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AN ABSTRACT OF THE THESIS OF Barbara Zuern for the Master
of Science in Economics presented May 30, 1974.

Title: The Rate of Return on the Investment in Registered Nurse
Education as Related to the Supply of Registered Nurses.

APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

Richard B. Halley, Chairman

Morton Paglin

Hugh G. Lovell

The focus of this research is the relationship between the supply of registered nurses and the rate of return on the educational investment to become a registered nurse. Is this rate of return a determining factor in the supply, past, present, and future? Since 98.8 percent of all registered nurses are women, an integral part of this study is a survey of the data on women in the labor force.

The empirical data, statistical, was obtained from government sources and non-government associations, The American Nurses Association, The American Hospital Association, and the educational institutions. The data indicates the following: the yearly average

supply of active registered nurses has increased by 3.15 percent from 1966 through 1970; the demand for registered nurses has decreased from 41.1 percent of nursing personnel in 1966 to 36.8 percent in 1970; the average weekly wage of general duty nurses has increased \$100.50 in 1966 to \$141.00 in 1969; the number of graduates from registered nurse schools has been increasing in recent years. Of the three programs, the Associate Degree shows the largest increase in number of students and it is the one in which the present value of benefits from the investment, \$10,414.00, exceeded the present value of the investment costs (education), \$6,923.00, which yielded a private rate of return of five percent.

In summary, the rate of return on the three registered nurse educational programs, Associate Degree, Diploma Degree, and Baccalaureate Degree, based on employment as a general duty nurse and calculated by both the present value of cost and benefit method and internal rate of return method indicated that only the Associate Degree program produced a positive rate of return. In addition, this is the program that has had the large increase in students and graduates in recent years. If this trend continues, the future supply of registered nurses will be adequate and may overshoot the demand. However, many questions remain unanswered which call for more research, particularly relating to the labor force participation of women.

THE RATE OF RETURN ON THE INVESTMENT IN REGISTERED
NURSE EDUCATION AS RELATED TO THE
SUPPLY OF REGISTERED NURSES

by

BARBARA ZUERN

A thesis submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE
in
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Portland State University
1974

TO THE OFFICE OF GRADUATE STUDIES AND RESEARCH:

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May 30, 1974

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CHAPTER I

INTRODUCTION

Over the years one has consistently heard the words "shortage of nurses." During World War II there was a very real shortage of nurses and the short supply has continued up to and including the present time. Over the past decade the health care industry has expanded rapidly and is now one of the fastest growing areas in the economy. Undoubtedly this growth will continue into the 70's. As a result, the demand for all health personnel has increased, including that for professional registered nurses, the largest occupational group in the health field.¹ With an expressed shortage of registered nurses before the expansion of health care the question is, what is the status of the supply of registered nurses today? Is there a shortage and if so what is the cause of this persistent lack of adequate supply?

This study focuses on the relationship of the rate of return on investment in registered nurse education to the supply problem. Is it a determining factor in the registered nurse supply? First, it is

¹U. S. Department of Labor, Bureau of Labor Statistics. Tomorrow's Manpower Needs Volume III, National Trends and Outlook: Occupational Employment Bulletin No. 1606 (Washington, D.C.: Government Printing Office, 1969), p. 11.

necessary to have a clear picture of the occupation, registered nurse, and second, to analyze both the demand and supply sides of the market for registered nurses. With this foundation the relationship of the rate of return on investment in registered nurse education to the supply of registered nurses will be analyzed.

Nursing as an occupation is a woman's domain; 98 percent of all registered nurses are women.² In 1935 one percent of employed registered nurses were men and this figure still holds for 1969.³ However, today more men are attracted into the nurse educational programs as a result of increasing demand, increasing salaries, and the expanding role of the registered nurse in health care. In the less skilled occupation, licensed practical nurse, 96 percent of the total employed are women; and in the unskilled group, nurse aides, orderlies, and attendants, 74 percent of the total employed are women.⁴

Women's role in all phases of American life, social,

²American Nurses Association, Facts About Nursing A Statistical Summary 1969 Edition (New York: American Nurses Association, 1969), p. 7.

³The Nursing Information Bureau of The American Nurses Association Cooperating with the National League of Nursing Education and The National Organization for Public Health Nursing. Some Facts About Nursing A Handbook for Speakers and Others. (New York: American Nurses Association, 1935), p. 11.

⁴American Nurses Association, Facts 1969 Edition, p. 7.

economic, and political has been changing since 1940.⁵ As a result of scientific and technological changes their home-making duties have lessened, making them available for other activities. More and more have entered the labor force as the demand for women workers increased. Their labor force participation rate in 1968 was 41 percent, a substantial increase from 28.9 percent in 1940.⁶ Also, women's level of education advanced and increasing opportunities for occupational training have developed. Now, nine out of ten women, married or not, work outside the home for some periods of their life. Studies indicate that a single woman's (about 1/10 of all women) work-life is about the same as a man's, 45 years. For the women that marry and do not have children (about 1/10) their work-life is about 35 years. For the married women with children, there is considerable variation depending greatly on the number of children. Most married women leave the labor force for about eight to ten years to raise their families and return to work in their middle thirties to average about 24 more years of work.⁷ In 1960 married women with children under three years had a labor force participation rate of 15.3 percent and by

⁵U. S. Department of Labor. Wage and Labor Administration. Women's Bureau. 1969 Handbook on Women Workers Bulletin 294 (Washington, D.C.: Government Printing Office, 1969), p. 76.

⁶Ibid., p. 18.

⁷Ibid., pp. 7-8.

1970 it had risen to 25.8 percent.⁸

In 1964, a study by the Bureau of Labor, Department of Statistics indicated that two-thirds of women in the labor force were married.⁹ The data on registered nurses of the Inventory, 1966, indicated that the percentage of practicing registered nurses had risen steadily over the years from 41.9 percent in 1949 to 64 percent in 1966.¹⁰ The median age for employed registered nurses has been gradually advancing over time, as in 1949 only 22.5 percent were 45 years of age and over, and in 1966 the median age was 40.3 years, which agrees with data for all women in the labor force with one-half being 40 years and over.¹¹ The result of the increased labor force participation of married and mature women has substantially increased the number of working registered nurses.

Education was found to be a most important factor in explaining the increase in women workers. The more education a woman has, the greater the tendency to work regardless of financial

⁸Bureau of Labor Statistics Table "Married Women in The Labor Force, March 1960-1970" in The American Journal of Nursing, 71 (April, 1971), p. 664.

⁹U.S. Department of Labor. Wage and Labor Administration. Women's Bureau 1969 Handbook, p. 8.

¹⁰American Nurses Association, Facts, 1969 Edition, p. 8.

¹¹U.S. Department of Labor. Wage and Labor Administration. Women's Bureau 1969 Handbook, p. 3.

status. The registered nurse's education and training program ranges from two years, minimum, to four-five or more years beyond high school and this should help to return and hold registered nurses in the labor force. In 1968 the labor force participation rate of women with 1-3 years of college was 45.5 percent; with 4 years of college 54.4 percent; and with 5 or more years of college 70.8 percent.¹²

Mainly, as a result of home and family responsibilities, women more than men are part-time and/or part-year workers. In 1967 it was found that only 42 percent of employed women worked full-time the year round, while 70 percent of men had full-time, all-year employment. About 10 percent of the women in the labor force worked part-time year round, 28 percent worked full-time for part of the year, and 18 percent worked only part-time for part of the year. Indeed, part of these part-time, part-year workers would take full-time all-year employment if it was available to them. The data for 1967 for women professional, technical and kindred workers shows 42.1 percent worked full-time, 28.4 percent worked full-time part of the year and 29.4 percent worked at part-time jobs.¹³

In comparison registered nurses in 1967 reported that 26 percent of the total number in active practice worked part-time, and

¹²Ibid., pp. 201, 205.

¹³U. S. Dept. of Labor, Handbook 1969, pp. 55-62.

the balance, 74 percent, were in full-time employment. Over the years the proportion of registered nurses in part-time work has continued to increase. The absolute number of registered nurses working increases each year, but an increasing percentage of these are part-time workers. In 1954 only ten percent of all active registered nurses worked part-time and, by 1969, 27.5 percent of all active registered nurses were working part-time.¹⁴ Undoubtedly, this is the response to the absolute increase in nurses' salaries which has made it worthwhile for the registered nurse to exchange a portion of her home-life for a part-time nursing job.¹⁵ In other words, "the economic utility of nursing has now begun to some extent to exceed its disutility."¹⁶

Another point in the work pattern of many married women with husbands present and employed is that the woman's income is supplemental and increases the family's standard of living. She is the secondary worker and consequently her employment and hours of work must adjust to and accommodate the husband's job; and also the activities of the family.¹⁷

¹⁴American Nurses Association, Facts 1969 edition, p. 8.

¹⁵Lysaught, Abstract, p. 55.

¹⁶Ibid., p. 55.

¹⁷Jacob Mincer, "Labor Force Participation of Married Women. A Study of Labor Supply" in Aspects of Labor Economics. A Report of the National Bureau of Economic Research. The labor force

To some extent, both availability and turnover result as the married nurse follows the career choice and opportunities of her husband. Given the fact that young nursing students place family above profession, it is not at all surprising that decisions on where to practice are determined, for the most part, by family priorities.¹⁸

The point is that women are mothers, wives, and home makers first and workers second. If women workers are needed, a favorable climate for their participation in the labor force must adjust to this evidence. In fact, increasing flexibility in personnel policies is developing as institutions are beginning to make adjustments in schedules to accommodate the registered nurse's family obligations. Also, in many health care facilities, maternity leave and child-care centers are provided.¹⁹

Traditionally nursing has been a "low-pay" occupation. This is explained in part by its being a woman's occupation. Since the old custom of paying women less than men is well known and acknowledged, it will not be discussed here. However, in addition to this nursing is "low-pay" relative to other women's occupations with respect to those

participation of married women is a three-way choice between leisure, paid work, and unpaid work (home) and this choice is a family decision. "While family income affects the total amount of work, the market wage affects the allocation of hours between leisure, the home and the market. p. 67.

¹⁸Lysaught, Abstract, p. 25.

¹⁹Ibid., p. 135.

requiring education beyond high school such as teachers and also those not requiring additional education such as sales workers, clerical workers, stenographers, typists and secretaries.²⁰ Income reports for 1949 based on the 1950 United States census indicates the total annual income for professional nurses ranked low on the scale for all women's professions with teachers 13 percent higher and social workers 17 percent higher.²¹ Donald Yett reports that from 1949 to 1959 nurses salaries increased less in both absolute and percent terms than the salaries of teachers and all women technical, professional and kindred workers. For all nurses the increase in money terms was 53 percent; for hospital nurses, 46 percent; for women technical professional and kindred workers, 67 percent; and for teachers (mean salary) 72 percent.²² According to a report of the United States Bureau of Labor Statistics in 1963-64, classroom teachers averaged \$6,235.00 a year, secretaries \$5,170.00, and factory workers \$5,075.00. In the same period, general duty nurses in non-federal

²⁰The minimum educational requirement for a teacher was a Bachelor of Arts Degree, four academic years, and the minimum for a registered nurse was the Diploma from a School of Nursing, three full (12 month) years. However, in recent years, the Associate Degree program for nurses has reduced the minimum time to become a registered nurse to two academic years. A complete discussion on nursing education follows later in this paper.

²¹American Nurses Association, Facts 1954 Edition, p. 111.

²²Donald E. Yett, "Supply of Nurses: An Economists View," Hospital Progress, 46 (February, 1965), p. 99.

hospitals, the largest group of nurses, averaged \$4,500.00 per year.²³

Health service workers are by custom paid less than other workers because of the "non-profit and eleemosynary nature" of health care²⁴ and the idea that health workers are dedicated to service.

Efforts being made to correct both of these customs are producing moderate to good results.

Since two-thirds of all registered nurses are employed by hospitals it is necessary to look at their employment policies and practices. As non-profit organizations, the government gave the hospitals special consideration and exempted them from labor and social legislation. This, too, has changed in the recent past and now hospital employees are covered by Social Security, Taft Hartley, and in 1966 legislation was passed to bring them under the minimum wage law. The economic factors, low salaries and poor working conditions, in

²³David D. Rutstein, M.D., The Coming Revolution in Medicine (Cambridge, Mass.: The M. I. T. Press, 1967), p. 72.

²⁴Jerome P. Lysaught, An Abstract For Action, National Commission for the Study of Nursing and Nursing Education, (New York: McGraw Hill Book Company, 1970), p. 135. Herman M. Somers and Anne R. Somers, Medicare and the Hospital: Issues and Prospects, Brookings Studies in Social Economics, (Washington, D.C., 1967) pp. 51, 98, 118, 231. The voluntary hospital originated as a Community Charity to care for the poor and ill, a tax-exempt eleemosynary institution, operating largely with free labor and contributions. This inheritance has been a handicap in trying to change and modernize the hospital and Somers says: "...there will have to be more systematic recognition that nurses are no longer just dedicated spinsters."

combination with a "lack of professional status"²⁵ are responsible for the problem referred to as "the shortage of nurses."²⁶

Currently, the education and training of registered nurses is offered by three programs, and these schools must be approved by the State Board of Nursing for its graduates to be eligible to take the State Board Examination for Licensure as a registered nurse. A license is required to practice nursing in all states. All of these programs require a high school diploma for entrance.

The Diploma Program, hospital school, is the original nurse training program and still educates and trains a large portion,

²⁵Somers and Somers, Medicare and the Hospital, pp. 98-117. The poor working conditions cover a large range of conditions. For one, the traditions and organizational structure inherited by the hospitals with their confused lines of responsibility and accountability and the "restrictive legal and professional codes and traditional relationships" hamper attempts to progress into a modern and appropriate personnel-management system. In addition to low wages, the fringe benefits lag far behind other occupations. Pensions are rare and hospital insurance is lacking in most cases. The awkward working hours and schedules, and few chances for advancement contribute to the unattractiveness of the nursing profession. These conditions are a major cause of the large turnover rate for nurses which is three times that of women public school teachers. In commenting on the status of nurses, Somers says: "The registered nurse has achieved a status of 'professional' in the nomenclature, but does not often enjoy that type of treatment from physicians, administrators, or the public"

Rutstein, The Coming Revolution in Medicine, pp. 135-136. Because of the wide range of duties and responsibilities expected of the nurse, there has resulted "utter confusion in status with inadequate salaries --- it is no wonder that the recruitment of nurses --- has been unsuccessful."

²⁶Lysaught, Abstract, p. 56.

52.4 percent in 1969-70, of registered nurses.²⁷ Its program was a three-year program, but now some hospitals have reduced it to 27-33 months. Also, many of the hospital schools have closed because of changes in the education program and the related high costs. Most hospital school graduates do not obtain college credit for classes, but recently most schools include a few college credit classes, 16 to 30 credits.

The Associate Degree, Community College, program is a two-year course which is gaining in favor rapidly. In the 1969-70 year, it graduated 26.8 percent of the registered nurses.²⁸ These graduates are frequently referred to as nurse technicians and are considered qualified for staff nurse positions.

The Baccalaureate Degree, University program is a four to five year course and these graduates are often referred to as professional registered nurses and are qualified for all nursing positions, especially supervisory, administrative, public health, and nurse faculty. In the 1969-70 year, it graduated 20.8 percent of registered nurses.²⁹ A portion of these go on to obtain more advanced degrees and so become eligible and qualified for the higher positions open to

²⁷American Nurses Association, Facts, 1970-71 Edition, Table 5, p. 75.

²⁸Ibid., p. 75.

²⁹Ibid., p. 75.

professional registered nurses. Graduates from these three programs which vary considerably in time, education, training, and money cost all take the same state board examination in their respective state to become licensed registered nurses and most enter the profession at about the same salary.³⁰

As a result of the growing demand for health care and rapid advances in medical technology, the demands on all existing health personnel has increased and has brought about greater specialization requiring new technicians and expanding the role of the registered nurse to include many new duties and responsibilities. In turn, more and higher education is required by all health workers, including registered nurses, as well as a greater number of workers.

³⁰It is beyond the scope of this paper to analyze and evaluate the changes in registered nurse education and job classification now in progress. However, this situation of the majority of registered nurses entering the employment field at the same level, regardless of their education, is part of the disagreement and confusion associated with breaking away from old customs and moving into the modern world.

CHAPTER II

REGISTERED NURSES LABOR MARKET: DEMAND

The labor market for the economy is the aggregate of all the many specific labor markets which differ greatly and are based on certain characteristics such as profession, occupation, skill, or industry to name a few. The market for registered nurses is clearly a separate occupational labor market. Although each labor group has its own market, these specialized labor markets function interdependently with other markets because a single factor input does not work alone but cooperates with other inputs in the production process. In addition, all markets are governed by the traditional economic theory of supply and demand which functions through the price mechanism to determine employment.¹ Even though the subject of this paper is the supply of registered nurses, it is necessary to study both sides of the labor market, demand and supply, and the way they interact in order

¹Allan M. Cartter, Theory of Wages and Employment (Homewood, Illinois: Richard D. Irwin, 1959), p. 5.

