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**A comparative analysis of registered nurse demand in Tennessee
rural and urban hospitals and nursing homes**

Pullen, Carol Hall, Ed.D.

East Tennessee State University, 1991

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A COMPARATIVE ANALYSIS OF REGISTERED NURSE DEMAND
IN TENNESSEE RURAL AND URBAN HOSPITALS AND NURSING HOMES

A Dissertation
Presented to the Faculty of the Department of
Educational Leadership and Policy Analysis
East Tennessee State University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
Carol H. Pullen
May 1991

APPROVAL

This is to certify that the Advanced Graduate Committee of

CAROL HALL PULLEN

met on the

1st day of April, 1991.

The committee read and examined her dissertation, supervised her defense of it in an oral examination, and decided to recommend that her study be submitted to the Graduate Council and the Associate Vice-President for Research and Dean of the Graduate School, in partial fulfillment of the degree of Doctor of Education in Educational Administration.

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ABSTRACT

A COMPARATIVE ANALYSIS OF REGISTERED NURSE DEMAND
IN TENNESSEE RURAL AND URBAN HOSPITALS AND NURSING HOMES

by

Carol Hall Pullen

The purpose of this study was to compare Registered Nurse (RN) current and future demand between Tennessee rural and urban licensed hospitals and nursing homes. Comparisons of Registered Nurse demand by principal duty or position and by educational level were also undertaken. The educational level of RNs was examined using the proportion of RNs at each of five educational levels: diploma, associate, baccalaureate, master's, and doctorate. The variables examined were 1988 and 1989 vacancy rates and proportion of budgeted positions, change in vacancy rates and proportions from 1988 to 1989, projected changes in positions and proportions from 1988 to 1992 and to 1995.

Nurse administrators from one hundred fifty four hospitals (63% response rate) and two hundred twelve nursing homes (72% response rate) were surveyed for responses about current and future RN demand. This study is a secondary analysis of data that were collected as a part of a larger research project conducted by the Tennessee Board of Regents Task Force on Nurse Supply and Demand.

The findings were that rural hospitals had significantly higher vacancy rates for total nurse positions in 1988 and general duty positions in 1989. Urban hospital administrators reported higher vacancy rates for RN positions at the diploma level and projected significantly greater changes in clinical specialist and master's level positions for 1992 and 1995. Rural hospitals had a higher proportion of associate degree nurses in 1989, and urban hospitals had a higher percentage of master's prepared RNs for 1988 and 1989. Urban hospitals projected a greater change in the proportion of RNs at the doctoral level for 1995. Rural nursing homes projected higher numbers of associate degree nurses for 1992 and 1995.

The major conclusion was that the nursing shortage in Tennessee hospitals was more severe than that reported on the national level and greater in rural hospitals. The shortage in Tennessee nursing homes was reported to be much less acute than the national shortage, and the critical shortages were limited to a few facilities, both rural and urban.

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DEDICATION

To

My Children

Joey, Leslie, and Jeffrey

For their support and encouragement.

ACKNOWLEDGMENTS

Sincere appreciation is extended to Dr. Hal Knight, committee chairperson, for his encouragement, guidance, and expertise. His willingness to provide feedback and assistance in a timely manner helped me in meeting crucial deadlines.

Special gratitude is due Dr. Russell West for his patience, endurance, and expert assistance in the analysis of a large and complex data set. The other members of my committee who provided encouragement and advice were Dr. Nancy Garland, Dr. Paul Fendt, and Dr. Ernest Bentley, Jr.

Thanks are in order for Sharron Whitaker who provided staff support. Her specialized computer skills were indispensable in the preparation of tables.

The support and encouragement I received from the School of Nursing faculty and staff, and most particularly, Dr. Cynthia Lenz, Dean, will always be appreciated. Without Dr. Lenz, who believed that this dissertation could be completed in spite of adversity, I could not have persisted through this process.

A special thanks to my three children for their extra help when I had deadlines to meet. I appreciate their understanding and forbearance through the many weekends when I was busy writing.

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CHAPTER 1

Introduction

Recent changes in the factors affecting the demand and supply of Registered Nurses (RNs) have resulted in a national nursing shortage that has become widespread and severe (U.S. Department of Health and Human Services, 1988b). A nursing shortage compromises access to health care services and has a direct impact on the quality of health care that is received by consumers (U.S. Department of Health and Human Services, 1988c). The current nursing shortage has characteristics that are different from previous shortages and traditional methods for alleviating the problem will not suffice (Buerhaus, 1987).

The present nursing shortage has emerged in a competitive and changing health care environment characterized by changes in the roles, functions, and opportunities for employment for Registered Nurses (Beyers & Damore, 1987). The demand for RNs has increased in all health care settings due to the increased complexity of health care delivery, the versatility of the RN, the development of alternate delivery modes, and the changing demographics in the patient population (American Nurses' Association, 1988).

The complexity of the nursing shortage has been magnified by the many and diverse duties and positions

assumed by the RN and the concomitant educational levels required for the various positions. Unresolved issues surrounding the educational levels, including titling and licensure, may impact the future demand of nurses with specific academic preparation. Furthermore, the chronic maldistribution of RNs seen historically in certain facilities, that is, nursing homes, and in rural areas may be compounded by the current shortage. Strategies for relieving the nursing shortage, including federal and state policy decisions, require empirically based data definitive to specific facilities and geographical areas.

The output of RNs has doubled over the past 30 years; there are now 2.1 million. In the last decade alone, the number of employed nurses has increased by 50% (Aiken & Mullinix, 1987). Nursing has one of the highest labor participation rates of any predominantly female occupation. Further, over 80% of RNs are actively employed compared to 54% of American women that are in the workforce (Aiken, 1987). However, approximately one-third of employed nurses are working part-time (American Nurses' Association, 1988).

Concomitant with the increased demand for nurses has been the gradual decline in the supply of nurses. Nursing school admissions, enrollments, and graduations are declining. Enrollments dropped 23% between 1983 and 1987. In 1987, only 4% of freshmen women expressed interest in nursing as a career, compared to slightly more than 8% in

1983 (American Nurses' Association, 1988). There has also been a decline in the number of nursing programs over the past three years. Associate degree nursing programs produced the greatest percentage of graduates, 53% (National League for Nursing, 1989). Future projections to 2020 indicate that the greatest demand will be for nurses with a baccalaureate or graduate degree. The demand was predicted to be almost three times the expected supply (U.S. Department of Health and Human Services, 1988a).

Overall, the nature and extent of the national nursing shortage has been documented in numerous reports and studies. In 1987 the Department of Health and Human Services established a 25 member panel, the Secretary's Commission on Nursing, to assess the nature and extent of the Registered Nurse shortage. The conclusion of the panel was that a nursing shortage existed in all health care settings and in all nursing practice areas. The shortage initially appeared to be worse in urban hospitals and in nursing homes; however, the Commission concluded that additional documentation was needed to provide a more definitive view of the nursing shortage in the specific health care facilities and in the rural and urban areas of the nation (U.S. Department of Health and Human Services, 1988b).

This study will examine the nursing shortage in two major inpatient health care facilities, hospitals and

nursing homes, by comparing nurse demand between the urban and rural facilities. Although hospitals are the major employers of Registered Nurses (Aiken & Mullinix, 1987), nursing homes have traditionally experienced chronic shortages (Menzin, 1988). Furthermore, a distributional imbalance of RNs has occurred historically in the rural areas of the nation (U.S. Department of Health and Human Services, 1988c). Rural and urban areas of the nation and of the state have different characteristics, health statistics, resources, and thus, may have different manpower needs. The diversity found between rural and urban areas may have a significant impact on the strategies that can be employed to alleviate current shortages and to make recommendations for long term solutions (National Association of Community Health Centers and the National Rural Health Association, 1988).

Hospitals have continued to employ the greatest numbers of RNs compared to other facilities. Sixty-eight percent of all employed nurses worked in hospitals. In 1972, hospitals employed 50 nurses per 100 patients; by 1986 the figure had increased to 91 nurses per 100, an 82% increase. Hospitals continued to increase the proportion of RNs in the nursing staff mix (composed of RNs, licensed practical nurses [LPNs], and unlicensed nursing personnel) by substituting RNs for other nursing personnel (Aiken & Mullinix, 1987).

The American Hospital Association (1987) found that over 50% of hospitals reported a nursing shortage. Vacancy rates had increased from 4.4% in 1983 to 11.3% in 1987. While 76% of all hospitals report at least some degree of shortage, 19% of the hospitals report severe shortages. The largest percentage of hospitals with high nursing shortages were located in the South (American Hospital Association, 1987). Preliminary data in a 1988 report indicated that fewer hospitals reported a severe shortage; however, the shortage appeared to be more widespread than previous reports indicated (Larkin, 1988).

The American Hospital Association (1987) found that large hospitals in urban areas were initially more acutely affected by Registered Nurse shortages than smaller rural hospitals. However, most of the regional and state studies have focused on the shortage in urban hospitals and adequate data for comparison have not been collected (U.S. Department of Health and Human Services, 1988c).

Historically, nursing homes have experienced chronic RN shortages. The American Nurses' Association (McKibbin, 1990) reported that nursing homes had higher vacancy rates at 18.9% than other health care facility types. The Health Care Financing Administration monitoring and industry surveys indicated that some nursing homes operated with RN staffing levels below minimum federal criteria (U.S. Department of Health and Human Services, 1988c). New

federal standards for certification of nursing homes that was effective October 1990 will increase the requirements for RNs in nursing homes and compound the already existing shortage. In addition, predictions of increased numbers of elderly persons and continued discharge of large numbers of patients from hospitals to nursing homes will have a significant impact on the potential number of RNs that will be needed in nursing homes (Menzin, 1988). A review of the literature and communication with the U.S. Department of Health and Human Services (K. Wassem, personal communication, March 30, 1990) indicated that studies were not available comparing rural and urban nursing homes.

A review of Tennessee studies indicated a significant change from the earlier studies to more recent ones regarding nurse supply and demand. As recently as 1984, the predictions were that Tennessee would have an adequate supply of nurses by 1990 or even exceed the supply, with the exception of nursing homes and rural areas (Tennessee Department of Health and Environment, 1984). However, the Tennessee Commission on Nursing (1987), the Tennessee Hospital Association (1988), the University of Tennessee System (1989), and the Tennessee Board of Regents (1989) documented that Tennessee may have a nursing shortage similar to or greater than that reported in national reports.

The most recent study in Tennessee was conducted by the Tennessee Board of Regents Task Force on Nurse Supply and Demand. The need for the study arose from the frequently heard concerns of health care providers in Tennessee that there was a critical shortage of nurses that could seriously compromise the quality of health care. The purpose of the study was to provide empirically based supply-demand data on which the TBR staff and Tennessee institutions could make nursing programming decisions. The study was comprehensive in nature and provided documentation about the statewide demand for nurses and specific information about nurses' positions, licensing levels, and educational levels in all licensed health care facilities in Tennessee (Tennessee Board of Regents, 1989). However, a limitation of the study was that the data were not analyzed by specific health care facilities or by rural and urban areas of the state.

The Problem

The Statement of the Problem

The problem of this study was that nurse demand in Tennessee had not been sufficiently documented as to the extent and scope of the shortage specific to hospitals and nursing homes and in rural and urban areas. Strategies, recommendations, and policy decisions to alleviate the

current shortage and long-term demand required more definitive empirical data than what was currently available.

The Purpose of the Study

The purpose of this study was to determine if there was a difference in Registered Nurse demand between Tennessee rural and urban licensed hospitals and nursing homes. A sub-objective of this study was to determine if there was a difference in Registered Nurse demand between Tennessee rural and urban hospitals and nursing homes by principal duty or position and by educational level.

Significance of the Study

A comparative analysis of Registered Nurse demand in urban and rural hospitals and nursing homes of Tennessee will provide information that has significance both at the state and national level. Public attention has focused primarily on the nursing shortage in urban hospitals; however, of the nation's population, 25% reside in rural areas, and approximately 33% of Tennessee residents are in areas designated as rural (U.S. Department of Commerce, 1980; Vickers & Wood, 1989). The Secretary's Commission Report (U.S. Department of Health and Human Services, 1988c) stated that a comprehensive analysis of nurse demand in rural areas is hampered by insufficient data. Although a number of states have addressed the overall shortage of nurses, there is insufficient data about the extent of the

shortage in hospitals and nursing homes in the rural areas of the nation, or of nurse position and educational level needed. Rural facilities are already threatened by financial vulnerability, and with the addition of the nursing shortage, access to health care for many rural residents may be threatened. Lack of adequate data and research on the demand for nurses in rural facilities hinders efforts to develop appropriate federal and state policies to meet the needs of rural residents.

Adequate data on nurse demand from nursing employers is essential for assessment and planning for nursing education programs. A factor contributing to the inequitable number of RNs employed in rural areas has been the lack of educational programs that prepare nurses for rural practice. In addition, nurses who receive their clinical education in urban facilities tend to remain in that type of facility after graduation; the most successful educational programs that resulted in nurse employment in rural areas have been ones located in a rural areas or used a decentralized approach by using rural practitioners as preceptors (American Nurses' Association, 1989; Ryan, Hanson, Hodnicki, & Dorroh, 1986).

With the current nursing shortage, administrators in health care facilities have been confronted with the monumental task of nurse recruitment and retention. Recruitment in urban or rural facilities may require

different strategies based on empirical nurse demand data. Traditionally, urban hospitals have been able to offer higher wages and a greater number of opportunities for formal and continuing education than rural facilities. Practitioners in rural areas often feel isolated from other health care professionals, a situation that could either limit professional growth and/or the opportunity to readily consult other health care professionals. Another difficulty often encountered for married nurses in rural areas was the lack of employment available for spouses (Staff Report to the Special Committee on Aging, United States Senate, 1988).

Definition of Terms

Associate Degree in Nursing--An educational pathway to licensure as a Registered Nurse (RN). The educational preparation typically occurs in a junior or community college. These programs prepare a technical nurse designed to give nursing care to patients in structured settings under the direction of a baccalaureate nurse or a physician. However, in the practice setting, the Associate Degree Nurse may sometimes be employed in the same positions as baccalaureate nurses (Ellis & Hartley, 1988).

Bachelor of Science in Nursing--An educational pathway to licensure as a Registered Nurse (RN) offered by colleges or universities. The baccalaureate nurse is prepared to provide professional nursing care for patients and their

families in a variety of health care settings (Ellis & Hartley, 1988).

Clinical Specialist--The role of an expert in clinical practice as an educator, consultant, researcher, and manager. The role does not usually fit into the hierarchical management structure of a health care institution but may move through the role components as circumstances dictate. Although a master's degree in nursing is recommended for this level, historically, specialty experience and certification have been accepted (American Nurse's Association, Council of Clinical Specialists, 1986).

Diploma nursing--An educational pathway to licensure as a Registered Nurse (RN) offered by hospitals. Graduates receive a diploma in nursing and are prepared to give patient care in structured settings (Ellis & Hartley, 1988).

Doctorate in Nursing--A doctoral degree in nursing, which can be a doctor of nursing science (DNSc), doctor of science in nursing (DSN), doctor of nursing education (DNEd), or the doctor of philosophy in nursing (PhD). Doctoral programs in nursing typically prepare nurses for leadership positions within educational or service institutions or for positions in research (Ellis & Hartley, 1988).

Full-time equivalent positions (FTE)--A calculation of full-time and part-time positions that reflect total positions expressed as full-time positions.

General duty RN--The entry level nursing position. Duties usually include direct patient care or management of care for a group of patients.

Head nurse/assistant head nurse--Nurses who are usually responsible for a unit or a floor in a hospital or nursing home setting.

Hospital--A licensed health care facility whose primary function is the care of patients with acute illnesses. Facilities may offer a wide array of services including home health, clinics, and emergency services (Kelly, 1987).

Inpatient facility--A health care facility that provides accommodations for an overnight stay for patients.

Licensed practical nurse (LPN)--A nurse who has completed a one-year program usually in a vocational or technical school and successful completes the national examination for licensure as a practical nurse in a particular state (U.S. Department of Labor, 1988-89).

Master of Science in Nursing--A master's degree in nursing prepares nurses for an expanded role in education, service institutions, or for advanced clinical practice such as nurse practitioner or clinical specialist (Ellis & Hartley, 1988).

Nurse administrator/assistant administrator--A nurse who has responsibility for policy development, fiscal affairs, allocation of resources, strategic planning, and professional practice for the nursing department in a health care facility (LaBar & McKibbin, 1986).

Nurse anesthetist--A nurse who has graduated from an nurse anesthetist program and be certified. Major duty is the provision of anesthesia care including administration of anesthetic agents (Kelly, 1987).

Nurse practitioner--A nurse who has completed advanced training through a certificate or masters degree program. The scope of practice is broad, but the nurse practitioner works under established protocols. Nurse practitioners provide a full range of nursing services as well as certain medical tasks (Staff Report to the Special Committee on Aging, United States Senate, 1988).

Nurse supervisor/assistant supervisor--A middle management nursing position. Principal duties usually include supervising and evaluating delivery of nursing care and coordinating staff activities to include recruitment, hiring, and evaluation of personnel (Kelly, 1987).

Nursing home--A licensed long-term care facility whose primary function is the care of patients with chronic diseases (Kelly, 1987).

Registered Nurse (RN)--A person who has passed the National Licensure Examination for Registered Nurses and is licensed to practice nursing in a state.

Registered Nurse demand--The number of RNs who are needed by employers of Registered Nurses as reported by budgeted filled and vacant positions and to include projections of future need (U.S. Department of Health and Human Services, 1988c).

Registered Nurse shortage--The supply of RNs is insufficient to meet employer demand as evidenced by vacant positions (U.S. Department of Health and Human Services, 1988c).

Registered Nurse supply--The total population of Registered Nurses (U.S. Department of Health and Human Services, 1988c).

Rural--An area that is defined synonymously with the definition for non-metropolitan areas. The non-metropolitan areas are outside the areas designated as Metropolitan Statistical Areas (MSAs) (U.S. Department of Commerce, 1980). A map illustrating metropolitan and non-metropolitan statistical areas in Tennessee is located in Appendix A. A list of the metropolitan statistical areas in Tennessee and their respective counties is located in Appendix B (Vickers & Woods, 1989).

Unlicensed nursing personnel--Persons without a license who perform selected technical aspects of patient health care.

Urban--An area that is defined synonymously with the definition for a Metropolitan Statistical Area (MSA). It contains one or more central counties containing an area's main population concentration or an urbanized area of at least 50,000 inhabitants. An MSA includes outlying counties having close economic and social relationships with the central counties and meet certain standards such as population density, urban population, and population growth (U.S. Department of Commerce, 1980).

Vacancy rate--The most common measure used to define nursing shortages. Vacancy rates are calculated by summing the number of budgeted full-time equivalent (FTE) vacancies and then dividing the total budgeted FTE filled and vacant positions (American Hospital Association, 1987).

Research Questions

1. Is there a difference in Registered Nurse demand between rural and urban hospitals and nursing homes?
2. Is there a difference in the demand for Registered Nurses according to principal duty or position between rural and urban hospitals and nursing homes? The position/duties are as follows:
 - a. Administrator

- b. Supervisor
- c. Head Nurse
- d. General Duty RNs
- e. Nurse Practitioner
- f. Clinical Specialist
- g. Nurse Anesthetist

3. Is there a difference in the demand for Registered Nurses according to educational levels between rural and urban hospitals and nursing homes:

- a. Diploma
- b. Associate Degree
- c. Bachelor of Science in Nursing
- d. Master of Science in Nursing
- e. Doctorate in Nursing

Hypotheses

H1. There is no difference in Registered Nurse demand between rural and urban inpatient facilities (hospitals and nursing homes).

H2. There is no difference in Registered Nurse demand between rural and urban hospitals.

H3. There is no difference in Registered Nurse demand between rural and urban nursing homes.

H4. There is no difference in Registered Nurse projections for 1992 between rural and urban hospitals.

H5. There is no difference in Registered Nurse projections for 1992 between rural and urban nursing homes.

H6. There is no difference in Registered Nurse projections for 1995 between rural and urban hospitals.

H7. There is no difference in Registered Nurse projections for 1995 between rural and urban nursing homes.

H8. There is no difference in Registered Nurse demand by principal duty or position between rural and urban hospitals. The duties that will be analyzed are administrator, supervisor, head nurse, general duty RNs, nurse practitioner, clinical specialist, and nurse anesthetist.

H9. There is no difference in Registered Nurse demand by principal duty or position projected for 1992 between rural and urban hospitals.

H10. There is no difference in Registered Nurse demand by principal duty or position projected for 1995 between rural and urban hospitals.

H11. There is no difference in Registered Nurse demand by principal duty or position between rural and urban nursing homes. The duties that will be analyzed are administrator, supervisor, head nurse, and general duty RNs.

H12. There is no difference in the proportion of Registered Nurses prepared at different educational levels (diploma, associate degree, baccalaureate degree, master's

degree, and doctoral degree) between rural and urban hospitals.

H13. There is no difference in the proportion of Registered Nurses prepared at different educational levels projected for 1992 between rural and urban hospitals.

H14. There is no difference in the proportion of Registered Nurses prepared at different educational levels projected for 1995 between rural and urban hospitals.

H15. There is no difference in Registered Nurse demand according to educational level between rural and urban hospitals.

H16. There is no difference in Registered Nurse demand according to educational level projected for 1992 between rural and urban hospitals.

H17. There is no difference in Registered Nurse demand according to educational level projected for 1995 between rural and urban hospitals.

