2001

The Health Care Workforce in New York City

Trends in the Supply of and Demand for Health Workers in New York City

CHWS
Center for Health Workforce Studies
School of Public Health
University at Albany, State University of New York

THE HEALTH CARE WORKFORCE IN NEW YORK CITY, 2001

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September 2001

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PREFACE

This is the third annual report on the New York City Health Workforce Tracking System conducted by the Center for Health Workforce Studies. The Tracking System is designed to provide information about health workforce trends and developments to the health industry, health professionals, educators, policy makers, and the public.

The Tracking System is principally supported through funding from the 1199 Hospital League Health Care Industry Planning and Placement Fund, Inc., a joint labor management fund responsible for the education and training of health workers. This report helps the Fund better understand trends in the supply and demand for health workers in New York City, effectively plan for health worker education and training and direct available training dollars to meet priority needs. The Center also receives support from the Bureau of Health Professions, HRSA, for analysis of health workforce data and trends.

The Center for Health Workforce Studies is located at the School of Public Health, University at Albany, State University of New York. The Center is a not-for-profit research organization dedicated to health workforce data collection and analysis. Several Center staff contributed to this study, including Jean Moore, Robert Martiniano, Edward Salsberg, Amy Rizzo, and Michael Dill.

TABLE OF CONTENTS

LIST OF EXHIBITS

Charts

Tables

EXECUTIVE SUMMARY

Background

Nearly one of every eight workers in New York City (the City) is employed in health care. The health care industry in the City continues to undergo significant changes. Health care organizations are merging and consolidating and service delivery systems are reorganizing. Many health care providers are facing significant fiscal pressures that could lead to workforce reductions. At the same time, these providers are facing significant clinical workforce shortages that threaten their ability to provide safe, high quality health care. It is important to understand the impact of these pressures and changes on the supply and demand for health workers.

The Center for Health Workforce Studies has completed its third annual assessment of the New York City health workforce. This study, based on extensive data analysis and structured interviews with health care leaders in the City, examines the health care delivery system and the health care workforce. Key findings include:

1. The health industry is experiencing significant worker shortages in a wide range of occupations.

According to Human Resources Directors at voluntary hospitals, the occupations that are most difficult to recruit include:

- Registered nurses, especially those with specialty care experience;
- Pharmacists;
- Medical coders;
- Radiologic technicians;
- Mammographers;
- Information systems staff; and
- Senior clerical staff.

Human Resources Directors at public hospitals identified the occupations listed above, as well as:

- Masters prepared social workers;
- Dieticians;
- Licensed practical nurses; and
- Nurse practitioners.

Many hospitals also reported difficulty finding bi-lingual or multi-lingual workers, especially social workers. Identified needs included health workers fluent in Spanish, Russian, French, Chinese, Korean, and Hindi.

2. A number of factors are contributing to the growing shortage of RNs, including a significant decline in the production of RNs in the City, the aging of the existing RN workforce, and growing demand for RNs in a variety of settings.

The production of RNs both in New York State and New York City declined steadily from 1996 to 2000 with net decreases of 25% and 26% respectively. Based on current enrollments, the number of RN graduates in 2001 is expected to be essentially the same as in 2000 and rise slightly in 2002. In addition to RN shortages reported by hospitals, New York City nursing homes, home health agencies and health centers report growing difficulty recruiting registered nurses.

RNs ranked 6th among occupations identified as having the greatest need to replace retirees nationwide between 1998 and 2008, with 331,000 replacements projected. It is estimated over 17,000 nurses in New York State will need to be replaced by 2008.

3. The health care sector continues to grow and is a major employer in New York City.

The health care sector represents almost 12% of the New York City workforce and has grown by more than 14% between 1990 and 1999, driven in a large part by increases in the non-hospital workforce.

4. As a result of downsizing, cost containment efforts and fiscal uncertainty, overall hospital employment in New York City declined by 9% between 1994 and 1999. Most of this decline was experienced by public hospitals.

Hospitals are the primary employers of the City's health workers, accounting for more than half of all health care employment. Since 1994, public hospital employment has declined by more than 30%. Private sector[1] hospital employment dropped by 2% from 1994 to 1997 but increased slightly (1.6%) between 1997 and 1999. Preliminary data from the New York State Department of Labor indicate that private sector hospital employment declined by 1% between 1999 and 2000. However, the United Hospital Fund has reported that there was a 1% growth in total hospital FTEs in 2000 in voluntary hospitals, a 1% decline in total FTEs in 2000 in public hospitals, and a slight overall growth across both voluntary and public hospitals.[2]

5. Hospitals have slowed expansion of ambulatory services.

While Certificate of Need approvals in 1999 reflected a continued expansion of ambulatory services, the number of approvals was below the number reported in 1998.[3] In addition, in April

[1] Private sector hospitals include both not-for-profit (voluntary) and for-profit (proprietary) institutions not operated by the government. The vast majority of private sector hospitals in New York City are voluntary hospitals. The terminology 'private sector' is used by the Department of Labor and their data does not distinguish between voluntary and for-profit hospitals.

[2] "Hospital Watch", April 2001, Vol. 12, No. 2.

[3] Many but not all ambulatory care services require approval by the State. Freestanding health centers, hospital satellite clinics and surgical centers require approval. Private offices of physicians and other practitioners do not require any State approvals.

of 2001, the New York State Department of Health, citing concern about the proliferation of freestanding diagnostic and treatment centers throughout the state, imposed a moratorium on processing new applications. This action will further slow the expansion of ambulatory services.

6. Health services employment in New York City has grown significantly in two sectors: (1) practitioner offices and clinics and (2) nursing and personal care facilities[4].

Health services employment in offices and clinics increased 56% between 1990 and 1999, according to the Department of Labor. Of the health care employment classified advertisements in the New York Times from September 1999 through August 2000, over 30% of health care ads were for jobs in offices and clinics. Health services employment in nursing and personal care facilities grew steadily between 1990 and 1999, rising 48%.

7. Despite Bureau of Labor Statistics projections that home health care employment would grow rapidly, home health care employment in New York City declined 13% between 1997 and 1999.

While home health employment increased by 93% between 1990 and 1997, it experienced a reversal beginning in 1997 and continuing through 1999. This shift from rapid growth to decline may reflect changes in government reimbursement policies that have reduced demand for services. More recently, home health agencies report increasing difficulty filling vacancies for RNs and home health aides.