Even though traditional price theory is based on the assumptions of pure competition it is valid in the case of imperfect competition. The difference between the two is in the pricing rate.

to determine the relationship existing between the supply of registered nurses and the rate of return on their investment in the education necessary to become a registered nurse.

The element of time plays an important role in the market behavior. Time, as used here, is not a calendar time but is related to the time period necessary for adjustments to economic situations or changes to be instituted and completed. It ranges from the immediate short run to short run and through the long run. In the immediate short run no adjustments would take place but in the short run the time period allows for adjustments in labor. The long run allows for all adjustments to be initiated and completed and includes all production factors, capital, labor, plant, equipment and technology.²

The focus of this study is in the long period because the time required to choose and to complete the education for the occupation is at a minimum two years and the rate of return on the investment in the education for an occupation is based on the expected life-time earnings and the expected years of working life. Finally, a forecast of the future supply of registered nurses is made on the basis of this study. However, the long run supply is dependent on the short period con-

²Joan Robinson, Economic Heresies, Some Old Fashioned Questions in Economic Theory (New York: Basic Books, Inc., Publishers, 1971), p. 18.

"Indeed --- The short period is not a length of time but a state of affairs. Every event that occurs, occurs in a short period situation; it has short period and long period consequences"

ditions which include wage rate, wage differential of skill levels of nursing personnel, availability and costs in time and money for required education, employment opportunities, and alternative opportunities. How will prospective registered nurses respond to these conditions? Will more or fewer individuals choose to enter the occupation?

The demand for a factor of production is a derived demand arising from the demand for the product. This demand for a factor input is a function of wage rate, supply, available substitutes and their price and supply, the demand and price of the product, and the price and supply of the other inputs in the production process. The production process is formally stated by the production function which gives the technical relationship of output to inputs and tells the maximum output obtainable from each set of specific inputs.³ The importance of this is that a given output can be produced by a choice of alternative sets of inputs which may change the production process.⁴ The time element also influences the production function. The immediate short run proportions of inputs are set for a specific process and no adjustments take place. The short run and long run

³Paul A. Samuelson, Economics, 8 ed. (New York: McGraw-Hill, 1970), p. 516.

⁴Belton M. Fleisher, Labor Economics Theory and Evidence (New Jersey: Prentice-Hall, Inc., 1970) p. 121.

adjustments have been defined above.

Therefore the demand for registered nurses is directly related to the demand for health care. The consumer demand for health care has been steadily increasing since 1955 as a result of many changes, increasing population, changing age composition of the population with large numbers of old and young, rising level of education, an expanding economy, increasing disposable personal incomes, changing tastes and preferences of consumers, changing prices of other goods, increasing numbers of persons with medical insurance, expanding health care coverage by government and employers, expanding government subsidy for health care costs, and rapidly changing social and political attitudes concerning the availability of health care to all persons. The combined effect has been a tremendous increase in the demand for all components of health care; and this has exerted great pressure and strain on the existing health care facilities. The consequences of rapid expansion of the industry in response to the demand has been higher production costs and higher consumer prices. Expansion results in increased demand for all inputs and increased wages to specialized factors. Therefore both the demand for registered nurses and the wage rate would increase.

That the health service industry is one of the most rapidly expanding industries is supported by the increase in the number of health workers. In 1960 the number of health workers was 1,548 million

and the total employment was 54,231 million. By 1965 the number of health workers totaled 2,080 million, a 30 percent increase as compared to the total employment which had increased to 60,815 million, a 12 percent increase. By 1970 the health workers had increased 47 percent over that of 1965. For the same period the total employment had increased 13 percent. From 1960 to 1970 the number of health workers had doubled while the total employment for this period had increased 30 percent.⁵

The increased wage will have little effect on employment in the immediate short run because a process of production usually has fixed proportions of inputs for that specified process. In addition, an employer does not react immediately to the wage increase by decreasing employment but will recover added cost by using his usual mark-up and raise the product price. In questionnaires, employers have stated that the wage changes do not affect employment but the demand for the product is the determining factor.⁶ In the health industry the demand is still strong even though the prices have been rising sharply. Thus in the short run employment will not be much affected. However, in the short run adjustments in labor may take place. Consequently if a

⁵Calculated from data from The Statistical Abstract of the U.S. 1973 prepared by the Bureau of the Census. Table No. 364 Non-agricultural Industries - Number of Employees 1960 - 1970, and Number and Earnings of Production Workers 1965, 1970 and 1971. pp. 227-229.

⁶Cartter, Theory of Wages and Employment, p. 40.

less expensive nursing input is available it may be substituted for some of the more expensive registered nurses. This would be a change in the skill mix of the nursing factor. In the long run, when all adjustments can be made in the production process a wage increase will result in substitutions such that less of the more costly labor is employed.

The effect of a wage change on employment depends on the elasticity of demand for labor (all else unchanged) and it is determined by four major factors.

The first factor is the elasticity of demand for the product.

If the demand for the product is inelastic, a rise in wages will result in a large rise in the price of the product and in little change in the number of firms and in the output of the industry. In that case there will be little change, also, in the quantity of the labor employed. That is, an inelastic for a product demand is likely to result in an inelastic demand for any input which goes to produce it.⁷

It was noted by Klarman that several studies have found the market demand for medical services to be inelastic.⁸ This would indicate that employment in health care will change little with a rise in wages and also the elasticity of demand for registered nurses, an input is

⁷Kenneth E. Boulding, Economic Analysis, 4 ed. Vol. 1 Microeconomics (New York: Harper & Row, Publishers, 1966), p. 441.

⁸Herbert E. Klarman, The Economics of Health (New York: Columbia University Press, 1965), pp. 24-25.

likely to be inelastic for the short run. For the long run, though, variability and substitution in response to an increase in wages will bring about a decrease in the amount of labor demanded.⁹

The second factor in determining the elasticity of demand for an input is the availability of good substitutes. The less other factors can be technically substituted for a factor input (labor, here) the less elastic is the demand for the factor input. Imperfect substitutes for registered nurses have been used since World War. II when the substitution was instituted due to the excessive demand for registered nurses. Over the years this has continued at an increasing rate because of the expanding health care industry, continuing slow increase of registered nurse supply and a rising wage rate for registered nurses. These conditions caused employers to seek less costly, more available nursing input. The result was the substitution of the less skilled and less educated practical nurse and nurse aide for the registered nurse. The substitution, once started, progressed to the specialization of the nursing occupation.

The once single nursing occupation of registered nurse has been divided into three nursing occupations according to the degree of skill, years of education, and training; and a non-nurse occupation, ward clerk, to take over non-nursing work previously done by regis-

⁹Fleisher, Labor Economics Theory and Evidence, p. 135.

tered nurses. One, is the registered nurse, the most highly skilled with education and training ranging from two to four or more years.¹⁰ Two, is the licensed practical nurse, the semi-skilled nurse with one year of education and training. Three, is the unskilled group which includes the nurse aide, orderly, attendant with on-the-job training and, more recently, nurse aides have three months formal education and training. Thus, by specialization, these two new classifications of less skilled and less costly nursing personnel have been created to perform the less skilled duties of the registered nurse and release her for the more skilled and specialized duties. Nursing personnel are now a mix of these three skill levels. In the short run the substitution of the less skilled would be limited by their current supply, training period, and present plant and production process. However, in the long run, the supply lag is eliminated, plant and the production process change, technology changes, and labor adjustments take place.¹¹ The nursing personnel skill mix will change with a decrease in employment of registered nurses and a decrease of registered nurses as a proportion of total nursing personnel. The degree of change in the

¹⁰ Within the classification, registered nurse, are many levels of skill and years of advanced specialized education. However, in this paper, all registered nurses are treated as one group.

¹¹ Health Care Facilities also have become specialized and this brings changes in the production process. Each specialized facility has its own specific production function.

skill mix will be determined in part by the elasticity of demand for the registered nurse. Due to the substitutes this elasticity of demand should become more elastic and the greater the elasticity of demand for the factor the greater the decrease of employment as the wage increases. Also the demand curve for labor is less elastic in the short run than in the long run, which would result in a smaller decrease in employment in the short run than in the long run.

The empirical data for the decade of the 60's shows the decrease of employment of registered nurses as a percentage of total medical and health workers and a percentage of nursing personnel as follows: (See Tables I through VIII, and Graph I and II) In 1960, registered nurses were 31.6 percent of all service medical and other health workers; in 1970 this had dropped to 23.6 percent when the total number of these workers had almost doubled, increasing from 1,595,000 in 1960 to 2,966,000 in 1970. Over the same period the percent of licensed practical nurses to total medical and other health personnel maintained an average of about 12.7 percent and the nurse aide, orderlies and attendants maintained an average of 28 percent. Thus the employment for the registered nurse has been decreased by the substitution through the specialization process. Further evidence regarding the extent of this is the ratio of registered nurses to total nursing personnel which in 1960 was 45 percent, in 1966 it was 41.1 percent, in 1969 it dropped to 37.26 percent and on down to 36.8 per-

TABLE I

**REGISTERED NURSES, NUMBER, PERCENTAGE, AND ANNUAL PERCENTAGE INCREASE FOR TOTAL
NUMBER ACTIVE, WORKING FULL-TIME, WORKING PART-TIME, AND PART-TIME
ADJUSTED TO FULL-TIME EQUIVALENTS**

Year	REGISTERED NURSES 1954 - 1970										
	Total Number Active*	Per- cent Increase	Aver- age Annual % Inc.	Working * Full-Time	Absolute Full-Time Increase	Working * Part-Time	Absolute Part-Time Increase	Per- cent P.T.	Total Equiva- lent F.T. (Adj. P.T.)	Adj. F. T. Percent In- crease	Adj.F. T. Annual % In- crease
1954	401,600	%						%		%	
1956	430,000	7.0	3.5%	388,000		42,000		10.0%	409,000		
1958	460,000	7.0	3.5	384,000	-4,000	76,000	34,000	16.5	422,000	3.18	1.59
1960	504,000	9.5	4.75	414,000	30,000	90,000	14,000	17.8	459,000	8.77	4.37
1962	550,000	9.1	4.55	433,000	19,000	117,000	27,000	21.3	491,000	7.0	3.5
1964	582,000	5.8	2.9	450,000	17,000	132,000	15,000	22.7	516,000	5.09	2.55
1966	621,000	6.7	3.35	466,000	16,000	155,000	23,000	25.0	543,000	5.23	2.62
1967	640,000	3.0	3.0	474,000	8,000	166,000	11,000	26.0	557,000	2.57	2.57
1968	659,000	3.0	3.0	483,000	9,000	176,000	10,000	26.7	571,000	2.51	2.51
1969	680,000	3.19	3.19	493,000	10,000	187,000	11,000	27.5	586,000	2.62	2.62
1970	700,000	3.0	3.0								

Source: *American Nurses Association. Facts About Nursing: A Statistical Summary 1970-71 Edition
New York, A.N.A. p. 9.

TABLE II

REGISTERED NURSES AND LICENSED PRACTICAL NURSES:
NUMBER AND RATIOS WITH PERCENTAGE CHANGES
1950 - 1970

Year	Number** Active Reg. Nurses	Number** Licensed Practical Nurses	LPN / RN	RN / LPN	LPN / RN % Change
1950	374,584*	136,541*	.365	2.8	1950 to
1960	504,000	205,974	.408	2.5	1960 4.3
1966	621,000	254,800			1960
1967	640,000	252,522	.400	2.5	to 1970
1969	680,000	345,000	.507	2.0	12.1
1970	700,000	370,000	.529	1.9	

Source: *U. S. Dept. of H. E. W. Health Manpower Source
Book Section 2 Nursing Personnel Revised 1969,
p. 9.; p. 84.

**American Nurses Association. Facts About Nursing,
1970-71 Edition, p. 9.

**MEDICAL AND OTHER HEALTH WORKERS, NUMBER AND
PERCENTAGE INCREASE, REGISTERED NURSES,
TOTAL NUMBER WITH RATIOS AND ANNUAL
PERCENTAGE CHANGE
1956-1970**

Year	Total No. Medical & Other Hlth. Wkrs (1,000)	Percent Increase THP **	*** Total Num- ber Active Registered Nurses	THP/ RN	RN/ THP	RN/ THP % change over prev.yr.
1956	1,298		430,000	3.02	0.331	.
1957	1,369		464,138	2.92	0.339	+.008
1958	1,431		460,000	3.11	0.321	-.018
1959	1,535	11.46				-.005
1960	1,595		504,000	3.14	0.316	-.004
1961	1,660	4.0				
1962	1,762	6.1	550,000	3.20	0.312	
1963	1,867	6.0				
1964	1,969	5.4	582,000	3.38	0.296	-.016
1965	2,094	6.3				
1966	2,257	7.78	621,000	3.63	0.275	-.021
1967	2,450	8.53	640,000	3.79	0.263	-.012
1968	2,603	6.25	659,000	3.95	0.253	-.010
1969	2,603	7.03	680,000	4.09	0.244	-.009
1970	2,966	6.46	700,000	4.24	0.236	-.008

Source: *U. S. Department of Commerce, Office of Business Economics
Survey of Current Business, Washington, D. C., Government
Printing Office, Annual National Income Issue; July, 1960
p. 25, July 1964, p. 29; July 1970, p. 31; July 1971, p. 35.

**T.H.P. Total Number Medical and Other Health Workers

***American Nurses Association. Facts About Nursing, 1970-71
p. 9

TABLES IV, V, VI

MEDICAL AND OTHER HEALTH WORKERS AND NURSING
OCCUPATIONS, NUMBER, ABSOLUTE AND
PERCENTAGE CHANGE
1969-1970

Table IV

	1969	1970	Per- cent Change	Absolute Change	% Inc. of Med. & Hlth. Wkrs.	
Registered Nurses	680,000	700,000	3.0%	20,000	11.0%	
Licensed Prac. Nrs.	345,000	370,000	7.25	25,000	14.0	
N. Aides, Orderlies Attendants	800,000	830,000	3.75	30,000	17.0	
LPN / RN	.507	.5286				
N.A. Etc. / RN	1.176	1.1857				
Medical & Other Hlth. Workers	2,786,000	2,966,000	6.46	180,000		

Table V

1966-1970

	1966	1970	Per- cent Change	Absolute Change	% In- crease of T.H.P.	Average Annual % Increase 66-70
Registered Nurses	621,000	700,000	12.72	79,000	11.0	3.0
Licensed Prac. Nrs.	254,800	370,000	45.20	115,000	16.24	11.3
N. Aides, Orderlies, Attendants	637,900	830,000	30.00	192,000	27.11	7.5
LPN / RN	.4103	.5286				
NA Etc. / RN	1.027	1.1857				
Med. and Other Hlth. Workers	2,257,000	2,966,000	31.41	709,000		7.5

Table VI 1966-1969

	1966	1969	Per- cent Change	Absolute Change	% In- crease of inc. T.H.P.	Average Annual % Increase 66-69
Registered Nurses	621,000	680,000	9.5	59,000	11.15	3.17
Licensed Prac. Nrs.	254,800	345,000	35.4	90,200	17.05	11.8
N. Aides, Orderlies, Attendants	637,900	800,000	25.41	162,100	30.64	8.47
LPN / RN	.4103	.507				
NA Etc. / RN	1.027	1.1764				
Med. and Other Hlth. Workers	2,257,000	2,786,000	23.43	529,000		7.81

Sources: American Nurses Association, Facts About Nursing
1970-71 Edition, p. 9; p. 185.

U. S. Department of Health, Education and Welfare Health
Manpower Source Book Section 2 Nursing Personnel
Revised 1969, p. 84.

National League for Nursing, Preliminary Data 1970.

Jerome P. Lysaught, An Abstract for Action, McGraw-Hill
Book Company, New York 1970, p. 54; p. 26.

TABLE VII

**MEDICAL AND OTHER HEALTH WORKERS AND NURSING OCCUPATIONS; NUMBER AND RATIOS
1958-1970**

Year	Medical* & Other Hlth. Wkrs.	Registered ¹ Nurses	Licensed ² Practical Nurses	Nrs. Aides Orderlies Attendants	Total No. Nursing Personnel	Percent RN THP	Percent LPN THP	Percent NA THP	Percent NP THP	Percent RN NP
1958	(1,000) 1,431	460,000				32.1				
1960	1,595	504,000	205,974		1,122,974	31.6	12.9		70.4	45.0
1962	1,762	550,000	225,000			31.2	12.8			
1966	2,257	621,000		367,000 ³	1,510,000	27.5		28.26	66.9	41.1
1967	2,450	640,000	252,000			26.3	10.4			
1968	2,603	659,000				25.3				
1969	2,786	680,000	345,000 ²	800,000 ⁴	1,825,000	24.5	12.4	28.52	65.5	37.26
1970	2,966	700,000	370,000 ³	830,000 ³	1,900,000	23.6	12.6	27.98	64.0	36.8

Source: *U.S. Department of Commerce Office of Business Economics Survey of Current Business National Income Issue, July 1960, p. 25; July 1964, p. 29; July 1970, p. 31; July 1971, p. 35.