H18. There is no difference in Registered Nurse demand according to educational level between rural and urban nursing homes.

H19. There is no difference in Registered Nurse demand according to educational level projected for 1992 between rural and urban nursing homes.

H20. There is no difference in Registered Nurse demand according to educational level projected for 1995 between rural and urban nursing homes.

Limitations

1. This study was limited to hospitals and nursing homes in Tennessee.
2. This study was limited by the definitions selected for rural and urban.
3. This study was limited by the use of vacant positions to define the nursing shortage. Although vacancy rate is the most common measure used for a nursing shortage, other measures such as recruitment time to hire new nurses, perceptions of nurse administrators, hospital bed closings due to nurse understaffing, and use of agency nurses have also been used to define nurse shortages (U.S. Department of Health and Human Services, 1988b).
4. This study was limited in the ability of nurse administrators to make accurate projections regarding the future need for nurses.
5. This study was limited by the data collected in the Tennessee Board of Regents Study.

Assumptions

1. The respondents provided accurate information regarding budgeted positions.

2. The respondents gave thoughtful and accurate responses to projections for future need based on historical use of personnel and future goals of the institution.

3. The length and format of the questionnaire did not influence the nurse administrator's response to the study.

4. The data for 1988 and 1989 and the 1990, 1992, and 1995 projections are adequate to reflect a trend in nursing demand.

Organization of the Study

Chapter 1 includes the introduction, the statement of the problem, the purpose of the study, significance of the study, the limitations, the assumptions, the definition of terms, the research questions, the hypotheses, the procedures, and the organization of the study.

Chapter 2 reviews the literature and research related to the study.

Chapter 3 describes the methods and procedures used in conducting the study.

Chapter 4 presents the analysis of the data and the findings of the study.

Chapter 5 provides a summary of the findings and the conclusions of the study and recommendations for future research.

Summary

This study was expected to provide information that was not previously available and would be useful on the state and national level. Empirical data illuminating the differences or similarities of Registered Nurse demand in rural or urban health care facilities should be helpful in decisions regarding health care policy, nurse recruitment and retention, and admission and curricular decisions in educational programs for nurses. An analysis of the needs of rural Tennesseans should add to the body of knowledge collected in other areas of the nation leading to a national rural health care policy that could have a significant impact on the nation as a whole.

CHAPTER 2

Review of Literature

Introduction

The United States has currently experienced a nursing shortage that has been reported to be critical, has affected all health care settings, and has encompassed rural and urban areas of the nation (U.S. Department of Health and Human Services, 1988b). Since Registered Nurses (RNs) were the largest group of health care providers (U.S. Department of Health and Human Services, 1988a), the nursing shortage has resulted in a lower quality of patient care and has decreased access to health care services in many areas (U.S. Department of Health and Human Services, 1988c).

Cyclical shortages in nurse supply have occurred since World War II although the overall number of employed nurses has continued to increase substantially (Aiken, 1987). In the last decade, the number of employed nurses had increased by 50% (Aiken, 1987); however, national data indicated that the shortage would worsen (U.S. Department of Health and Human Services, 1988b). Reports from the National League of Nursing (1989) indicated that the supply of nurses has continued to decline since 1983.

There have been indications that previous methods of alleviating the shortage were not effective (Buerhaus, 1987). National and state committees and experts who

examined the present and past shortages had recommended a restructuring of the role of the nurse within the current health care system (Aiken, 1987; Association of Academic Health Centers, 1989; Buerhaus, 1987; Tennessee Commission on Nursing, 1987). Murphy (1988) called for an enactment of a national health system that would address all aspects of a complicated health care market. Auerbach (1989) advocated a National Health Care Policy to provide every U.S. citizen equal access to a reasonable level of health care.

Empirical data addressing all aspects of the shortage were essential for decision making on the federal and state level and for long term solutions to this recurrent crisis in health care (U.S. Department of Health and Human Services, 1988b).

This study examined the nursing shortage in the major inpatient health care facilities in Tennessee. A comparative analysis was made of current and future nurse demand between rural and urban hospitals and nursing homes. The literature review that follows addressed the following topics: 1. Studies of nurse demand, 2. Rural and urban considerations, and 3. Current and future nurse supply and demand.

Studies of Nurse Demand

Studies pertaining to nurse demand were grouped in three major areas. A review of general literature was conducted; national and state reports were examined.

Review of General Literature

A review of the general literature available on the nursing shortage revealed that most of the articles were analyses of national studies and reports discussed in another section of this report. The majority of the original research reports in the literature were studies by specialty groups. Overall, the RN shortage was perceived as acute, and studies by the specialty groups have verified the severity of the shortage in particular specialty areas.

Rosenfield and Moses (1988) reviewed and analyzed newspapers, journals, and newsletters published from March 1986 to May 1987. Two-hundred and seventy-five articles appeared in 56 newspapers, an average of 4.8 articles per newspaper. The highest number of articles was found in the mid-atlantic region, and the larger the city the more media attention was given.

Four types of newspaper articles were found in the media survey: news items on nursing, news items addressing nursing as a secondary concern, letters and editorials, and American Hospital Association's news wire reports. The majority of the articles (67%) were about hospitals; 13%

concerned nursing schools; and another 10% addressed nursing homes. The remainder of the articles was about nurses and their activities. The primary focus of the hospital articles was on recruitment and the impact of the nursing shortage.

Sixty-four journal and newsletter articles were reviewed. These articles were similar to the newspaper articles; in fact, the citations often came from the newspaper articles themselves or from the same primary sources. Rosenfield and Moses stated that this study was conducted in the initial stages of the nursing shortage, and that since the completion of the project, evidence indicated that the number of articles from all media sources continued to proliferate.

Shortages have been reported by many of the major nursing specialty groups. A national survey in 1987 conducted by the American Association of Critical Care Nurses found a vacancy rate of 13.8%. This group considered vacancy rates over 10% as significant and those over 14% as critical. A rate of 13.8% was particularly severe in a specialty that needed additional knowledge and experience after completion of a basic nursing education program (American Association of Critical Care Nurses, 1988). In addition, a survey of the readership of Critical Care Nurse (Alspach, 1988) indicated further shortages in this specialty.

Other specialty groups that reported shortages were pediatric nurses (Feeg, 1987), nurses employed in long term care settings (Larkin, 1988), nurse anesthetists (Lust, 1988), and operating room nurses (Palmer, 1988; Roberts, 1988). Further, delegates representing Emergency Nurse Association state councils and chapters were polled at a Emergency Nurse Association General Assembly in 1987. Sixty-four percent of the nurses reported that their facility had serious or moderate difficulty recruiting emergency room nurses. Fifty-three percent stated that the recruitment problems had existed for more than six months (McKay, 1989).

National Studies

In this section an overview of major national studies and reports conducted and prepared since 1987 will be presented. Concerns that a national Registered Nurse shortage was occurring surfaced in 1986 (Aiken, 1987). National organizations and foundations sought documentation as to the extent and scope of the shortage.

In 1987, the Department of Health and Human Services established a 25-member Secretary's Commission on Nursing. The advisory panel was charged to advise the Secretary on issues and problems related to the recruitment and retention of RNs. In addition, the panel was to develop recommendations on short and long range plans for increasing

the supply of RNs (U.S. Department of Health and Human Services, 1988c).

The nursing shortage was defined by the Commission in economic terms as "a market disequilibrium between RN supply and RN demand in which the quantity of RNs demanded exceeds the supply that is forthcoming at the prevailing wage" (U.S. Department of Health and Human Services, 1988d, p. II-1). In other words, the Commission looked at the shortage from the employer's need rather than from past utilization of RNs or from clinical need which could be based on the amount and type of RN services needed to meet the needs of a given set of patients.

The panel concluded that the shortage of RNs was a reality and was critical. Seventy-six percent of the hospitals reported a shortage, and 19% indicated that the shortage was severe. The nursing shortage has resulted in a temporary closing of hospital beds, which was reported to be 30% of the beds in urban areas and 15% in rural areas. The panel found that it was becoming increasingly difficult to recruit nurses often taking as long as 90 days in critical care and medical surgical areas. Hospitals reported a lack of nurses with higher degrees and expressed the need for a better educated staff (U.S. Department of Health and Human Services, 1988b).

Shortages existed in all health care settings and in all nursing practice areas. The shortage appeared to be

worse in urban hospitals, critical care and medical/surgical units, and in nursing homes. Although nursing homes have historically reported shortages, 34% stated that the shortage was critical. Forty percent of home health agencies experienced shortages, and others reported difficulties with recruitment (U.S. Department of Health and Human Services, 1988b).

According to the American Hospital Association (1987), the majority of hospitals reported a nursing shortage. Over 50% reported the shortage to be moderate to severe. The reported shortages were analyzed by comparing the RN full-time equivalency (FTE) vacancy rate, the RNs employed per 100 patient days, and the RN shortage as perceived by the nursing supervisors or hospital administrators.

The FTE RN vacancy rate was 11.3% which represented a substantial increase from 4.4% in 1983. RNs per 100 patient days, a method that measured actual hospital employment of RNs and counted contract or per diem RNs and agency nurses that may be hired temporarily, correlated highly with the vacancy rate measure. Using these measures, the largest percentage of hospitals with high nursing shortages were located in the South. Small hospitals (less than 100 beds) reported the highest shortages except for the Northeast (American Hospital Association, 1987).

The third measure of shortage utilized, the perceived severity of shortage, had limitations. If budget

constraints were disregarded or if RN utilization was inappropriate, administrators could conceivably have overstated the demand for RNs. Fifty-four per cent of the participating hospitals reported a severe shortage; whereas 46% indicated that the shortage was mild (American Hospital Association, 1987).

The American Hospital Nursing Personnel Survey--1988 (Powills, 1989) indicated that the nursing shortage may have been less acute than what was reported in 1987. Of the 813 hospitals surveyed, only 13% stated that they were experiencing a severe shortage as compared to 19% in 1987. However, the nursing shortage appeared to be more widespread in 1988, and hospitals with over 300 beds reported a more acute shortage.

An additional perspective to the nursing shortage was provided by the Commonwealth Fund Foundation study that surveyed RNs and administrators in hospitals. A random sample was drawn from a population of RNs and hospital administrators in six urban areas of the United States (Boston, New York, Pittsburgh, Chicago, Houston, and Los Angeles). These cities were chosen for their diversity in geography, population, economics, and hospital environment. Fifteen thousand nurses (50% response rate) and 400 hospital administrators (60% response rate) responded. In addition, data on nursing programs supplied by the National League for

Nursing were analyzed from these six regions (Roberts, Minnick, Ginzberg, & Curran, 1989).

Results of this study showed that the average vacancy rate in the hospitals surveyed was 15%. Over 80% of the nurses surveyed were employed. Of the approximate 18% of nurses unemployed, 8% were either disabled or retired. Thirty percent of the nurses worked in health care settings other than the hospital, but contrary to other reports only 4% were employed in areas other than nursing (Roberts et al., 1989)

In response to concerns that most of the data collected on the national shortage had been hospital based, the American Nurses' Association conducted a survey in settings other than hospitals (McKibbin, 1990). Preliminary data released from this study indicated that nursing homes reported the highest vacancy rates. The results showed rates of 18.9% in nursing homes and 12.9% in home health agencies. A section of the report yet to be released considered factors relating to the recruitment and retention of nurses.

A review of the major national studies and reports verified the existence of a national nursing shortage that appeared to be in all health care settings and to encompass most practice areas. Nursing homes reported the highest vacancy rates as compared to other settings. Studies indicated that misconceptions had prevailed about unemployed

nurses who might be enticed to return to work as these numbers were not substantial. Recruitment and retention efforts were considered to be problematic as deteriorating workplace conditions due to an inadequate supply of nurses could conceivably lead to greater attrition in the workplace.

State of Tennessee Studies

Beginning in 1984 and continuing into the 1990s, a variety of Tennessee groups have made intensive efforts to assess the current supply and demand of nurses and to make necessary projections for future supply and demand to plan for the health care needs of Tennesseans. A specific focus in this state has been on the educational preparation of the nurse as demanded by the marketplace and as provided by nursing education programs. A specific analysis of each Tennessee report follows.

The Tennessee Department of Health and Environment (1984) conducted a comprehensive study that examined nursing issues with ramifications for public policy. Data used in this study were from a variety of state and national sources including the Tennessee Board of Nursing, American Nurses' Association, and the National League for Nursing. The primary source of data was from the State Center for Health Statistics of the Tennessee Department of Health and Environment.

Using the Research Triangle Institute Model, a mathematical equation used for projections, the major conclusion of the study was that by 1990, the supply of nurses would overtake the demand. These projections were based on demand in hospitals and were not projected according to specialty or education. The supply was not deemed to be adequate in nursing homes or in rural areas (Tennessee Department of Health and Environment, 1984).

Concerns about the educational level of nurses that would be needed in Tennessee emerged in 1985 and has continued to be of interest into the 1990s. The Tennessee Higher Education Commission (Appleson & Wade, 1985) initiated a study in response to requests to consider proposals for new master of science programs in nursing at Tennessee state universities. The employers surveyed included hospitals with 150 or more beds, licensed nursing homes, nursing education programs, commercial home health providers in Davidson County, Tennessee Public School Systems serving cities of 25,000 or more, regional facilities and regional offices of the Tennessee Department of Mental Health and Mental Retardation, and Tennessee Department of Health and Environment including local government health agencies and Department of Corrections facilities. Seven individual questionnaires were developed for utilization with the appropriate facility.

The response rate was over 50% in all areas other than home health care facilities and school systems. Nursing education programs had an 84% response rate, and hospitals an 52% rate, which included 66% of the reported beds. Based on the results of the survey, the following analysis and recommendations were made:

1. The number of RNs graduated in Tennessee with a master's in nursing would be sufficient to meet employer needs for the next five years. However, this conclusion was reached by considering the number of positions requiring a master's in nursing (MSN) rather than the positions for which a master's degree is preferred.

2. For the majority of clinical and educational positions, there was no alternative to the MSN. In very limited areas a master's degree in another concentration was preferred, that is, master's in psychology for some mental health positions.

3. Nursing education has the greatest need for nursing doctorates. However, the conclusion was that doctoral programs in other southern states could fulfill this need.

Based on the results of this study, the recommendation was to entertain no proposals for MSN programs before 1990 unless sufficient evidence was given of changes that occurred in the marketplace (Appleson & Wade, 1985).

A further attempt to determine the balance between educational program production and marketplace demand was

initiated in relation to undergraduate education. The Tennessee Nurses' Association (TNA) Education Committee examined existing resources of nursing programs and hiring preferences of hospitals in an attempt to project the supply and demand of nurses at particular educational levels by the year 2000 (Tennessee Nurse's Association, 1986). Associate degree and baccalaureate degree programs for generic and RN students and 35 hospitals were surveyed. An overall response rate of 60% was obtained.

The nursing programs were assessed according to the number of graduates, current enrollment, increase or decrease in enrollment, and ability to admit more students without increasing faculty. The hospitals were surveyed as to their hiring preferences for RN educational levels. The general conclusions of this study were:

1. Generic and RN baccalaureate programs could accommodate additional students. Overall, enrollment appeared to be relatively stable.
2. Of the hospitals in the survey, there were no reports of an all RN staff; however, the majority reported a decrease in the number of licensed practical nurses employed.
3. Only 6 hospitals of the 21 indicated that they would prefer to have a staff of nurses prepared at the baccalaureate level by 1992.

By 1987, there were national and state indications that a nursing shortage was imminent. A statewide Commission on Nursing (Tennessee Commission on Nursing, 1987) was appointed by the Governor of Tennessee to evaluate the current practice of nursing and to make recommendations about legal statutes governing nursing, the educational preparation of nurses, and methods needed to provide an adequate supply of nurses. In order to accomplish its purpose, the commission held seven meetings and utilized a variety of techniques, including verbal and written testimony at public meetings and a review of reports and studies.

The WICHE Model, a state model developed by the Western Interstate Commission on Higher Education, was used to project requirements for nursing personnel according to educational level for the year 2000. Application of this model in Tennessee indicated that Registered Nurses would continue to be in short supply, particularly the baccalaureate, masters, and doctorally-prepared nurses. Recommendations were as follows:

1. Existing nursing programs should be expanded, and new programs should be developed in underserved areas.
2. One doctoral program in nursing should be developed by 1990.

3. At least one additional master's in nursing program should be established, and the enrollment should be tripled in existing programs.

4. The number of baccalaureate programs should be increased by 50%, and the current enrollment doubled in existing programs.

5. Diploma programs should be affiliated with colleges or universities.

6. The number of associate degree programs should be maintained and enrollment increased by 15% (Tennessee Commission on Nursing, 1987).

With the intensification of the nursing shortage, particular state groups began studying the problem as it related to their area. A Nursing Task Force, appointed by the Tennessee Hospital Association (1988), surveyed Tennessee Hospital Association member hospitals. Of the 165 hospitals, 104 responded (63% response rate) to questions relating to their specific nursing needs. Significant results were:

1. Hospitals in all areas of the state were experiencing shortages, ranging from vacancy rates of 3.7% to 13%. The major cities reported the highest shortages.

2. The majority of hospitals had increased the number of RNs. Hospitals employed the greatest number of nurses at the associate degree level followed by the diploma in

nursing. The lowest percentage was employed at the baccalaureate level.

3. Recruitment of nurses to critical care and medical surgical areas posed the greatest problems for recruiters.

4. Of the hospitals responding, 79% made no distinction in salaries based on educational preparation; however 21% did give educational differentials.

In 1988, the University of Tennessee Board of Trustees appointed a task force to study the nursing shortage in Tennessee and specifically to determine the impact on the nursing education programs in the University of Tennessee system and its affiliated teaching hospitals. Based on scheduled meetings that were held across the state and an analysis of enrollment patterns at University of Tennessee institutions, several major findings emerged. The vacancy rate in the provider hospitals represented on the task force averaged 10-12%. Nursing programs within the UT system have shown a slight decline in enrollment and graduations from 1984-1988; however, applications have decreased 35%. In addition, the educational institutions have a scarcity of qualified nursing faculty (University of Tennessee System, 1989).

By 1989, it was evident that a more comprehensive analysis of the nursing shortage was needed. In response to these concerns, the Tennessee Board of Regents appointed a Task Force that assessed the supply of nurses in Tennessee,

the 1988 and 1989 demand for nurses, and projections for 1992 and 1995. Hospitals, nursing homes, home health agencies, and federal health care agencies were surveyed. A total of 741 facilities were surveyed, and 392 or 54% were analyzed. The 392 respondents represented 37,281 hospital beds or 65% of the available beds in Tennessee. Furthermore, the data provided information for 49% of the total nursing positions in the state (Tennessee Board of Regents, 1989).

The data collected in this study provided information about nursing positions in the following categories: principal duty or position, level of professional training, highest nursing degree, and clinical area of practice. In addition to the survey data collected, data pertaining to the supply of RNs from the Department of Health and Environment were used to analyze the balance between nurse supply and demand in Tennessee (Tennessee Board of Regents, 1989).

The findings and conclusions of the TBR Task Force indicated that a nursing shortage existed in Tennessee and could be expected to worsen. Major findings pertaining to the overall composite RN data are enumerated as follows:

1. RN budgeted full-time equivalent positions had increased 8% between 1988 and 1989.
2. Vacancy rates for Registered Nurses had increased from 12% in 1988 to 14% in 1989.

3. The demand created by existing vacancies, new positions, and annual attrition for the respondents was approximately 4,050 RNs for 1989.

4. Projected growth for RN positions through 1995 was predicted to be about 500 RNs each year.

5. RN positions were projected to increase 18% by 1992 and 25% by 1995.

Due to the comprehensive data obtained from this study, additional results will be reported elsewhere in the relevant sections of this report (Tennessee Board of Regents, 1989).

A review of Tennessee studies indicated significant attempts to determine nurse supply and demand and the educational levels of nursing desired. As recently as 1984, the predictions were that Tennessee would have an adequate supply of nurses by 1990 or even exceed the supply, with the exception of nursing homes and rural areas. Recent studies have indicated that Tennessee may have a shortage similar to that reported on the national level. Although the Tennessee Nurses' Association (1986) found that enrollments remained stable in nursing education programs, a study by the University of Tennessee System (1989) revealed that enrollments were on the decline.

The educational level of nurses desired in Tennessee remained a controversial issue. The Tennessee Higher Education Commission (Appleson & Wade, 1985) reported that

graduate education for nurses on the masters and doctoral level was available and sufficient to meet the needs of employers until 1990. The Tennessee Commission on Nursing (1987) expressed grave concern for the availability of nurses at the baccalaureate and graduate level. However, the Tennessee Hospital Association (1988) continued to advocate all educational levels of nursing and stated that the marketplace will eventually dictate the educational level of nurses that will be utilized.

The Tennessee Hospital Association (1988) found that a nursing shortage existed throughout the state in member hospitals. A more comprehensive study conducted in 1989 by the Tennessee Board of Regents encompassed all licensed health care facilities and determined that there was a current imbalance between nurse supply and demand that had critical future implications.

Overall, Tennessee studies indicated a nursing shortage involving all educational levels and positions that appeared to be widespread, progressing, and similar to shortages reported at the national level. Results of Tennessee and national studies provided data that have implications for future studies relative to the collection of more definitive information.