8. A special study of the impact of information systems technology on hospital workers in the City found that expanded use of medical information technology by hospitals has not reduced staffing levels but has required that clinical and non-clinical workers acquire the skills necessary to integrate medical information technology into their day-to-day work.[5]

New York City hospitals are currently seeking resources to support expanded use of medical information systems technology in an effort to increase efficiency and improve the quality of health care provided. Increasing use of information systems technology will require that hospital workers be trained in basic computer literacy as well as in the specific automated systems used by the hospital.

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[4] Nursing and personal care facilities include skilled nursing facilities, intermediate care facilities, and establishments primarily engaged in providing some nursing and/or health related care to patients.

[5] Moore J., Salsberg E., Martiniano R., Dill M., and Marzan G. **I.T. in the Workplace: The Impact of Information Systems Technology on the Education and Training Needs of Hospital Workers in New York City**. Rensselaer, NY: Center for Health Workforce Studies, School of Public Health, SUNY Albany. June 2001.

OVERVIEW

Background

The health care sector has continued to experience growth in employment the City. More than 376,000 full-time and part-time workers were employed in the health care sector in 1999, representing almost 12% of the City's workforce. It is also one of the industries in the City in which employment has risen over the past decade. Between 1990 and 1999, health care employment rose by more than 14%, driven in large part by increases in the non-hospital workforce.

This is third annual report on the New York City health care workforce. The Tracking System is designed to collect, compile, and analyze data on the City's health workforce by examining the health system and the health workforce from a variety of perspectives and identifying current trends. The report examines the health system and the health workforce by setting, by sector and by health occupation using standard data sources, interviews with health care leaders and special studies on a variety of related topics.

Goals

The goals of this report are to:

- Determine which health care settings are most likely to experience increases or decreases in their employment;
- Identify the professions and occupations that are likely to experience significant increases or decreases in the City;
- Assist the 1199 Hospital League Health Care Industry Planning and Placement Fund, policymakers, and other stakeholders to target health professions education and job training funds to meet priority needs;
- Help guide health workforce policies, including decisions about the capacity of health professions education programs;
- Inform current and prospective students about health care employment prospects and opportunities; and
- Recommend improvements in workforce data collection to better inform public policy debates and decisions.

Data Sources and Terminology

The data sources used in this report include the following:

1. Government Reports and Data

    - United States Bureau of Labor Statistics/New York State Department of Labor
        - Covered Employment and Wages Program (ES-202)
        - Occupational Employment Statistics
        - State and Area Current Employment Statistics

- Employment Projections

- HRSA State Health Workforce Profiles for New York State

- New York State Department of Health
  - Institutional Cost Reports
  - Certificate of Need Applications
  - SED State Licensure Data

2. Interviews with Health Facility Leaders

The Center conducted extensive structured interviews on health workforce recruitment and retention, workforce shortages, nursing recruitment and retention strategies, and training needs with executive staff of hospitals, nursing homes and home care agencies, including Chief Operating Officers, Human Resources Directors, Nursing Directors, and Finance Officers.

3. Center for Health Workforce Studies

- Trends in Nursing Education in New York State, August, 2001;
- Information Technology in the Workplace: The Impact of Information Systems Technology on the Education and Training Needs of Hospital Workers in New York City, June, 2001; and
- An Assessment of the Workforce Needs of Health Centers in New York.

4. Greater New York Hospital Association

- Survey of Nurse Staffing Shortages in Hospitals in the New York City Region, 2001; and
- Continuing Care Staffing in the New York City Region, 2001.

5. Other Sources of Data

- New York Times Job Advertisements
- Local 1199/Hospital League Job Vacancy Data

The following briefly describes the terminology used in this report:

1. Public and Private Sectors

Data presentation and analyses sometimes refer to the public and private sectors. The public sector consists of those institutions operated by the government, such as the Health and Hospitals Corporation. The private sector includes both not-for-profit (or "voluntary") and for-profit (proprietary) institutions not operated by the government.

2. Setting and Occupation

In general, the settings used are the Standard Industrial Classification (SIC) health care industries:

- Hospitals;
- Nursing and personal care facilities;
- Home health services;
- Medical and dental laboratories;
- Offices and clinics; and
- Other health and allied services not elsewhere classified.

These classification schemes provided some standardization among the data sets presented, but they have some limitations worth noting. For instance, by limiting the analyses to the SIC health services industries, health care workers in hospital ambulatory care sites may be included in hospital employment counts. In addition, health care professionals in industries outside of the above settings such as those in schools, insurance firms, etc. are excluded. An estimated 12% of health care workers nationally are employed outside the standard health care settings.

Occupations are usually grouped by Bureau of Labor Statistics (BLS) Occupational Employment Statistics categories. These occupational categories also have limitations. For example, Registered Nursing (RN) makes no distinction between RN managers and critical care RNs, and the standard "nursing aides, orderlies and attendants" occupational category includes multiple job titles, levels of training and certification status. There also are some job titles that overlap with occupational classifications, and this may cause some problems in reporting. For example, confusion may result from the difference between defining a home health aide as any individual providing services in the home and one who has completed the certification requirements.

3. Geographic Areas

Several different geographical areas are used throughout this report, depending largely on the detail available in the data:

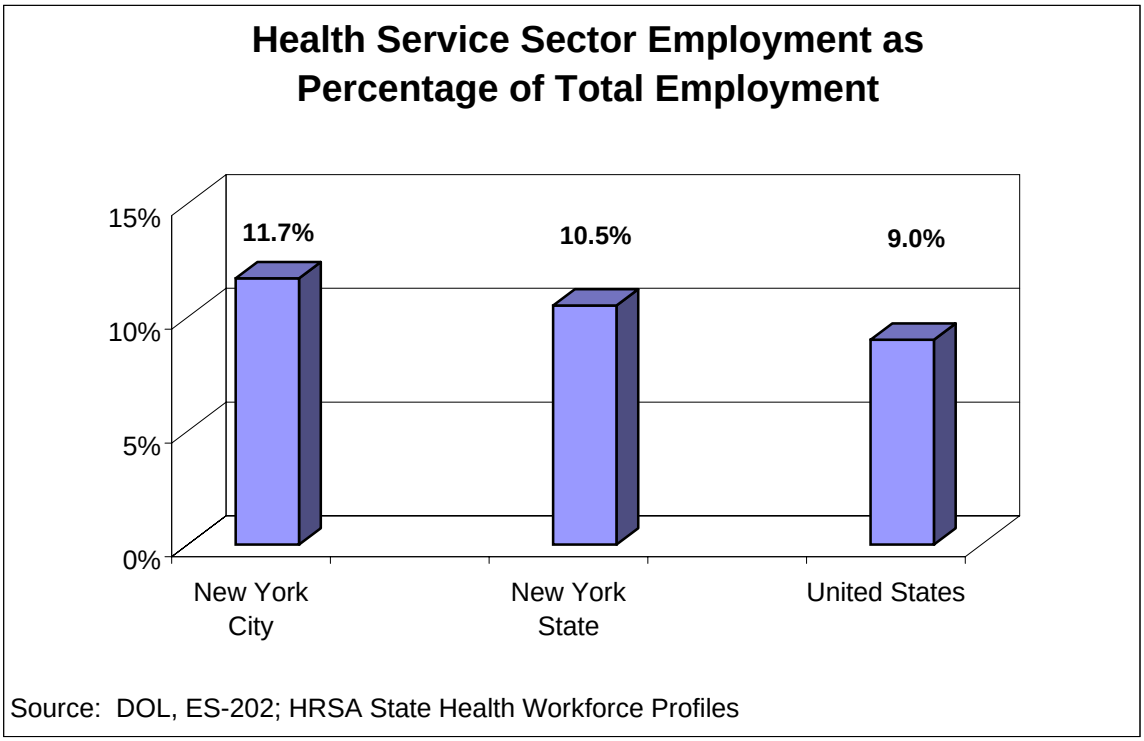
New York City:	The five counties/boroughs: Bronx, Kings, Manhattan, Queens, and Staten Island.
Greater New York City:	New York City, Long Island and Westchester County.
New York City PMSA	Primary Metropolitan Statistical Area: New York City, Putnam, Westchester and Rockland counties.

GENERAL TRENDS IN THE HEALTH SECTOR WORKFORCE

Overall Health Sector Employment

Between 1988 and 1998, 13% of the new jobs created in the United States were in health care. This trend is expected to continue through 2008. An estimated 2.8 million jobs will be added to the health sector between 1998 and 2008[6] Health sector employment accounted for 11.7% of total employment in New York City and 10.5% of total employment in New York State in 1999 (Chart 1). However, this excludes health professionals working outside of the health sector. Nationally, health sector employment represents 9% of the total United States labor force; but the total United States health workforce (health sector employment plus health professionals employed in other settings) comprises 10.5% of the total United States labor force.

Chart 1



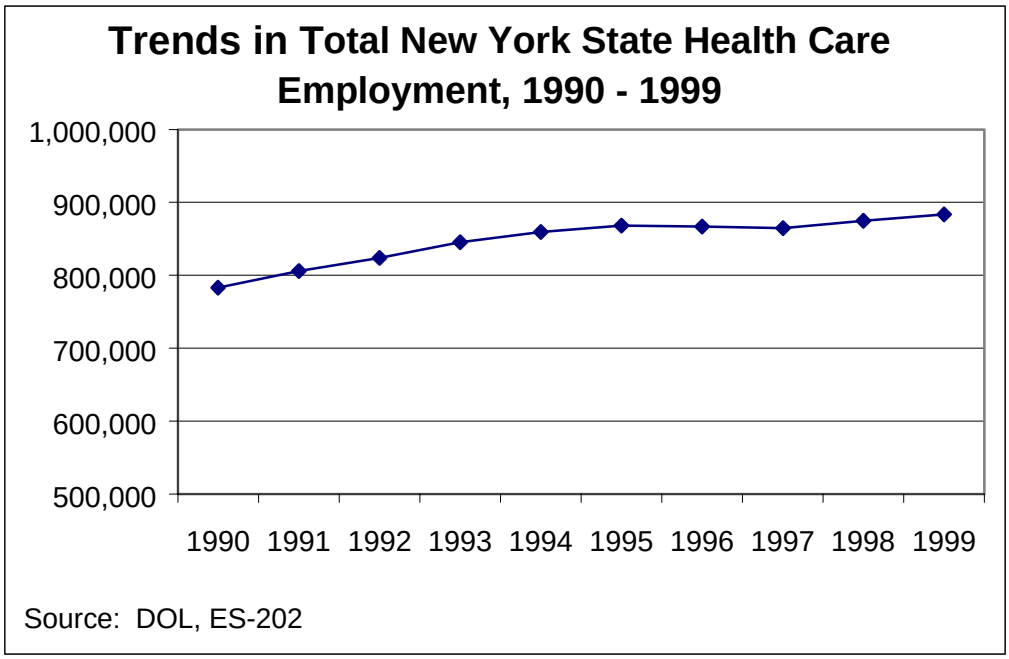
Source: DOL, ES-202; HRSA State Health Workforce Profiles

New York State

Employment in the health sector in New York State has increased since 1990, with the addition of over 100,000 jobs, or 13% growth (Chart 2).

[6] Occupational Projections and Training Data, May 2000

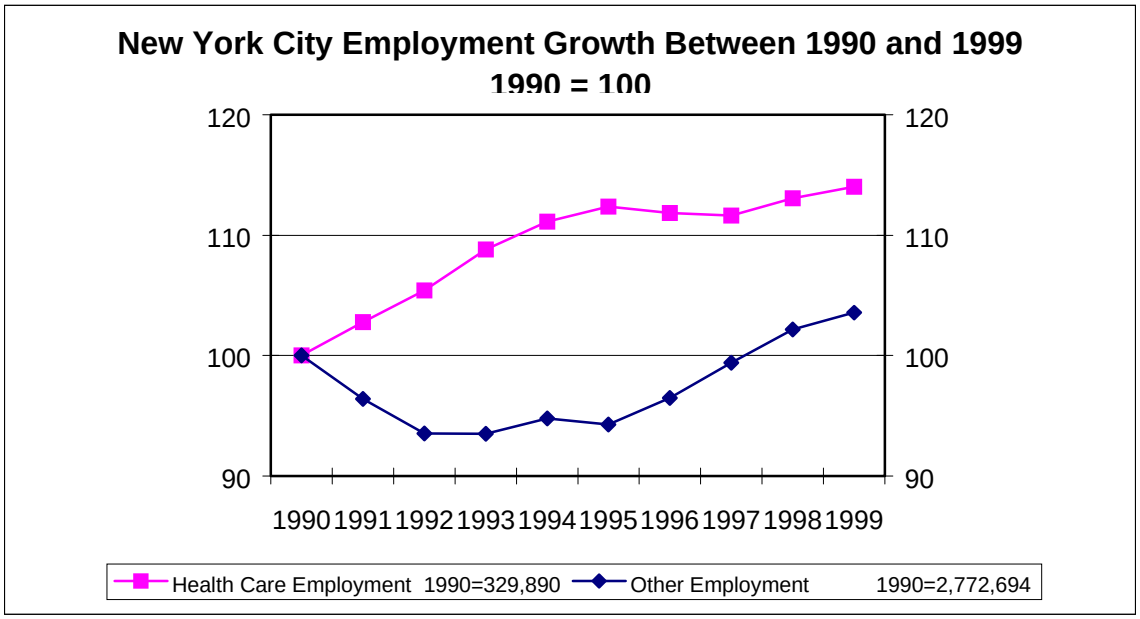
Chart 2



New York City

Employment in New York City's health sector grew 14% between 1990 and 1999, with this growth slowing considerable between 1995 and 1999. Employment in all other sectors only grew 2% overall between 1990 and 1999, with a significant decline between 1990 and 1993 but 11% growth between 1995 and 1999 (Chart 3).