¹American Nurses Association, Facts About Nursing 1970-71 Edition, p. 9.

²U.S. Department of Health, Education, and Welfare Health Manpower Source Book Section 2 Nursing Personnel. Revised 1969, p. 84.

³National League for Nursing, Preliminary Data 1970.

⁴Jerome P. Lysaught, An Abstract for Action, McGraw-Hill Book Co., New York 1970, pp. 26, 54.

TABLE VIII

REGISTERED NURSE; LICENSED PRACTICAL NURSE; NURSE AIDES; ORDERLIES, AND ATTENDANTS
AVERAGE WEEKLY WAGE, PERCENT INCREASE, AND RATIOS
1956-1969

Year	Registered Nurse		Licensed Practical N.		Nrs. A., Ord., Att.		Percent	Percent	Percent
	Average Weekly Wage	Percent Increase	Average Weekly Wage	Percent Increase	Average Weekly Wage	Percent Increase	LPN Wage RN Wage	NA Wage RN Wage	NA Wage LPN Wage
1956 ¹	\$ 66.00	%	\$ 49.50	%	\$ 42.00	%	75.0 %	63.6 %	84.77 %
1959 ¹	69.00	4.54	50.00	0	45.50	8.3	72.46	66.0	91.0
1960 ¹	75.00	8.7	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1963 ²	85.50	14.0	63.00	26.0	51.00	12.0	73.70	60.0	81.0
1966 ³	100.50	17.54	72.50	13.2	58.00	13.7	72.13	57.7	80.0
1969 ⁴	141.00	40.3	98.50	36.0	76.00	31.0	70.0	54.0	77.16

Source: ¹American Nurses Association, Facts About Nursing, A Statistical Summary, Annual Issue 1960 p. 29; 1962-63 p. 30; 1957 p. 68, p. 120.

²U.S. Department of Labor, Bureau of Labor Statistics, Industry Wage Survey Hospitals 1963 Bulletin No. 1409

³U.S. Department of Labor, Bureau of Labor Statistics, Industry Wage Survey Hospitals July 1966 Bulletin No. 1553, pp. 15-16.

⁴U.S. Department of Labor, Bureau of Labor Statistics, Industry Wage Survey Hospitals March 1969 Bulletin 1688, pp. 14-15.

TABLE IX

MEDICAL SERVICE WORKER AVERAGE ANNUAL & WEEKLY WAGE
 REGISTERED NURSE (OREGON) AVERAGE WEEKLY WAGE
 1967-1970

Year	Medical Service Workers ¹		Registered Nurses ²
	Average Annual Wage	Average Weekly Wage	Average Weekly Wage Oregon
1967	\$ 4,197	\$ 80.00	\$ 127.00
1968	4,579	88.00	132.00
1969	5,043	97.00	140.00
1970	5,687	109.30	146.50

Source: ¹U. S. Department of Commerce. Office of Business
 Economics Survey of Current Business July, 1971, p. 35.

²Oregon Nurses Association.

Figure 1. N.A., R.N., and L.P.N. ratio to total number of health workers (Table VI)
Percent annual increase in total number of health workers (Table III)

Figure 2. Ratio of Nursing Personnel to total Health Personnel
Ratio of Registered Nurse to Nursing Personnel
1960-1970

Figure 3. Registered Nurse and Health Worker average
weekly wage 1956-1970

cent in 1970. The ratio of licensed practical nurses to registered nurses increased from 36.5 percent in 1950 to 40.8 percent in 1960 and 40 percent in 1967; then it jumped to 50.7 percent in 1969 and to 52.9 percent in 1970. The unskilled group also increased substantially. The data indicates that as the wage rate increased the amount of employment decreased with respect to registered nurses. The absolute number of registered nurses employed has increased at a fairly stable rate; the average through the decade of the 1960's was 3.88 percent increase per year but when this was adjusted to full-time equivalents, it was 3.38 percent. From 1964 through 1969 (inclusive) it averaged 2.57 (adjusted to full-time equivalents) percent increase per year, which was a decrease from the earlier years of the decade. The decrease from 1964 on would agree with the other data indicating a decrease in demand for registered nurses. But this data on absolute numbers of registered nurses employed may be more fully explained in the following examination of the supply side of the labor market.

Has the elasticity of demand for registered nurses become more elastic as a result of the substitution of less skilled workers? It was a partial substitution for registered nurses, that is, through the specialization (division) of labor less skilled workers were substituted only to do the less skilled work of the registered nurses. Thus the registered nurse has become a more highly skilled, specialized, costly worker. She has moved up the skill ladder and is taking on

more highly skilled functions and responsibilities and, in fact, is substituting for doctors in their less skilled duties. Through these changes the registered nurse's percentage of employment in the nursing occupation has decreased, her importance in the production process has increased as no near substitutes are readily available. In the technical relationship of inputs in a production process there is a minimum amount of any input required in the process to produce a specified output. The sum of these conditions may cause the elasticity of demand for registered nurses to become less elastic.

As a rule, the long run changes are the substitution of capital for labor. Consequently, when changes occur in the price of supply of one or more of the productive resources, it may be desirable or necessary to implement an alternative process. New technology facilitates the change. In the health care industry though, which is a personnel service industry and labor-intensive, the opportunities for this kind of substitution is less than in manufacturing. Also medical and hospital technology results in additional and more specialized personnel which would add to labor costs.¹² Nevertheless, technology has been substituted for labor in such departments as administration, record department, communications, and computers are being used and put to new uses every day.

¹²Herman M. Somers, "Economic Issues in Health Services." Contemporary Economic Issues, p. 122.

The third factor that influences the elasticity of demand for a factor is the importance of the factor as a portion of the total cost of production. The smaller the ratio of the factor's cost to the total cost, the more inelastic the demand for the factor. Payrolls of hospitals account for about 67 percent of total hospital costs.¹³ In 1969, 2,858,000 persons were employed in hospitals in the United States and of these about two-thirds were employed in professional and technical health occupations of which about 69 percent were in the nursing service. Of these in nursing service, 36 percent were registered nurses and 16 percent licensed practical nurses.¹⁴ By rough calculation, 16.4 percent of those employed in hospitals are registered nurses and as they are in the skill salary range they would account for a little more than 16.4 percent of payroll cost. However, in a labor intensive industry with total labor accounting for 67 percent of total cost, a wage increase for 16.4 percent of their work force would, in the long run, have some effect on prices, output, and employment. The costs of nursing personnel based on it being 45.5 percent of total employment in hospitals would be important and so would influence the elasticity of demand for nursing personnel toward elasticity. The importance, with respect to cost for the registered nurse being considerably less, would

¹³Ibid., p. 123.

¹⁴U. S. Department of Health, Education and Welfare, Health Manpower In Hospitals, pp. 2-3; Table 9, p. 41.

influence its elasticity of demand toward less elasticity or relative inelasticity. In which case a wage increase for registered nurses would, in the long run, reduce the amount of employment for them, but less than the percentage of wage increase.

The fourth and last important factor that influences the elasticity of demand for an input is the elasticity of supply of other inputs. The less elastic the supply of cooperating inputs the less elastic the demand for labor. The technical and skilled professionals¹⁵ would be inelastic in supply in the short run, as would plant and equipment; but the semi-skilled and unskilled would be more elastic in supply so, in the short run, the elasticity of demand would tend towards inelasticity. However, in the long run, all supply becomes more elastic and so would the elasticity of demand with respect to this industry.

The conclusion is that the elasticity of demand for registered nurses as determined by these four factors would be inelastic in the short run. The long run elasticity of demand is more elastic than the short run; but in the time period covered here, the long run adjustments are still in the transitional period. In the labor market it may take a long time for completion of adjustments.¹⁶ Also the hospital

¹⁵Leo B. Osterhaus, "The Effects of Unions on Hospital Management, Part IV, Conclusions and Recommendations," Hospital Progress, 48 (Sept., 1967) Hospitals employ proportionally a greater number of highly specialized personnel than other organizations.

¹⁶Milton Friedman, Price Theory A Provisional Text Rev. ed, (Chicago, Illinois: Aldene Publishing Company, 1962), p. 212.

economy has peculiarities which result in a divergence from the usual economic behavior.¹⁷ However, in the long run, market forces will bring about adjustments and undoubtedly a major one will be structural changes in the health care sector.

A study by Lee Benham found that the elasticity of demand for registered nurses was two-thirds as large (1,706) in 1960 as it was in 1950 (-2.477)¹⁸ It seems that the decrease in elasticity continued through the 1960's. The elasticity of demand for the factor indicates the percentage of change in wage. The empirical data shows that between 1966-69 a 40 percent increase in wages for registered nurses was effected and this was accompanied by a 3.84 percentage decrease of registered nurses to total nursing personnel and a 3.10 percentage decrease in the percentage of registered nurses to total health personnel; between 1960-1970 a 53.2 percent increase in registered nurses' wage accompanied by a 7.80 percentage decrease in registered nurses to total nursing personnel and a 7.20 percentage decrease in

¹⁷Somers, "Economic Issues in Health Service," pp. 128-131. It must be kept in mind the peculiarities of the hospital economy. It is a cost plus, non-profit operation. Payment in most instances is by "third-party" payers which decrease the importance of price to a patient. With the lack of competitive forces one must not "confuse the hospital economy with the commercial economy." This applies to most health care facilities.

¹⁸Lee Benham, "The Labor Market for Registered Nurses; A Three Equation Model, The Review of Economics Statistics, L 111 (August, 1971), p. 248.

registered nurses to total health personnel. The percentage of wage increase is very much larger than the percentage of decrease in registered nurses employed, which would indicate an inelastic demand curve for registered nurses. The very large increase in wage rate in the 1966-69 period followed institution of Medicare and Medicaid and the resulting demand for health care. The data, Table III, indicates a very small slowing of the rate of decrease in the percentage of registered nurses in the total of medical health personnel. It is too early to determine the reasons for this change but it may be due to several factors: the demand for health care may be beginning to level off; the wage increases for registered nurses are much smaller; the specialization process for the nursing occupations is approaching the optimum for efficiency; the skill mix of nursing personnel is approaching the least cost combination to produce the most efficient total nursing input.

An adjustment of the demand for a factor input to a price change may be a movement along the demand curve, a shift in the curve, or a combination of both. A movement along the curve is a change in quantity demanded due to the change in price only, other things unchanged. A shift of the curve is due to changes in other variables than price of input which affect the demand for the input. The change in the demand for registered nurses would be both a movement along the curve as a result of the wage increase and a

shift in the curve as a result of the great increase in the demand for health care. The demand curve would shift upward to the right and movement along the curve would be up because of the wage increase. In this case the wage increase offset the effects of the curve shift with the result of a decrease in the percentage of registered nurses to total nursing personnel and also to the total medical health personnel.¹⁹

¹⁹William J. Baumol, Theory and Operations Analysis 2 ed. (New Jersey: Prentice-Hall, Inc., 1965) p. 171.

CHAPTER III

REGISTERED NURSES LABOR MARKET: SUPPLY

Historically econimists in writing about the supply of labor recognized that labor as a human factor of production had characteristics differentiating it from other factors of production. Marshall listed five "peculiarities" which distinguished labor from other factors of production. Of these, two strictly apply to labor and result from the basic principle of our society as one of free men, that is, not a slave society.

"The worker sells his work but retains capital in himself," and, "The seller of labor must deliver it himself." ¹

As a result of these a worker buys the working conditions as a part of the sale of his labor. ² Also, any investment in the worker such as education and training becomes a part of the worker regardless of who pays for it. Therefore, the incentive is for the individual or his family to pay for the investment in himself. This characteristic is important in the later part of this study which examines the

¹Friedman, Price Theory, pp. 200-202.

²Ibid., pp. 200-202.

rate of return to investment in education in the occupation, registered nurse.

In general the supply of labor, all labor, to the economy is determined by the population, its increase and age composition, the education and re-education of people,³ proportion of the population in the labor force, the number of hours worked by the workers and the quality and quantity of both the work and the worker. These, in turn, are dependent on both sociological conditions and economic factors of which the wage rate is of major importance.⁴ For purposes of analysis the labor supply is divided into short run and long run. The short run, which means "a period of time in which decisions are made about whether to sell labor services and how much to sell, and too short in time for choices concerning education, occupation, and relocation."⁵ However, in speaking of the short run, the quantity of labor is never absolutely fixed and a large enough increase in wage rate can increase the number of workers, for example, by drawing in inactive workers.⁶ For the short run the slope and shape of

³C. E. Ferguson, Microeconomic Theory, (Homewood, Illinois: Richard D. Irwin, 1966), p. 315.

⁴Samuelson, Economics, p. 553.

⁵Fleisher, Labor Economics Theory and Evidence, p. 37.

⁶Baumol, Economic Theory and Operations Analysis, pp. 390-391.

specialized labor supply can not be specified as it varies and may be positive or negative or both. For non-specialized labor it is positively sloped.⁷

The long run, which is a period of time long enough for adjustments of labor supply relating to quality, skill, and location;⁸ such as the choice of an occupation, the education and training necessary for the occupation, and relocation.⁹ The long run supply of labor is likely to be of positive slope¹⁰ and the curve is more elastic than the short run as a result of the adjustments that take place.

The supply of labor to a particular occupation is determined, in part, by factors independent of those pertaining to the supply of labor in general.¹¹ These are the differences in abilities and tastes of individuals which determine the structure of the relative wage rates between occupations. The wage rate differences depend on: one, equalizing differences such as attractiveness of work and cost of education; two, non-competing groups which result from barriers to free entry; and three, transitional differences resulting from lags

⁷Ferguson, Microeconomic Theory, pp. 317-318.

⁸Fleisher, Labor Economics Theory and Evidence, p. 37.

⁹Ibid., p. 92.

¹⁰Ferguson, Microeconomic Theory, p. 317.

¹¹Freidman, Price Theory, p. 211.

in adjustment to demand or supply.¹²

Following this look at the labor supply in general, the case of specialized labor, the supply of the occupation of registered nurses will be examined. In the short run, the supply of registered nurses is dependent on the willingness of those already educated and trained to work for the current wage and conditions of work. Because no new workers can be educated in this short period, the only new workers available would be the current annual graduates from nursing schools. The only way to increase the short run supply is to raise the wage and/or improve working conditions sufficiently to attract inactive eligible registered nurses to work, or to increase the number of hours worked by those already working. Consequently the short run supply is less elastic than the long run supply.

The short run supply curve is determined by the number of hours the individual worker is willing to supply at the wage rate offered. If the wage is increased, the worker may provide either more or less work (hours) as he chooses between more money income or more leisure hours. This is the substitution or income effect resulting from a change in income and they have opposite effects on the hours worked. The substitution effect results in more hours worked as the worker substitutes work for leisure. The income effect

¹²Klarman, The Economics of Health, pp. 78-79.
From Friedman, Price Theory, pp. 211-225.

results in less hours worked as the worker buys more leisure because he is wealthier due to the increased wage rate. It has been found that in the low range of wage rates the substitution effect rules and above that the income effect takes over.¹³ The result is a backward bending individual supply curve. This phenomena is illustrated by the work and wage pattern of an increasing percentage of registered nurses. The percentage of registered nurses working part-time has increased steadily as the wage rate has increased. (See Tables I and VII, pages 22 and 27) In 1956, part-time nurses were 10 percent of the total working and in 1969, they were 26.5 percent of the total working registered nurses. In evaluating this backward bending supply curve for this portion of registered nurses, it is well to recall that 99 percent of this occupation are women and of these, two-thirds are married. Therefore, at least two-thirds of them make their decisions concerning hours of work within the family unit of taking into consideration the family composition and total income.¹⁴ For some families, however, a member's labor supply, such as a wife who has an increased wage rate, may be upward sloping and she may supply more hours of work than before.¹⁵ Also, in this particular occupation,

¹³Fleisher, Labor Economics Theory and Evidence, pp. 46-57.

¹⁴Ibid., pp. 46-55.

