals in a Health Maintenance Organization." *Medical Care*. 28(10): 907-917.
- Johnston, J. 1972. *Econometric Methods*. McGraw-Hill. New York, New York.

- Khan, Abdullah and M. Surinder. 1994. "Access to Health Care: A conceptual framework and its relevance to Health Care Planning." *Evaluations and The Health Professions*. 17(1): 60-76.
- Kozma, Christopher; Eugene Reeder and Earle Lingle. 1990. "Expanding Medicaid Drug Formulary Coverage." *Medical Care*. 28(10): 963-976.
- Kreling, David, and Kenneth Kirk. 1986. "Estimating Pharmacy Level Prescription Drug Acquisition Costs for Third-Party Reimbursement." *Medical Care*. 24(7): 590-599.
- Lewin-VHI. 1993. *Options For Improving Access For The Medically Indigent In The Austin/Travis County Area: Final Report Submitted To The Health Care Task Force*. Austin, TX.
- MacStravic, Robin. 1984. *Forecasting Use of Health Services: A Provider's Guide*. Aspen. Rockville, Maryland.
- Miller, Henry, PhD; B. Balicki, W. P. Kelly, M. L. Bialzak, T. R. Yates, and G. D. Greenberg, PhD. 1991. "Costs of ambulatory care: Implications for outpatient prospective payment systems." *Journal of Ambulatory Management*. 14(1): 13-23.
- National Center for Health Statistics. *National Ambulatory Medical Care Survey: 1989 Summary*. U.S. Department of Health and Human Service. Washington: Government Printing Office, 1992.
- Newman, Laurie S.; Arthur E. Blank, PhD and John Billings, JD. 1992. "Health profiles of New York City communities." *Journal of Ambulatory Management*. 15(4): 63-76.
- Plested, William. 1991. "Ambulatory care, 1990: A view from the trenches." *Journal of Ambulatory Management*. 14(4): 40-47.
- Ruffin, Roy and Paul Gregory. *Principles of Economics*. Glenview, Illinois. Scott, Foresman and Company.
- Reeder, C. E. and Authur A. Nelson. 1985. "The Differential Impact of Copayment on Drug Use in a Medicaid Population." *Inquiry*. 22: 396-403.

- Schocken, Miriam, PhD. 1991. "Ambulatory care in the public sector: Perinatal care in Los Angeles County." *Journal of Ambulatory Management*. 14(3): 37-49.
- Schondelmeyer, Stephen, and Joseph Thomas. 1990. "Trends in Retail Prescriptions Expenditures." *Health Affairs*. (Fall) 131-145.
- Shields, Patricia M. and Mitchell F. Rice. 1989. "Using Price as a Management Tool." *New England Journal of Human Services*. 8(3): 21-27.
- Smith, Dean. 1993. "The Effects of Copayments and Generic Substitution on the Use and Costs of Prescription Drugs." *Inquiry* 30: 189-198.
- Spillman, Brenda C. 1992. "The Impact of Being Uninsured on Utilization of Basic Health Care Services." *Inquiry*. 29: 457-466.
- Tenan, Paul M. 1992. "Health area profiles as tools for primary care development: New York's primary care initiative." *Journal of Ambulatory Management*. 15(4): 77-80.
- Thomas, Joseph and Stephen Schondelmeyer. 1992. "Price indexes for pharmaceuticals used by the elderly." *Health Care Financing Review*. 14(1): 91-105.
- Waldo, Daniel. 1994. "Estimating the Cost of a Medicare Outpatient Prescription Drug Benefit." *Health Care Financing Review*. 15(3): 103-112.
- Wallack, Stanley S., 1991. "Managed care: Practice, pitfalls, and potential." *Health Care Financing Review*, (Annual Supplement), pp. 27-34.
- Weil, Thomas. 1993. "Use Rates Under President Clinton's Health Reform Plan" *Health Care Management Review*. 18: 27-37.
- White House Domestic Policy Council. *The Clinton Blueprint: The President's Health Security Plan*. 1st ed. New York: Times Books, 1993.
- White, Joseph. 1993. "Markets, Budgets and Health Care Cost Control." *Health Affairs*, (Fall), pp. 45-57.
- Wouters, Annemarie. 1990. "The Cost of Acute Outpatient Primary Care in a Preferred Provider Organization." *Medical Care*. 28(7): 573-585.