Chart 3

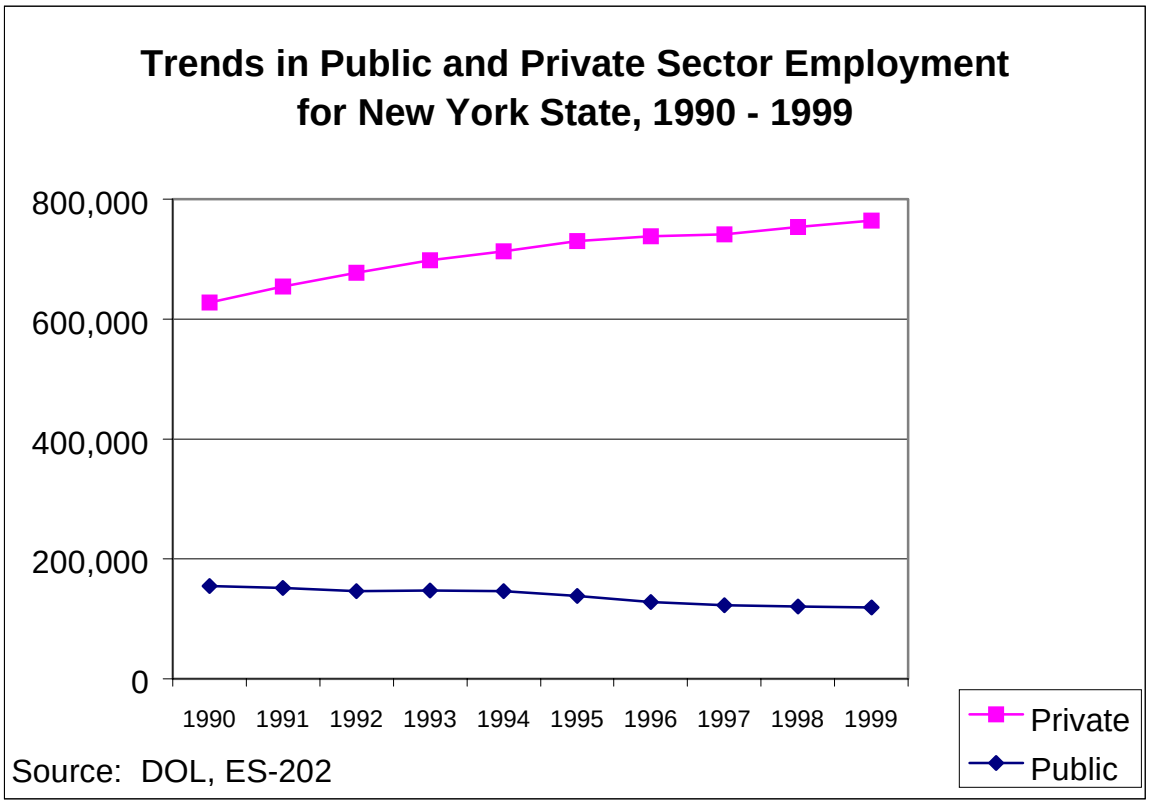


HEALTH WORKFORCE EMPLOYMENT
IN THE PUBLIC AND PRIVATE SECTORS

New York State

Growth in private and public health sector employment is similar in New York State and New York City, with major growth in private sector employment and major decline in public sector employment. For the entire state, private sector health services employment increased by almost 140,000 jobs, or 22%, while public sector health services employment decreased 23% between 1990 and 1999 (Chart 4).