¹⁵Ibid., pp. 54-55. Also see footnote No. 17, Page 6, Mincer, "Labor Force Participation of Women," in Aspects of Labor Economics in which he discusses the trade off between women's labor

the number of workers available can not quickly change and this may explain these individual backward bending supply curves.¹⁶ However, the percentage of registered nurses working part-time in 1967 was 26 percent of the total number of working registered nurses; and this compares well with that of women in the professional, technical, kindred worker group for all women workers in 1967 which had 29.4 percent on part-time work.¹⁷

The long run period for supply of labor, a particular type, is a period of sufficient length for individuals to make decisions to enter the occupation, secure the necessary education and training and then make the decision regarding working at the wage rate offered in the occupation. Also, included in the long run adjustments are changes in location of the worker who may relocate in an area offering a higher wage rate and on improved working conditions. Influencing the worker's decisions, also, are the factors discussed earlier: equalizing differences, differences from non-competing groups, and transitional differences. All of this adds up to an investment in time and money in a human resource and therefore the decision to invest is based on the expected returns, in this case lifetime earnings and occupational force participation and the family.

¹⁶Boulding, Economic Analysis Microeconomics, p. 264.

¹⁷U.S. Dept. of Labor, Handbook 1969, Table 61, p. 61.

work patterns. The occupation with higher costs must offer more in expected returns. Thus, for the long run, professional nursing with a higher wage and better working conditions may attract new workers if the costs of education and training compare favorably to alternative occupations. Now to become a registered nurse requires, at the very minimum, a preparation time of two years in the associate degree, Community College program and at the maximum a period of four and one-half to five years in the baccalaureate degree, university program.

This brings us to the central point of the study, the supply of registered nurses. In spite of the demand for registered nurses, the shortage has continued for over twenty-five years.¹⁸ What constitutes a shortage of supply? One view is the unfilled vacancies of registered nurse positions.

What is surprising is that despite the concern, the problem appears to have grown steadily worse. The number of unfilled professional nurse positions in hospitals, for example, increased from about five percent in 1941 to ten to fifteen percent in the mid 1950's and reached approximately 20 percent in the early 1960's.¹⁹

Empirical data, following, gives data on the percent

¹⁸ Donald E. Yett, "The Nurse Shortage and the Nurse Training Act of 1964", Industrial and Labor Relations Review 19 (January, 1966), 190.

¹⁹ Ibid., p. 180.

of vacancies in budgeted positions for registered nurses. Although the data is scant, it indicates the general situation. From the data the peak of vacancies in hospitals occurred from 1961 through 1963 with 24.0 percent vacancies in the category of full-time general duty registered nurse and then it tapered off to 14.2 percent in 1967 and 11.2 percent in 1969. The decrease in vacancies is no doubt a combination of many factors: one, could be a change in hospital organization and methods; and two, the supply of registered nurses may have increased as a result of the wage increases, Table VII (page 27), which show a wage increase of 14.0 percent in 1963, of 17.54 percent in 1966, and 40.3 percent in 1969; three, shows a decrease in the demand for registered nurses as a result of the specialization of the nursing occupation and introduction of new medical and health workers. These last two would be an interaction of the supply and demand for registered nurses. In public health agencies the vacancies continued to increase through 1969 and then a small decrease took place in 1970. The nurse faculty vacancies also increased up to 1968 when they were 11.7 percent of budgeted positions and then in 1970 took a sharp drop to 6.0 percent. These last two areas have positions calling for Baccalaureate Degree registered nurses and as more nursing students choose the University degree program this supply should increase. Baccalaureate degree nurses have increased from 13 percent of total graduates from all registered nurse programs

in 1958-59 to 20.8 percent of the total in 1969-70.²⁰ To obtain this degree requires a 4 to 5 year university education which would create a lag in an increase in supply response to an increased demand. The specialization process would not affect the demand for registered nurse faculty positions and would only have a moderate effect on public health positions because some licensed practical nurses are employed. The data shows this as it is in the general duty staff positions that the decrease in vacancies took place, down to 7.6 percent in 1970 from 10.6 percent in 1969. Even though the percent of unfilled positions has decreased, it still remains approximately 10 percent. From this data the supply is still not meeting the demand. However, since only about two-thirds of the total number of currently licensed registered nurses are actively employed in nursing it is not a lack of supply of registered nurses. It is a shortage of supply though in response to the working conditions and wage offered by the employers. This would indicate that the actual or effective demand is being met. Other aspects of the supply and shortage of registered nurses will be considered in the following paragraphs.

What is a shortage of supply of a particular labor input? The Blank-Stigler definition, "an economic one ignoring some vague idea of social need"²¹ is:

²⁰ American Nurses Association, Facts 1970-71 ed., p. 28.

²¹ M. Blaug, M.H. Peterson, and A. Ziderman, The Utiliz-

.... in an economy with free labor market
 a shortage exists when the number of
 workers available, S, increase less rapidly
 than the number, D, at salaries paid in the
 recent past. Then salaries will rise.²²

The unfilled positions discussed above indicate that the supply of registered nurses, those willing to accept employment at the offered wage does not meet the demand. But since only two-thirds of all currently licensed registered nurses are actively employed in nursing, it does not seem that a shortage of supply exists. The wage did rise and it was followed by an increase in the absolute number of registered nurses working; but the large increase in employment was in part-time workers. Part-time workers as a percentage of total number employed increased, Table I (page 22) from 10.0 percent in 1956 to 17.8 percent in 1960 to 25.0 percent in 1966 and 27.5 percent in 1969. When the annual average percent increase in absolute number of registered nurses employed was calculated for 1956 through 1962 inclusive it was 4.07 percent and for 1964 through 1969 inclusive it was 3.15 percent. In contrast the annual average percent increase in full-time equivalents (full-time plus part-time adjusted to full-time) for 1958 through 1962 inclusive, was 3.20 percent. The annual

ation of Educated Manpower in Industry (Toronto: University of Toronto Press, 1967), p. 57

²²Blaug, Preston and Ziderman, Utilization of Educated Manpower, p. 57.

average increase from 1964 on, in both categories, was quite stable. The data does not seem to support the concept of supply being drawn into employment to fill an unmet demand.

In efforts to solve the shortage the emphasis has been placed on supply with no concern for demand. Yett has pointed out:

.... even though the number of unfilled R.N. positions continued to be quite large, there might be no 'shortage' of nurses in terms of 'excess demand' or unmet nursing needs.²³

and he adds,

.... if one pays a salary above the prevailing rate the supply rises to meet demand.²⁴

The former Surgeon General of the United States, William H. Stewart, said that at the base of the nursing situation was low salaries, poor working conditions, and confusion in the nurse's role.²⁵

In the summary on the section on Nursing Climate in The Abstract for Action, it says:

The conditions of economic depression, environmental deprivation, and role confusion are endemic to much of American nursing. To the classic economist, it may be something of a marvel that our "shortage" of nurses is not greater; certainly, many experts feel that in terms of real demand, or demand backed by

²³Lysaught, Abstract, p. 52.

²⁴Ibid., p. 58.

²⁵Ibid., pp. 55-56.

money, there is no shortage at all.²⁶

Following is empirical data to confirm the claim that registered nurses' salaries compared unfavorably with many other women's occupations.

Data from Oregon Nurses Association, January 1, 1952:

General Duty Registered Nurse \$240.00 per month, other occupations and salaries, high school graduate with no further education:

U. S. Bank \$200.00 per month, general office work.

Union Pacific \$275.00 per month, short hand, little book-keeping, typing, general office work.

Union Pacific \$265.00 per month, clerk accounting.

Portland Federal

Service Employees . \$245.00 per month (base pay to start).

Data from Oregon Nurses Association, December 11, 1953:

Registered Nurse and Comparative Occupations Salaries, Portland, Oregon.

Registered Nurse, General Duty...	\$245.00 per month
Typist	\$185.00 to \$225.00 per month
Secretary	\$200.00 to \$275.00 per month
Social Worker.....	\$255.00 to \$325.00 per month
Dental Technician	\$295.00 to \$330.00 per month
Teachers	\$325.00 to \$485.00 per month

²⁶Lysaught, Abstract, p. 58.

TABLE X

ESTIMATED INCREASE IN MEDIAN MONTHLY WAGES AND
SALARIES OF YEAR ROUND FULL-TIME (OR
EQUIVALENT) WORKERS²⁷

Occupation	Money Increase		Real Increase (1957-59)	
	Absolute	Percent	Absolute	Percent
All Nurses	\$119.00	53%	\$68.00	25%
Hospital Nurses	\$104.00	46%	\$53.00	20%
Female Tech. Profession and Kindred Workers	\$147.00	67%	\$97.00	37%
Teachers (Mean Salary)	\$175.00	72%	\$119.00	41%

In 1963 a registered nurse in a metropolitan hospital received an average annual salary of \$4,450 which was \$2,000 less than the average annual salary of a teacher.²⁸ In 1966, in the San Francisco Bay area, a teacher's minimum salary was \$636 per month and a registered nurse's monthly salary ranged from \$435 to \$500.²⁹

²⁷Donald E. Yett, "Supply of Nurses: An Economists View." Hospital Progress, 46 (February, 1965), p. 99.

²⁸Edward Yost, The U.S. Health Industry The Costs of Acceptable Medical Care by 1975 (New York: Frederick A. Praeger, Publisher, 1969), p. 6.

²⁹Report of the Fact-Finding Panel in the Matter of the California Nurse's Association and the Bay Area Hospital Negotiating Committee, Henrette, Dabney Assistant Director Economic Security Program, American Nurse's Association (New York: American Nurses Association, 1966), p. 4.

Also at this time the hospital gardener received \$572 per month and hospital registered nurses received from \$425 to \$485 per month.³⁰

The turnover rate of an occupation mirrors dissatisfaction but not much data is available on turnover although a survey in 1962 showed it was 52.8 percent for full-time general duty nurses.³¹ In Abstract For Action turnover rate for registered nurses, nationwide, is reported to be 70 percent and for some institutions it is as high as 100 percent. In contrast, it gives a 20 percent turnover rate nationally for teachers.³²

Undoubtedly the increase in the number of registered nurses working part-time is in response to the wage increase that has taken place in the 60's. Also, the wage increases should after a time lag bring new entrants into the occupation. The time lag is necessary for the individual to make the decision and then acquire the education. The increase in new entrants is discussed in the following paragraph.

A factor influencing the labor supply is the increasing population and its age composition. Since the largest number of nursing students come from the recent high school graduates the percentage of these entering nursing schools indicates the trend of future supply.

³⁰Max D. Kossore, "The San Francisco Bay Area 1966 Nurse Negotiations," Monthly Labor Review, 90 (June 1967), p. 8.

³¹American Nurses Association, Facts 1964 ed., p. 27.

³²Lysaught, Abstract, pp. 132-133.

The United States Public Health Service reports that there has been a decline from 4.3 percent in 1950 to 3.4 percent in 1960-61 of seventeen year olds entering nursing schools.³³ The percentage change in nursing student admissions over that of previous years and the percentage change in graduates over that of the previous year should be a fair indicator of the attractiveness of professional nursing. Both of these increased in the 1967-68 academic year over the 1966-67 year.³⁴ The percentage increase in graduates from registered nurse schools was substantial; 8.8 percent in 1966-67 year and 8.7 in 1967-68 but dropped to 3.9 in the 1968-69 year and was up again to 7.7 percent in 1970-71. Of course, this is too short a period to base the long run supply on but it may be the beginning of an upward trend. The annual survey by the National League of Nursing for academic year 1969-70 shows new records in admissions, enrollments, graduations, and number of schools. Graduations increased by 1,433.³⁵ Random checks are reporting even higher totals in nursing schools for the year 1969-1970. The University of South Carolina, Clemson School of Nursing, reports its class entering this fall was double last year's.

³³Yett, "The Nurse Shortage and Nurse Training Act, 1964", p. 190.

³⁴American Nurses Association, Facts 1969 ed., pp. 83-86.

³⁵R. N. Magazine, May, 1971, p. 5.

The University of Michigan School of Nursing will graduate twice as many this year and many of the diploma schools are reporting the largest classes in their history.³⁶ At the present time nursing is drawing more students from the male population, the black community and mature women than previously. The reasons given for these new recruits are the security, opportunity for employment and higher salaries.³⁷ Undoubtedly a big factor in the increasing numbers entering the occupation, registered nurse, is the Associate Degree program, the two-year program. Its cost is low as compared to past costs of nursing education and relative to the other two programs. See Table X (page 51). The lower cost and the higher wage places the occupation, registered nurse, in a good competitive position with other occupations.

Another indicator of the position of the labor supply schedule is the labor force participation rate. The labor force participation rate of registered nurses as a percentage of the total number of licensed registered nurses in 1949 was 59.3 percent and in 1966 it had increased to 65.3 percent. The percentage increase of women in the labor force between 1940-68 was 108.2 percent.³⁸ The number of

³⁶R. N. Magazine, Oct. 1971, p. 7.

³⁷R. N. Magazine, May, 1971, pp. 48-51.

³⁸U.S. Dept. of Labor, Handbook 1969, Table 3, p. 17.

active registered nurses more than doubled from 1949 to 1967. The labor force participation rate of women by educational attainment in March 1968 for all women with high school completed was 48.1 percent; with one to three years of college was 45.5 percent; with four years of college was 54.4 percent; with five years of college was 70.8 percent.³⁹ As a comparison, the registered nurse labor force participation rate as a percent of all registered nurses was 65.3 percent in 1966 which indicates high labor force attainment.

The low wage and poor working⁴⁰ conditions of registered nurses that has been documented above and which is the principle reason for the short supply of active registered nurses is partly a result of the element of monopsony power of the employer, mainly hospitals. Since the wage rate of registered nurses is not determined in a competitive market but in an imperfect market with a degree of monopsony the wage and employment of registered nurses is below what it would be in a more competitive market. Because hospitals are the largest employers of registered nurses they set the wage rate pattern for the industry. For hospitals, the local market is the relevant labor market area and here they have a monopsony.

Over 10 percent of all general hospitals

³⁹U.S. Dept. of Labor, Handbook 1969, Table 95, p. 207.

⁴⁰See Footnote Number 25, Chapter I, on page 10 of this paper for details on working conditions.

are the only hospitals in their Hill-Burton service area; approximately 30 percent are in one or two hospital service areas, over 40 percent are in three or less.⁴¹

The supply schedule of registered nurses is an upward sloping curve because in a local labor market there is not perfect knowledge and mobility, all employees are not judged to be the same by potential workers, and many employers do have some influence on the general wage level.⁴² When the firm has a degree of monopsony power and the labor supply curve is upward sloping an increase in workers will increase the wage rate in his labor market. For the buyer the supply curve is considered to be his average cost curve and his marginal cost curve is above it since it is upward sloping. Therefore, the cost of new workers hired will be the marginal cost plus the additional wage that must be paid to those already employed. As a result the marginal cost is higher than the wage being paid to a marginal unit of labor. Since the employer is large enough to affect the labor market and realizes this he will hire workers only to the point on the supply curve where the wage rate is equal to his marginal revenue product. In this case, both the wage rate and amount of employment is below what it would be at the equilibrium point in a com-

⁴¹Yett, "The Nurse Shortage and Nurse Training Act 1964," p. 199.

⁴²Cartter, Theory of Wages and Employment, pp. 52-53.

petitive market.⁴³ The monopsonist employer uses this situation to minimize his cost in the same way a monopolist tries to obtain maximum return.⁴⁴

Therefore, hospitals as the main buyer of a particular input, registered nurse, specific to their production have a degree of monopsony power which they have used to limit wage increases and employment. By using this power the hospitals perpetuated their problem of short supply of nurses. In areas served by more than one hospital, the administrations have agreements and well developed "wage stabilization programs." Thus, they all pay about the same wage and do not bid against each other for the available registered nurses in the local area.⁴⁵ Mobility of labor restricts an employer's ability to use monopsony power but the mobility of registered nurses is limited because many are married women and the decision to move is determined by the husband's career. Consequently, the nurse's decision, to work or not to work, is decided by the wage rate and work conditions in her local area.

The monopsony power of the employers prevailed for many

⁴³Ibid., pp. 60-61.

⁴⁴Baumol, Economic Theory and Operations Analysis, p. 322.

⁴⁵Yett, "The Nurse Shortage and Nurse Training Act. 1964, p. 199.

years because the registered nurses were not organized into a group to challenge the employers and force them to bargain on wages and working conditions. However, in the 60's pressure was mounting and the registered nurses became restive as dissatisfaction grew. By mid 1966 they had through mass action forced the employers in several large metropolitan areas to enter into collective bargaining. As a result the registered nurses gained substantial wage increases and many other areas followed the wage increases. A spot survey of hospitals in 1967 found that the increases ranged from 2.4 percent to 26.7 percent with about one-fourth reporting at least 20 percent increases. The median percentage increase was 12.8.⁴⁶ Also at this time, 1966, Medicare and Medicaid were passed and these put greater demands on the health care system which increased the demand for registered nurses and reinforced the pressure for increased wages. Since that time more bargaining units have been formed by registered nurses and the monopsony power of the employers has been reduced.