Rural and Urban Considerations

Problems impacting the urban and rural health care delivery system have some similarities but also major differences. The rural health care delivery system, which has been in a state of deterioration since the economic decline in the 1980s, faced multiple and complex problems (Rosenberg, 1989). The series of federal health programs in the 1970s aimed at rural America included the Hill-Burton Act (for construction of hospitals), Community Health Centers, Area Health Education Centers, Rural Health Clinic Reimbursement, and the National Health Service Corps. With the initiation of these programs, it was hoped that long term strategies would emerge for rural health care. The cost-containment measures of the Carter administration resulted in budget cuts that did not allow for expansion of existing programs or the development of new programs (Patton, 1989).

In response to national and state concerns about the critical nature of health care services in rural areas, Congress established the Office of Rural Health Policy within the Health Resources and Services Administration of the Department of Health and Human Services in 1987. The major responsibility of this office was to work with Federal and State agencies, national associations, foundations, and other organizations to seek solutions to health care

problems in rural areas (U.S. Department of Health and Human Services, 1990a).

The Secretary of the Department of Health and Human services also chartered the National Advisory Committee on Rural Health in October, 1987. The Committee was composed of 18 experts in rural health who were primarily responsible for advising the Secretary on the provision and financing of health care services in rural areas. Although the financial problems in rural hospitals were the major initial impetus of the Committee, the Second Annual Report (U.S. Department of Health and Human Services, 1989) indicated the presence of several barriers to maintaining an adequate supply of rural health care providers and recommended that additional research was necessary to develop appropriate policies to meet the needs of rural areas.

Furthermore, the jeopardy of health care services in rural areas has emerged as one of the most challenging health care issues facing the Congress. In 1988, the Special Committee on Aging held three hearings to focus on the problems within the rural health care system and to devise appropriate strategies to recruit and retain health care providers. The hearings revealed that over 160 rural hospitals had closed since 1980 and that an additional 600 faced closure in the next few years (Staff Report to the Special Committee on Aging, United States Senate, 1988).

In 1990, 22 states had Offices of Rural Health to address problems of rural health (U.S. Department of Health and Human Services, 1990a). However, Tennessee did not have such an office. Statewide activities in Tennessee were coordinated through state agencies, that is, the Tennessee Primary Care Association and the Division of Health Access, Tennessee Department of Health and Environment. Communication with these two agencies indicated that few efforts had been expended to address nurse supply but rather the focus was on physician recruitment (J. Sivley, personal communication, March 31, 1990).

The supply and demand of nurses were examined in the context of other factors that are impacting rural and urban areas. Particular problems impacting the urban and rural health care delivery system that will be discussed include urban/rural demographics, economic problems, physician shortages, and issues specific to hospitals and nursing homes.

Rural versus Urban Demographics

The demographics and characteristics of rural life influenced the types of nursing services needed and the utilization of nursing resources. In the following section national demographics are reported. Tennessee did not report health statistics according to rural and urban areas

of Tennessee; therefore, state statistics were not available (G. Plumley, personal communication, January, 1990).

The rapid increase in the number and proportion of persons 65 and older in the United States has been well documented by census reports (U.S. Department of Health and Human Services, 1987). Substantial increases in the elderly population were noted over the past decade. In 1987, the Department of Health and Human Services reported that by the year 2000 almost 35 million Americans would be 65 years of age and older. The fastest growing segment of the population was persons 85 years of age and older (U.S. Department of Health and Human Services, 1987). Rural areas tended to have higher concentrations of elderly persons, urban, 10.7%, to rural, 13% (Cordes, 1989).

Individuals living in rural areas had a higher incidence of maternal and infant mortality, chronic illness and disability, and morbidity related to diabetes, cancer, high blood pressure, heart disease, stroke, and lung disease and a greater likelihood of being employed in an occupation that was hazardous or identified as being unhealthy. Although it was believed that AIDS would primarily impact the urban delivery system, Centers for Disease Control data indicated that 20% of AIDS cases were rural. The rural health care system was ill-prepared to meet the needs of these patients (National Association of Community Health

Centers and the National Rural Health Association, 1988; Norton & McManus, 1989).

Other characteristics of rural life, which may compound the incidence of health problems, were poor housing and low educational levels. Access to health care was hampered by scarcity of health services, a lack of public transportation, geographic barriers to health services, and an inadequate number of persons with health insurance (American Association of Colleges of Nursing, 1989; American Nurses' Association, 1989).

Economic Factors

In contrast to urban populations, rural residents were more economically disadvantaged. The poverty rate in rural areas was one-third greater than in urban areas; however, the unemployment rate was not so different (8% in rural; 6% in urban). A major problem was the greater rate of underemployment (workers in part time jobs or jobs beneath their skill levels) that occurred in rural areas (18.1% in rural compared to 12.1% in urban areas). In addition, rural counties had fewer higher paying occupations than urban areas (Cordes, 1989).

For all races, the median family income for rural areas was consistently lower than it was for urban areas. Approximately 15% of rural families had incomes below the federal poverty level. Predictions were that, for newly

created jobs, one will be available in rural areas as compared to seven in the city (National Association of Community Health Centers and the National Rural Health Association, 1988). These economic factors eroded the ability of rural families to purchase health care and to maintain health insurance.

Physician Shortage

Many rural areas have historically depended on mid-level practitioners, nurse practitioners, and physician assistants to extend physician services. There was a decline in nurse practitioners locating to rural areas in recent years, and the full impact of the current nursing shortage on areas underserved by physicians had not been fully assessed (Staff Report to the Special Committee on Aging, United States Senate, 1988).

Rural facilities in many areas still had difficulty recruiting and retaining physicians. Despite the alleged oversupply of physicians in some areas, a maldistribution of physicians still existed in many rural counties. With the decrease in the number of physicians available through the National Health Service Corps, the physician shortage could become even more acute in underserved areas. It was estimated that by 1990 only about 80 placements will be made compared to 2,595 in 1988 and 1,401 in 1989 (U.S. Department of Health and Human Services, 1990b; National Association of

Community Health Centers and the National Rural Health Association, 1988).

The overall physician-population ratio in Tennessee was about 190 per 100,000 in the Metropolitan Statistical Areas or urban counties. However, only 87 per 100,000 physicians were reported for the counties that are in rural or Non-metropolitan Statistical Areas in Tennessee (Burkett, Baxley, & Theisen, 1988).

Hospitals

Hospitals were the leading employers of nursing personnel in the United States when compared to other health care settings. Registered Nurses comprised over 60% of the 1,573,465 nursing personnel employed in hospitals (U.S. Department of Health and Human Services, 1988a). Tennessee was similar to national averages with 68% of RNs employed in hospitals (Tennessee Department of Health and Environment, 1988).

Between 1983 and 1986, national hospitals had increased the number of full-time equivalent RNs they employed by approximately 6%. In addition, increases had been noted in the number of RNs employed in hospitals per patient, which was 86 to 100 in 1984 and 96 to 100 in 1986 (U.S. Department of Health and Human Services, 1988c).

The primary factor responsible for the increased utilization of RNs within hospitals in the last decade was

the enactment of the prospective payment method of reimbursement. With this method the complexity of care requirements increased, and the ratio of Registered Nurses was greater in proportion to other nursing staff. Therefore, the overall requirements of hospitals for RNs were increased (U.S. Department of Health and Human Services, 1988c).

In addition, studies indicated the cost effectiveness of RNs compared to other nursing personnel; therefore, hospitals were substituting RNs who could perform a wide array of duties. Other factors necessitating a greater need for RNs have been nursing service delivery models that required a greater number of RNs and the technological advances that dictated a practitioner that was more highly skilled (U.S. Department of Health and Human Services, 1988a).

Rural hospitals were different entities than their urban counterparts and were faced with some similar but also differing concerns. They tended to be smaller and performed a wide range of services without the advanced technology found in larger institutions. In contrast to urban hospitals' tendency to substitute RNs for other personnel, rural hospitals had maintained a broader mix of licensed practical nurses and unlicensed personnel. This tendency in rural areas was related to the inability of rural hospitals to provide competitive salaries with urban facilities and

the mix of nursing personnel available and residing in rural areas (Staff Report to the Special Committee on Aging, United States Senate, 1988).

In addition to increasing the acuity level of the patient population in rural hospitals, Medicare's implementation of the prospective payment system had a negative economic effect on rural hospitals. With this system rural hospitals received 36% less than urban hospitals for the same services. Because rural populations tended to serve large populations of elderly clients, they were as a rule more dependent on medicare than the typical urban hospital (Cordes, 1990).

From 1980 to 1988, 204 rural hospitals closed in the United States. The U.S. Senate Special Committee on Aging estimated that an additional 600 rural hospitals could close by 1990 (Rosenberg, 1989). A greater number of hospitals closed in 1987 than at any other time during the last decade with rural hospitals closing at a record rate (National Association of Community Health Centers and the National Rural Health Association, 1988).

A survey by the Center for Rural Health Administration and Promotion of the University of Oklahoma Health Sciences Center reported that of the rural hospitals that closed in 1988, 75% reported substantial to severe nursing shortages. Estimates were that 9% closed in 1987 as a direct result of

the nursing shortage (American Association of Colleges of Nursing, 1989).

The American Hospital Association Report (1987) indicated that large hospitals in urban areas were more acutely affected by RN shortages than smaller rural hospitals in spite of the chronic shortages often reported by rural facilities. Historically, even mild to moderate shortages in rural facilities were critical in the delivery of care and even in the viability of the facility (U.S. Department of Health and Human Services, 1989). The preliminary data in the 1988 American Hospital Association Report (Powills, 1989) indicated that rural hospitals as a whole reported a full staff. Further comparison of nurse shortages in urban and rural areas will be needed to validate these findings.

Nursing Homes

Nursing homes have been the dominant long term care institution in the United States. Approximately 2.4 million Americans used this service annually in 1988. Although only 5% of all persons aged 65 and over resided in a nursing home, it was estimated that 20% of all elderly persons spent some time in a nursing home before they died (Lambert & Lambert, 1989).

Nursing homes were the second largest employer of nursing personnel; however, only 8% of the total were RNs

(U.S. Department of Health and Human Services, 1988b). Tennessee nursing homes employed an even lower percentage of RNs, only 4% (Tennessee Department of Health and Environment, 1988). Nevertheless, from 1981 to 1986, national RN employment in Medicaid and Medicare certified facilities increased 22%. Over the same time period the average RN-to-bed ratio increased 9% in these same facilities (U.S. Department of Health and Human Services, 1988b).

Several factors have contributed to the increased demand for RNs in nursing homes. With the passage of the prospective payment system, additional demands were placed on nursing homes. Hospital stays were reduced, which resulted in the transfer of a greater number of patients to nursing homes. These patients often were more acutely ill. In addition, with the predictions of increased numbers of elderly persons, nursing homes could expect an even greater number in the next 10 years (Lambert & Lambert, 1989).

Nursing homes have been classified according to the level of care provided. According to these regulations, facilities providing a higher level of care had to provide more extensive nursing services. In October, 1990, both types of facilities were required to provide 24 hour coverage and employ a full-time RN as the director of nursing (Grimaldi, 1989). Ousley (1987) predicted that nurse staffing needs would increase 20% by 1990 and up to

30% more by the year 2000. By 1990, the ratio of RNs to LPNs to aides was 1:1:3, and that ratio is expected to be 2:1:3 by the year 2000.

Nursing homes in non-metropolitan or rural areas utilized RNs in a different manner than their metropolitan or urban counterpart. A total of 77,500 RNs were employed in urban nursing homes compared to 25,600 employed in rural nursing homes. Urban areas tended to staff at higher levels than rural homes, 7 RNs per 100 beds to 5 RNs per 100 beds in the rural setting. RN minutes per patient day were higher in urban nursing homes: 23.4 minutes per day were reported as compared to 21 minutes per day for the rural counterpart (U.S. Department of Health and Environment, 1988c).

A factor that compounded the staffing problems in Tennessee nursing homes was the employment of 2.7 RNs per facility compared to 5.1 RNs per facility in the nation. In addition, Tennessee reported 39.9 residents per RN; whereas the national average was 17.5 residents per RN (U.S. Department of Health and Human Services, 1988c).

The dynamics and impact of a nursing shortage in rural hospitals and nursing homes are different from that of their urban counterparts because of the demographics and special health care needs of rural populations, the characteristics of the rural nurse population, the availability of other health care professionals, and the impact of economic

factors. Public attention has primarily focused on nursing shortages in urban areas, although, historically, chronic shortages have existed in rural areas. A comprehensive analysis of the nursing shortage is not complete without attention to similarities and differences that may be present in rural and urban areas.

Registered Nurse Supply, Demand, and Future Projections

Current Supply: Registered Nurse Licensees

In 1987, the supply of Registered Nurses was estimated to be approximately 2.1 million, double the number of 30 years ago. Between 1977 and 1984 alone, the number of employed nurses increased by 55% as compared with an 8% growth in population (Aiken & Mullinix, 1987).

In 1988, the number of RNs holding a current active license in Tennessee was 42,245, of which 35,142 were practicing. Of the practicing RNs, 24% reported practicing out of the state; therefore, the actual number of RNs in the Tennessee workforce was 26,649 (Tennessee Department of Health and Environment, 1988). A review of data from 1977 revealed that Tennessee lost annually more nurses than it gained from other states. The net loss since 1985 increased from 242 to 722 in 1989 (Tennessee Board of Nursing, 1989).

Although approximately 24% of the nation's population resided in rural areas, only 18% of the nurses worked in rural areas. Fourteen percent of the nurses living in rural

areas commuted to work in an urban site. A recent survey by the American Association of Colleges of Nursing found that only 10% of the graduates stayed in rural practice after graduation. Reasons that have been cited for the shortfall of nurses in rural practice included salaries that are not equitable with urban facilities, professional isolation, lack of modern facilities and technology, and inability of spouses to find acceptable employment (American Association of Colleges of Nursing, 1989).

Nurse supply issues become more complex with the consideration of the variety of health care settings that employ nurses, the positions or duties that nurses assume, and the educational levels at which Registered Nurses are prepared. The focus of this study was on inpatient facilities, hospitals and nursing homes, and particular issues specific to each facility type has been addressed elsewhere in this report. In the following sections the educational levels of Registered Nurses and the principal positions commonly found in urban and rural inpatient facilities will be discussed.

Educational Levels of Registered Nurses. The development of nursing education in the United States has resulted in three major pathways to preparation for licensure as a Registered Nurse. The three major educational routes are the diploma programs, operated by

hospitals; the associate degree programs, usually offered by junior or community colleges; and baccalaureate degree programs, offered by 4-year colleges and universities. All graduates were eligible to take the Registered Nurse licensure examination, which tested minimal and safe nursing knowledge and skills. Much controversy has existed over which of these routes best prepared the graduate to function in the beginning role of a Registered Nurse and which degrees should be required for the various expanded roles (Ellis & Hartley, 1988).

In 1965, in an attempt to clarify the technical and professional roles of nursing, the American Association of Nurses' (ANA) stated that entry into professional practice should require a baccalaureate degree and technical nurses should be prepared in schools offering an associate degree in nursing (American Nurses' Association, 1965). Because Registered Nurse licensure was a state issue, implementation of this proposal called for state legislative changes, involving the rewriting of the Nurse Practice Act. In addition, the licensing examination and current titling would have to be revised to reflect the educational outcomes and the new scope of practice.

For over 20 years, this debate has continued. Research to define and differentiate the technical and professional level and scope of practice has proceeded. Most states have considered the proposal extensively;

however, North Dakota has been the only state to pass legislation. Although there were predictions that other states would follow North Dakota, the emergence of the nursing shortage changed the focus of concern (Lambert & Lambert, 1989).

Although specific competencies had been identified for each level of nursing practice by the National League for Nursing, many health care facilities have not provided job descriptions that would be reflective of the educational level of the nurse. Salary differential has varied from one facility to another but differences remained minimal in most instances. Many employers had not been supportive of the changes with concerns that the supply of nurses might decrease, and increased salaries that could be demanded by baccalaureate nurses might raise the costs of health care (Maraldo, 1986).

Graduate programs in nursing had been important in the expert and efficient delivery of nursing care. The American Nurses' Association Statement (1978) described graduate education as:

the preparation of highly competent individuals who can function in diverse roles, such as clinical nurse generalists or specialists, researchers, theoreticians, teachers, administrators, consultants, public policy makers, system managers, and colleagues on

multidisciplinary teams . . . prepared through master's, doctoral, and postdoctoral programs in nursing that subscribe to clearly defined standards of scholarship. (p.3)

Advanced degrees in nursing prepared the nurse for positions of great responsibility and challenge and have directly led to the improvement of health care. Institutions have only begun to identify the many areas in which these nurses could play relevant roles (Lambert & Lambert, 1989).

The most comprehensive statistical survey of Registered Nurse educational preparation was in 1984 (U.S. Department of Health and Human Services, 1986). Table 1 depicts the proportion of nurses at each educational level for 1977, 1980, and 1984. An increasing proportion of nurses were being prepared at the associate and baccalaureate degree level.

A literature review and an analysis of major national reports did not reveal the specific educational levels of nurses that were found in hospitals. However, the greatest percentage of nurses in nursing homes were prepared at the diploma level (56.3%). Table 2 depicts the percentages for each educational level (U.S. Department of Health and Human Services, 1988c).

Table 1

Educational Level of Registered Nurses in the United States

<u>Program</u>	<u>1977 Percent</u>	<u>1980 Percent</u>	<u>1984 Percent</u>
Diploma	74.8	63.2	54.1
Associate	11.3	18.6	24.7
Baccalaureate	13.6	17.3	20.4
Master's	Not Available	.1	.1
Not Reported	.2	.8	.6
TOTAL	99.9	100.0	99.9

Table 2

Educational Level of Nurses Employed in U.S. Nursing Homes

<u>Program</u>	<u>Number</u>	<u>Percent Distribution</u>
Diploma	58,000	56
Associate Degree	23,000	22
Bachelor's Degree	18,700	18
Master's	2,700	3
TOTAL	102,400 ¹	99 ²

¹The number of RNs reported represented an undercount due to the method used for data collection.

²Percentage does not total 100% due to rounding.

The greatest number of nurses practicing in Tennessee were educated at the associate degree level. Table 3 depicts the highest educational level attained by employed nurses in Tennessee (Tennessee Department of Health and Environment, 1988).

Table 3

Highest Educational Level of Registered Nurses¹ in Tennessee

Program	Number	Percent Distribution
Diploma	9,599	31
Associate Degree	10,896	36
Baccalaureate	6,376	21
Master's	1,208	4
Doctorate	178	0.5
Other	2,348	8
Not Reported	33	Less than .1
TOTAL	30,638	101 ²

¹Denotes nurses having an active license.

²Percentage does not total 100% due to rounding.

In the Tennessee Board of Regent Study (1989), employers reported RN demand by highest nursing degree. Major findings from this portion of the study were:

1. The greatest increase in positions was at the master's level, an increase of 93% from 1988 to 1989.
2. Other position increases according to educational level were baccalaureate degree (44%), associate degree (28%), and diploma (27%).
3. Vacancy rates for 1989 were highest for baccalaureate nurses (13%), followed closely by diploma vacancies at 12% and associate degree vacancies at 11%. Although the greatest overall increase was in master's prepared nurses, the 1989 vacancy rate was only 6%.

National reports indicated that differences were found in the educational level of rural and urban nurses with rural nurses having lower levels of education than urban nurses. Of the rural nurses, 76% had diplomas or associate degrees as compared to 66% of urban nurses. Only 19.5% of rural nurses had a baccalaureate degree in nursing or a related field; whereas, 27% of urban nurses held the degree. Furthermore, only four percent of rural nurses held a graduate degree as compared to six percent of urban nurses (U.S. Department of Health and Human Services, 1988c).

Principal Positions of Registered Nurses in Inpatient Facilities. A variety of career opportunities were available to nurses within inpatient facilities. Hospitals offered a greater variety of positions than did nursing homes. Opportunities have varied from small to large

facilities and from urban to rural locations. Positions commonly found in rural and urban hospitals were administrators, supervisors, head nurses, general duty RNs, nurse practitioners, clinical specialists, and nurse anesthetists. Limited information was available concerning the overall impact of the nursing shortage on nursing positions and even less was available comparing rural and urban positions.

According to the National Sample Survey of Registered Nurses (U.S. Department of Health and Human Services, 1986), 5% of nurses held the position of administrator, and 12% held the position of supervisor or head nurse. In Tennessee only 3.5% of nurses were employed as administrators; however, 21% were in supervisor or head nurse positions (Tennessee Department of Health and Environment, 1988).

Nurse administrators were at the highest level of management, and supervisors and head nurses were at the middle management level. Nurse administrators and supervisors had been identified as being essential to the success of the nursing department. These nurses have continued to play a major part in the decision making activities of the facility. Considerable discussion had centered around the educational level that should be required for these nurses and what should be the appropriate degree. Graduate programs in nursing have had administrative tracks; however, a current trend has been to

establish alliances with Colleges of Business (U.S. Department of Health and Human Services, 1988a). The Secretary's Commission on Nursing found that 60% of hospitals indicated vacant head nurse positions (U.S. Department of Health and Human Services, 1988c).

General duty RNs were the first level positions for Registered Nurses. Individual roles were dependent upon the facility in which the person was employed. National data specific to general duty positions were not available; however, approximately 59% of Tennessee nurses were employed in these positions (Tennessee Department of Health and Environment, 1988).