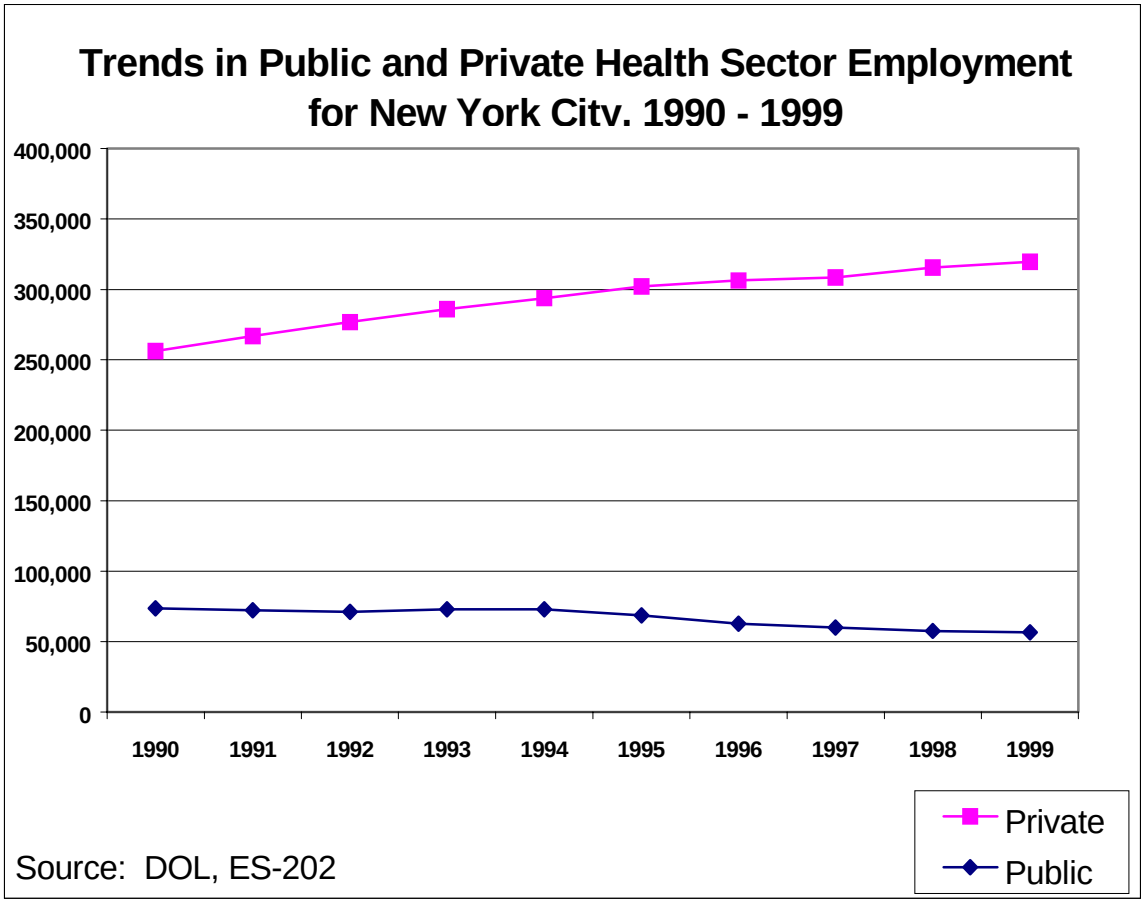
Chart 4



New York City

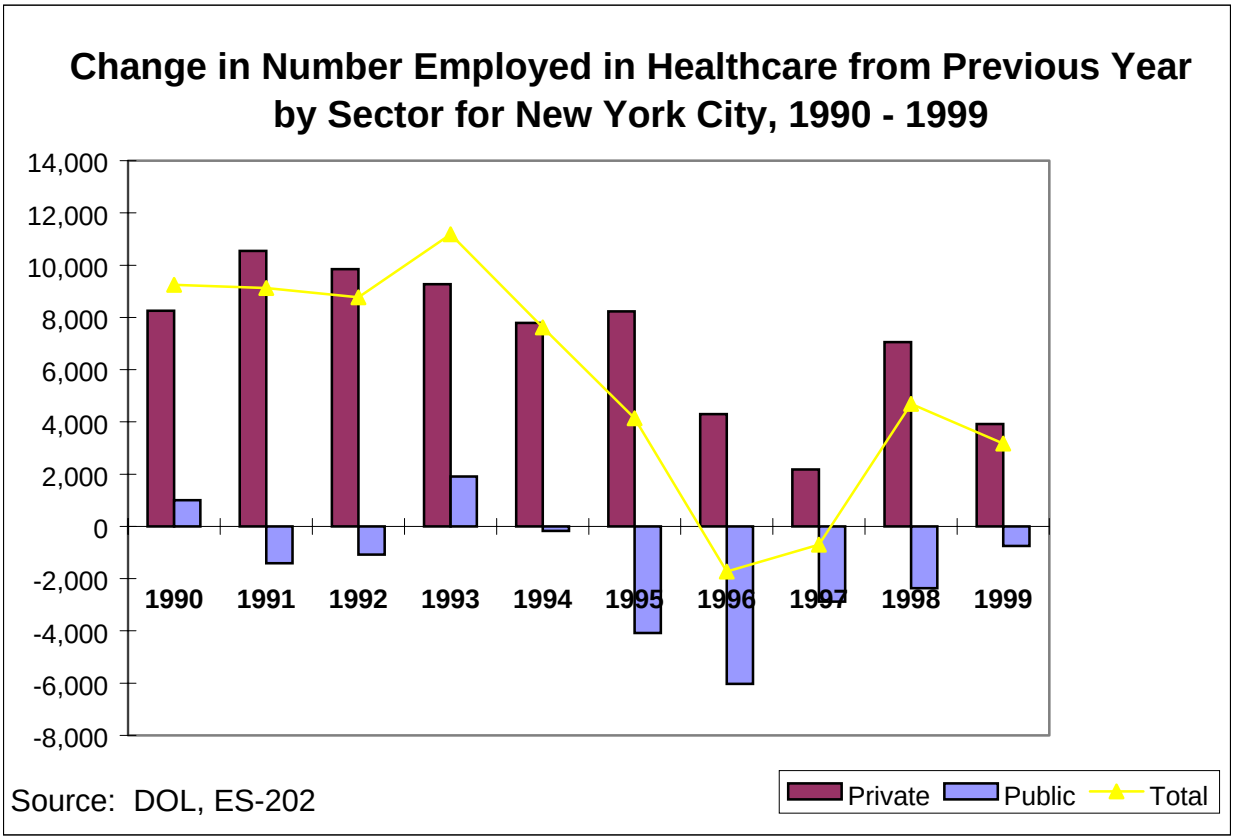
Similarly, between 1990 and 1999, private sector health services employment increased 29%, while public sector health services employment decreased 21% in the City (Chart 5).

Chart 5



Overall health sector employment, fueled by increases in private sector employment, steadily increased between 1990 and 1995. In 1996 and 1997, significant reductions in public sector employment overshadowed limited growth in private sector employment, and overall health sector employment declined. Beginning again in 1998, growth in private sector employment outpaced declines in public sector employment, and overall health sector employment increased (Chart 6).

Chart 6


Change in Number Employed in Healthcare from Previous Year by Sector for New York City, 1990 - 1999
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
-8,000
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Private
Public
Total
Source: DOL, ES-202

THE HEALTH WORKFORCE BY SETTING

New York State

Despite a 5.5% decrease between 1990 and 1999 in overall hospital employment in New York State, hospitals remained the largest health services employer in 1999 with more than 406,000 employees. Additionally, health services employment in New York State grew between 1990 and 1999 for all other major health care settings (Table 1).

Table 1

Change in Health Sector Employment Between 1990 and 1999 for New York State

Health Setting	1990	1999	Percent Change
Hospitals	430,078	406,389	-5.5%
Offices and Clinics	138,240	198,306	43.5%
Nursing and Personal Care Facilities	130,116	169,733	30.4%
Home Health Care	49,735	66,597	33.9%
Medical and Dental Laboratories	12,101	12,881	6.4%
Health Care Employment Not Elsewhere Classified	22,533	29,317	30.1%
Totals	782,803	883,223	12.8%

Source: DOL, ES-202

Hospitals in New York City were also the largest employer of health workers and made up 53% of overall health care services employment in New York City in 1999 in contrast to 47% statewide (Chart 7).