In the short run, the wage increases did not increase the supply of active registered nurses. But it did bring about a change in the number of hours worked as an increasing number of registered nurses actively employed chose part-time work. The number working part-time in 1960 was 17.8 percent of the total active number

⁴⁶ American Nurses Association, Facts, 1967 ed., p. 137.

(Table I, page 22) and by 1969 it had increased to 27.5 percent of the total number. The average annual percentage increase in absolute number of registered nurses changed in 1964. Prior to that, from 1956 through 1962, it was 4.07 percent and from 1964 through 1969 it had dropped to 3.09 percent. For 1971 it has been reported to be 3.3 percent which is a small increase over 1970 which was 3.0 percent. The increase in supply in response to the wage increases may just be coming on stage because there is a considerable lag between the time a person chooses an occupation and starts the training or the education and the time the individual is ready to enter the labor-force as a "full-fledged" member.⁴⁷ Also, since the labor market is much slower to adjust to changes than other markets the results of the increased wage may not show up as changes in the supply for a considerable time, probably several years.⁴⁸

The short run and long run curves of the labor supply are distinguished also by their elasticity; the degree of responsiveness as a percentage change of supply to a percentage change in its price. The short run supply curve tends to be less elastic than the long run curve for reasons related to the time element which has been discussed

⁴⁷Allan M. Cartter, "The Economics of Higher Education," in Contemporary Economic Issues, ed. by Ned U. Chamberlain (Homewood, Illinois: Richard D. Irwin, Inc., 1969), p. 164.

⁴⁸Fleisher, Labor Economics Theory and Evidence, p. 158.

above. In Theory of Wages and Employment Cartter discusses several reasons why the short run supply of labor under the conditions of imperfect competition would be less than elastic and these are: Imperfect knowledge and mobility in the local labor market; prospective employees do not consider all employers as perfect substitutes; the majority of employers do influence the general wage level in their areas; the existence or non-existence of unemployment in the areas; if all firms employing a particular type of labor raise that occupations wage at the same time, and thereby maintain their share of supply; as full employment is approached the labor supply to an individual employer becomes less elastic; and, the greater the monopsonistic power of a firm in the area the more aware it will be of the wage effects of increased employment.⁴⁹ Applying this criteria to the occupation of registered nurse, and analyzing the data on wage increases and their effect on the supply of registered nurses (Table I and VII, pages 22 and 27), the short run supply tends to be relatively inelastic. This conclusion is supported by the following quotation from comments after the institution of Medicare and Medicaid.

.... nearly all available medical manpower was already engaged in medical service. To greatly increase the demand for services in the face of a relatively inelastic and inflexible

⁴⁹Cartter, Theory of Wages and Employment, pp. 52-56.

supply created great upward salary pressures.⁵⁰

The long run supply curve becomes more elastic as the period lengthens. However, this depends on the occupation and the process of occupational choice which in turn depends on available information concerning occupations and access to investment for education and training. If the time period is long enough to allow for all adjustments in human capital the labor supply to an occupation may approach perfect elasticity.⁵¹ However if a particular type of labor cannot be transferred easily from one occupation to another its elasticity of supply is less than perfectly elastic.⁵² Since registered nurses are a specialized type of labor they would not have great mobility between occupations and so their elasticity of supply would be less than perfectly elastic.

In the short run the supply curve may take any shape or position. When additional workers enter the market it is a case of increased supply at the existing price or wage and the supply curve would shift to the right⁵³ which could be a move along the long run

⁵⁰Allan M. Cartter, "The Economics of Higher Education," in Contemporary Economic Issues, ed. by Neil U. Chamberlain (Homewood, Illinois: Richard D. Irwin, Inc., 1969) p. 165.

⁵¹Fleisher, Labor Economics Theory and Evidence, p. 110.

⁵²Boulding, Economic Analysis, Microeconomics, pp. 276-277.

⁵³Ibid., p. 178.

supply curve. This increase in the short run supply of registered nurses comes mainly from the annual graduating classes with some increase also from non-working qualified registered nurses re-entering the labor force and some already working registered nurses increasing their hours of work. If there is an increase in wages there may be an increase in new workers and this could be a move up the supply curve. Therefore the short run supply may have both a shift and a movement along the curve. It is difficult to separate the two under continually changing conditions.

Over time the long run supply curve also changes shape and position. As a result of the adjustments during the time period the supply usually becomes more elastic (See above) and with the addition of new workers it shifts to the right, (If a decrease in workers, the shift would be to the left). In the long run when all adjustments may take place and be completed the supply curve could show the employment resulting from a wage change, work conditions, and "tastes" of all registered nurses, old, new, and potential.⁵⁴

INTERACTION OF DEMAND AND SUPPLY

The interaction of the demand and supply of labor is their effect on the wage rate and the amount of labor employed. Both the

⁵⁴Yett, "Supply of Nurses: An Economists View," p. 91.

demand and supply for registered nurses has been discussed above. This section will be a summary of the combined action of these as it affects the wage rate and numbers employed. In theory the ultimate result of the interaction of demand and supply is for equilibrium wage rate to be established so that the amount of the labor demanded just equals the amount of labor supplied. However, in the real world of continuing change this does not happen but there is a movement toward this condition. Also, as compared to other markets, the labor market is slow to adjust and disequilibriums may persist for a long period.

The demand for health care had been increasing and after 1966 the demand accelerated and output increased. To meet this increased demand, the demand for all health care workers including registered nurses increased. In the short run the result of a relatively inelastic supply, a relatively inelastic demand, and a wage increase was: one, an increasing percentage of active registered nurses working part-time and a small decrease from the previous annual average percentage increase in active registered nurses; two, a decrease in the demand for registered nurses as a percentage of total nursing personnel, although the absolute number increased over that of the previous year. The increased wage rate and inelastic supply resulted in a large increase in the supply and employment of the semi-skilled and unskilled nursing personnel. The Health Resources Statistics of the Public Health Service reported that between

1967 - 1968 the number of registered nurses increased about three percent, the licensed practical nurses increased about seven percent and the nurse aides, orderlies and attendants increased more than fourteen percent.⁵⁵ These less skilled nursing personnel are less costly and by the specialization (division of labor) were created to substitute for a portion of the registered nurses.

The wage increase will after a time lag (discussed previously) increase the supply of registered nurses. In addition because of the 'shortage of supply' changes have been made in the educational process of registered nurses (discussed above) which reduces both time spent and dollar cost. As these changes become known they will attract new entrants and the long run supply of registered nurses will become highly elastic. During the 60's the elasticity of demand for the registered nurse seemed to be moving toward more inelasticity which probably is a result of the specialization. The registered nurse is the highly skilled nurse with more responsibility and complex duties and no near substitute. The data indicates that the rate of decrease of the percentage of registered nurses as a percentage of the total number of medical health workers is gradually declining (see Table III

⁵⁵Lysaught, Abstract, p. 54. These statistics as reported here were taken from Health Resources Statistics. Report from the National Center for Health Statistics. Washington, D.C.: U. S. Department of Health, Education, and Welfare, Public Health Service. P. H. S. publication No. 1509. 1968. pp. 135-137.

page 24) which would suggest that the substitution process is slowing and may be approaching the optimum. The results of these changes that have been taking place concerning registered nurses, other nursing personnel, and the level of wage rates have decreased the demand for registered nurses and should have lessened the gap between demand and supply. Another result of these changes, but slower to take place, should be an increase in the supply of registered nurses. This trend is just now beginning to appear as large numbers apply for entrance to nursing educational programs.⁵⁶

OCCUPATIONAL SKILL WAGE DIFFERENTIAL

In mid 1966, as a result of the many factors already listed and discussed, the wages of all nursing personnel increased with that of registered nurses very substantially. Prior to the changes in mid 1966 the wage differentials between the three skill levels of nursing personnel had remained fairly stable. Following the changes in mid 1966 the wage skill differential of these three has not narrowed but, as shown by the data in Table VII, has widened from 1966 to 1969. The licensed practical nurse wage was about 72.5 percent of the registered nurse wage and by 1969 this was down to 70.0 percent. Thus the skill differential RN/LPN in 1966 was 1.40 and in 1969 was

⁵⁶See data on the increase in the number of student nurses in Chapt. VI, Tables XXXI and XXXII

1.43. The skill wage differential for the LPN/NA in 1966 was 1.25 and in 1969 it was 1.30. Thus the unskilled group widened even more. This is contrary to the expected and secular trend of decreased skill differentials resulting from increased level of education, on the job training, and other factors. The shift in demand seems to be the explanation. "Evidently, the demand for labor has shifted toward more education at least as fast as the supply."⁵⁷ Another suggested explanation is that the skill differential "may have approached the minimum necessary to induce marginal workers into the skill jobs."⁵⁸

⁵⁷Edward F. Dennison, "Measuring The Contribution of Education (and The Residual) To Economic Growth," in The Residual Factor and Economic Growth by the Organization For Economic Cooperation and Development. Published by the Director for Scientific Affairs, 1967, p. 30.

⁵⁸Richard B. Freeman, Labor Economics Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972, p. 83.

CHAPTER IV

EMPIRICAL DATA AND CALCULATION OF RATES OF RETURN

Method used to calculate Present Value and Rate of Return is from The Utilization of Educated Manpower in Industry by M. Blaug, M. H. Preston, and A. Ziderman.

The present value (x) of the total salary stream between the present age 18 and the age of retirement 62 is the sum of the present value of each year's salary.

$$X = \sum_{t=18}^{62} X_t = \sum_{t=18}^{62} \frac{S_t}{(1+i)^{t-18}}$$

Calculate the present values of the cost of the education (y) in the same way.¹

Method used to calculate the Internal Rate of Return is from Managerial Economics by Donald E. Farrar and John R. Meyer.

An internal rate of return may be defined as the rate of return (or the rate of interest) that equates the present values of an invest-

¹M. Blaug, M. H. Preston, and A. Ziderman, The Utilization of Education Manpower in Industry, (University of Toronto Press, 1967), pp. 59-60.

ment's returns with that of the capital outlays.²

Method of Calculation

First calculate the cost of education for a registered nurse for the three programs: Associate Degree, Diploma, and Baccalaureate Degree. In this calculation only the costs associated with the education, tuition, fees, books, uniforms, transportation and car expense for special classes and field work, forgone earnings and income earned are included.

The time period is the estimated working life: age 18 to 62 years, the age of retirement. Since this is a calculation on the benefits derived from choosing education beyond high school over immediately entering the labor force age 18, the average age of completing high school and entering the labor force is taken as the starting age. Therefore the estimated available work life is 44 years.

The estimated available work life for the registered nurse is 41 years, starting at age 21 to retirement age 62 years. However, "the Federal Bureau of Health Manpower has estimated that the average working life of a nurse is between 20 and 21 years ---. The highest estimate of professional working life, 21 years, would

²Donald E. Farrar and John R. Meyer, Managerial Economics, (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1970) pp. 58-60.

constitute 48 percent of the total available time."³ Therefore these calculations are based on 48 percent of the estimated life-time earnings if working the total available time of 41 years. This same method of 48 percent of total available work-life is also used in calculating earnings of nurse aide and licensed practical nurse.

To become a licensed practical nurse requires one full year (12 months) educational program at the Community College.⁴ Therefore her estimated available work-life is 43 years.

The nurse aide is a high school graduate with on-the-job training, but no requirements for additional formal training.⁵ Her estimated available work-life is 44 years.⁶

³Jerome P. Lysaught, An Abstract for Action, National Commission For the Study of Nursing and Nursing Education (McGraw-Hill Book Company, 1970), p. 33. Also see Jacob Mincer, "The Special Reference to the Human Capital Approach," Journal of Economic Literature, VIII (March, 1970), pp. 22-23. Mincer says that women in particular, expect to spend only a part of their available work-life in the labor force

⁴This is now the requirement here in Oregon.

⁵Recently nurse aide training has been taken over by the Community College, 3 month course, (and all aides working are not high school graduates) in Portland Metropolitan areas.

⁶For the calculations in this study it is assumed that all women retire at age 62 which results in a variation in the years of estimated available work-life of registered nurse, licensed practical nurse, and nurse aide. The work-life is shortened by the additional years of education. See note in Jacob Mincer, "Investment in Human Capital and Personal Income Distribution, Journal of Political Economy LXVT (August, 1958), p. 284, which states from a recent study "... men in better jobs - as measured by education and earnings - spend a shorter period of their lives in the working force."

In this study the calculations are based on a registered nurse's salary for an inexperienced registered nurse in a staff position. The nurse aide's salary (no additional education beyond high school) is used as the base to compute benefits derived from the investment in the registered nurse education. The benefits are the additional income of the registered nurse above that of the nurse aide calculated as the difference between the nurse aide's estimated lifetime earnings as 48 percent of her total available work-life and the registered nurse's estimated lifetime earnings as 48 percent of her total available work life and the registered nurse's estimated lifetime earnings as 48 percent of her total available work-life.

The discount rate used in this calculation to obtain the present values of costs and benefits is four percent as this is a long-term investment. The time period used to obtain the present value of earnings is 44 years, since that is the estimated total available time.

In these calculations the growth factor and inflation rate are disregarded. No deductions are taken for taxes which is a Herman P. Miller assumption. He assumes "that taxes are just one of the ways we spend our money."⁷

⁷Herman P. Miller, Rich Man, Poor Man (New York: Crowell Company, 1971), p. 240.

TABLE XI
1969 EARNING'S

	<u>Weekly Salary</u>	<u>Annual Salary</u>
Registered Nurse (RN)	\$ 141.00	\$ 7,332.00
Licenses Practical Nurse (LPN)	99.00	5,148.00
Nurse Aide (NA)	78.50	4,062.00
R.N. Annual Salary	\$ 7,332.00	
N.A. Annual Salary	<u>4,062.00</u>	
Differential	\$ 3,270.00	

Industry Wage Survey, Hospitals March 1969
U.S. Dept. of Labor, Bureau of Labor Statistics,
Bulletin 1688, Table 3, pp. 14-15

TABLE XII
DATA ON COST OF R.N. EDUCATION
INVESTMENT
(1969)

<u>Associate Degree Program*</u>	2 year Program Community College
Tuition (2 yrs. of 9 months each)	
Fees	\$ 930.00
Personal Income Forgone at wage of Nurse Aide	<u>8,124.00</u>
	\$9,054.00
Income earned (2 summers' work, 10 weeks as Nurse Aide	<u>1,566.00</u>
Cost	\$7,488.00

*Data compiled from Portland Community College; Mt. Hood Community College; Clark College, Vancouver, Washington.

Table XII (cont'd.)

Diploma Program*	3 year Program Hospital School
Tuition (3 years)	
Fees	\$ 2,495.00
Personal Income Forgone at wage of Nurse Aide	<u>12,186.00</u>
	\$14,681.00
No allowance for summer work as these students do not have a long summer vacation. **	<u> </u>
Cost	\$14,681.00

*Data compiled from Emanuel Hospital School of Nursing,
Portland, Oregon. Good Samaritan Hospital School of Nursing,
Portland, Oregon.

**However some of these students work on their days off and some
take a leave from school for several months or a year to earn
money, but this adds time to educational program before attaining
R.N. status.

Table XII (cont'd.)

Baccalaureate Degree*

4 1/2 year Program
University or 4 year CollegePublic University

Tuition (4 1/2 years)	
Fees	\$ 3,600.00
Personal Income Forgone at wage of Nurse Aide	<u>18,329.00</u>
	\$21,929.00
Income earned (3 summers) at \$2.00 1 hour 5 days 1 week, 10 weeks	- <u>\$ 2,400.00</u>
Cost	<u><u>\$19,529.00</u></u>

Private University

Tuition (4 1/2 years)	
Fees	\$ 9,570.00
Personal Income Forgone at wage of Nurse Aide	<u>18,329.00</u>
	\$27,899.00
Income earned as above	- <u>\$ 2,400.00</u>
Cost	\$25,499.00

*Data compiled from U. of O. School of Nursing, Portland, Oregon
and Portland University, Portland, Oregon

TABLE XIII

MEAN INCOME AND EDUCATION OF WOMEN
AGED 25 AND OVER: 1968

Schooling Completed	INCOME (Annual)	
	All Women	Year Round Full-time Workers
Total	\$ 3,023.00	\$ 4,930.00
Elementary School less than 8 years	1,664.00	3,222.00
8 years	2,153.00	3,744.00
High School 1-3 years	2,616.00	4,067.00
4 years	3,321.00	4,904.00
College 1-3 years	3,717.00	5,699.00
4 years	4,639.00	6,680.00
4 years or more	5,349.00	7,416.00
5 years or more	6,720.00	8,489.00

U. S. Bureau of the Census, Current Population Reports,
Series P-60 No. 66, Table 41.

Miller, Herman P., Richman Poorman, Thomas Y. Crower Co.,
New York 1971, p. 174.