The National Sample Survey of Registered Nurses reported nurse practitioners and nurse midwives together and indicated that they represented only about 1% of all employed Registered Nurses (U.S. Department of Health and Human Services, 1986). Of these, 82% were working in urban areas and 18% in rural areas. From 1977 to 1980, there was a decline in nurse practitioners in rural areas from 22% to 9.4%, which might have been reflective of more financially rewarding opportunities in urban areas (Staff Report to the Special Committee on Aging, United States Senate, 1988). Although statistics were not available, Kelly (1987) indicated that most nurse practitioners were employed in ambulatory care settings or in private practice. Tennessee statistics indicated that nurse practitioners constituted

1.4% of employed nurses and nurse midwives less than 1% (Tennessee Department of Health and Environment, 1988).

According to the National Sample Survey of Registered Nurses, approximately 2% of nurses were clinical nurse specialists. The majority, 73%, were employed in hospitals, 13% in ambulatory settings, and 8% in public health community agencies (U.S. Department of Health and Human Services, 1986). Typically, a clinical specialist's role within an institution has been a staff position that has allowed administrative as well as clinical functions and has brought a new perspective to patient care (U.S. Department of Health and Human Services, 1988c). Only about 1% of Tennessee nurses were in clinical specialist positions (Tennessee Department of Health and Environment, 1988).

National percentages for nurse anesthetists were not available; however, 2.4% of Tennessee nurses were in this position (Tennessee Department of Health and Environment, 1988). Nationally, 24,000 Registered Nurse anesthetists provided anesthesia services to more than 50% of patients undergoing anesthesia. In rural areas, nurse anesthetists provided 70% of anesthesia care (Staff Report to the Special Committee on Aging, United States Senate, 1988). Nurse anesthetists have been the sole providers of anesthesia care in the majority of rural hospitals and over 83% practiced in rural areas. In some isolated areas they have rotated between two to four hospitals. Although the effects of the

nursing shortage on these specialty nurses were not known, there has been concern about the potential supply of nurse anesthetists. Compounding the supply was the aging of the population as about 27% of nurse anesthetists were over 50 years of age. A shortage of nurse anesthetists could have a significant effect on the viability of the rural hospital (U.S. Department of Health and Human Services, 1988c).

The Tennessee Board of Regents (1989) reported RN demand according to principal positions assumed by Registered Nurses. The positions reported were administrative (including supervisors and head nurses), general duty, practitioner (including nurse practitioners and clinical specialists), and nurse anesthetists. Relevant results to this study follow:

1. The greatest percentage increases were reported for practitioners. Positions increased 10% between 1988 and 1989 and were projected to increase 49% and 67% respectively for 1992 and 1995. Further, the 1989 vacancy rate was 70%.

2. General duty positions increased 9% from 1988 to 1989. Projections for 1992 and 1995 indicated increases of 20% and 27%. The 1989 vacancy rate was 15%.

3. Administrative positions increased 4% from 1988 to 1989; however, future projections indicated increases of 12% by 1992 and 14% by 1995. The average vacancy rate for all administrative levels was 8% in 1989.

4. Nurse anesthetists positions increased 4% from 1988 to 1989. Future projections to 1992 and 1995 indicated increases of 13% and 31% respectively. The survey data might not reflect true demand as many nurse anesthetists are employed by private anesthesiology firms and would not be reflected in institutional totals.

Overall, nurses in rural hospitals have practiced in a variety of different roles. Nurses who practiced in rural hospitals have had greater breadth and scope of practice than did nurses in urban facilities and have often been called generalists due to the range of skills and knowledge that they possessed. In smaller rural hospitals, nurse were called upon to function in all practice areas, that is, medical, surgical, obstetrical, pediatric, and emergency departments even on the same shift (U.S. Department of Health and Human Services, 1988c).

Nursing homes have not had the wide array of positions available for nurses as reported in hospitals. Part of this trend has been due to the limited RN time per patient in these facilities, which has prohibited the delivery of direct patient care. In essence, less than 10% of direct patient care was given by RNs. Approximately 21% of Registered Nurses were in staff positions, and over one-half of the Registered Nurses were employed in some form of supervisory capacity such as charge nurse, head nurse, or supervisor. In addition, 17% held the position as director

or assistant director and 2% were administrators of facilities. Less than 1% were in positions as clinical specialists or nurse practitioners (U.S. Department of Health and Human Services, 1988c).

An analysis of the current supply of nurses available in Tennessee and in the nation revealed that nurses were practicing at different educational levels and in various positions. Due to the four year disparity in reporting for national and state data, direct comparisons could not be made. Overall, the supply of associate degree and baccalaureate degree nurses has continued to increase although diploma nurses have remained a significant part of the workforce.

The largest number of nurses were employed in general duty positions. Positions requiring advanced preparation continued to be in short supply both in the nation and the state. Rural areas have depended heavily upon nurse practitioners and nurse anesthetists, and indications were that these positions had been decreasing.

Future Supply: Nursing Programs

The Division of Research of the National League for Nursing annually has published statistics relating to admissions, enrollments, and graduations of students from state-approved RN schools of nursing. The data collected encompassed the academic year from August 1986 through July

1987 and are based on a 100% response rate (National League for Nursing, 1989).

As of 1988 (National League for Nursing, 1989), there were 1,465 basic RN programs that reflect different educational levels. Associate degree programs represented the greatest number of programs comprising 53% of the total programs. Baccalaureate degree constituted 32%, and diploma programs represented 14.3%. There has been a slight decline in the number of nursing programs over the past three years. The decline was due to decreases in the number of diploma programs as baccalaureate and associate degree programs have shown slight increases.

Table 4 reflects the 1987 percent change as compared to 1988 of admissions, enrollments, and graduations for all types of basic RN programs as reported by the League. The average of the overall decreases were noted in the total percentages. The greatest decreases seen were in diploma programs (National League for Nursing, 1989).

The enrollment of RNs returning to school to obtain a baccalaureate degree had remained relatively stable. In nursing higher education, graduations from doctoral and master's programs continued to increase at 3.5% and 15% respectively (National League for Nursing, 1989).

Table 4

Percent Change for Basic RN Programs From 1987 to 1988

	Admissions	Enrollments	Graduations
Diploma	-15	-16.4	-21.4
Associate	-4	+1.0	-6.8
Baccalaureate	-18	-9.8	-5.6
TOTAL	-10%	-5.6%	-8.4%
			+Increase -Decrease

In 1990, educational institutions in Tennessee that prepared nurses consisted of 4 diploma programs, 14 baccalaureate programs, and 17 associate degree programs. In addition, there were 3 programs that offered a master's degree in nursing, and 2 that had begun a doctoral program although graduates had not yet been produced. Enrollments in nursing programs that prepared candidates for initial licensure had been steadily decreasing from 6,491 in 1984 to 4,752 in 1988. In 1989, the enrollment increased to 5,193. This increase reflected the first upsurge in enrollment since 1985 (Tennessee Board of Nursing, 1990).

In 1989, the RN schools of nursing graduated 1,504 students that successfully passed the nurse licensure examination. The number of new licensees represented a decrease of 19% from licensees in 1985 (Tennessee Board of Nursing, 1989).

State and national figures indicated a steady decline in the production of Registered Nurses by nursing programs. However, the most recent Tennessee statistic related to enrollment indicated an increase from 1988. The largest number of graduates continued to be from associate degree programs.

Projections of Future Need: Supply and Demand

The Nursing Report, from the Sixth Report to the President and the Congress on the Status of Health Personnel in the United States (U.S. Department of Health and Human Services, 1988a), proposed supply and demand of nursing personnel according to educational levels for the years 2000, 2010, and 2020. Nurses with a baccalaureate and higher degrees were predicted to have the greatest imbalance between supply and demand. Requirements for the baccalaureate degree graduate continued to increase until the demand in the year 2010 was almost three times the supply. For nurses with graduate degrees, the demand was almost three times higher for all three periods of projections. For associate degree nurses, the supply was greater than the demand for the years 2000 and 2010; however, by 2010, the supply and demand were similar.

In the Tennessee Board of Regent Study (1989), projections were made for 1992 and 1995 for each of the RN educational levels. Table 5 shows the number of RNs at each

educational level in the respondent cohort and the number of projected and percentage increases for 1992 and 1995. By 1995, the disparity in numbers between associate degree and baccalaureate degree nurses has decreased considerably. Associate degree nurses continue to represent the largest number of nurses; however, nurses graduating at the baccalaureate level have increased three times the 1988 number. The greatest percentage increase is at the Master's degree level.

Table 5

Projected Educational Levels
for Registered Nurses in Tennessee

<u>Program</u>	<u>1988</u>	<u>1992</u>	<u>% Increase¹</u>	<u>1995</u>	<u>% Increase¹</u>
Diploma	1,595	2,052	29	2,074	30
Associate	2,190	3,722	70	3,900	78
Baccalaureate	1,380	2,759	100	3,064	122
Master's	137	550	301	656	379
Doctoral	2	14	600	27	250
TOTAL	5,304	9,097		9,721	

¹Percentage of increase since 1988

Summary

A comprehensive review of studies indicated that a nursing shortage has existed on the national and state level and has continued to progress. The nursing shortage in Tennessee has had similarities to the national reports.

With the severe imbalances between nurse supply and demand and the future projections shown in the Tennessee Board of Regent Study in 1989, Tennessee could have a shortage that might be worse than what has been reported nationally.

Major gaps have remained in data bases collected nationally and statewide. Assessment and analysis of the shortage have been difficult, and information has not been complete for policy decision making on the institutional, state, or national level. Furthermore, complex issues have surrounded the nursing shortage, and solutions have not appeared to be readily available.

The difficulties in a comprehensive analysis of the nursing shortage have been compounded by the employment patterns of Registered Nurses. RNs have been employed in a multitude of health care settings, in many specialty areas, in diverse positions, at different educational levels, and in rural and urban areas of the state and nation. Little uniformity existed in educational requirements for particular positions, specialties, and in the various health care settings.

Historically, nursing shortages were most acute and remained chronic in nursing homes and in rural areas. National studies indicated that vacancy rates were highest in nursing homes; however, data comparing rural and urban areas have been inadequate. Information about nurse positions and specific educational levels was not available.

The state of Tennessee has vigorously pursued supply and demand issues relative to educational levels since 1984; however, in view of significant changes in nurse supply and demand, major areas need additional consideration and analysis. Additional research should focus on comparison of rural and urban areas of the state with facility specific data that relate to nurse positions and educational levels. Comprehensive Tennessee data will be an additional resource in analyzing the national nursing shortage and will provide specific information for Tennessee administrators and policy makers.

CHAPTER 3

Research Methodology

Introduction

Historically, many methods and techniques have been employed to assess, evaluate, and predict nurse demand. One definition of nurse demand is based on the need for RNs according to marketplace need. Employers measure a nursing shortage by a combination of several measures including vacancy rates, recruitment time, hospital bed closings, use of temporary agency nurses, and opinions of nurse administrators. The most common, objective, and available measure of labor shortages is vacancy rate (U.S. Department of Health and Human Services, 1988c). The method used to measure nurse demand in this study was the vacancy rate and predictions by employers as to the future need for Registered Nurses.

Research Design

This study is a secondary analysis of data collected as a part of a larger research project conducted by the Tennessee Board of Regents (TBR) Task Force on Nurse Supply and Demand. The Tennessee Board of Regents study (1989) analyzed data from the Tennessee Department of Health and Environment, the State Board of Nursing, and surveyed all licensed health care facilities in Tennessee. A total of

741 facilities were surveyed, and 403 or 54% provided usable responses. Prior to data entry and upon preliminary analysis of the returns, 11 ambulatory surgical centers were eliminated due to their prior inclusion in the responses of their affiliate hospitals. This decision left a respondent cohort of 392 facilities of 730, a response rate of 54%.

The TBR study was designed to collect data that would be useful in making nursing programing decisions based on employer need. Although comprehensive in nature and providing valuable information about the overall nursing shortage, the TBR study provided mainly statewide data by the state's 13 developmental districts (Tennessee Board of Regents, 1989).

The decision to employ secondary analysis in this present study was based on the national and state need for the data to be analyzed relative to a comparison of rural and urban nursing homes and hospitals. According to national data, the nursing shortage appears to cut across all health care settings and geographical areas (U.S. Department of Health and Human Services, 1988c); however, a more detailed analysis is not available for Tennessee. Issues, such as RN positions and duties and required educational levels are complex and need to be examined specifically to each health care agency and differentiated according to rural and urban areas of the state. Federal and state policy makers, health care agency administrators,

and educational administrators require greater specificity in order to make important decisions that have implications for the health care needs of Tennesseans. In addition, the study would add to the body of knowledge about the nursing shortage on the national level.

Secondary research is beginning to assume a more prominent role in contemporary research. Secondary research provides an efficient and cost-effective use of data that has been previously collected. In addition to financial and time constraints of the researcher, other issues, such as the time involved on the part of the responder to participate in a study, make secondary analysis an even more viable option (Kiecolt & Nathan, 1985; Stewart, 1984).

A comparative design was selected for this study. Current and future nurse demand in hospitals and nursing homes were compared according to rural and urban areas of Tennessee. Nurse demand by principal duty or position and educational level will be analyzed for each facility type.

The Population

The population list from the original TBR study was obtained from the 1988 directories of hospitals and nursing homes obtained from the Board for Licensing Health Care Facilities and a list of the Veterans Administration hospitals in Tennessee. The population selected for secondary analysis was licensed hospitals, Veterans

Administration Hospitals (VA), and nursing homes. Of the 154 hospitals surveyed, 97 of the hospitals responded for a response rate of 63%. Of the 212 nursing homes surveyed, 152 responded for a response rate of 72%. Table 6 shows the pattern of responses by facility type located in rural and urban areas of the state. All types of facilities had response rates of 59% or higher.

Table 6

Pattern of Responses By Facility and By Rural/Urban

Facility	Total	Respondents	Non-Respondents	% Response
Urban Hospitals	85	50	35	59
Rural Hospitals	69	47	22	68
Urban Nursing Homes	112	81	31	72
Rural Nursing Homes	96	71	25	74

Responses by respondents and nonrespondents were categorized according to the size of the facility, defined by the number of patient beds. The percentage response was calculated for each facility size. Table 7 shows the response rates by size of the urban and rural hospitals. All response rates are 56% or higher. Table 8 indicates the response rates

by size of the urban and rural nursing homes. All response rates are 64% or higher.

Table 7

Response Rate By Size¹ of Hospital

<u>TYPE</u>				²
Size	Total	Respondents	Non-Respondents	Response ²
<u>URBAN</u>				
>50	10	6	4	60
50 - 99	15	9	6	60
100 - 199	22	13	9	59
200 - 299	12	7	5	58
300 - 399	9	5	4	56
400 - 499	3	2	1	67
500	14	8	5	57
<u>RURAL</u>				
>50	12	9	3	75
50 - 99	37	24	13	65
100 - 199	16	11	5	69
200 - 299	4	3	1	75
300 - 399	0	0	0	0
400 - 499	0	0	0	0
500	0	0	0	0

¹Number of beds in facility

²Percent response for each size

Table 8

Response Rate By Size¹ of Nursing Home

<u>TYPE</u>				
Size	Total	Respondents	Non-Respondents	% Response ²
<u>URBAN</u>				
>50	15	10	5	67
50 - 99	33	21	12	64
100 - 199	50	37	13	74
200 - 299	9	8	1	89
300 - 399	2	2	0	100
400 - 499	0	0	0	0
500	3	3	0	100
<u>RURAL</u>				
>50	12	9	3	75
50 - 99	40	28	12	70
100 - 199	42	32	10	76
200 - 299	2	1	0	100
300 - 399	0	0	0	0
400 - 499	0	0	0	0
500	0	0	0	0

¹Number of beds in facility²Percent response for each size

Instrument

A survey questionnaire (Appendix C) was used to collect data for budgeted filled and vacant positions for 1988 and 1989 and for projections for 1990, 1992, and 1995. The instrument was organized into four principal categories of nurse demand: 1. principle duty or position, 2. level of professional training, 3. nursing degree, and 4. clinical area of practice. For each section of the questionnaire, respondents were asked to report totals in full-time equivalents (FTE) and to omit any persons who were utilized "on call" or as needed. For sections that listed a number of nursing positions, respondents were cautioned to report each person only once and for their primary position. Projections were to be made based on the assumption that there would be full availability of qualified personnel.

The questionnaire content was developed according to research questions identified by the Task Force members. Several sessions were held with the entire Task Force in which the problems to be addressed were identified. The Task Force members represented all of the TBR institutions with existing or planned RN nursing programs, a doctoral intern, a representative from the TBR System's LPN programs, two TBR staff members, and representatives from the Tennessee Higher Education Commission and University of Tennessee System. A subcommittee developed the

questionnaire, and drafts were sent to the Task Force periodically for feedback and for final approval.

A small pilot study, consisting of four representative facility types, was conducted in East Tennessee. The pilot study was limited in nature due to time constraints imposed on the overall study. The respondents were asked to fill out the questionnaire, indicate the length of time it took to complete the questionnaire, and make suggestions for revisions. The questionnaire was subsequently revised to include the suggestions of the pilot participants as well as the advice of expert consultants and computer analysts at East Tennessee State University and at the Tennessee Board of Regents office. Major revisions included altering the length of the original questionnaire, providing more explicit directions, and using a format that would provide greater ease in responding to each item. A grid format was adopted that requested the same type of data for four major categories of nursing personnel.

Data Collection

The survey instrument and a transmittal letter were sent to both the Chief Executive Officer and to the Nursing Service Executive Officer. The transmittal letters can be found in Appendix D. The nurse was identified as the responsible respondent and a postpaid return envelope was provided. Vigorous follow-up activities were initiated, and

a reminder letter was sent after two weeks. A Task Force member in each developmental district was assigned follow-up activities in their area. The TBR staff sent lists of non-respondents each week to Task Force members. Various activities, including personal telephone calls and additional reminder letters, were utilized. After four weeks, the presidents of local TBR institutions phoned non-respondents in their developmental district.

Analysis of the Data

The survey data from the Tennessee Board of Regent Study were encoded and validated by a commercial data entry firm. Computer analysis of data was performed by the research staff of the Tennessee Board of Regents. Data analysis followed the four major categories represented on the survey instrument. Nurse demand was determined by calculation of vacancy rates from the budgeted, filled and vacant, positions for 1988 and 1989. The percent of change from 1988 to 1989 was examined to determine if nurse demand appeared to be increasing.

The balance between nurse supply and demand was determined by comparing nurse supply and demand for 1988 based on the survey respondents. Nurse supply data was obtained from the Department of Health and Human Services and the Tennessee Board of Nursing.

In this present study, the raw data from the TBR study were utilized. The county codes were labeled according to metropolitan or non-metropolitan area. Subsequently, the data were analyzed according to selected facility type, hospitals and nursing homes. Comparisons of nurse demand were made between rural and urban hospitals and nursing homes. Vacancy rates were calculated; percentage increases were noted from 1988 to 1989. Additional percentage increases were calculated by the number of nurses required in each category from 1988 to 1989, and projections made from 1988 to 1992, and 1988 to 1995.

In this present study the county codes were used to designate a rural or urban location for each hospital and nursing home. (Refer to the Map in Appendix A for rural and urban designations.) Tennessee has seven metropolitan statistical areas (MSAs), which comprise 26 counties (Vickers & Wood, 1989). These MSAs are defined as the urban areas of Tennessee and are listed in Appendix B. Approximately 85 hospitals and 112 nursing homes are located in these counties. The other 69 counties in Tennessee are defined as non-metropolitan statistical areas or rural. Approximately 69 hospitals and 96 nursing homes are located in these rural counties.

The responses were analyzed according to facility type and geographic location, rural or urban.

Each hypothesis was tested and the level of significance was set at .05. The data were analyzed according to: 1. the vacancy rate for 1988 and 1989, 2. the percent of increase in vacancy rate from 1988 to 1989, 3. the proportion of personnel according to educational level, 4. the percent of increase in projected positions from 1988 to 1992, and 5. the percent of increase in projected positions from 1988 to 1995.

The statistical test employed to test the null hypotheses was the Mann Whitney U. This test is one of the best known nonparametric tests to determine the significant difference between two independent samples and compares favorably to the t test. The Mann Whitney U considers both the central tendency and the distribution of scores. This test assumes ordinal level data, and for sample sizes above 20 a z value is reported (Champion, 1981).

The observed z value will be compared to table of areas of the normal curve, the critical value of z, to determine if there is a significant difference at the .05 level for a two-tailed test (Champion, 1981).

Summary

This study was a secondary analysis of survey data collected in a larger research project by the Tennessee Board of Regents. The current and projected demand for nurses was analyzed by nurse position and educational level

utilizing the Mann Whitney U test for the significant difference between two independent samples. Comparisons were made between rural and urban hospitals and nursing homes.

CHAPTER 4

Analysis of Data

This study is a secondary analysis of data that were collected as part of a larger research project conducted by the Tennessee Board of Regents Task Force on Nurse Supply and Demand. This present study compared current and future nurse demand in rural and urban hospitals and nursing homes according to RN budgeted positions, RN positions by principal duty, and RN positions by educational level. Of the 154 hospital administrators surveyed, 97 (63%) responded. Of the 212 nursing home administrators surveyed, 52 (72%) responded.

Manipulation of the Data

Information from the questionnaires that provided usable responses were coded and entered into the SPSS/PC software package for data manipulation. The questionnaires had been coded according to metropolitan or non-metropolitan locations and by facility type, hospital or nursing home. Each null hypothesis was tested with a two-tailed test and the level of significance set at .05.