Chart 7
Health Services Employment by Setting for New York State and New York City, 1999

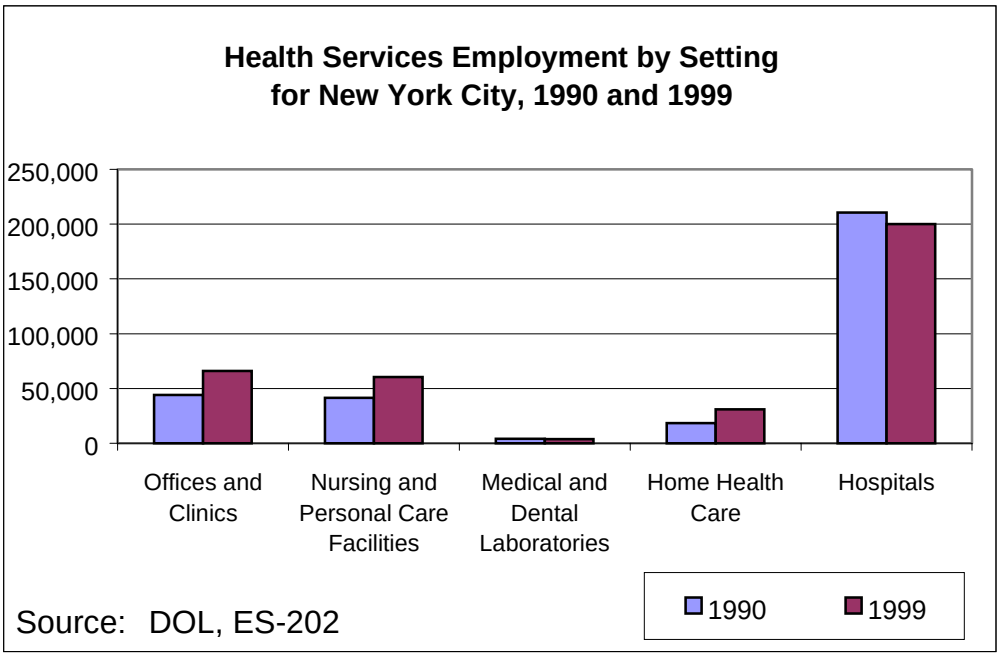
New York State

New York City

New York City

While hospitals were the primary employer of New York City health workers as depicted in Chart 7, accounting for more than half of all health care employment, as a result of downsizing and cost containment efforts, hospital employment in New York City declined by 5.1% between 1990 and 1999 (Chart 8).

Chart 8



Health sector employment significantly increased in most other employment settings between 1990 and 1999 in New York City, including:

- Offices and clinics -- 50%;
- Home health care -- 68%; and
- Nursing and personal care facilities -- 46%.

Employment in NYC medical and dental laboratories declined 6.6% between 1990 and 1999.

New York City Certificate of Need Approvals

The Health Workforce Tracking System monitored Certificate of Need (CON) approvals for New York City for the second year. Any major change in service by licensed health care providers, e.g., hospitals, nursing homes or health centers, must be approved by the State Health Department. It should be noted that CON projects approved in 1999 are not necessarily completed in 1999. In fact, there are frequent delays, as facilities may need to arrange financing

and make final plans for these projects. Table 2 provides a summary of 1999 CON approvals for New York City.

Table 2

Department of Health Certificate of Need Approvals, New York City, 1999

Ambulatory Services	30 primary care extension clinic certifications 19 extension clinic certifications 11 part-time clinic certifications 11 new diagnostic and treatment centers 7 specialty extension clinic certifications 4 diagnostic and treatment center MRI services constructions 6 other
Nursing & Personal Care Facilities	4 ventilator dependent services certifications, 2 adult day health care program certifications 1 addition including a young adult unit 2 RHCF bed additions
Home Health Services	5 Long Term Home Health Care Program expansions, 3 AIDS home care program certifications 2 personal care services certifications 1 Long Term Home Health Care Program certification
Dialysis Services	7 dialysis extension clinic expansions, 3 dialysis facility constructions, 3 dialysis clinic addition certifications 2 dialysis extension clinic certifications
Hospital-based Services	6 Bed Conversions 6 Bed Certifications 4 Bed De-certifications 4 cardiac catherization laboratory certifications, 1 linear accelerator certification, 5 service certifications 3 CT scanner certifications, 2 PACS radiology system purchases 1 pediatric emergency room expansion, 1 labor and delivery unit expansion 2 computer system purchases, 1 telephone and network data infrastructure purchase

Source: New York State, DOH

The most significant findings are:

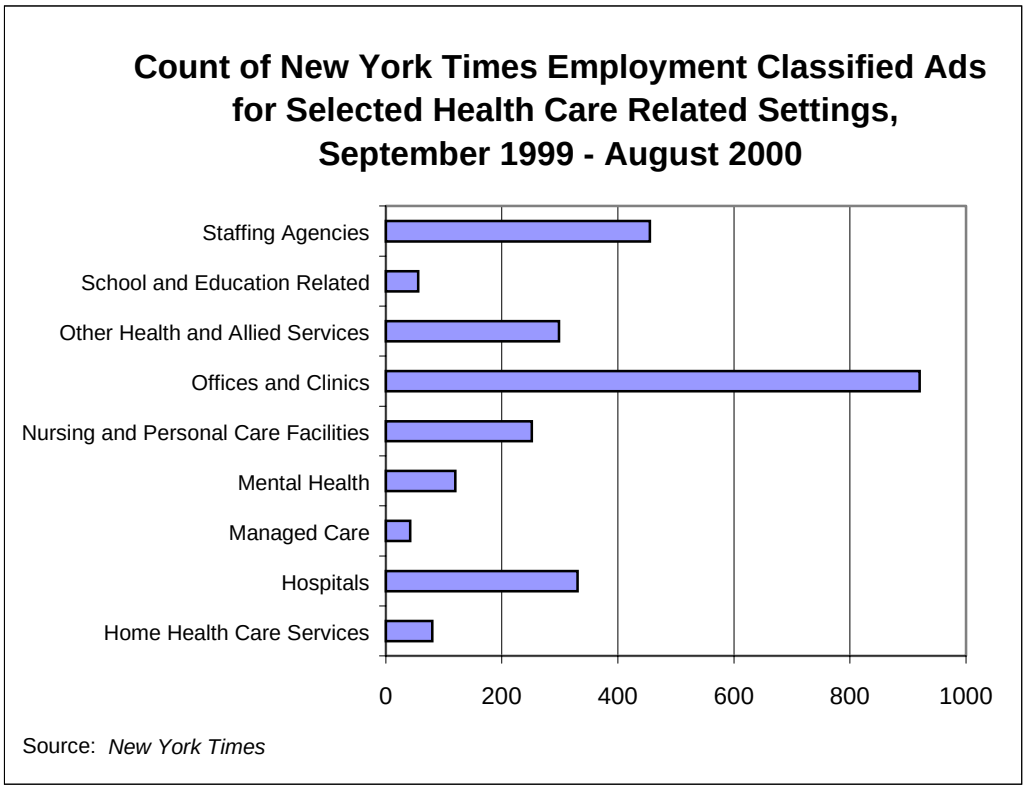
- Ambulatory services continued to represent the bulk of CON approvals, with 11 new diagnostic and treatment centers, 11 part-time clinic certifications, 19 extension clinic certifications, and 30 primary care extension clinic certifications. While this reflects a continued expansion of ambulatory services, the rate of growth in approvals was less than in 1998.
- There were a broad range of hospital-based service CON approvals in 1999, including 2 new computer system purchases and many pediatric and neonatal services expansions. Compared to 1998, there was a smaller reduction of inpatient services.
- Long Term Home Health Care capacity expansions approved for home health services added more than 500 additional slots. In addition, there were two new AIDS home care programs and two new personal care services certifications. While this represents continued growth, the rate of growth was less than it was in 1998.
- The expansion in dialysis services is comparable to the level of growth reflected in 1998 CON approvals.