TABLE XIV

EDUCATION AND LIFETIME INCOME FOR WOMEN
BASED ON 1966 DOLLARS

Schooling Completed	INCOME (Weekly)	
	All Women	Year Round Full-time Workers
Total	\$154.00	\$250.00
Elementary School less than 8 years	95.00	167.00
8 years	115.00	184.00
High School 1-3 years	132.00	213.00
4 years	165.00	249.00
College 1-3 years	188.00	312.00
4 years	232.00	326.00
4 years or more	270.00	375.00
5 years or more	342.00	436.00

*From age 25 to death

U.S. Bureau of the Census, Current Population Reports, Series
P-60 No. 66.

Miller, Herman P., Richman, Poorman, Thomas Y. Crowell Co.,
New York, 1971, p. 178.

TABLE XV

RATE OF RETURN TO INVESTMENT IN EDUCATION
FOR OCCUPATION, REGISTERED NURSE.
1969

PRIVATE RATES OF RETURN

Program	Present Value of Cost of Education	Present Value of Benefit from Education	Internal Rate of Return %
A.D. (2 yr.)	\$ 6,923.00	\$10,414.00	5%
Diploma (3 yr.)	12,880.00	10,414.00	3 1/2%
Baccalaureate (4 1/2 yr.)			
Public	16,372.00	10,414.00	3%
Private	21,369.00	10,414.00	2 1/4% (2 5/16)

TABLE XVI
PRIVATE RATE OF RETURN
R.N.

1969 DATA

Pro-gram	Cost of Edu-cation \$	Present Value of Cost of Education \$	Estimated Life Ear-nings(48%) RN \$	Est. Life Ear-nings (48%) NA \$	Benefit from Educa-tion to RN \$	Present Value of Benefit \$	Inter-nal Rate of Re-turn %
AD (2 yrs)	7,488	6,923	144,294	85,789	58,505	10,414	5%
Diploma (3 yrs)	14,488	12,880	144,294	85,789	58,505	10,414	3 1/2
Baccalaureate (4 1/2 yrs.)							
Public	19,529	16,372	144,294	85,789	58,505	10,414	3
Private	25,489	21,369	144,294	85,789	58,505	10,414	2 1/4 (2 5/16)
R.N. Annual Salary \$7,332							
R.A. Annual Salary <u>4,062</u>							
Difference \$3,270							

In answer to the question: Are these three really interchangeable?

See Chapter I for description of these three programs. All graduates from these programs upon passing the State Board Examinations for registered nurses are qualified to practice as such. Comments relating to this situation are found in Blaug, Preston and Ziderman, pp. 5, 18. They say that the connection between education and occupation may not be a simple one and in most cases there is not a single educational requirement for each occupation but a range of educational programs. Also, ... even specific occupations consist of jobs of varying complexity calling for different levels of competence.

The results of this study, rates of return on investment in registered nurse education, indicate that only one of the three programs, Associate Degree, yields a positive return for registered nurse employed as a staff nurse. In evaluating these rates of return it is essential to keep in mind that this occupation, registered nurse, is a woman's occupation, as 99 percent of all active registered nurses are women and of these two-thirds are married. The labor force behavior of women, especially married women, differs greatly from that of men. Although some studies have been done on women's labor force participation, much remains to be done before satisfactory explanations are produced.

It is well known and documented that women and women's occupations receive lower pay than do men and men's occupations. Nevertheless, the cost of education is the same for women as for men which would bring about a lower rate of return to the investment in the education for women. Mincer noted a somewhat lower rate of return on total training for women than men, about two percentage points.⁹

Also, the data presented in this study agrees with two factors commented on by Mincer in relationship to women in the labor force:

The observed flatness of the female age-income profiles and the small differential

⁹Mincer, Jacob, "On The Job Training: Costs, Returns, and Some Implications," Journal of Political Economy, 70 (Oct. 1962), p. 536.

between observed incomes of women of different levels of formal education.¹⁰

Becker suggests that the relevant measure of the monetary return to women's investment in education is their contribution to the family income rather than these rates of return.¹¹ See Table XVII¹² which confirms the large contribution of married women to the family income.

TABLE XVII

FAMILY INCOMES COMPARED WITH HUSBAND'S INCOME: 1968

Income Level	Number of Families (Millions)	
	By Family Income	By Husband's Income
Total	43.8	43.8
Under \$3,000	3.3	6.1
\$3,000 to \$4,999	4.7	6.3
\$5,000 to \$6,999	6.1	8.5
\$7,000 to \$9,999	10.8	11.8
\$10,000 to \$14,999	11.8	7.8
\$15,000 and over	7.1	3.5

U.S. Bureau of the Census, Current Population Reports, Consumer Income, Series P-60, No. 66 Tables 12 and 38.

Miller, Herman P. Richman, Poorman, Thomas Y. Crowell Company, New York 1971, p. 223.

¹⁰Ibid., p. 536. Also influencing the lower rate of return is the smaller labor force participation rate of women.

¹¹Ibid., rate p. 536.

¹²Miller, Rich Man, Poor Man, p. 223.

TABLE XVIII
RETURN TO INVESTMENT IN R. N.
BACCALAUREATE PROGRAM
1969 Data

Instructor*

Median annual salary	\$ 8,600	
Estimated lifetime income (41 yrs.)	342,000	PV. \$60,983
48% of above	164,448	29,272
R.N. Instructor (48%)	164,448	
N.A. (48%)	<u>85,789</u>	
Benefit to R.N.	78,659	
P.V. of Benefit (4%)(44 yrs.)	14,001	
P.V. of Education (public)	16,372	
Internal Rate of Return about 3 3/4%		

*A.N.A., Facts About Nursing, 1969. Edition Table 3, p. 141.

Public Health R.N.* Fully Qualified

Median annual salary	\$ 8,059	
Estimated lifetime income (41 yrs.)	330,419	PV. 58,815
48% of above	158,601	28,031
R.N. (48%)	158,601	
N.A. (48%)	<u>85,789</u>	
Benefit to R.N.	72,812	
P.V. of Benefit	12,961	
P.V. of Education (public)	16,372	
Internal Rate of Return about 3 1/2%		

*A.N.A. Facts About Nursing, 1969. Edition Table 2, p. 132

Table XVIII (cont'd.)

Supervisor (hospital)*

Average (mean) weekly salary	\$ 174.00	
Average Annual salary	9,048.00	
Estimated lifetime income	370,968.00	P. V.
48% of above	178,065.00	
R.N. (48%)	178,065.00	
N.A. (48%)	<u>85,789.00</u>	
Benefit to R.N.	92,276.00	
P. V. of Benefit	16,425.00	
P. V. of Education (public)	16,372.00	
Internal Rate of Return about 4%		

*U.S. Dept. of Labor, Bureau of Labor Statistics Industry Wage Survey, Hospitals. March 1969, Bulletin 1688, p. 14.

Registered Nurse with a Baccalaureate Degree is only R.N. qualified for positions above the Staff Nurse or General Duty Position. However, in actual practice, many of these positions are filled by Associate Degree or Diploma Program Registered Nurses because the supply of Baccalaureate Degree registered nurses is not adequate to fill all of these positions.

TABLE XIX

RATE OF RETURN TO INVESTMENT IN R.N.
EDUCATION BACCALAUREATE DEGREE

POSITIONS REQUIRING BACCALAUREATE DEGREE
1969

Position	Median Salary Annual	Present Value of Cost of Education (Public)	Present Value of Benefit (48%)	Internal Rate of Return
Instructor (R.N. Program)	\$8,600	\$16,372	\$14,001	3 3/4%
Public Health (Fully Qualified)	8,059	16,372	12,961	3 1/2%
Supervisor (Hospital)	9,048	16,372	16,425	4 %

POSITION OPEN TO ALL R.N.'S

Staff R. N. (Gen. Duty)	\$7,332	\$16,372	\$10,414	3 %
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The rate of return to investment in the baccalaureate degree program for registered nurses is negative in the position of Staff Nurse as discussed above. However since the degree registered nurse is the only one officially qualified to hold the positions above the level of

Staff Nurse the present value and internal rate of return is calculated for three of these higher positions, Table XIX. Of these three only the highest paying position, Supervisor, shows a positive return and for this position the present value of the benefit barely exceeds the present value of the cost. The internal rate of return was four percent. Very likely these rates of return are understated because these registered nurses have 4 1/2 to 5 years of college education which suggests their work-life is greater than that of the average registered nurse, the 21 years. Studies have shown that the more educated person has greater attachment to the labor force.

If the baccalaureate degree registered nurse continues with her education and obtains a Masters or Doctors degree, the opportunities for advancement improve and also income. A study done by Lynn Maxwell reported a rate of return to a female with a Masters degree of 6.3 percent, while the rate of return to a male with the same degree was negative.¹³

CONCLUSION: PRIVATE RATES OF RETURN

Present Value Method: In comparing the present value of benefits to the present value of costs the only program having a positive return, present value of benefits greater than present value of

¹³Lynn Maxwell, "Some Evidence on Negative Returns to Graduate Education," Western Economic Journal, VIII (June 1970), p. 186

costs, to the investment in the education is the Associate Degree program. The other two programs, Diploma and Baccalaureate, have negative returns as both have present value of benefits less than present value of costs.

Internal Rate of Return Method: The Associate Degree program has the highest rate of return, five percent. The other two programs have less than a four percent rate of return.

The internal rate of return is an alternative discounting method often recommended because it is a way "to break the latter's dependence on the decision-maker's specific choice of an interest rate."¹⁴ Aside from this the present value method is the one of choice¹⁵ as it is more flexible and easier to calculate. As a rule it will give the correct answers in every project where the internal rate of return would apply.

¹⁴Donald Farrar and John R. Meyer, Managerial Economics, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970), p. 58.

¹⁵E. J. Mishan, Economics For Social Decisions (New York: Praeger Publishers, 1973), pp. 128-133. In only one case, the two period investment, in which the first period is cost and the second period is benefit, does the internal rate of return yield the same ranking as the present value method at any discount rate. For an investment stream of three or more periods the discount rate usually determines the ranking and as stated by Irving Fisher the internal rate of return is "the discount rate at which ranking reversal takes place." Additional support for the present value method is found in the investment stream which incurs costs in later periods because it may yield two internal rates of return. The evidence strongly supports the preference for the present value method over the internal rate of return criterion.

The basic rule in investment decisions is to make the investment if the present value of future returns is greater than the present value of all costs.¹⁶ In accordance with this rule the Associate Degree Program of Education for registered nurses should be the program of choice to become a staff registered nurse. However if the nurse plans to advance to higher positions the Baccalaureate Degree will be required and probably will yield a positive return in positions above supervisor; but in other professions advancement usually requires advanced study and degrees.¹⁷

¹⁶Farrar, Managerial Economics, p. 60.

¹⁷See Footnote 13 in this Chapter regarding rate of return to women with Masters Degrees.

CHAPTER V

CONCLUSIONS

The answer to the question posed at the beginning of this study - how does the rate of return on the investment in the education for registered nurse, relate to the supply of registered nurses? - is two fold. One, are the rates of return an important factor in the individuals choice of an occupation that requires additional education after completing high school? Two, are the rates of return an important factor in decisions made by government policy makers and educators concerning the supply of registered nurses?

First, is the individual influenced by the rate of return on the investment in the education in making the choice? Under the assumption: One, that the cost of the education is viewed strictly as an investment by the prospective student; and two, that the rates of return are known and that the meaning of the calculation is understood by the individual, the decision very likely would be to choose either education in an occupation with a higher rate of return or no further education. Therefore, under these assumptions these rates of return could be considered a factor in creating the "shortage" in the

supply of registered nurses.¹ However, these assumptions are not acceptable in the real world. As we know education is considered as much a consumption goods as an investment by both the student and the parents. In addition, most students and parents do not have the necessary information to calculate rates of return on the investment and if they did, the rates of return on investments in education for particular occupations are not readily available for comparison. Then, too, these sophisticated computations, present value, and internal rates of return are not comprehended by most of the prospective students. The choice of education for a particular occupation is based on available information obtained mainly by personal contact and the press which relates the employment opportunities through job vacancies. The principle determinant of supply is availability of jobs² and not earnings.

Moreover the fact that supplies of labor services are poorly informed with regard to specific salary information has been frequently noted.³

However, although prospective students do not make these complex calculations they often calculate the absolute wage differen-

¹That is if one subscribes to the hypothesis that there is a "shortage of nurses."

²Lester O. Bumas, "Engineering Occupational Choice 1951-1965," Industrial Relations, 9 (February 1970), p. 231.

³Ibid., p. 234.

tials in choosing occupations or in making decisions concerning education for particular occupations.⁴ The student may use a variation of the pay-back period method. It is defined "as the number of years which is required to accumulate earnings sufficient to cover its costs."⁵ This is a crude rule of thumb or short-cut method and it yields inaccurate results because it ignores the time pattern of payments.⁶

In Table XX it is readily seen that the Associate Degree program is the best investment by the pay-back method of calculating returns for an individual choosing to become a registered nurse. This agrees with the rates of return calculated earlier. Another point is: If the present choice is between the Associate Degree or the Diploma Program with plans to continue later and obtain the Baccalaureate Degree the best program with respect to time and money would be the Associate Degree because it is a two-year Community College Degree. Therefore, the Associate Degree registered nurse has two years of college credit in nursing when she goes back to obtain the Baccalaur-

⁴Ibid., p. 231. Becker states that "absolute occupational wage differentials are appropriate for occupational supply functions when the set of alternative occupations involve different "investments in human capital."

⁵William J. Baumol, Economic Theory and Operation Analysis (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965), p. 438.

⁶Ibid., p. 439.

TABLE XX
PAY-BACK PERIOD SCHEDULE

Program	Total Cost	Time Relative to R.N. Annual Salary \$7,332 Years	Time Relative to Differential N.A. Salary & R.N. Salary \$3,270 Years
Associate Degree	\$ 7,488	1.02	2.29
Diploma Program	14,448	2.0	4.3
Baccalaureate Degree			
Public	19,529	2.65	6.0
Private	25,489	3.48	7.79

ate Degree and this the Diploma nurse does not have.

Two important factors in the calculation of both the rates of return and the pay-back period are the salary, or wage rate, of the occupation and the cost of the education to the individual in dollars and time, forgone earnings. With respect to the Associate Degree program both of these factors improved the rates of return and the pay-back period. The increased wage rate greatly increased the annual income and the lower educational costs are the result of reducing the length of the course from three to two years and placing it in the public educational institutions which transfers a large part of

the cost to the public. These advantages for the individual, plus the availability of employment, have improved the attractiveness of the occupation, registered nurse. Consequently, the supply of registered nurses would be expected to improve unless unforeseen changes occur.

It cannot be said that the rates of return on the investment in education to become a registered nurse directly influence the prospective student's decision but indirectly in a less complex, sophisticated form, they do. That is, the factors entering into the calculation of rates of return, except the time pattern of payments, influence the individual's evaluation of the occupation and final decision as to whether to become a registered nurse or to choose another occupation.

The young person choosing to become a registered nurse does consider the long run period, not in the sense of the rate of return in dollars on an investment, but as an occupation compatible with her first choice, marriage and a family. Nursing has been an occupation she could leave for marriage and child rearing and return to later as either a part-time or full-time worker to supplement the family income. Nursing was chosen for its utility and not on the basis of a capital investment. In the past, nursing did fit this life pattern but in the past decade it has changed. Now, if the registered nurse is inactive for more than five years she must take a refresher course or work under supervision to prove her ability to perform the duties and functions of a registered nurse before her license is reinstated

for active practice. With the rapid advance in medical knowledge and technology continuing education has become a necessity. At present it is highly recommended and in the future it probably will be required for renewal of the license to practice as a registered nurse.

These changes in conjunction with other changes in women's employment patterns and opportunities will increase the registered nurse's attachment to the labor force. Most will at least work part-time if only a few hours a week, or a few days per month, to maintain a current license. Also, many young married women, with small children, are staying in the labor force.⁷ More women are now combining a career with marriage and family instead of subordinating their careers to their family life and responsibilities.

Second, Are the rates of return an important factor in decisions made by government policy makers and educators concerning the supply of registered nurses? In the above discussions only the private rates of return were considered. In this section the social rate of return, as well as the private rate of return, is important because it influences government policy decisions, educational changes and actions regarding health facilities and agencies. The social rate of return to society is calculated by the same method as the private rate of return; but it includes all costs to society plus the

⁷Elizabeth Waldman, "Marital and Family Characteristics of Workers, March, 1970," Monthly Labor Review, 94(March 1971), p. 46.

private costs to the individual including forgone earnings. Within the last decade, society has decided that the availability and rendering of adequate care to all members of our society is a responsibility and goal of the government. In this respect it is very similar to education, it is a service that benefits all of society but one that all individuals cannot afford to buy for themselves individually. Consequently, the government is obligated and authorized to assume a share of the financial cost and implement programs to aid in its production and availability. As a result of this the government is concerned about the supply of nurses.