Due to the nature of the questionnaire, all sections and component parts of each section of the questionnaire did not necessarily apply to every facility. Consequently, there was a difference in the response rate to each variable. Respondents were asked to include only those

positions for which there was a budgeted position in their facility. Some respondents used a zero; others left the section of the grid blank. For questionnaires that were otherwise complete, the assumption was made that blank spaces indicated no positions and were coded as zeroes for data analysis. These decisions were made by the researcher and were consistent across all questionnaires. If there was any question as to whether the spaces were missing data or zeroes, the assumption was made that it was missing data.

Current nurse demand was measured by calculating vacancy rates for 1988 and for 1989. The Mann Whitney U test was used to determine if there was a significant difference in the vacancy rates for 1988 and for 1989 between rural and urban hospitals and between rural and urban nursing homes. The change in the vacancy rate from 1988 to 1989 was calculated, and the Mann Whitney U test was used to determine if there was a significant difference in the change in percentage points in vacancy rates from 1988 to 1989.

Nurse employers projected future demand for positions for 1992 and 1995. The Mann Whitney U Test was used to determine if there was a significant difference in projected positions from 1988 to 1992 and from 1988 to 1995 between rural and urban hospitals and between rural and urban nursing homes.

In addition to the manipulations described, the variable, RN position according to educational level, was further analyzed by determining what proportion of RNs at each level were budgeted for 1988 and for 1989. The Mann Whitney U test was used to determine if there was a significant difference in the proportion of positions at each educational level between rural and urban hospitals for 1988 and 1989. The Mann Whitney U Test was used to determine if there was a significant difference in the change in the proportions of RNs from 1988 to 1989. Further, the changes in proportions of personnel from 1988 to 1992 and 1995 were analyzed by Mann Whitney U Test to determine if there was a significant difference in projections between rural and urban hospitals that would affect the proportion of each educational level required.

Data Analysis

Registered Nurse Budgeted Positions

Nurse demand. Hypotheses one, two, and three all involve Registered Nurse budgeted positions in inpatient facilities in rural and urban areas. The first null hypothesis stated that there would be no difference in RN demand between rural and urban inpatient facilities (hospitals and nursing homes). The null hypothesis was retained. There was not a significant difference in the

vacancy rate for 1988 ($\underline{z} = -1.19$). The mean vacancy rate was .13 in rural facilities ($n = 108$), compared to a mean of .09 in urban facilities ($n = 117$). (See Table 9).

There was not a significant difference in the vacancy rate for 1989 ($\underline{z} = -.25$). Both the rural ($n = 114$) and urban ($n = 126$) means were .13. There was not a significant difference between the change in vacancy rates for rural and urban facilities ($\underline{z} = -1.75$). The mean vacancy rate change for rural facilities was $-.00$ ($n = 108$) which indicated a slight decrease in the vacancy rate between 1988 and 1989; the urban mean was .03 ($n = 116$). RN vacancy rates for 1988 and 1989 were not significantly higher between rural and urban facilities. In 1988 the rural vacancy rate was higher; however, in 1989 the vacancy rates were identical. There was not a significant difference in the change in vacancy rates from 1988 to 1989 although the urban facilities experienced a greater increase.

The second null hypothesis stated that there would be no difference in RN demand between rural and urban hospitals. There was a significant difference in the vacancy rate for 1988 in that nurse demand was greater in rural hospitals ($\underline{z} = 2.24$). The rural mean was .17 ($n = 43$); the mean in urban hospitals was .11 ($n = 44$). There was not a significant difference in the vacancy rates for 1989 ($\underline{z} = -1.58$). The rural mean was .16 ($n = 46$); the urban mean was .11 ($n = 47$). There was not a significant

Table 9

Registered Nurse Demand

Variable	Inpatient Facilities				Hospitals				Nursing Homes			
	Rural	Urban	U	Z	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Vacancy Rate</u>			5789.50	-1.19 NS			683.5	-2.24*			2368.00	-0.03 NS
Mean	.13	.09			.17	.11			.11	.08		
Median	.00	.00			.14	.08			.00	.00		
N	108	117			43	44			65	73		
Mean Rank	117.89	108.48			50.10	38.03			69.43	69.56		
<u>1989 Vacancy Rate</u>			7054.50	-.25 NS			876.00	-1.58 NS			2497.00	-.87 NS
Mean	.13	.13			.16	.11			.10	.14		
Median	.07	.05			.10	.09			.00	.00		
N	114	126			46	47			68	79		
Mean Rank	121.62	119.49			51.46	42.64			71.23	76.39		
<u>Vacancy Rate Change¹</u>			5511.5	-1.75 NS			730	-1.86 NS			2324.00	-.10 NS
Mean	-.00	.03			-.01	.01			.00	.03		
Median	.00	.00			.00	.001			.00	.00		
N	108	116			43	44			65	72		
Mean Rank	105.53	118.99			38.98	48.91			69.25	68.78		

¹Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

difference in the change in vacancy rate from 1988 to 1989 ($\underline{z} = -1.86$). The mean percentage point change was $-.01$ ($n = 43$) for rural hospitals; the urban mean was $.01$ ($n = 44$) (See Table 9).

RN vacancy rates for 1988 were significantly higher in rural hospitals; however, in 1989 there was not a significant difference. There was no significant difference in the percentage point change in vacancy rates from 1988 to 1989.

The third null hypothesis stated that there would be no difference in RN demand between rural and urban nursing homes. The null hypothesis was retained. There was not a significant difference in the vacancy rate for 1988 between rural and urban nursing homes ($\underline{z} = -.03$). The mean vacancy rate for rural nursing homes was $.11$ ($n = 65$); the urban mean was $.08$ ($n = 73$). There was not a significant difference in the vacancy rates for 1989 between rural and urban nursing homes ($\underline{z} = -.87$). The mean in rural homes was $.10$ ($n = 68$); the mean in urban nursing homes was $.14$ ($n = 79$). There was not a significant difference in the change in vacancy rates from 1988 to 1989 ($\underline{z} = -.10$). The mean change for rural was $.00$ ($n = 65$); the mean for urban was $.03$ ($n = 72$) (See Table 9).

RN vacancy rates were higher for rural nursing homes in 1988; however, in 1989, the rural rate had decreased

slightly and the urban rate was higher. There was no significant difference in the change in vacancy rates.

Projected Changes for 1992 and 1995. The fourth null hypothesis was that there would be no difference in RN projections for 1992 between rural and urban hospitals. The null hypothesis was retained ($z = -1.23$). The mean number of positions for rural hospitals was 7.87 ($n = 39$), and for urban hospitals a mean of 11.60 ($n = 39$). Urban hospitals projected a greater number of positions for 1992 (See Table 10).

The fifth null hypothesis was that there would be no difference in RN projections for 1992 between rural and urban nursing homes. The null hypothesis was retained ($z = -.62$). There was a mean of 1.08 ($n = 58$) in rural nursing homes; the mean number of positions in urban nursing homes was .78 ($n = 67$). Rural nursing homes projected a greater number of positions for 1992 (See Table 10).

The sixth null hypothesis was that there would be no difference in RN projections for 1995 between rural and urban hospitals. The null hypothesis was retained ($z = -1.48$). The mean number of positions for rural hospitals was 11.71 ($n = 38$); the mean number of positions for urban hospitals was 23.98 ($n = 39$). Urban hospitals projected a greater increase for 1995 (See Table 10).

Table 10

Projected Changes for Registered Nurses

Variable	Hospitals				Nursing Homes			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			637.50	-1.23 NS			1823.50	-.62 NS
Mean	7.87	11.60			1.08	.78		
Median	3.00	5.00			1.00	.00		
N	39	39			58	67		
Mean Rank	36.35	42.65			65.06	61.22		
<u>1995 Projections</u>			595.50	-1.48 NS			1724.00	-.66 NS
Mean	11.71	23.98			1.23	.97		
Median	4.50	10.50			1.00	.25		
N	38	39			56	66		
Mean Rank	35.17	42.73			63.71	59.62		

¹ Change from 1988 to 1989
 NS - Not Significant

The seventh null hypothesis was that there would be no difference in RN projections for 1995 between rural and urban nursing homes. The null hypothesis was retained ($\underline{z} = -.66$). The mean number of positions for 1995 for rural nursing homes was 1.23 ($n = 56$); the urban mean number of positions for 1995 was .97 ($n = 66$). Rural nursing homes had predicted a greater number of positions from 1988 to 1995 (See Table 10).

Registered Nurse Positions in Hospitals According to Principal Duty

Nurse Demand. The eighth null hypothesis stated that there would be no difference in RN demand by principal duty between rural and urban hospitals. Each principal duty was analyzed separately and results are presented in Table 11.

1. Administrator--There was no difference in the 1988 vacancy rate ($\underline{z} = -.25$). The mean vacancy rate for rural hospitals was .03 ($n = 39$); the urban mean was .03 ($n = 47$). There was no significant difference in the 1989 vacancy rate ($\underline{z} = -.65$). The rural mean was .02 ($n = 42$); the urban mean was .03 ($n = 48$). There was no significant difference in the change in vacancy rate from 1988 to 1989 ($\underline{z} = -.10$). The mean vacancy rate change for rural hospitals was $-.01$ ($n = 39$), and for urban hospitals the mean was $.00$ ($n = 47$).

2. Supervisor--There was no significant difference in the 1988 vacancy rate with a \underline{z} of -1.16 . The rural mean was

Table 11

Registered Nurse Demand by Position in Hospitals

Variable	Administrator		Supervisor		Head Nurse		z
	Rural	Urban	Rural	Urban	Rural	Urban	
<u>1988 Vacancy Rate</u>		905.00		708.50		576.50	-1.16 NS
Mean	.03	.03	.09	.05	.13	.06	
Median	.00	.00	.00	.00	.00	.00	
N	39	47	38	42	29	43	
Mean Rank	43.21	43.74	42.86	38.37	38.12	35.41	
<u>1989 Vacancy Rate</u>		973.00		789.50		665.50	-.43 NS
Mean	.02	.03	.07	.05	.17	.07	
Median	.00	.00	.00	.00	.00	.00	
N	42	48	40	41	31	44	
Mean Rank	44.67	46.23	41.76	40.26	38.53	37.63	
<u>Vacancy Rate Change¹</u>		874.50		691.00		59.5	-1.34 NS
Mean	-.01	.00	-.02	-.00	.02	.02	
Median	.00	.00	.00	.00	.00	.00	
N	39	47	38	41	28	43	
Mean Rank	42.42	44.39	37.68	42.15	36.25	35.84	

¹ Change from 1988 to 1989

NS - Not Significant

Table 11 (Cont'd)

Registered Nurse Demand by Position in Hospitals

Variable	General Duty		Anesthetist	
	Rural	Urban	U	Z
<u>1988 Vacancy Rate</u>			751.00	-1.67 NS
Mean	.18	.10		
Median	.16	.09		
N	42	45		
Mean Rank	48.62	39.69		
<u>1989 Vacancy Rate</u>			805.00	-1.98*
Mean	.20	.11		
Median	.13	.10		
N	45	47		
Mean Rank	52.11	41.13		
<u>Vacancy Rate Change¹</u>			895.50	-.25 NS
Mean	.02	.01		
Median	.00	.00		
N	42	44		
Mean Rank	42.82	44.15		

¹ Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

.09 (n = 38); the urban mean was .05, (n = 42). There was no significant difference in the 1989 vacancy rate ($\underline{z} = -.43$). The mean for rural hospitals was .07 (n = 40); the mean for urban hospitals was .05 (n = 41). There was no significant difference in the change in vacancy rate from 1988 to 1989 ($\underline{z} = -1.34$). The rural mean vacancy rate change was $-.02$ (n = 38). The urban mean was $-.00$ (n = 41).

3. Head Nurse--There was no significant difference in the vacancy rate for 1988 ($\underline{z} = -.66$). The mean for rural hospitals was .13 (n = 29); the mean for urban hospitals was .06, (n = 43). For 1989 there was no significant difference in the vacancy rate in rural hospitals ($\underline{z} = -.20$). The mean for rural hospitals was .17 (n = 31); the urban vacancy rate mean was .07 (n = 44). There was not a significant difference in the change in vacancy rate from 1988 to 1989 ($\underline{z} = -.10$). The rural mean was .02 (n = 28); the urban mean was .02 (n = 43).

4. General Duty RN--There was not a significant difference in the vacancy rate for 1988 ($\underline{z} = -1.67$). The mean vacancy rate for rural hospitals was .18 (n = 42); the urban mean was .10 (n = 45). There was a significant difference in rural hospitals in 1989 ($\underline{z} = -1.98$). The mean in rural hospitals was .20 (n = 45); the urban mean was .11 (n = 47). There was not a significant difference in the change in vacancy rate from 1988 to 1989 ($\underline{z} = -.25$). The

rural mean vacancy rate change was .02 (n = 42); the urban mean was .01 (n = 44).

5. Nurse Practitioner--The null hypothesis could not be tested due to insufficient cases. Rural hospitals did not have budgeted positions for nurse practitioners in 1988; urban hospitals reported six positions. For 1989 rural hospitals reported one position compared to eight positions in urban hospitals.

6. Clinical Specialist--The null hypothesis could not be tested because rural hospitals did not have budgeted positions for this particular duty in 1988 and 1989. Urban hospitals reported 18 positions in 1988 and 20 in 1989.

7. Nurse Anesthetist--There was no significant difference in 1988 ($\underline{z} = -1.40$). The rural mean vacancy rate was .02 (n = 21); the urban mean was .03 (n = 14). There was no significant difference in 1989 ($\underline{z} = -.16$). The rural mean was .12 (n = 26); the urban mean was .04 (n = 15). There was no significant difference in the vacancy rate changes from 1988 to 1989 ($\underline{z} = -.60$). The mean vacancy rate change in rural hospitals was .09 (n = 21); the urban mean was .02 (n = 14).

Registered Nurse administrative positions, administrator, supervisor, and head nurse, did not show a significant difference in 1988 and 1989 vacancy rates. The vacancy rates were greater for rural hospitals with the exception of the administrative position. Vacancy rate

changes were greater for urban areas with the exception of the head nurse position. The only position showing a significant difference was the general duty position for rural areas in 1989.

Projected Changes for 1992 and 1995. The ninth null hypothesis stated that there was no difference in Registered Nurse demand by principal duty or position projected for 1992 between rural and urban hospitals. Each position was analyzed separately and results are presented in Table 12.

1. Administrator--The null hypothesis was retained ($\underline{z} = -.92$). The mean number of projections for rural areas was .00 ($n = 40$); the urban mean was .06 ($n = 44$).

2. Supervisor--The null hypothesis was retained ($\underline{z} = -.74$). The rural mean was .25 ($n = 40$); the urban mean was .05 ($n = 42$).

3. Head Nurse--The null hypothesis was retained ($\underline{z} = -1.91$). The rural mean was .28 ($n = 39$); the urban mean was 1.00 ($n = 41$).

4. General Duty Nurse--This null hypothesis was retained ($\underline{z} = -1.73$). The mean for rural hospitals was -.16 ($n = 39$); urban hospitals had a mean of 9.56 ($n = 37$).

5. Nurse Practitioner--The null hypothesis was retained ($\underline{z} = -1.14$). The rural mean was .03 ($n = 39$); the urban mean was .26 ($n = 42$).

Table 12

Projected Changes¹ for Registered Nurses in Hospitals

Variable	Administrator				Supervisor				Head Nurse			
	Rural	Urban	U	z	Rural	Urban	U	z	Rural	Urban	U	z
<u>1992 Projections</u>			803.50	-.92 NS			769.00	-.74 NS			618.50	-1.91 NS
Mean	.00	.06			.25	.05			.28	1.00		
Median	.00	.00			.00	.00			.00	.00		
N	40	44			40	42			39	41		
Mean Rank	40.59	44.24			39.72	43.19			35.86	44.91		
<u>1995 Projections</u>			804.00	-.88 NS			792.50	-.49 NS			618.00	-1.92 NS
Mean	.03	.08			.08	.09			.41	1.00		
Median	.00	.00			.00	.000			.00	.00		
N	40	44			40	42			39	41		
Mean Rank	40.60	44.23			40.31	42.63			35.85	44.93		

¹ Change in positions from 1988
 NS - Not Significant

(table continues)

Table 12 (Cont'd.)

Projected Changes¹ for Registered Nurses in Hospitals

Variable	General Duty				Anesthetist			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			555.50	-1.73 NS			771.00	-.13 NS
Mean	-.16	9.56			.10	.01		
Median	2.00	5.00			.00	.00		
N	39	37			39	40		
Mean Rank	34.24	42.99			40.23	39.78		
<u>1995 Projections</u>			502.50	-2.28*			735.50	-.64 NS
Mean	2.59	20.36			.30	.09		
Median	3.00	9.00			.00	.00		
N	39	37			39	40		
Mean Rank	32.88	44.42			41.14	38.89		

¹Change in positions from 1988

*Significant at the .05 level, two-tailed test

NS - Not Significant

(table continues)

Table 12 (Cont'd.)

Projected Changes¹ for Registered Nurse Demand in Hospitals

Variable	Nurse Practitioner				Clinical Specialist			
	Rural	Urban	U	z	Rural	Urban	U	z
<u>1992 Projections</u>			760.00	-1.14 NS			633.50	-2.28*
Mean	.03	.26			.18	.95		
Median	.00	.00			.00	.00		
N	39	42			39	42		
Mean Rank	39.49	42.40			36.24	45.42		
<u>1995 Projections</u>			740.50	-1.43 NS			627.00	-2.22*
Mean	.03	.33			.33	1.27		
Median	.00	.00			.00	.00		
N	39	42			39	42		
Mean Rank	38.99	42.87			36.08	45.57		

¹Change in positions from 1988

*Significant at the .05 level, two-tailed test

NS - Not Significant

6. Clinical Specialist--The null hypothesis was rejected ($\underline{z} = -2.28$). The mean for rural hospitals was .18 (n = 39); the urban mean was .95 (n = 42).

7. Nurse Anesthetist--The null hypothesis was retained ($\underline{z} = -.13$). The mean for rural hospitals was .10 (n = 39); the urban mean was .01 (n = 40).

For this hypothesis the only significant difference reported was for the clinical specialist position indicating a greater number of positions projected for urban areas. With the exception of the nurse anesthetist, all other positions showed greater increases in the urban hospitals.

The tenth null hypothesis stated that there was no difference in Registered Nurse demand projected for 1995 between rural and urban hospitals. Each position was analyzed separately and results are presented in Table 12.

1. Administrator--The null hypothesis was retained ($\underline{z} = -.88$). The rural mean was .03 (n = 40); the urban mean was .08 (n = 44).

2. Supervisor--The null hypothesis was retained ($\underline{z} = -.49$). The mean for rural hospitals was .08 (n = 40); the mean for urban hospitals was .09 (n = 42).

3. Head Nurse--The null hypothesis was retained ($\underline{z} = -1.92$). The mean for rural areas was .41 (n = 39); the urban mean was 1.00 (n = 41).

4. General Duty Nurse--The null hypothesis was retained ($z = -2.28$). The mean for rural areas was 2.59 ($n = 39$); the urban mean was 20.36 ($n = 37$).

5. Nurse Practitioner--The null hypothesis was retained ($z = -1.43$). The mean for rural areas was .03 ($n = 39$); the urban mean was .33 ($n = 42$).

6. Clinical Specialist--The null hypothesis was rejected ($z = -2.22$). The mean for rural areas was .33 ($n = 39$); the urban mean was 1.27 ($n = 42$).

7. Nurse Anesthetist--The null hypothesis was retained ($z = -.64$). The mean for rural hospitals was .30 ($n = 39$); the urban mean was .09 ($n = 40$).

For this hypothesis the clinical specialist position was the only position for which a significant difference was reported for 1988 and 1989 vacancy rates, and the difference was greatest for urban hospitals. All other positions, with the exception of the nurse anesthetist, indicated greater future needs in the urban hospitals.

Registered Nurse Positions in Nursing Homes According to Principal Duty

The eleventh null hypothesis stated that there was no difference in RN demand by principal duty or position between rural and urban nursing homes. The duties were analyzed separately and the results are presented in Table 13.

Table 13

Registered Nurse Demand by Position in Nursing Homes

Variable	Administrator				Supervisor			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Vacancy Rate</u>			2263.00	-1.52 NS			1061.50	-.68 NS
Mean	.02	.00			.04	.01		
Median	.00	.00			.00	.00		
N	64	73			43	51		
Mean Rank	70.14	68.00			48.31	46.81		
<u>1989 Vacancy Rate</u>			2470.00	-.92 NS			1191.00	-.36 NS
Mean	.00	.01			.05	.02		
Median	.00	.00			.00	.00		
N	65	77			45	54		
Mean Rank	71.00	71.92			50.53	49.56		
<u>Vacancy Rate Change¹</u>			2232.00	-1.77 NS			1082.00	-.28 NS
Mean	-.02	.01			.02	.01		
Median	.00	.00			.00	.00		
N	64	73			43	51		
Mean Rank	67.38	70.42			47.16	47.78		

¹ Change from 1988 to 1989

NS - Not Significant

(table continues)

Table 13 (Cont'd.)