New York Times Health Care Classified Advertisements by Setting

As part of the Health Workforce Tracking System, all classified advertisements for health care and related positions listed on-line in the *New York Times* from September 1999 to August 2000 were reviewed on the first Sunday of each month and classified by setting and occupation. Since the New York Times tends to advertise a very select set of positions, it is important to recognize that it doesn't represent all available jobs in health care In New York City. The following summarizes the findings depicted in Chart 9:

- Slightly less than one-third (32%) of the advertisements were for positions in offices and clinics, consistent with overall growth in this setting, comparable to the percent reported (31%) in the 2000 Tracking Report. Approximately 16% of the advertisements were for positions in staffing agencies, which play a significant role in supplying hospitals with workers, increasing from 11% reported in the 2000 Tracking Report.
- Nine percent of the advertisements were for positions in nursing and personal care facilities, up from 6% last year; and
- Twelve percent were for positions in hospitals, down from 15% last year.

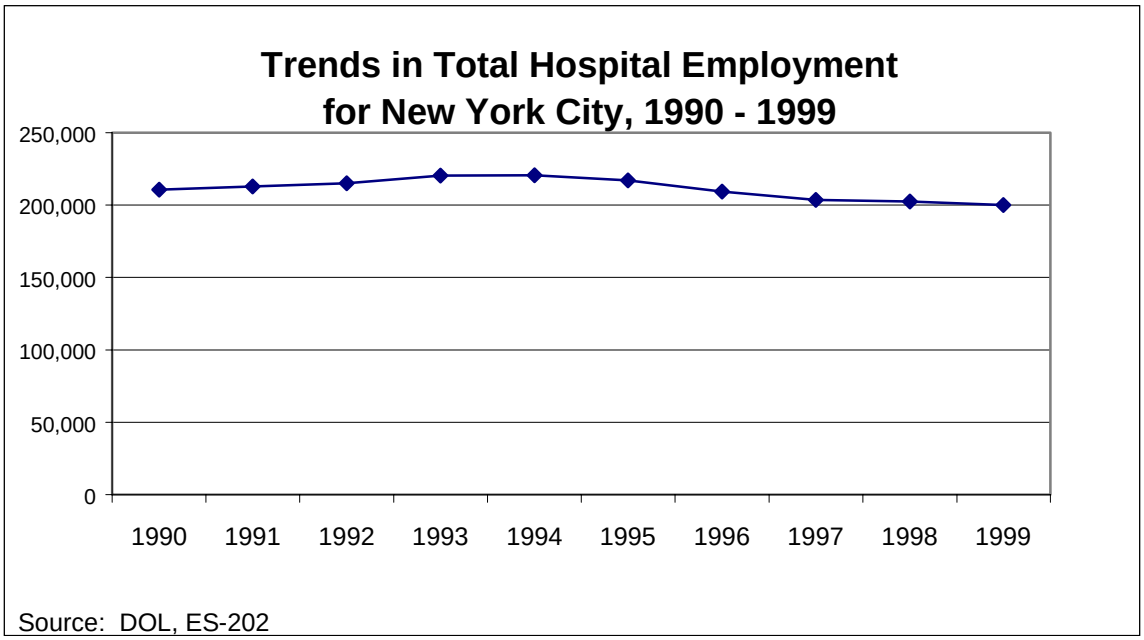
Chart 9



New York City Hospital Employment Trends

Overall hospital employment in New York City decreased by 5% between 1990 and 1999. Hospital employment increased between 1990 and 1993 but declined 9% between 1994 and 1999 (Chart 10).