Since the economist is concerned with the most efficient allocation of resources to attain the desired goals, his role is to perform the complex calculations such as present value, all rates of return on investments, cost-benefit analysis of proposed programs and advise those concerned - mainly the government policy makers, educators, administrations of health care facilities and agencies. However, the economist does not make value judgments and they do not enter into his analysis and conclusions.

The hypothesis that there has been and is a shortage of nurses, which has also been discussed above, has been generally accepted by the public, news media, most all in government, educators and health care facilities. Most of those that have questioned it and opposed it have been economists. These economists argue that

increasing supplies of nurses will not increase the supply of active nurses but will further depress the economic position of nurses and cause a "still larger flight from the professional activity."⁸ Nevertheless the policies adopted are based on the idea of a shortage of supply and are designed to increase the supply of all nurses, and in particular the registered nurse. To this end the rates of return have been used to aid in formulating the programs.

One method to increase the supply of registered nurses has been to attract more persons into the educational programs. This has been done by increasing the private rate of return on the investment in the necessary education through the introduction of the Associate Degree program which has been discussed above. By moving the registered nurse educational program to the formal institutions of education, the public has assumed a larger share of the cost which makes the cost to the student less and so the program is more attractive to students. Also, the Associate Degree program has reduced the time needed to acquire the education to two years which reduces cost in the form of forgone earnings. These reductions in cost and the increased wage rates work together to improve the private rate of return on the investment in the education. Also, the government has subsidized registered nurse education through loans

⁸Jerome P. Lysaught, An Abstract For Action, (New York: McGraw-Hill Book Company, 1970), p. 4.

to students, scholarships, subsidy to hospital schools of nursing and special aids for minority and disadvantaged groups. In all of these, educators have cooperated.

In summary, the private rates of return on the three registered nurse educational programs based on employment as a general duty staff registered nurse when calculated by the two methods, present value of cost and benefit and internal rate of return indicate that only one program, the Associate Degree, is an efficient investment. For the Associate Degree program the present value of benefits exceeds the present value of costs and the internal rate of return is five percent. For the other two programs, Diploma and Baccalaureate Degree, the internal rates of return are below the four percent interest rate used to compute the present values and the present value of benefits are less than the present value of costs which means these are inefficient investments.

The data and calculations for the Baccalaureate Degree program shows that this registered nurse in the position of hospital supervisor just meets the criteria of an efficient investment as the present value of benefits is slightly greater than the present value of costs and the internal rate of return is just four percent.

The private internal rates of return to the investment in registered nurse education are all low, which is in part due to this being a woman's occupation. Not enough is known about women in

the labor force, their work patterns, the returns to investment in their education, and what is the relevant measure for woman's earnings, return to the individual or as contribution to the family unit. Research needs to be done in all these areas of women as members of the labor force and society. Practically all research done in the area of labor economics has been based on data from men in the labor force. These studies and their conclusions are not applicable to women in the labor force.

CHAPTER VI

ESTIMATED PROJECTION OF THE SUPPLY OF REGISTERED NURSES FOR 1985

The study just completed in the previous pages, on the rate of return to the investment in education for registered nurses, will now be used to project the supply of registered nurses for 1985 with the assumption that there will be no major changes in the national government's role in medical and health care. In order to evaluate the adequacy of the supply of registered nurses forecast for 1985, it is necessary to have an estimated future trend of the demand for registered nurses. An in-depth study of the demand and projection of this demand for registered nurses is not included in this paper; but a survey of the data presented here on population changes, public and private expenditures on health care and the utilization of hospital facilities will be used to determine and approximate future trend of demand for health care. The demand for registered nurses is closely related to the demand for health care.

The first consideration will be population changes. See Tables XXI, XXII, and XXIII. The estimated projections of total population has been adjusted downward since 1970 as a result of the 1970 census

TABLE XXI

PROJECTIONS OF POPULATION BY AGE TO 1985

Age	Population (Millions)		Net Change 1970 to 1985		Net Change 1955 to 1970	
	1970	1985	Number Millions	Percent %	Number Millions	Percent %
All Ages	204.8	235.7	30.9	17.3	40.1	24.2
Under 5 years	17.4	20.5	3.1	18.0	0.2	0.9
5 to 9 yrs.	20.6	18.7	-1.9	-9.2	3.8	22.9
10 to 14 yrs.	20.7	17.0	-3.7	-18.0	7.0	51.6
15 to 19 yrs.	19.1	17.6	-1.5	-8.0	8.1	73.0
20 to 24 yrs.	17.3	20.4	3.1	18.0	6.5	61.1
25 to 34 yrs.	25.3	40.7	15.4	60.8	1.0	4.3
35 to 44 yrs.	23.0	31.4	8.4	36.7	0.1	0.2
45 to 54 yrs.	23.3	21.7	-1.6	-7.0	4.4	23.5
55 to 64 yrs.	18.5	21.2	2.7	14.8	3.9	26.5
65 yrs. & over	19.6	25.0	5.4	27.5	5.1	34.8

Source: Herman P. Miller Richman, Poorman. New York: Thomas Y. Crowell, 1971, p. 286. Table adjusted by new data from 1970 Census using Series E to estimate population.

TABLE XXII

TOTAL POPULATION AND ACTIVE REGISTERED
NURSES PER 100,000 POPULATION

Year	Total Population ¹		Active Registered Nurses ²		
	Thousands	Per- cent Increase	Total Number	RN 100,000 Pop. ³	
				Number	Percent Increase
1960	180,684	1.6	504,000	282	5.2
1961	183,756	1.6			
1962	186,656	1.5	550,000	298	5.67
1963	189,417	1.4			
1964	192,120	1.4	582,000	306	2.68
1965	194,592	1.2			
1966	196,907	1.2	621,000	319	4.24
1967	199,114	1.1	640,000	325	1.88
1968	201,152	1.0	659,000	331	1.84
1969	202,600	1.1	680,000	338	2.11
1970	204,800	1.1	700,000	345	2.07
1971	207,000	1.1	723,000	353	2.31

Source: ¹U. S. Department of Commerce, Bureau of Census.
Statistical Abstract of the U.S. 1972 Ed. p. 5 No. 2

²American Nurses Association Facts About Nursing
1970-71 Edition, p. 10. Table 3

³Ibid., p. 9 Table 1.

TABLE XXIII

POPULATION ESTIMATES AND PROJECTION CHANGES
SINCE 1970 POPULATION CENSUS

Series E: New low, Series E, has been added assuming a complete fertility rate of 2.11 children per woman - for 2.11 is the value needed for population to exactly replace itself after the age structure stabilizes.

Estimate and Projection of Total Population and Changes, Series E
1960 to 2000

1971 through 1975 (inclusive) Average Net Annual
percent increase 0.9 percent.

1976 through 1985 (inclusive) Average Net Annual
percent increase 1.0 percent.

Total population, Estimated and Projected
1985 - 235,701 (millions).

Source: U. S. Department of Commerce, Bureau of Census Characteristics of the Population 1970 Census of Population
Volume I, Series p. 25, p. 9.

and the lower fertility rate of women. The increase in total population between 1970 and 1985 based on Series E, fertility rate 2.1 is for 17.3 percent increase. The increase in those 65 years and over will be five million persons, or an increase of 27.5 percent over that of 1970; which will, in 1985, be 10.6 percent of the total population in

comparison to 9.4 percent in 1970. It has been estimated by the Social Security Administration that this group in fiscal year 1970 spent 27 percent of the total expenditures for personal health care, and the greater share of this was public funds, 67.5 percent. Consequently, the increase in the numbers in this age group will increase the demand for and expenditures for health care. The other age group with large changes is the 19 and under group. In 1970 it made up 38 percent of the total population and in the estimate for 1985 it will be 31.3 percent. In 1970 the Social Security Administration estimated this group accounted for 16 percent of the total expenditures for personal health care and 73 percent of this expenditure came from private funds.¹ The reduction in the numbers in this age group will not have so great an effect on the demand for and expenditures for health care as the older group.

Thus the increase in population in itself will increase the demand for health care plus the expected increase due to the increase in the age group, 65 and over, because they are large users of health care. The total population will increase by approximately 1.0 percent per year which is considerably less than that for 1960 through 1970 which averaged 1.3 percent per year. It was 1.6 percent in 1960 and gradually dropped to 1.1 percent in 1967 and continued at

¹American Nurses Association, Facts, 1970-71 Edition pp. 243-244.

1.1 percent through 1971. (Table XXII) Since the estimated annual average net increase from 1971 through 1975 is 0.9 percent and from 1976 through 1985 is 1.0 percent (Table XXIII) the annual increase in the demand for health care would not be expected to increase over that of the latter half of the 1960's. Based on the population changes documented here, the demand for health care could be estimated to increase at the same rate as that of the latter 60's because the decrease in the annual average percentage population increase would be offset by the increase in the numbers of age 65 years and over, other things unchanged. Of course other things will not remain unchanged and a few of these other things will be considered next.

The second consideration will be the public and private expenditures for health care. A measure of public expenditures is the percent of Gross National Product spent annually for all health care. (Table XXIV). In 1950 4.5 percent of G.N.P. was spent for health care and by 1972 it had risen to 7.6 percent of G.N.P. The percentage increase from 1966 through 1972 was at an annual average rate of 0.278 percent in comparison with 0.133 percent for the period 1960 through 1965 (inclusive). In view of the accepted obligation of government to extend financial aid to health care and with the goal of available adequate health care for all persons irrespective of social or economic condition, the trend of an increasing demand and increasing expenditure would be expected to continue. This would be so

TABLE XXIV

TOTAL NATIONAL HEALTH EXPENDITURES AND
PERCENT OF GROSS NATIONAL PRODUCT

Year	Total Gross National Product \$ (Billions)	Total National Health Expenditure \$(Billions)	Total Expenditure as a Percent of G.N.P.
1950 ¹	284.8	12.9	4.5 %
1955	398.0	18.0	4.5
1960	503.7	26.9	5.3
1961	520.1	28.8	5.5
1962	560.3	31.4	5.6
1963	590.5	33.6	5.7
1964	631.7	37.5	5.9
1965	681.2	40.6	6.0
1966	743.3	45.0	6.0
1967 ²	789.7	50.7	6.4
1967-68	827.4	53.7	6.5
1968-69	899.6	59.9	6.7
1969-70	956.2	67.2	7.0
1971	1,046.8	75.0	7.4
1972		83.4	7.6

Source: ¹American Nurses Association, Facts About Nursing,
1968 Edition, p. 217, Table 4.

²American Nurses Association Facts About Nursing
1970-71 Edition, p. 246, Table 4.

even if the government is successful in its search for new methods of administering health care such as the experiment with Health Maintenance Organization (H.M.O.) which would decrease the per capita costs, but would increase the total absolute expenditure because it would include large numbers of persons not now covered.

The private sector also shows an increasing demand for health care (Table XXV) as personal incomes increase, even though the price of health care has increased more rapidly than all other items on the consumer price index. Between 1969 and 1970 the only major component on the consumer price index to increase more than medical care was housing and it increased 7.3 percent as compared to medical care, 6.3 percent as reported by the Bureau of Labor Statistics.² The per capita personal disposable income has been rising at an increasing rate. In 1961 it increased 2.45 percent over the previous year and in 1969-70 it increased by 8.0 percent over the previous year. The increase in dollars spent per capita as a percent over the previous year has enlarged also; in 1961 it was 5.3 percent and in 1969-70 it was 11.1 percent. The percentage of personal disposable income, per capita, spent for health care was 7.7 percent in 1960 and by 1969-70 it was 9.65 percent and 10.0 percent in 1971. The average annual percentage increase for this percentage from 1966

²Ibid., p. 243.

TABLE XXV

PER CAPITA: PERSONAL DISPOSABLE INCOME
AND NATIONAL HEALTH EXPENDITURES

Year	Per Capita Personal Disposable Income			Per Capita National Health Expendi- tures			Ratio Per Capita Nat'l. Hlth. / Per Exp. Capita P.D.I. Percent
	Annual \$	Change over Previous Year		Annual \$	Change over Previous Year		
		Dollars	Percent		Dollars	Percent	
1950	1,364			84.49			6.2
1955	1,666	302	22.1	108.67	24.18	29.0	6.5
1960	1,937	271	16.3	149.25	40.58	37.3	7.7
1960	1,937			149.25			7.7
1961	1,985	48	2.45	157.17	7.92	5.3	7.9
1962	2,060	75	3.8	168.21	11.04	7.0	8.1
1963	2,125	65	3.1	177.50	9.29	5.5	8.3
1964	2,280	155	7.3	195.41	17.91	10.0	8.6
1965	2,432	152	6.7	210.12	14.71	7.5	8.6
1966	2,598	166	6.5	230.69	20.57	9.8	8.9
1966-67	2,744			238.23			8.7
1967-68	2,939	195	7.1	263.97	25.74	10.8	9.0
1968-69	3,108	169	5.76	291.78	27.81	10.5	9.4
1969-70	3,358	250	8.0	324.32	32.54	11.1	9.65
1971	3,581	223	6.6	358.00	33.68	10.4	10.0

Source: ¹U.S. Department of Commerce, Bureau of the Census
Statistical Abstract of the U.S.: 1966 p. 232,
No. 456; 1967 p. 321 No. 456; 1968 p. 319 No. 406;
1970 p. 312 No. 472; 1972 p. 315 No. 512.

²American Nurses Association, Facts About Nursing.
1968 Edition, p. 217 Table 5; 1970-71 Edition p. 246
Table 5.

TABLE XXVI
CONSUMER PRICE INDEX FOR ALL ITEMS
AND MEDICAL CARE

(1957 - 1959=100)		
Year	All Items	Medical Care
1950	83.8	73.4
1955	93.3	88.6
1960	103.1	108.1
1961		
1962	105.4	114.2
1963	106.7	117.0
1964	108.1	119.4
1965	109.1	122.3
1966	113.1	127.7
1967	116.3	136.7
1968	121.2	145.0
1969	127.7	155.0
1970	135.3	164.9

Source: U.S. Department of Commerce Bureau of the Census
Statistical Abstract of the U.S. 1969 Edition, p. 62 No. 80;
p. 345 No. 506.

American Nurses Association, Facts About Nursing. 1966
Edition p. 218; 1969 Edition p. 221; 1970-71 Edition
pp. 244-245.

through 1971 was 0.233 as compared to the government annual percentage increase of G.N.P. spent for health care of 0.278 percent. Both the public and private data seems to indicate a continuation of the increasing demand and expenditure for health care. Also the data indicates that for the private sector the income elasticity of demand for health care is elastic and the price elasticity of demand for health care is elastic.

The third consideration is the utilization of hospital facilities which are the one health care indicator showing a decrease in demand. These, hospitals, are also by far the most expensive of all health care services and their prices have advanced the most rapidly. The hospital daily service charge increased 12.5 percent for 1969-1970 and in the period 1966 to 1970 it rose 71.4 percent as compared to the overall consumer price index for all medical care which increased 29.1 percent for this period.³ The percentage of bed occupancy for all hospitals decreased -4.4 percent from 1957 to 1970 (Table XXVII). However, during this period the number of beds increased by +3.7 percent. The average daily census decreased by -1.7 percent for this same period. Why this decrease in utilization of hospital facilities when the other data through 1971 shows an increase in demand for health care? It could be the response to the relative high cost of

³Ibid., p. 243.

TABLE XXVII
ALL HOSPITALS 1957-1970

Year	Percentage of Beds Occupied ¹	Average Daily Census ²
1957	84.7	1,320,309
1960	84.6	1,401,873
1961	83.4	1,392,856
1962	83.3	1,406,818
1963	84.0	1,429,586
1964	83.8	1,420,918
1965	82.3	1,402,625
1966	83.3	1,398,491
1967	82.6	1,380,410
1968	82.9	1,378,398
1969	81.6	1,346,347
1970	80.3	1,297,708
	Percent Chanel -4.4 1957-1970	Percent Change -1.7 1957-1970

Note: Number of hospital beds, Percent change 1957-1970, +3.7

Source: ¹American Nurses Association Facts About Nursing 1970-71
Edition p. 225 Table 6

²American Nurses Association Facts About Nursing 1970-71
Edition p. 227 Table 8.

hospital services or it may be the first manifestation of a change in structure and method of delivering health care. In the past, hospital services have at times been over-used and misused because of convenience and because the majority of insurance programs paid only for hospitalization and not for the same care and treatment on an out-patient basis. Increasingly more insurance programs have been restructured to cover out-patient care. It should be noted also that hospitals have undergone specialization similar to that of the nursing occupation discussed earlier. Within the general hospital there are specialized departments ranging from Intensive Care Units through general care down to out-patient care. Hospitals too have been specialized into different levels of care facilities ranging from the General Acute Care Hospital to Extended Care Facilities on down to Nursing Homes. One reason for this specialization was to permit adjustments of price to conform with the amount and level of care required.