Registered Nurse Demand by Position in Nursing Homes

Variable	Head Nurse				General Duty			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Vacancy Rate</u>			610.00	-.36 NS			553.50	-.58 NS
Mean	.08	.06			.20	.16		
Median	.00	.00			.00	.00		
N	30	42			29	41		
Mean Rank	37.17	36.02			36.91	34.50		
<u>1989 Vacancy Rate</u>			672.00	-.65 NS			749.50	-.36 NS
Mean	.09	.12			.26	.26		
Median	.00	.00			.10	.00		
N	30	48			32	49		
Mean Rank	37.90	40.50			42.08	40.30		
<u>Vacancy Rate Change</u> ¹			560.00	-.38 NS			562.50	-.74 NS
Mean	-.02	.01			.01	.04		
Median	.00	.00			.00	.00		
N	28	41			28	41		
Mean Rank	34.50	35.34			33.30	36.16		

¹Change from 1988 to 1989
 NS - Not Significant

1. Administrator--The null hypothesis was retained. There was no significant difference in the 1988 vacancy rate ($\underline{z} = -1.52$). The mean for the rural nursing homes was .02 ($n = 64$); the urban mean was .00 ($n = 73$). There was no significant difference in 1989 ($\underline{z} = -.92$). The mean for rural homes was .00 ($n = 65$); the urban mean was .01 ($n = 77$). There was no significant difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -1.77$). The mean for rural nursing homes was $-.02$ ($n = 64$); the urban mean was .01 ($n = 73$).

2. Supervisor--The null hypothesis was retained. There was no difference in the vacancy rate in 1988 ($\underline{z} = -.68$). The mean for rural hospitals was .04 ($n = 43$); the urban mean was .01 ($n = 51$). There was no difference in the vacancy rate for 1989 ($\underline{z} = -.36$). The mean for rural was .05 ($n = 45$); the urban mean was .02 ($n = 54$). There was no difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -.28$). The rural mean was .02 ($n = 43$); the urban mean was .01 ($n = 51$).

3. Head Nurse--The null hypothesis was retained. There was no significant difference in the vacancy rate in 1988 ($\underline{z} = -.36$). The rural mean was .08 ($n = 30$); the urban mean was .06 ($n = 42$). There was no significant difference in the vacancy rate in 1989 ($\underline{z} = -.65$). The rural mean was .09 ($n = 30$); the urban mean was .12 ($n = 48$). There was no significant difference in the vacancy rate change from 1988

to 1989 ($\underline{z} = -.38$). The rural mean was $-.02$ ($n = 28$); the urban mean was $.01$ ($n = 41$).

4. General Duty Nurse--The null hypothesis was retained. There was no significant difference in the vacancy rate in 1988 ($\underline{z} = -.58$). The mean for rural nursing homes was $.20$ ($n = 29$); the urban mean was $.16$ ($n = 41$). There was no significant difference in the vacancy rate in 1989 ($\underline{z} = -.36$). The mean for rural nursing homes was $.26$ ($n = 32$); the urban mean was $.26$ ($n = 49$). There was no significant difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -.74$). The rural mean was $.01$ ($n = 28$). The urban mean was $.04$ ($n = 41$).

Registered Nurse positions by principal duty in nursing homes did not show a significant difference in vacancy rates or vacancy rate change between rural and urban locations for any position.

Registered Nurse Positions According to the Proportion at Each Educational Level in Hospitals

Current Budgeted Positions. The twelfth null hypothesis stated that there would be no difference in the proportion of the Registered Nurses prepared at different educational levels between rural and urban hospitals. Each educational level was examined separately and the results are presented in Table 14.

Table 14

Proportion of Registered Nurses by Educational Level in Hospitals

Variable	Diploma				Associate				Baccalaureate			
	Rural	Urban	U	Z	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Proportion</u>			370.50	-1.12 NS			341.50	-1.55 NS			353.00	-1.38 NS
Mean	.18	.21			.65	.55			.17	.21		
Median	.12	.16			.70	.49			.10	.17		
N	33	27			33	27			33	27		
Mean Rank	28.23	33.28			33.65	26.65			27.70	33.93		
<u>1989 Proportion</u>			389.50	-1.79 NS			359.00	-2.18*			431.00	-1.24 NS
Mean	.18	.21			.64	.50			.17	.21		
Median	.12	.23			.70	.45			.11	.17		
N	35	30			35	30			35	30		
Mean Rank	29.13	37.52			37.74	27.47			30.31	36.13		
<u>Changes in Proportions¹</u>			392.00	-.83 NS			432.00	-.21 NS			416.50	-.44 NS
Mean	.01	-.00			-.02	.00			.01	.00		
Median	.00	.00			.00	.00			.00	.00		
N	27	33			27	33			27	33		
Mean Rank	28.88	32.48			30.91	30.00			31.38	29.43		

¹Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

(table continues)

Table 14 (Cont'd.)

Proportion of Registered Nurses by Educational Level in Hospitals

Variable	Master's				Doctorate			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Proportion</u>			233.00	-3.97*			432.00	-.90 NS
Mean	.00	.04			.00	.00		
Median	.00	.02			.00	.00		
N	33	27			35	27		
Mean Rank	24.06	38.37			30.91	30.00		
<u>1989 Proportion</u>			298.50	-3.54*			510.00	-.93 NS
Mean	.01	.04			.00	.00		
Median	.00	.02			.00	.00		
N	35	30			33	30		
Mean Rank	26.53	40.55			33.43	32.50		
<u>Changes in Proportions¹</u>			411.00	-.67 NS			432.00	-.90 NS
Mean	.00	.00			.00	.00		
Median	.00	.00			.00	.00		
N	27	33			27	33		
Mean Rank	31.55	29.22			30.09	31.00		

¹ Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

1. Diploma--The null hypothesis was retained. There was no significant difference in the proportion of diploma nurses for 1988 between rural and urban hospitals ($\underline{z} = -1.12$). The rural hospital mean was .18 (n = 33) compared to an urban mean of .21 (n = 27). There was no difference in the proportion for 1989 ($\underline{z} = -1.79$). The mean for rural hospitals was .18 (n = 35); the urban mean was .21 (n = 30). There was no difference in the change in proportions from 1988 to 1989 ($\underline{z} = -.83$). The rural mean was .01 (n = 27) compared to an urban mean of -.00 (n = 33) which indicated a slight decrease in the urban vacancy rate from 1988 to 1989.

2. Associate degree--For 1988 there was no significant difference in the proportion between rural and urban hospitals ($\underline{z} = -1.55$). The mean for associate degree nurses in rural hospitals was .65 (n = 33); urban hospitals had a mean of .55 (n = 27). For 1989 there was a significant difference in the proportion ($\underline{z} = -2.18$). The rural mean was .64 (n = 35); the urban mean was .50 (n = 30). But there was no difference in the change in the proportions between 1988 and 1989 ($\underline{z} = -.21$). The rural mean was -.02 (n = 27); the urban mean was .00 (n = 33).

3. Baccalaureate degree--The null hypothesis was retained. There was no difference for 1988 ($\underline{z} = -1.38$). The rural mean was .17 (n = 33); the urban mean was .21 (n = 27). There was no difference in the 1989 proportion

($\underline{z} = -1.24$). The rural mean was .17 ($n = 35$); the urban mean was .21 ($n = 30$). There was no difference in the change in proportions from 1988 to 1989 ($\underline{z} = -.44$). The rural mean was .01 ($n = 27$); the urban mean was .00 ($n = 33$).

4. Master's degree--In 1988 there was a significant difference in the proportions ($\underline{z} = -3.97$). The rural mean was .00 ($n = 33$); the urban mean was .04 ($n = 27$). There was a significant difference in 1989 ($\underline{z} = -3.54$). The rural mean was .01 ($n = 35$); the urban mean was .04 ($n = 30$). There was no difference in the change in proportions between 1988 and 1989 ($\underline{z} = -.67$). The rural ($n = 27$) and urban ($n = 33$) mean were .00 which indicated that there was no vacancy rate change from 1988 to 1989.

5. Doctorate--The null hypothesis was retained. There was no significant difference in the proportion between rural and urban hospitals ($\underline{z} = -.90$). The rural ($n = 35$) and urban ($n = 27$) mean were .00. There was no difference in the 1989 proportion ($\underline{z} = -.93$). The rural ($n = 33$) and urban ($n = 30$) mean were .00. There was no difference in the change in proportions from 1988 to 1989 ($\underline{z} = -.90$). The rural ($n = 27$) and urban ($n = 33$) mean were .00.

The proportion of RNs at each educational level was significant for associate and master's degree between rural and urban hospitals. Rural areas had a significantly higher proportion of associate degree nurses in 1989; whereas urban

areas had a significantly higher proportion of master's prepared nurses for 1988 and 1989. The other educational levels had no significant differences.

Projected Changes for 1992 and 1995. The null hypothesis 13 stated that there would be no difference between rural and urban hospitals in the proportion of Registered Nurses prepared at different educational levels projected for 1992. Each educational level was examined separately and the results are presented in Table 15.

1. Diploma--The null hypothesis was retained ($\underline{z} = -.23$). The rural mean was $-.03$ ($n = 26$); the urban mean was $-.04$ ($n = 24$).
2. Associate Degree--The null hypothesis was retained ($\underline{z} = -.04$). The rural was $-.03$ ($n = 26$); the urban mean was $-.07$ ($n = 24$).
3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -.37$). The rural mean was $.05$ ($n = 26$); the urban mean was $.07$ ($n = 24$).
4. Master's Degree--The null hypothesis was retained ($\underline{z} = -1.11$). The rural mean was $.01$ ($n = 26$); the urban mean was $.04$ ($n = 24$).
5. Doctorate--The null hypothesis was retained ($\underline{z} = -1.75$). The rural mean was $-.00$ ($n = 26$) which denoted a slight proportional decrease; the urban mean was $.00$ ($n = 24$).

Table 15

Projected Change¹ in Proportion of Registered Nurses by Educational Level

Variable	Diploma				Associate				Baccalaureate			
	Rural	Urban	U	Z	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			3000.5	-.23 NS			310.00	-.04 NS			293.00	-.37 NS
Mean	-.03	-.04			-.03	-.07			.05	.07		
Median	-.01	.00			-.04	-.03			.04	.03		
N	26	24			26	24			26	24		
Mean Rank	25.06	25.98			25.58	25.42			26.23	24.71		
<u>1995 Projections</u>			307.00	-.10 NS			304.00	-.16 NS			291.00	-.41 NS
Mean	-.03	.05			-.05	-.08			.07	.07		
Median	-.03	.00			-.06	-.03			.07	.02		
N	26	24			26	24			26	24		
Mean Rank	25.31	25.71			25.81	25.17			26.31	24.63		

¹ Change from 1988
 NS - Not Significant

(table continues)

Table 15 (Cont'd.)

Projected Change¹ in Proportion of Registered Nurses by Educational Level in Hospitals

Variable	Master's				Doctorate			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			260.00	-1.11 NS			275.00	-1.75 NS
Mean	.01	.04			-.00	.00		
Median	.00	.00			.00	.00		
N	26	24			26	24		
Mean Rank	23.50	27.67			24.08	27.04		
<u>1995 Projections</u>			235.00	-1.65 NS			248.00	-2.06*
Mean	.01	.05			-.00	.00		
Median	.00	.01			.00	.00		
N	26	24			26	24		
Mean Rank	22.54	28.71			23.04	28.17		

¹Change from 1988

*Significant at the .05 level, two-tailed test

NS - Not Significant

There were no significant differences between the change in the proportion of RNs prepared at the five educational levels for 1992. The projected changes were quite similar for undergraduate degrees; however, urban hospitals projected greater changes in the proportion of graduate prepared nurses than did the rural hospitals.

The null hypothesis 14 stated that there was no difference in the proportion of Registered Nurses prepared at different educational levels projected for 1995 between rural and urban hospitals. Each educational level was examined separately and the results are presented in Table 15.

1. Diploma--The null hypothesis was retained ($\underline{z} = -.10$). The rural mean was $-.03$ ($n = 26$); the urban mean was $.05$ ($n = 24$).
2. Associate Degree--The null hypothesis was retained ($\underline{z} = -.16$). The rural mean was $-.05$ ($n = 26$); the urban mean was $-.08$ ($n = 24$).
3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -.41$). The rural mean was $.07$ ($n = 26$); the urban mean was $.02$ ($n = 24$).
4. Master's Degree--The null hypothesis was retained ($\underline{z} = -1.65$). The rural mean was $.01$ ($n = 26$); the urban mean was $.05$ ($n = 24$).

5. Doctorate--There was a significant difference in the change in proportions projected for 1995 ($z = -2.06$). The rural mean was $-.00$ ($n = 26$); the urban mean was $.00$ ($n = 24$). The proportion decreased in rural areas and remained the same in urban areas.

Urban and rural hospitals projected similar changes in proportions for diploma and associate degree nurses. Urban hospitals projected greater changes in the proportion for master's prepared nurses, and rural hospitals projected a slightly greater proportion for baccalaureate prepared nurses. There was a significant difference in the proportion of nurses at the doctoral level for 1995 as rural hospitals predicted a decrease and urban hospitals remained the same.

Registered Nurse Positions According to Educational Level in Hospitals

Nurse Demand. The null hypothesis 15 stated that there would be no difference in nurse demand according to educational level between rural and urban hospitals. Each educational level was examined separately and the results are presented in Table 16.

1. Diploma--The null hypothesis was partially rejected. There was a significant difference in the 1988 vacancy rate ($z = -2.27$). The rural mean was $.01$ ($n = 28$); the urban mean was $.03$ ($n = 22$). There was a significant

Table 16

Registered Nurse Demand by Educational Level in Hospitals

Variable	Diploma				Associate				Baccalaureate			
	Rural	Urban	U	Z	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1988 Vacancy Rate</u>			233.00	-2.27*			365.50	-.83 NS			246.00	-.71 NS
Mean	.01	.03			.13	.09			.25	.11		
Median	.00	.00			.07	.03			.00	.00		
N	28	22			32	26			24	23		
Mean Rank	23.00	28.68			31.08	27.56			25.25	22.70		
<u>1989 Vacancy Rate</u>			259.00	-2.55*			410.50	-1.38 NS			284.00	-1.46 NS
Mean	.01	.05			.15	.06			.29	.11		
Median	.00	.00			.08	.00			.15	.00		
N	29	25			35	29			29	25		
Mean Rank	23.93	31.64			35.27	29.16			30.21	24.36		
<u>Vacancy Rate Change¹</u>			244.00	-1.51 NS			371.00	-.76 NS			241.00	-.84 NS
Mean	-.01	.03			-.01	-.02			.07	.01		
Median	.00	.00			.00	-.00			.00	.00		
N	27	22			32	26			24	23		
Mean Rank	23.04	27.41			35.27	29.16			25.46	22.40		

¹ Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

difference in the 1989 vacancy rate ($\underline{z} = 2.55$). The rural mean was .01 ($n = 29$); the urban mean was .05 ($n = 25$). There was no difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -1.51$). The rural mean was $-.01$ ($n = 27$) compared to an urban mean of .03 ($n = 22$).

2. Associate Degree--The null hypothesis was retained. There was not a significant difference in the 1988 vacancy rate ($\underline{z} = -.83$). The rural mean vacancy rate was .13 ($n = 32$); the urban mean was .09 ($n = 26$). There was not a significant difference in the 1989 vacancy rate ($\underline{z} = -1.38$). The rural mean was .15 ($n = 35$); the urban mean was .06 ($n = 29$). There was no difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -.76$). The rural mean was $-.01$ ($n = 32$); the urban mean was $-.02$ ($n = 26$).

3. Baccalaureate Degree--The null hypothesis was retained. There was no difference in the 1988 vacancy rate ($\underline{z} = -.71$). The rural mean was .25 ($n = 24$); the urban mean was .11 ($n = 23$). There was no difference in the 1989 vacancy rate ($\underline{z} = -1.46$). The rural mean was .29 ($n = 29$); the urban mean was .11 ($n = 25$). There was no difference in the vacancy rate change between 1988 and 1989 ($\underline{z} = -.84$). The rural mean was .07 ($n = 24$); the urban mean was .01 ($n = 23$).

4. Master's Degree--The null hypothesis was not tested due to insufficient cases. There were only 2 rural and 18

urban positions for 1988; for 1989 there were 5 rural and 21 urban positions.

5. Doctorate--The null hypothesis was not tested. There was only one case each for rural and urban hospitals for 1988 and 1989.

Projected Changes for 1992 and 1995. The null hypothesis sixteen stated that there would be no difference in Registered Nurse demand according to educational level projected for 1992 between rural and urban hospitals. Each education level was examined separately and the results are presented in Table 17.

1. Diploma--The null hypothesis was retained ($\underline{z} = -.35$). The rural mean number of projected positions was .17 ($n = 29$); the urban mean was -8.16 ($n = 25$).
2. Associate Degree--The null hypothesis was retained ($\underline{z} = -.33$). The rural mean number of projections was 3.77 ($n = 28$); the urban mean was 5.28 ($n = 25$).
3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -.72$). The rural mean number of projections was 3.93 ($n = 28$); the urban mean was 10.11 ($n = 25$).
4. Master's Degree--The null hypothesis was rejected ($\underline{z} = -2.39$). The rural mean was .67 ($n = 29$); the urban mean was 5.00 ($n = 27$).
5. Doctorate--The null hypothesis was retained ($\underline{z} = -.96$). The rural mean was .03 ($n = 29$); the urban mean was .19 ($n = 32$).

Table 17

Projected Changes¹ for Registered Nurses by Educational Level in Hospitals

Variable	Diploma				Associate				Baccalaureate			
	Rural	Urban	U	Z	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992</u>			344.00	-.35 NS			331.50	-.33 NS			310.50	-.72 NS
Mean	.17	-8.16			3.77	5.28			3.93	10.11		
Median	.00	.00			.75	2.00			1.60	2.80		
N	29	25			28	25			28	25		
Mean Rank	28.14	26.76			26.34	27.74			25.59	28.58		
<u>1995</u>			336.00	-.27 NS			301.50	-.66 NS			297.50	-.74 NS
Mean	.25	-6.39			3.99	7.87			7.85	13.54		
Median	.00	.00			1.00	2.00			2.00	2.80		
N	28	25			27	25			27	25		
Mean Rank	27.50	26.44			25.17	27.94			25.02	28.10		

¹ Change from 1988
 NS - Not Significant

(table continues)

Table 17 (Cont'd.)

Projected Changes¹ for Registered Nurses by Educational Level in Hospitals

Variable	Master's				Doctorate			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			262.00	-2.39*			435.50	-.96 NS
Mean	.67	5.00			.03	.19		
Median	.00	.50			.00	.00		
N	29	27			29	32		
Mean Rank	24.03	33.30			30.02	31.89		
<u>1995 Projections</u>			243.00	-2.65*			420.50	-1.02 NS
Mean	1.14	7.30			-.10	.44		
Median	.00	1.00			.00	.00		
N	29	27			29	32		
Mean Rank	23.38	34.00			29.50	32.36		

¹ Change from 1988

*Significant at the .05 level, two-tailed test

NS - Not Significant

Projected changes in the number of positions for RNs at each educational level were not significant between rural and urban areas with the exception of the nurse prepared at the master's level. Urban areas projected a significantly higher number of nurses needed at this level. Although there were not statistical differences, urban areas projected a higher number of nurses at the associate, baccalaureate, and doctoral level.

The null hypothesis 17 stated that there was no difference in Registered Nurse demand according to educational level projected for 1995 between rural and urban hospitals. Each educational level was examined separately and the results are presented in Table 17.

1. Diploma--The null hypothesis was retained ($\underline{z} = -.27$). The rural mean number of projected positions was .25 (n = 28); the urban mean was -6.39 (n = 25).
2. Associate Degree--The null hypothesis was retained ($\underline{z} = -.66$). The rural mean number of projections was 3.99 (n = 27); the urban mean was 7.87 (n = 25).
3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -.74$). The rural mean number of projections was 7.85 (n = 27); the urban mean was 13.54 (n = 25).
4. Master's Degree--The null hypothesis was rejected ($\underline{z} = -2.65$). The rural mean was 1.14 (n = 29); the urban mean was 7.30 (n = 27).
5. Doctorate--The null hypothesis was retained

($z = -1.02$). The rural mean was .10 ($n = 29$); the urban mean was .44 ($n = 32$).

Projected changes in the number of positions for RNs at each educational level were not significant between rural and urban areas with the exception of the nurse prepared at the master's level. Urban areas projected a significantly higher number of nurses needed at this level. Although there were not statistical differences, urban areas projected a higher number of nurses at the associate, baccalaureate, and doctoral level.

Registered Nurse Positions According to Educational Level in Nursing Homes

Nurse Demand. The null hypothesis 18 stated that there was no difference in Registered Nurse demand according to educational level between rural and urban nursing homes. Each level was examined separately and results are presented in Table 18.

1. Diploma--The null hypothesis was retained. There was not a significant difference in the 1988 vacancy rate ($z = -1.35$). The rural mean was .10 ($n = 20$); the urban mean was .06 ($n = 42$). There was not a significant difference in the 1989 vacancy rate ($z = -1.09$). The rural mean was .06 ($n = 20$); the urban mean was .10 ($n = 46$). There was no difference in the vacancy rate change from 1988 to 1989 ($z = -.73$). The rural mean was .01 ($n = 19$)

Table 18

Registered Nurse Demand by Educational Level in Nursing Homes

Variable	Diploma				Associate				Baccalaureate			
	Rural	Urban	U	z	Rural	Urban	U	z	Rural	Urban	U	z
<u>1988 Vacancy Rate</u>			365.00	-1.35 NS			866.00	-.39 NS			112.00	-.12 NS
Mean	.10	.06			.12	.11			.17	.11		
Median	.00	.00			.00	.00			.00	.00		
N	20	42			46	39			12	19		
Mean Rank	28.75	32.81			43.67	42.21			15.83	16.11		
<u>1989 Vacancy Rate</u>			407.50	-1.09 NS			973.00	-.50 NS			161.00	-.05 NS
Mean	.06	.10			.11	.20			.17	.14		
Median	.00	.00			.00	.00			.00	.00		
N	20	42			51	40			12	27		
Mean Rank	30.88	34.64			45.08	47.17			19.92	20.04		
<u>Vacancy Rate Change¹</u>			362.50	-.73 NS			818.00	-.24 NS			90.00	-.52 NS
Mean	.01	-.01			.01	.06			-.10	-.03		
Median	.00	.00			.00	.00			.00	.00		
N	19	41			45	37			10	19		
Mean Rank	31.92	29.84			41.18	41.89			14.50	15.26		

¹ Change from 1988 to 1989

*Significant at the .05 level, two-tailed test

NS - Not Significant

compared to an urban mean of $-.01$ ($n = 41$).

2. Associate Degree--The null hypothesis was retained. There was not a significant difference in the 1988 vacancy rate ($\underline{z} = -.39$). The rural mean vacancy rate was $.12$ ($n = 46$); the urban mean was $.11$ ($n = 39$). There was not a significant difference in the 1989 vacancy rate ($\underline{z} = -.50$). The rural mean was $.11$ ($n = 51$); the urban mean was $.20$ ($n = 40$). There was no difference in the vacancy rate change from 1988 to 1989 ($\underline{z} = -.24$). The rural mean was $.01$ ($n = 45$); the urban mean was $.06$ ($n = 37$).

3. Baccalaureate Degree--The null hypothesis was retained. There was no difference in the 1988 vacancy rate ($\underline{z} = -.12$). The rural mean was $.17$ ($n = 12$); the urban mean was $.11$ ($n = 19$). There was no difference in the 1989 vacancy rate ($\underline{z} = -.05$). The rural mean was $.17$ ($n = 12$); the urban mean was $.14$ ($n = 27$). There was no difference in the vacancy rate change between 1988 and 1989 ($\underline{z} = -.52$). The rural mean was $-.10$ ($n = 10$); the urban mean was $-.03$ ($n = 19$).

4. Master's Degree--The null hypothesis was not tested due to insufficient cases. Rural nursing homes reported only one position for master's prepared nurses for 1988 and 1989; urban nursing homes reported 6 positions for 1988 and 8 for 1989.

5. Doctorate--The null hypothesis was not tested because there were no reported budgeted positions for rural or urban nursing homes for 1988 and 1989.

Projected Changes for 1992 and 1995. The null hypothesis 19 stated that there was no difference in Registered Nurse demand according to educational level projected for 1992 between rural and urban nursing homes. Each educational level was examined separately and the results are presented in Table 19.

1. Diploma--The null hypothesis was retained ($\underline{z} = -1.03$). The rural mean number of projected positions was .30 ($n = 48$) compared to an urban mean of .28 ($n = 54$).

2. Associate Degree--The null hypothesis was rejected ($\underline{z} = -3.02$). The rural mean number of projections was .91 ($n = 48$); the urban mean was $-.38$ ($n = 54$).

3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -1.74$). The rural mean number of projections was .14 ($n = 48$); the urban mean was .38 ($n = 54$).

4. Master's Degree--The null hypothesis was retained ($\underline{z} = -1.58$). The rural mean was .00 ($n = 48$); the urban mean was .07 ($n = 54$).

5. Doctorate--The null hypothesis was not tested. There were no projections for either rural or urban nursing homes for doctorally prepared nurses for 1992.

Table 19
Projected Changes¹ for Registered Nurses by Educational Level in Nursing Homes

Variable	Diploma				Associate			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			1189.50	-1.03 NS			892.00	-3.02*
Mean	.30	.28			.91	-.38		
Median	.00	.00			.00	.00		
N	48	54			48	54		
Mean Rank	53.72	49.53			59.92	44.09		
<u>1995 Projections</u>			1167.00	-.99 NS			896.50	-2.86*
Mean	.30	.26			.91	-.35		
Median	.00	.00			.00	.00		
N	48	53			48	53		
Mean Rank	53.19	49.02			58.82	43.92		

¹Change in positions from 1988

*Significant at the .05 level, two-tailed test

NS - Not Significant

(table continues)

Table 19 (Cont'd.)

Projected Changes¹ for Registered Nurses by Educational Level in Nursing Homes

Variable	Baccalaureate				Master's			
	Rural	Urban	U	Z	Rural	Urban	U	Z
<u>1992 Projections</u>			1097.00	-1.74 NS			1200.00	-1.58 NS
Mean	.14	.38			.00	.07		
Median	.00	.00			.00	.00		
N	48	54			48	54		
Mean Rank	47.35	55.19			49.50	53.28		
<u>1995 Projections</u>			1070.50	-1.79 NS			1176.00	-1.59 NS
Mean	.18	.46			.00	.08		
Median	.00	.00			.00	.00		
N	48	53			48	53		
Mean Rank	46.80	54.80			49.00	52.81		

¹Change in positions from 1988
 NS - Not Significant

Rural nursing homes projected a significantly greater number of associate degree nurses needed for 1992 and an increased number of diploma nurses as compared to the urban nursing homes. Nursing homes in urban areas projected increased need for baccalaureate and master's degree level positions. Neither area projected a need for doctorally prepared nurses.

The null hypothesis 20 stated that there was no difference in Registered Nurse demand according to educational level projected for 1995 between rural and urban nursing homes. Each educational level was examined separately and the results are presented in Table 19.

1. Diploma--The null hypothesis was retained ($\underline{z} = -.99$). The rural mean number of projected positions was .30 ($n = 48$); the urban mean was .26 ($n = 53$).
2. Associate Degree--The null hypothesis was rejected ($\underline{z} = -2.86$). The rural mean number of projections was .91 ($n = 48$); the urban mean was $-.35$ ($n = 53$).
3. Baccalaureate Degree--The null hypothesis was retained ($\underline{z} = -1.79$). The rural mean number of projections was .18 ($n = 48$); the urban mean was .46 ($n = 53$).
4. Master's Degree--The null hypothesis was retained ($\underline{z} = -1.59$). The rural mean was .00 ($n = 48$); the urban mean was .08 ($n = 53$).

5. Doctorate--The null hypothesis was not tested. There were no projections for either rural or urban nursing homes for 1995.

Rural nursing homes projected a significantly greater number of associate degree nurses needed for 1995 and an increased number of diploma nurses as compared to the urban nursing homes. Nursing homes in urban areas projected increased need for baccalaureate and master's degree level positions. Neither area projected a need for doctorally prepared nurses.

Summary

Nurse demand was compared between rural and urban hospitals and nursing homes by testing 20 null hypotheses. Many of the hypotheses contained sub-parts such as RN position by principal duty and by educational level. Nurse demand was tested by using three different variables, the 1988 vacancy rate, the 1989 vacancy rate, and the change in vacancy rate from 1988 to 1989. Future nurse demand was tested by comparing the increase in the number of projected positions between 1988 to 1992 and to 1995. Educational level was further analyzed by comparing the proportion of RNs at each level for 1988, 1989, and projected for 1992 and 1995. The statistical test utilized in the analysis was the Mann-Whitney U. The level of significance was set at .05, and a two-tailed test was used.

None of the null hypotheses was totally rejected; however, some of the component sub-parts that were rejected and indicated a significant difference between the rural and urban areas are summarized. The findings are arranged according to vacancy rates, proportions, and future projections.

Vacancy Rates

1. Rural hospitals had a significantly higher RN vacancy rate for 1988.
2. Rural hospitals had a significantly higher vacancy rate for the position of general duty nurse in 1989.
3. Urban hospitals had a significantly higher vacancy rate for diploma positions in 1988 and 1989.

Proportions

1. Rural hospitals had a significantly higher proportion of RNs prepared at the associate degree level in 1989.
2. Urban hospitals had a significantly higher proportion of RNs prepared at the master's level in 1988 and 1989.
3. Urban hospitals projected a significantly higher proportion of RNs prepared at the doctoral level for 1995.

Projections

1. Urban hospitals projected a significantly greater change in general duty positions for 1995.

2. Urban hospitals projected a significantly greater change in clinical specialist positions for 1992 and 1995.

3. Urban hospitals projected a significantly greater change in RN positions at the master's level for 1992 and 1995.

4. Rural nursing homes projected a significantly greater change in the number of associate degree positions projected for 1992 and 1995.

The most significant changes were in hospitals. Rural hospitals reported the greatest number of shortages in overall positions and in general duty nurse positions. Urban hospital indicated the greatest increase in positions for specialized positions and at graduate levels.

CHAPTER 5

Summary, Conclusions, and Recommendations

Summary

The purpose of this study was to determine if there was a difference in Registered Nurse current and future demand between Tennessee rural and urban licensed hospitals and nursing homes. A sub-objective of this study was to determine if there was a difference in Registered Nurse demand between Tennessee rural and urban hospitals and nursing homes by principal duty or position and by educational level. The variables examined were 1988 and 1989 RN vacancy rates, change in vacancy rates from 1988 to 1989, and projected changes in positions from 1988 to 1992 and from 1988 to 1995.

The educational level of RNs was further examined to determine if there was a difference between rural and urban hospitals in the proportion of RNs at each of five educational levels: diploma, associate, baccalaureate, master's, and doctorate. The variables considered were the proportion of budgeted positions for 1988 and 1989, change in the proportion from 1988 to 1989, and projected changes in proportions from 1988 to 1992 and from 1988 to 1995.

This study is a secondary analysis of data that were collected as a part of a larger research project conducted by the Tennessee Board of Regents Task Force on Nurse Supply

and Demand. For the present study the questionnaire data were utilized from a survey of nurse administrators in the licensed hospitals and nursing homes in Tennessee. Of the 154 hospital nurse administrators, 97 (63%) responded. Of the 212 nursing home administrators, 152 (72%) responded.

The statistical test selected for use in the analysis was the Mann-Whitney U. The level of significance was set at .05, and a two-tailed test was utilized.

National and state studies had indicated that a nursing shortage existed in all health care settings and in all nursing practice areas (U.S. Department of Health and Human Services, 1988b, Tennessee Board of Regents, 1989). The national shortage appeared to be worse in urban hospitals and in nursing homes. Current national and state data concerning rural areas were limited although rural areas historically reported greater shortages. Further, nurse demand by position and educational level had not been sufficiently addressed by facility or by rural or urban location.

Guidelines for determining the severity of vacancy rates was used in this study to evaluate reported vacancy rates in Tennessee. Vacancy rates over 10% were considered significant, and those over 14% were considered critical (American Association of Critical Care Nurses, 1988). This study examined the mean and median vacancy rates, and an important finding was the disparity found between the two

measures with certain variables. The variable, increase in vacancy rate from 1988 to 1989, was not statistically significant in any area tested.

This study found that there was not a statistically significant difference in the vacancy rate for total RN positions between rural and urban inpatient facilities; however, a related finding was that vacancy rates were approaching critical levels by 1989 in both rural and urban facilities (13%). These findings indicated that the vacancy rate for total Registered Nurse positions was higher in rural hospitals than urban hospitals; however, the reverse was true for rural and urban nursing homes. Urban hospitals projected a greater number of positions from 1988 budgeted positions for 1992 and 1995 than rural hospitals. Conversely, rural nursing homes projected a greater number of positions for 1992 and 1995.

Additional findings are discussed by examining data specific to hospitals and nursing homes.

Hospitals

The American Hospital Association reported that the FTE RN vacancy rate was 11.3% in 1987 (American Hospital Association, 1987). By 1988 there were reports that the shortage appeared to be less acute but more widespread (Powills, 1989). The findings in this study suggested that Tennessee hospitals had a shortage more acute than national

reports indicated and more severe in rural hospitals. There was a statistical significant difference in the 1988 vacancy rate between rural and urban hospitals. Rural hospitals had mean and median vacancy rates at critical levels (17%, 14%). By 1989, the vacancy rates decreased slightly in rural hospitals (16%, 10%) and increased slightly in urban hospitals (mean 11%, median 9%).

National studies reported that the number of full-time equivalent RNs had increased 6% between 1983 and 1986. The increase in the utilization of the RN position was attributed to the greater complexity of care, the substitution of the RN for other nursing personnel, and technological advances requiring a more highly skilled practitioner (U.S. Department of Health and Human Services, 1988c). In contrast rural hospitals had less technology and maintained a broader mix of licensed practical nurses and unlicensed personnel (Staff Report to the Special Committee on Aging, United States Senate, 1988). In this study, urban hospitals predicted a greater number of RN positions that would be needed for 1992 and 1995; however, these projections were not significantly different from that projected by the rural hospitals. This finding indicated that both rural and urban hospitals in Tennessee predicted the increased utilization of RNS over current levels.

Positions by Principal Duty. This study examined nurse demand according to the principal duties that the RN performs in hospitals: administrator, supervisor, head nurse, general duty nurse, nurse practitioner, clinical specialist, and nurse anesthetist. The only position for which there was a significant difference between rural and urban hospitals was the general duty nurse. Reports from the hospital respondents indicated the general duty nurse position to be more acute in rural areas with critical vacancy rates (mean 18%, median 16%) for 1988. By 1989 the vacancy rate was statistically significant for rural areas (mean 20%, median 13%). Urban vacancy rates, while not critical, were comparable to the national vacancy rates of approximately 10%. Urban hospitals had significantly higher projections for general duty positions for 1995.

Low vacancy rates were reported for the administrative positions of administrator and supervisor for both rural and urban areas. Although not statistically significant, there were critical vacancy rates reported for rural head nurse positions; however, these findings appeared to be confined to a few rural hospitals.

The literature revealed that advanced practice positions, nurse practitioner and clinical specialist, were more prevalent in urban areas than rural areas (Staff Report to the Special Committee on Aging, United States Senate, 1988). In this study, the reported positions for rural

hospitals were so few that statistical testing could not be performed. There was a significant difference for 1992 and 1995 projections for the clinical specialist position; urban hospitals predicted a greater number of budgeted positions.

National data indicated that over 83% of nurse anesthetists practice in rural areas (U.S. Department of Health and Human Services, 1988c). This percentage was not available for Tennessee; however, in this study approximately twice as many rural hospitals reported this position. There was no significant difference in the vacancy rates between rural and urban hospitals; nevertheless, rural hospitals projected a slightly greater increase in positions for 1992 and 1995.

Positions according to educational level. National reports indicated that rural nurses typically were prepared at lower educational levels than the urban nurse. For instance, only 19.5% of rural nurses held a baccalaureate degree; whereas, 27% of the urban nurses held the degree (U.S. Department of Health and Human Services, 1988c). Over one-third of the respondents in this study indicated that they did not budget positions according to educational level. However, with consideration of the limited response in this area, this study supported national data. There was a significant difference in the percentage of nurses in rural hospitals having an associate degree, and there was a

significant difference in the proportion of nurses in urban areas with a master's degree. Although not statistically significant, an interesting finding in this study was the lower than national average of nurses prepared at the baccalaureate degree, 17% and 21% reported for rural hospitals and urban hospitals respectively.

Using the vacancy rate measure, there was a significant difference for the diploma level between rural and urban hospitals with higher vacancy rates in urban hospitals. Although not statistically significant and limited to a few facilities, rural hospitals reported critical vacancy rates for associate degree positions (13%) and even higher rates (25%) for baccalaureate positions. Rural hospitals reported only a very few positions at higher degree levels. By 1992 and 1995 there was a significant difference in the number of nurses projected at the master's level for urban hospitals.

Nursing Homes

National studies reported a much higher overall vacancy rate for nursing homes, 18.9%, than that seen in Tennessee rural or urban homes. The overall vacancy rate for Tennessee homes was a mean rate of 10% for 1988 increasing to 13% for 1989; however, the median for both years was 0%. Urban nursing homes reported higher vacancy rates than their rural counterpart and greater increases occurring from 1988 to 1989. The nursing shortage was evidently limited to a

few facilities because the reported means tended to be consistently higher than the medians.

The literature indicated that over one-half of Registered Nurses in nursing homes were employed in a supervisory capacity (U.S. Department of Health and Human Services, 1988c). The findings in this study indicated that vacancy rates in these areas were minimal; the area of concern was the general duty position with extremely high mean rates for 1988 and 1989 in both rural and urban nursing homes. The data reported indicated that the severity in shortages was confined to a few homes.

National data indicated that the greatest percentage of nurses practicing in nursing homes were prepared at the diploma level (U.S. Department of Health and Human Services, 1988c). The respondents in this study reported the greatest number of positions in the rural area at the associate degree level, and similar numbers at the diploma and associate degree level for the urban area. There were no significant difference in the vacancy rates between rural and urban nursing homes for nurses prepared at different educational levels. Vacancy rates were reported only in a low number of institutions, and were higher in rural facilities for each of the undergraduate levels. There was an insufficient number of positions reported at the master's level for any conclusion, and there were no positions reported at the doctoral level. Future projections

indicated a significant difference for rural facilities in the number of positions needed at the associate degree level.

In brief the findings of this study were:

1. There was a significant difference in the 1988 RN vacancy rate between rural and urban hospitals. Rural hospitals had a significantly higher vacancy rate.
2. There was a significant difference in the 1989 RN vacancy rate for the position of general duty nurse between rural and urban hospitals. Rural hospitals had a significantly higher vacancy rate.
3. There was a significant difference in the change in general duty nurse positions projected for 1995 between rural and urban hospitals. Urban hospitals projected a significantly higher change.
4. There was a significant difference in the change in clinical specialist positions projected for 1992 and for 1995 between rural and urban hospitals. Urban hospitals projected a significantly higher change.
5. There was a significant difference in 1989 in the proportion of RNs prepared at the associate degree level between rural and urban hospitals. Rural hospitals had a significantly higher percentage.
6. There was a significant difference in 1988 and in 1989 in the proportion of RNs prepared at the master's

degree level between rural and urban hospitals. Urban hospitals had a significantly higher percentage.

7. There was a significant difference between rural and urban hospitals in the change in the proportion of RN positions at the doctorate level projected for 1995. Urban hospitals projected a significantly higher change.

8. There was a significant difference in the 1988 and the 1989 vacancy rate for RN positions at the diploma level between rural and urban hospital. Urban hospitals had a significantly higher vacancy rate.

9. There was a significant difference between rural and urban hospitals in the change in RN positions at the master's level projected for 1992 and for 1995. Urban hospitals projected a significantly higher change.

10. There was a significant difference between rural and urban nursing homes in the change in RN positions at the associate degree level projected for 1992 and for 1995. Rural nursing homes projected a significantly greater change.

Conclusions

This research contributed to the body of knowledge about current and future nurse demand in Tennessee for total RN positions, positions according to principle duty, and positions according to educational level between rural and urban hospitals and nursing homes. An analysis of the

findings pertaining to current nurse demand, based on mean and median vacancy rates, indicated that overall hospitals in Tennessee had a greater nursing shortage than what was reported on the national level. In contrast Tennessee nursing homes did not report a shortage as severe as national reports indicated. This study found that hospitals in Tennessee had greater problems with vacancy rates than did the nursing homes.

Although national studies reported that the nursing shortage was more acute in urban facilities, this study did not support that finding. This study demonstrates that the RN vacancy rate was higher in rural hospitals for total RN positions and for general duty positions. However, urban hospitals also have vacancy rates that are of concern. This suggests that Tennessee policymakers and educators must seriously consider short term strategies to alleviate the current shortage and the development of a long range plan to prevent serious compromises in health care. Because this study found that nurse demand was more serious in rural hospitals, additional measures should be taken to ensure that the problems specific to the shortage in rural areas are addressed.

The findings of the nursing shortage in Tennessee indicated that the designation of federal nurse manpower shortage areas would be helpful in developing methods specific to the more underserved areas, whether rural or

urban. These manpower shortage areas, patterned after physician manpower shortage areas, could then be targeted for federal grants for research studies or demonstration projects. Successful recruitment and retention measures could be implemented, and scholarship/loan programs initiated for students residing in those areas that agree to return to practice or for the enticement of other students to agree to work in underserved areas.

Urban hospitals projected a greater number of positions for 1992 and 1995 than rural hospitals, although this finding was not statistically significant. However, urban hospitals projected a significant difference in the change in general duty nurses projected for 1995. This finding reinforced earlier conclusions regarding the necessity for long range planning to occur in Tennessee. The current nursing shortage, a decrease in the number of new licensees since 1985 (Tennessee Board of Nursing, 1989), and an increase in future RN positions may necessitate the consideration of alternate methods of health care delivery. One example would be the restructuring of RN job descriptions which would allow other personnel to perform non-nursing tasks.

Nurse demand according to principle position was not problematic in most categories, except the general duty nurse position, for either rural or urban hospitals or nursing homes. This may be due to the tendency to utilize

nurses based on licensure level rather than educational qualifications. Although higher educational levels are considered desirable for administrative positions in many facilities, the lack of credentials may not create a vacancy. Nurses may be promoted from general duty positions thus creating the greatest number of vacancies in that category.

In rural hospitals there were fewer positions reported or projected for 1992 and 1995 for nurse practitioner and clinical specialist positions than that reported in urban areas. A significant difference was found in the projections by urban hospitals for clinical specialist positions for 1992 and 1995. These advanced practice positions are usually found in primary care clinics in rural areas and have not been utilized or even available in rural hospitals. Further, in urban areas the utilization of these positions enabled the nurse administrator to more accurately predict the future demand. In addition, because the graduate nursing programs in Tennessee are located in urban areas, urban hospitals have had the distinct advantage of interfacing with the graduate nursing student.