The traditional method of delivering health care is becoming outmoded and incapable of delivering adequate care to the total population at an acceptable cost.⁴ Consequently the health care system

⁴Herman M. Somers, "Economics in Health Services," in Contemporary Economic Issues, ed. by Neil W. Chamberlain (Homewood, Illinois: Richard D. Irwin, Inc., 1969) pp. 109-144. Also earlier in this paper the "Eccentric character of the health care economy," was discussed and the rapidly increasing costs are shown in Table XXIV giving the total National Health Expenditures and Percent of Gross National Product.

must be restructured to meet the changing demands; but how to do this is a problem yet to be solved. An analysis of this problem is beyond the scope of this paper. The degree of change, rapidity of change and method chosen particularly by the government could have large effects on the increasing demand for health care and registered nurses. The estimated projection for demand here will be based on the data presented above and will not assume a large sudden increase in demand for health care produced by a new government national health care program extending health care to all persons.

As the demand for health care increases, the demand for registered nurses increases. Based on past trend and on data presented here, the future trend of demand for registered nurses would be expected to increase at approximately the rate it had during the period 1966 through 1970 which would be by 3.15 percent per year over the previous year (i. e., total absolute number of active registered nurses of the previous year.)

If the decrease in demand for hospital services as measured by percentage of beds occupied and average daily census continues to grow, as shown in Table XXVII, a number of registered nurses will be available to fill a new demand created by the budgeted federal funds for increased aid to new health care programs known as Health Maintenance Organizations.

If, in the future, the demand for the registered nurse with

advanced education, highly skilled, and specialized, increases markedly as it very likely could the supply of this particular registered nurse could be less than the demand. These are the ones that do not have a positive rate of return on their investment until attaining positions above supervisor and if the specialized education is in addition to their education (which it usually is) the investment would increase. Therefore to increase the supply would call for an increase in the return on the investment which would be increased salary, fringe benefits, and improved attractiveness of the profession. In addition, it must be kept in mind that many professions are now open to women which means that those demanding this class of registered nurses will have to meet the competition of the other professions if they are to attract the better, more capable persons.

The estimated projection of the supply of registered nurses based on past data of the number of active registered nurses and the annual average percentage increase, 3.6 percent, using the 1960-1971 period yields a supply in 1985 of 1,189,498. If the supply is calculated on the period 1966-1970, which had an average annual increase of 3.15 percent, the number of active registered nurses in 1985 would be 1,114,646. The conclusion from the brief survey of the estimated future demand for registered nurses was that the demand would continue about as it had been during the period 1966-1970 except for the highly educated, skilled and specialized. Consequently, the estimated

supply, 1,114,646, would meet the estimated demand of 1985. However if the very recent data of the number of graduates from registered nurse schools of July, 1971 and July, 1972 is used, and assuming two-thirds of these graduates (LFPR) of registered nurses become active registered nurses, the annual percentage increase would be 4.0 and 4.5 percent respectively. Using these new percentage rates to estimate the 1985 supply projects 1,252,019 at 4.0 percent and 1,338,924 at 4.5 percent.

The results of the long-time complaint of a shortage of nurses and the numerous programs instituted to correct this shortage are now being noted in the data as above. Also, see Tables XXVIII, XXIX, XXX, XXXI, and XXXII, which give the data on the recent increases in admissions, graduations and enrollments. The American Council on Education reports that in 1972, of a total of College Freshmen, 4.7 percent chose the nursing profession, as compared to 4.1 percent in 1971 and only 2.7 percent in 1968.⁵ Probably part of these additional nursing students are "would-be teachers" who changed their field as a result of the over supply of teachers. The professional nurse schools have classes filled a year in advance and waiting lists of large numbers for future classes. All this indicates that the supply of potential active registered nurses is increasing in fairly large

⁵R. N. Magazine, May 1973, p. 6.

TABLE XXVIII

ADMISSIONS, GRADUATIONS, AND ENROLLMENTS IN
INITIAL PROGRAMS - R.N. IN U.S. AND PERCENT
CHANGE OVER PREVIOUS YEAR
1958-59 TO 1969-70

Academic Year	Admissions		Graduations		Enrollments	
	Number	Percent Change	Number	Percent Change	Number	Percent Change
1969-70	69,677	+9.9	43,103	+3.1	162,924	+9.2
1968-69	63,408	+4.5	41,801	+1.3	149,124	+3.5
1967-68	60,673	+4.6	41,245	+8.7	144,024	+2.4
1966-67	58,021	-3.6	37,931	+8.6	140,631	+1.9
1965-66	60,191	+5.3	34,909	+1.2	137,972	+2.4
1964-65	57,180	+9.4	34,497	-1.6	134,733	+4.9
1963-64	52,274	+6.2	35,050	+8.8	128,429	+3.6
1962-63	49,228	-0.6	32,223	+3.9	124,014	+0.7
1961-62	49,506	+0.6	31,006	+3.3	123,197	+0.7
1960-61	49,219	+0.6	30,019	+0.4	122,344	+3.5
1959-60	48,919	+6.4	29,895	-0.8	118,163	+3.3
1958-59	45,988	+4.7	30,136	-0.3	114,345	+1.3

Source: American Nurses Association Facts About Nursing
1970-71 Edition, p. 80 Table 80.

TABLE XXIX

GRADUATION STUDENTS R. N. PROGRAMS
PERCENT CHANGE OVER PREVIOUS YEAR

Academic Year	Total	Diploma	Associate Degree	Bacca- laureate
1958-59	-.3	-1.6	8.7	7.4
1959-60	-.7	-2.8	70.8	4.9
1960-61	+5.5	+0.5	16.2	-2.4
1961-62	3.0	1.6	26.4	6.5
1962-63	3.9	2.8	27.6	4.2
1963-64	8.8	6.8	32.6	12.9
1964-65	-1.6	-5.1	27.9	6.4
1965-66	1.3	-1.9	33.4	2.2
1966-67	8.8	4.5	39.0	11.5
1967-68	8.7	2.7	33.5	16.5
1968-69	3.9			
1969-70	3.4			
1970-71	7.7			

Source: American Nurses Association Facts About Nursing
1970-71 Edition p. 75 Table G.

TABLE XXX
GRADUATION STUDENTS R. N. PROGRAMS

Academic Year	Total Number	Diploma		Associate Degree		Baccalaureate	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1958-59	30,312	25,907	85.5	462	1.5	3,943	13.0
1959-60	30,113	25,188	83.7	789	2.6	4,136	13.7
1960-61	30,267	25,311	83.6	917	3.0	4,039	13.4
1961-62	31,168	25,727	82.5	1,159	3.7	4,300	13.8
1962-63	32,398	26,438	81.6	1,479	4.6	4,481	13.8
1963-64	35,259	28,238	80.1	1,962	5.6	5,059	14.3
1964-65	34,686	26,795	77.3	2,510	7.2	5,381	15.5
1965-66	35,125	26,278	74.8	3,349	9.5	5,498	15.7
1966-67	38,237	27,452	71.8	4,654	12.2	6,131	16.0
1967-68	41,555	28,197	67.8	6,213	15.0	7,145	17.2
July 1969	42,196	25,114	59.5	8,701	20.6	8,381	19.9
July 1970	43,639	22,856	52.4	11,678	26.8	9,105	20.8
July 1971	47,001	23,339	49.65	14,754	31.39	9,913	21.09

Source: American Nurses Association, Facts About Nursing 1970-71 Edition, p. 75 Table 5

TABLE XXXI

ADMISSIONS OF STUDENTS R.N. PROGRAMS

Academic Year	Total Number Admissions	Number Increase over Previous Year	Percent Increase over Previous Year
1959-60	49,166		6.3
1960-61	49,487	321	.6
1961-62	49,805	318	.6
1962-63	49,521	-284	-.6
1963-64	52,667	3,146	6.4
1964-65	57,604	4,937	9.4
1965-66	60,701	3,097	5.4
1966-67	58,700	-2,001	-3.3
1967-68	61,389	2,689	4.6
1968-69	64,157	2,768	4.5
1969-70	69,677	5,520	8.6

Source: American Nurses Association Facts About Nursing
1970-71 Edition, p. 72 Table 1, Table 2.

TABLE XXXII

GRADUATION OF STUDENTS IN R.N. PROGRAMS

Academic Year	Total Number Graduates	Number Increase over Previous Year	Percent Increase over Previous Year
1959-60	30,113		-.7
1960-61	30,267	514	.5
1961-62	31,186	919	3.0
1962-63	32,398	1,112	3.9
1963-64	35,259	2,861	8.8
1964-65	34,686	-566	-1.6
1965-66	35,125	439	1.3
1966-67	38,237	3,112	8.8
1967-68	41,555	3,318	8.7
*July 31, 1969	42,196	1,641	3.9
July 31, 1970	43,639	1,443	3.4
July 31, 1971	47,001	3,362	7.7

Source: American Nurses Association Facts About Nursing
1970-71 Edition, p. 75 Table 5, Table 6.

*U.S. Department of Health, Education, and Welfare
Current Nursing Statistics in Brief 1970.

numbers. In view of the demand for nurses, according to data of the past, the supply will exceed the actual demand.⁶ Also related to the future supply required is the additional evidence: the number of budgeted vacant positions has been decreasing even though the increase in the supply of active registered nurses has been at approximately the same annual percent increase, 3.0, from 1966 through 1970, following the 1970 census the estimated future population was revised downward considerably.

The recent indications are that the supply of registered nurses is increasing but one cannot project a definite trend from the data of a few years. However if this present trend continues, the supply will be adequate and may overshoot the demand as the programs set in motion to increase the supply to overcome the 'shortage' gain momentum. This future supply will be influenced by the rates of return on the educational investment. Of the three programs the Diploma Hospital school, which is being phased out, need not be considered in the future supply since there will be very few in operation. Therefore, the Associate Degree program will be preparing the major share of the future registered nurses since it will gain most of the students that would have entered the Hospital schools. It is the program which showed the positive rate of return on the educational investment to

⁶This has been discussed earlier.

the general duty or staff nurse and should continue to do so in the future. If the wage rate increases faster relative to the educational costs this rate of return would improve. The Baccalaureate Degree program will continue to attract those wanting and able to pay for a College or University education and degree and aspiring to the higher positions or advanced education. This program will also increase its percentage of the total nursing students but by a lesser amount than the Associate degree program. The rate of return to these graduates is not positive for the general staff nurse or lower positions and won't be unless salaries increase. These higher educated and specialized registered nurses probably will be the ones in short supply because of the low salaries and low rates of return. This program graduated 20.8 percent of the professional graduates in July, 1970. This problem was discussed above under 'estimated future demand.'

A possible difficulty for the future may be the over-supply of registered nurses brought on in large part by the increased salaries, Associate Degree program, and the great amount of publicity given to the shortage of nurses and the many career opportunities in nursing and other health occupations. In such a situation the comment in 1967 by Yett and Furstenberg would be applicable.

Without a program to translate the Nation's 'needs' into effective demand, the proposal to greatly increase the supply of nurses could

cause large relative salary declines. Under such circumstances, nursing will become an even less attractive career than at present; and we will soon be faced with still another request for massive support to remedy the 'shortage' of nurses by increasing the supply available. The vicious circle will continue as long as market demand is below the desired 'goal at existing nurse salary schedules.'⁷

Times have changed as they do, now one does not read about the 'shortage of nurses', but that it is a mis-use and maldistribution of the supply.

It should be emphasized that the crisis does not arise from any shortage of medical personnel or the other resources employed in providing medical care....⁸

DATA FOR ESTIMATED PROJECTION OF REGISTERED NURSES

Active registered nurses 1954-1970 average percent increase per year 3.96 (because of the large increase 1958-1962).

Active registered nurses 1962-1969 average percent increase per year 3.09.

Active registered nurses 1960-1971 average percent increase per year 3.6.

Active registered nurses 1966-1970 average percent increase

⁷ Lysaught, Abstract, p. 55.

⁸ William H. Glazier, "The Task of Medicine." Scientific American Magazine, April 1973, p. 15.

per year 3.15.

Active registered nurses 1967-1970 average percent increase
per year 3.04.⁹

R.N. / Medical
and
Health Workers
(Table III)

This ratio has been gradually and
consistently decreasing each year.
In 1960 the ratio was 0.316 percent,
in 1966 it was 0.275 percent and in

1970 it was 0.236 percent, which indicates a decreasing demand for
registered nurses relative to the total of all medical and other health
workers. However, the rate of decrease per year is gradually be-
coming smaller which suggests the substitution process is nearing its
optimum and the demand for registered nurses is stabilizing.

The number of active registered nurses working part-time
has been increasing: in 1960, 17.8 percent; in 1966, 25.0 percent;
and in 1969, 27.5 percent.

The absolute number of active registered nurses has been in-
creasing each year. From 1964 through 1970 it has averaged 3.07
percent increase per year. When these (including full-time and
part-time) are adjusted to full-time equivalents, the percent increase
per year ranges between 2.51 and 2.62 with the average 2.57 (Table
I).

⁹Percentages taken from Table I.

ESTIMATED PROJECTION OF SUPPLY OF REGISTERED NURSES FOR 1985

Past Trend and Estimated Supply

The increase in the number of active registered nurses from 1960-1971 averaged 3.6 percent increase per year.

If this trend continued unchanged from 1970 to 1985 the registered nurse supply would be:

1970 700,000 Active Registered Nurses, increase 3.6 percent
per year (compound)

1985 1,189,498 Active Registered Nurses.

The increase in the number of active registered nurses from 1966-1970 averaged 3.15 percent increase per year. If this trend continued unchanged from 1970-1985, the registered nurse supply would be:

1970 700,000 Active Registered Nurses, increase 3.15 percent
per year (compound)

1985 1,114,646 Active Registered Nurses.

The increase in the number of active registered nurses from 1967-1970 averaged 3.04 percent per year. If this trend continued unchanged from 1970-1985 the registered nurse supply would be:

1970	700,000	Active Registered Nurses, increase 3.0 percent per year (compound)
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1985 1,090,000 Active Registered Nurses.

This method of calculating includes the attrition per year as

the average percent increase per year is the actual increase in the number of active registered nurses over the number of the previous year.

Another method of measuring the number and adequacy of registered nurses is the number per 100,000 population. The number of active registered nurses per 100,000 population has increased as a percentage over the previous year by more than the total population percentage increase each year. (See Table XXII)

The number of registered nurses per 100,000 population from 1960-1971 average annual increase per year has been 2.01 percent.

1971 353 active registered nurses per 100,000 population
 increase at 2.0 percent per year (compound).

1985 464 active registered nurses per 100,000 population.

1985 estimated projected population 235.7 million then at 464 nurses per 100,000 population in 1985 there would be 1,093,648 active registered nurses. When calculated at 3.0 percent increase per year in the number of active registered nurses, the 1985 number is 1,090,600 which is approximately the same as by the above method. Therefore, the 3.0 percent per year increase would continue the supply of registered nurses in the same ratio to population in 1985 as in 1971. If the number of active registered nurses per 100,000 population increases at an average percent of 2.0 per year, this is double the rate of population increase per year for the estimated rate of

increase from 1970-1985.

ESTIMATED PROJECTIONS OF R.N. 1985 GRADUATES FROM R.N. PROGRAMS

1966 through July 1971, average per year increase over the previous year	6.5%
1960 (inclusive) through July 1971 average per year increase over the previous year	3.975%
1966-67 (inclusive) through 1970-71 average per year increase over the previous year	6.5%.

If the graduates from R.N. schools increased by 6.5 percent per year from 1966 through 1971 the active registered nurses should have increased by two-thirds (LFPR) of 6.5 percent, which is 4.32 percent; but this did not show up on the table I. The increase in actual active registered nurses average percent per year was 3.18%. Was supply greater than demand? The same comments apply to the year 1966-67 also. The National League of Nursing reports, for the year 1971, Registered Nurse schools graduated 47,001 students; for the year ending July 1972, Registered Nurse schools graduated 51,784 students.¹⁰

If two-thirds (LFPR) of these graduates become active registered nurses:

1971 graduates 47,001 (2/3) = 31,334 Registered Nurses
1972 graduates 51,784 (2/3) = 34,522 Registered Nurses

¹⁰ R. N. Magazine, May 1973, p. 5.

which would be a 4.33 percent increase, 1971, over the number of active registered nurses the previous year and a 4.57 percent increase for the year 1972.

1971	723,000 active registered nurses, increase at 4.0 percent (compound)
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1985	1,252,019 active registered nurses.
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1971	723,000 active registered nurses, increase at 4.5 percent (compound)
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1985	1,338,924 active registered nurses.
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