An analysis between rural and urban facilities of the proportion of nurses at each educational level, the current demand as evidenced by the vacancy rates, and the future projections were indicative of the location of the different types of educational programs that prepare nurses in

Tennessee. National data have indicated that nurses tend to practice in the types of facilities in which they received their educational training. Educational programs located in rural counties in Tennessee include seven of the seventeen associate degree programs and one baccalaureate degree program. Rural hospitals reported a significantly greater proportion of nurses prepared at the associate degree level, and urban hospitals a significantly greater proportion of nurses at the master's level. This finding suggests that the establishment of outreach programs in rural areas or the creation of clinical tracks in which students rotate to rural hospitals could increase the numbers of nurses prepared at higher educational levels in rural hospitals. Further, a statewide articulation program should be instituted that permits diploma and associate degree nurses to obtain higher degrees without repetition of prior learning.

Nurse demand according to educational level in Tennessee mirrors the complexity that is seen on the national level. The lower response rate in this category due to the assertion by nurse administrators that they do not budget by educational level indicated that in many facilities job descriptions have not been differentiated according to educational level. A partnership must be formed between service and educational institutions to

insure that future nurses are prepared at the educational levels that are desired.

Nurse demand in nursing homes may be confined to serious problems in a few facilities. This finding may be of special concern because national reports indicated that a lower number of RNs were employed per facility in Tennessee: 2.7 RNs per facility compared to the national average of 5.1 RN per facility (U.S. Department of Health and Human Services, 1988c). Any shortage in a Tennessee facility that already staffs at such a low level may pose a significant threat to quality of patient care. Additional research may need to identify the characteristics or commonalities in facilities with such serious shortages before measures for alleviating the problems can be instituted.

Recommendations

Recommendations will be addressed in two major areas: matters pertaining to the profession and matters pertaining to future research.

Recommendations for the Profession

Long range planning for future nurse demand must address the recruitment of nurses in the areas needed, the retention of nurses, and the educational level that will be required.

1. Federal nurse manpower shortage areas should be designated to target the areas of Tennessee, rural or urban,

that are the most acutely affected by the nursing shortage. This approach may better serve the needs of Tennesseans rather than specifically addressing only rural areas.

2. A statewide task force should be appointed consisting of nursing service administrators and nurse educators with the primary task of differentiating RN job descriptions according to educational level. There are some indications from the study that nurses were utilized according to licensure rather than by educational level.

3. To address nurse retention, rural and urban hospitals and nursing homes should compensate RNs commensurate with responsibility, prior experience, clinical competence, and length of service.

4. To increase recruitment in underserved areas, a statewide recruitment campaign should be implemented. Scholarship and financial aid should be available with pay-back mechanisms that require recipients to work in underserved areas for specified periods of time. Preferential admission should be given to students from underserved areas because they are more likely to return to these areas to work (American Association of Colleges of Nursing, 1989).

5. Nursing education programs should include experiential learning experiences in underserved areas by designated clinical rotations and/or by the assignment of

rural nurses as preceptors because students tend to work in areas in which they have had their basic preparation.

6. A statewide articulation plan should be developed to enable diploma and associate degree nurses to obtain higher degrees without repetition of prior learning. This may facilitate nurses from rural or underserved areas to obtain higher degrees. Further, Tennessee nurses have a lower percentage of baccalaureate degrees than that reported on the national level (U.S. Department of Health and Human Services, 1988c).

7. Communications technology should be utilized to establish networks between rural areas to address issues of concern for example, continuing education and professional isolation.

Recommendations for Research

Additional and continuing research on nurse demand will facilitate policy decision making in Tennessee as it relates to the recruitment, retention, and education of nurses.

1. Consideration should be given to other definitions of rural and urban other than metropolitan and nonmetropolitan statistical areas to determine if they more accurately reflect what may be considered rural or urban areas of Tennessee.

2. Although the vacancy rate measure was helpful in assessing and evaluating nurse demand, the increase in

vacancy rate within a one year span of time may not have allowed adequate time for change to occur.

3. A more indepth analysis should be conducted in rural areas to determine if nurse demand relates to other factors such as particular characteristics of the facility. Examples would be the size of the facility, financial viability, services offered, work environment, and access to other health care professionals and facilities.

4. Studies relating to nurse demand should consider the proximity of educational institutions preparing RNs to the facility and whether student rotations through the facility impact on recruitment of that student population.

5. Studies should address the impact of RN shortages on hospitals and nursing homes.

6. Different methodologies should be considered in future studies. A case study approach could be utilized that compares similar facilities with high and low vacancy rates to determine successful methods of nurse recruitment and retention. A longitudinal study could be undertaken that measures the long term impact of measures recommended to alleviate the current shortage and prevent future shortages.

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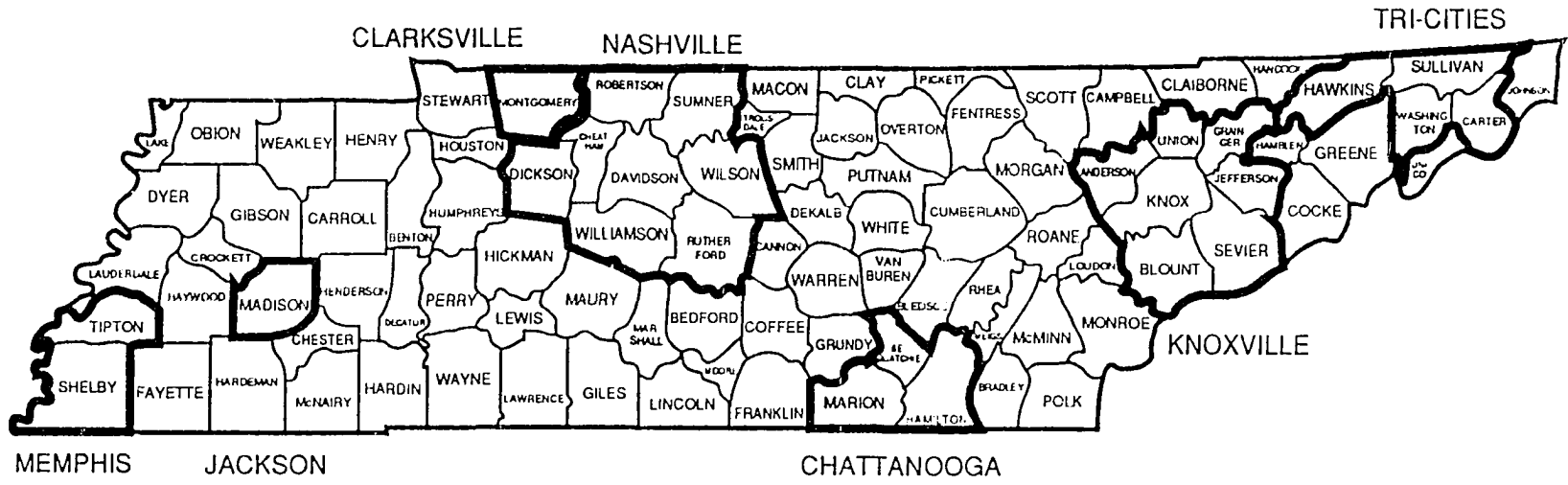
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APPENDICES

APPENDIX A

TENNESSEE COUNTIES BY METROPOLITAN STATISTICAL AREA



LEGEND:
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Metropolitan Statistical Areas

APPENDIX B

Appendix B

METROPOLITAN STATISTICAL AREAS

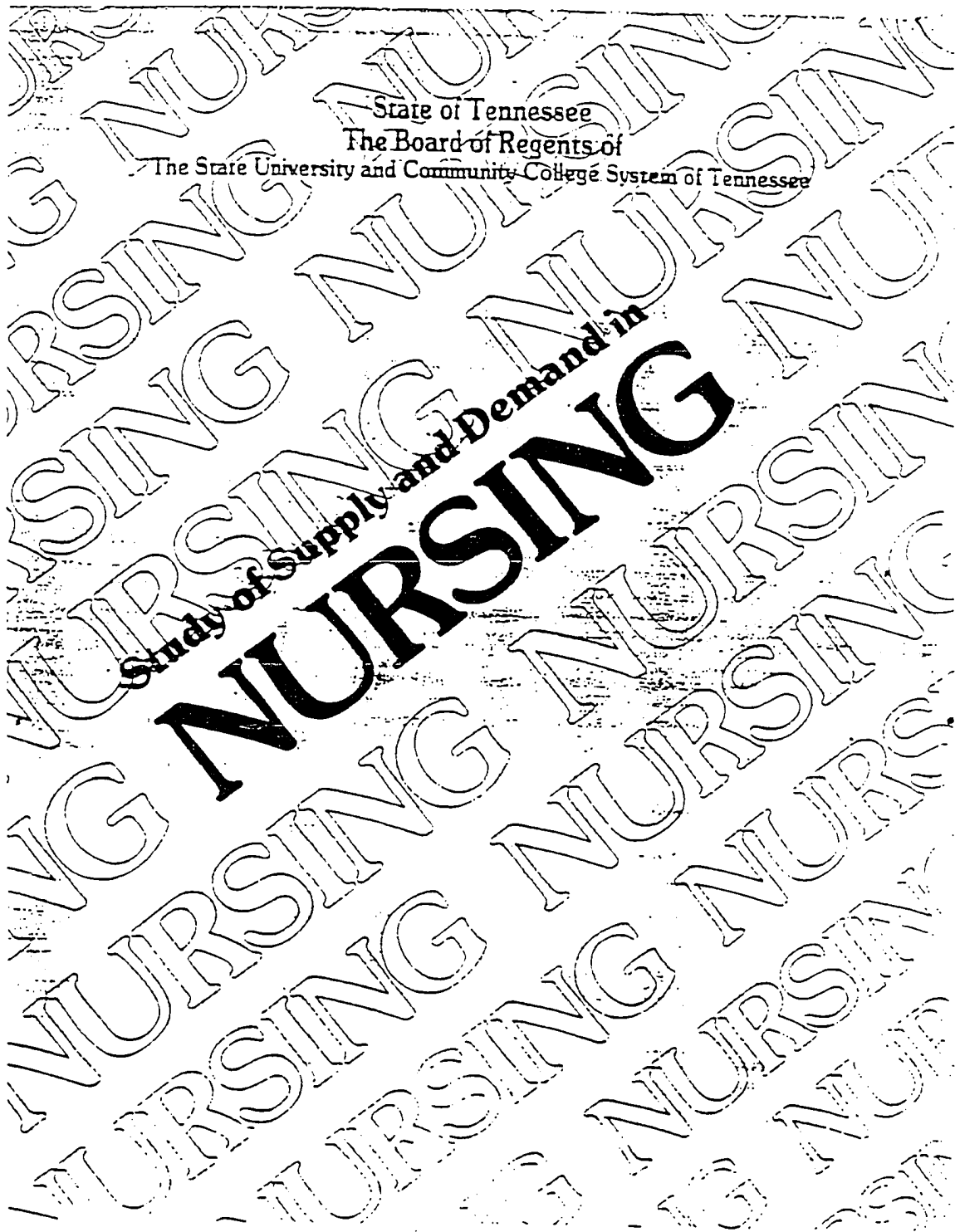
<u>MSA</u>	<u>COUNTIES</u>
MEMPHIS	TIPTON SHELBY
JACKSON	MADISON
CLARKSVILLE	MONTGOMERY
NASHVILLE	ROBERTSON SUMNER WILSON RUTHERFORD WILLIAMSON DICKSON CHATHAM DAVIDSON
CHATTANOOGA	SEQUATCHIE MARION HAMILTON
KNOXVILLE	ANDERSON UNION GRAINGER KNOX JEFFERSON BLOUNT SEVIER
TRI-CITIES	HAWKINS SULLIVAN WASHINGTON CARTER

APPENDIX C

State of Tennessee
The Board of Regents of
The State University and Community College System of Tennessee

Study of Supply and Demand in

NURSING



Introduction

This questionnaire has been prepared with you the busy administrator in mind. We have made it as quick and as easy to complete as possible while taking care to request all the information that is needed for the study. Please take a few minutes to read these directions and the directions that precede each question before you respond. Taking a few moments now to read this will give you an overall sense of the information that you are being asked to provide. In that way, you will help assure the overall quality and usefulness of the data.

The questions that follow assess the current supply of nurses you have available and the projected future demands for your facility. Totals should be reported in full-time equivalents. Positions should be counted only once. For future projections, assume providers are available at the educational levels desired.

When you have completed the questionnaire, return it in the enclosed self-addressed envelope on or before May 22, 1999. No postage is necessary. A Task Force member from your region will be contacting non-respondents.

Thank you in advance for taking the time from your busy schedule to participate in this important study. We will be happy to share the results with you when it is completed. If you have any questions in the meantime, please contact Dr. Cynthia L. Lenz or Carol H. Pullen at (615) 929-5626 or contact any local member of the Task Force. A list of the members is provided on the final page of this survey.

State of Tennessee
The Board of Regents
of
The State University and Community College System of Tennessee
Study of Supply and Demand in Nursing

Please make necessary address corrections in the space provided below.

FOR STAFF USE ONLY

CP _____
TP _____
DD _____

1. Type of Facility Hospital Home Health Agency Nursing Home School of Nursing
 Home for Aged Ambulatory Surgical Center Federal/State Agency Other

2. Name of Nursing Service Executive Officer _____

3. Telephone Number of Nursing Service Executive Officer () _____

4. County _____

5. City/Town _____

6 Total Nursing Staff by Principal Duty or Position

In columns 1, 2, and 3 include all budgeted positions only. In columns 4 and 5, assume full availability of qualified personnel. Give totals in Full-time Equivalents (FTE). Do not count any one person more than once. In rows A-M, do not include a type of employee if you do not provide the corresponding type of service. For example, if you do not provide midwifery services but employ a Nurse Midwife in some other capacity, that person should be included in one of the other categories but NOT in Row M.

Principal Duty / Position	1 Budgeted 1988		2 Budgeted 1989		3 Budgeted 1990	4 Projected 1992	5 Projected 1995
	Filled	Vacant	Filled	Vacant	Total	Total	Total
A Administrator / Assistant Administrator							
B Supervisor / Assistant Supervisor							
C Head Nurse / Assistant Head Nurse							
D General Duty - RNs							
E General Duty - LPNs							
F General Duty - Unlicensed							
G Nurse Practitioner							
H Clinical Specialist (Master's)							
I Consultant							
J Instructor / Educator (Staff and Patient)							
K Nurse Anesthetist							
L Nurse Epidemiologist							
M Nurse Midwife							
N Other							

7. Total Nursing Staff by Level of Professional Training

In columns 1, 2, and 3 include budgeted positions only. In columns 4 and 5, assume full availability at the educational level(s) preferred. Give totals in Full-time Equivalents (FTE). Do not include a person who is merely "ON CALL".

Licensing Levels	1 Budgeted 1988		2 Budgeted 1989		3 Budgeted 1990	4 Projected 1992	5 Projected 1995
	Filled	Vacant	Filled	Vacant	Total	Total	Total
A. Total Unlicensed							
B. Total LPN's							
C. Total RN's							

8. RN's by Highest Nursing Degree Attained and Preferred

In columns 1, 2, and 3 include budgeted positions only. In columns 4 and 5, assume full availability at the educational level(s) preferred. Give totals in Full-time Equivalents (FTE). Do not include a person who is merely "ON CALL". Make only ONE entry for each nurse.

Highest Educational Levels	1 Budgeted 1988		2 Budgeted 1989		3 Budgeted 1990	4 Projected 1992	5 Projected 1995
	Filled	Vacant	Filled	Vacant	Total	Total	Total
A. Diploma							
B. Associate Degree Nursing							
C. Bachelor of Science Nursing							
D. Master of Science Nursing							
E. Doctorate in Nursing (Ph D, D N.)							

APPENDIX D



The State University and Community College System of Tennessee

1415 Murfreesboro Road • Suite 350 • Nashville, Tennessee 37217 • (615) 366-4400

May 11, 1989

Dear Health Care Administrator:

In the past months, a number of chief executives of health care facilities have visited with or called me to discuss the difficulties they are having in filling nursing positions. One thing clear from those discussions is that public higher education needs your assistance in defining what the present and projected needs are. The 46 Board of Regents institutions in Tennessee now graduate collectively more than 700 LPN's and 850 RN's per year. How many do we and will we need to graduate in order to meet current and future needs? Do we need to graduate more RN's than LPN's, more RN's with associate than with baccalaureate degrees? Is there a need for more nurses with graduate education, and in what clinical specialty areas? Only you and your counterparts across the state can answer those questions. Once you do, it will be up to us to respond accordingly and have the number and kinds of nursing personnel available for you when you need them.

To get the answers to those and related questions, I have established a state-wide Task Force on Nursing to study the current and projected need for nurses throughout the State. I have appointed Dr. Cynthia L. Lenz, Dean of the School of Nursing at East Tennessee State University, to serve as Chair.

The study will focus on each of the State's thirteen (13) Developmental Districts in order to take into account the differences that may exist from region to region. It is very important, therefore, that every health care facility in a given district participate. Your nursing executive has received the enclosed questionnaire and has been invited to complete and return it as soon as possible. Your support in assuring that we get the best data is of the utmost importance. Responses must be returned before May 22, 1989. (Please note that health care facilities are identified on the questionnaire for follow-up purposes only. No facility or institution will be identified in any reports that may come from the Task Force. Confidentiality will be maintained as completely as possible.)

Thank you in advance for your help. Should you have any questions, please feel free to contact me, Dr. Lenz, or any member of the Task Force listed on the back of the questionnaire.

Sincerely yours,

A handwritten signature in cursive script that reads "Thomas J. Garland".

Thomas J. Garland
Chancellor



East Tennessee State University
School of Nursing

Office of the Dean • Box 21010A • Johnson City, Tennessee 37614-0002 • (615) 929-5626

May 11, 1989

Dear Nursing Service Executive Officer:

There is no doubt that the quality of health care that your facility is able to provide for Tennesseans is very much dependent upon the availability of health care professionals as well as on the quality of their preparation. That is why the stories carried by both state and national media on the shortage of nurses are cause for grave concern to both policy makers and educators alike. Do we or will we have shortages in Tennessee? How should higher education respond in order to avert the critical shortages that, in some places, appear to be crippling the delivery of quality health care services?

To get the answers to these and related questions, the Board of Regents has established a state-wide Task Force on Nursing. The Task Force has been asked to study the current and projected need for nurses throughout the State. In order to assure that the study takes into account the differences that exist between one region and another, the Task Force will collect data for each of the State's thirteen (13) Developmental Districts. For that reason, it is very important that every health care facility in a given District participate, and we hope that yours will.

The Chief Executive Officer has received a copy of this survey. Its completion may require the cooperation of several individuals. However, you are the identified respondent.

Institutional identification is requested to identify and follow-up survey responses. Institutions will not be identified in the final report. Raw data will be used in a confidential manner for research purposes only. The surveys are to be returned on or before May 22, 1989.

As you may know, the colleges and universities in the State Board of Regents System are together the largest supplier of nurses in Tennessee. Our institutions, for example, have graduated over 700 LPN's and about 850 RN's per year for the past five (5) years. Most of these are employed in Tennessee. This survey will help us to plan for the next five years and to insure that the personnel are there when you need them.

Should you have any questions, please feel free to contact me or direct them to any local member of the Task Force. A list of members is enclosed as the final page of the survey. Thank you in advance for your help and for participating in this very important study. The report is expected to be released September 1989.

Sincerely yours,

Cynthia L. Lenz

Cynthia L. Lenz, R.N., Ph.D.
Dean, School of Nursing
East Tennessee State University
Chair, SBR Task Force on Nursing

VITA

CAROL HALL PULLEN

- Education: East Tennessee State University, Johnson City, Tennessee; Nursing, B.S.N., 1965
University of Tennessee, Knoxville, Tennessee; Nursing, M.S.N., 1986
East Tennessee State University, Johnson City, Tennessee; Ed.D., 1991
- Professional Experience: Staff Nurse, Bristol Memorial Hospital; Bristol, Tennessee, May 1965-September 1965
Staff Nurse, Presbyterian Hospital; Charlotte, North Carolina, September 1965-September 1966
Nursing Instructor, Presbyterian Hospital; Charlotte, North Carolina, September 1966-September 1969
Staff Nurse and CPR Instructor, Bristol Memorial Hospital; Bristol, Tennessee, September 1981-September 1983
Assistant Professor, School of Nursing, East Tennessee State University; Johnson City, Tennessee, September 1983-present
- Professional Organizations: Member, American Nurses' Association, 1987
State Task Force for Impaired Nurses, 1988
State Nominating Committee, 1991
State Continuing Education Review Committee
Member, Phi Delta Kappa
Past Member, Mid-South Educational Research Association (1988)
Past Member, Tennessee Council for Associate Degree Nursing (1987-89)
- Grants: Project Director, Teacher Educator Contracts, 1989-91, Tennessee Department of Education, \$20,472.00 annually
- Publications: Pullen, C. & Lenz, C. L. (1990, May). Shortage hits Tennessee hard. The American Nurse, p. 30.

Pullen, C. (1988) LPN to ADN: What options are currently available nationwide? The American Journal of Nursing, 88, 1129.

Pullen, C. (1988). Your answer. Journal of Psychosocial Nursing and Mental Health Services, 26(6), 40.

Honors and
Awards:

Kellogg Fellowship for Graduate Study
(1984-1986)

Member of Sigma Theta Tau, nursing honorary
society (1984-present)