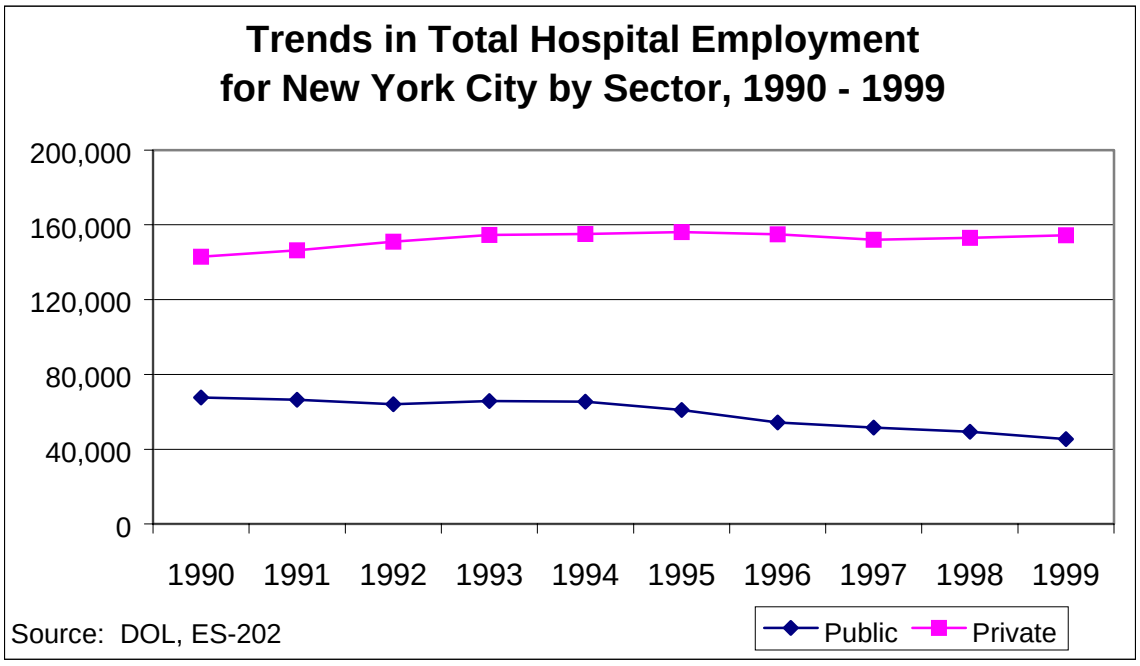
Chart 10



Hospital employment is much higher in the private sector, approximately three times that of the public sector in 1999. Private sector hospital employment experienced overall growth of 8% between 1990 and 1999. Specifically, private sector hospital employment increased between 1990 and 1995 then decreased between 1995 and 1997. After slight increases in 1998 and 1999, the Department of Labor has indicated that, using its preliminary data, private sector hospital employment declined by approximately 1% between 1999 and 2000. Public sector hospital employment declined in New York City by almost 33% between 1990 and 1999 (Chart 11). However, the United Hospital Fund has reported that there was a 1% growth in total hospital FTEs in 2000 in voluntary hospitals, a 1% decline in total FTEs in 2000 in public hospitals, and a slight overall growth across both voluntary and public hospitals.[7]

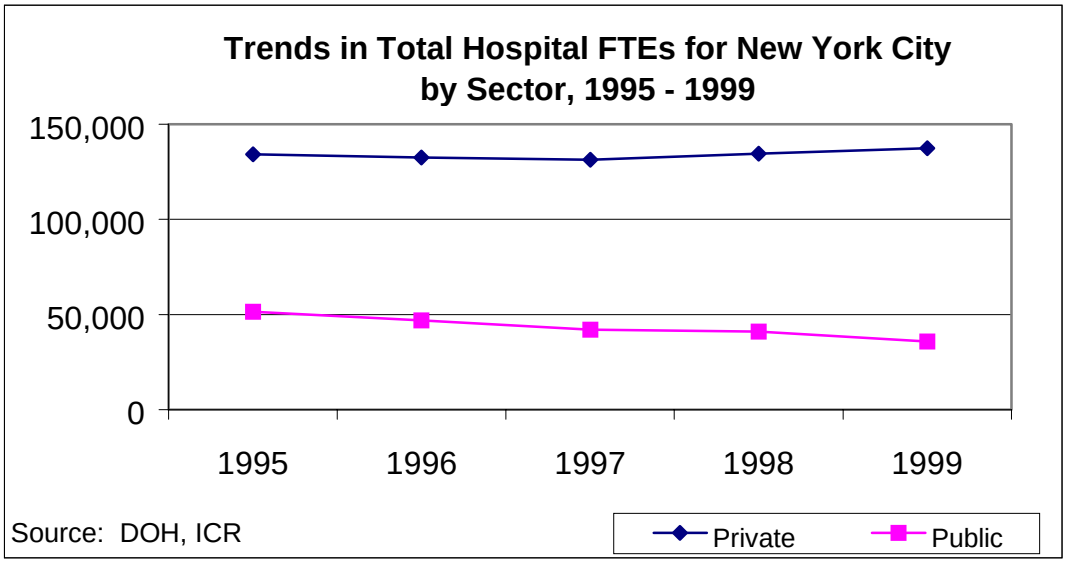
[7] "Hospital Watch", April 2001, Vol. 12, No. 2.

Chart 11



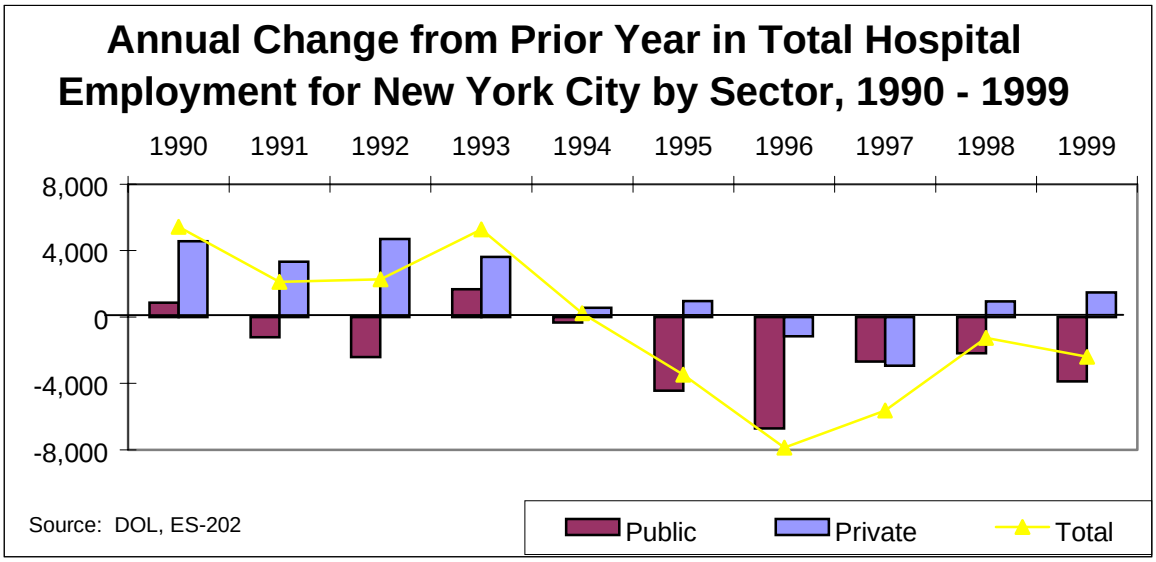
Data on hospital full time equivalents (FTEs) provide another perspective on hospital employment, with 2% growth in FTEs for private sector hospitals between 1995 and 1999 (in contrast to the 1% decrease for total private sector hospital employment during that same period). One possible explanation is that private sector hospitals may be relying more on full time employees while eliminating part time employees. Public sector employment data are more consistent, with a 30% decrease in FTEs between 1995 and 1999 (Chart 12).

Chart 12



Annual changes in total hospital employment were driven by substantial increases in private sector hospital employment between 1990 and 1993, when increases in private sector hospital employment overshadowed minor decreases in public sector hospital employment. Substantial public hospital employment decreases between 1995 and 1999 contributed to overall decreases in total hospital employment (Chart 13).

Chart 13

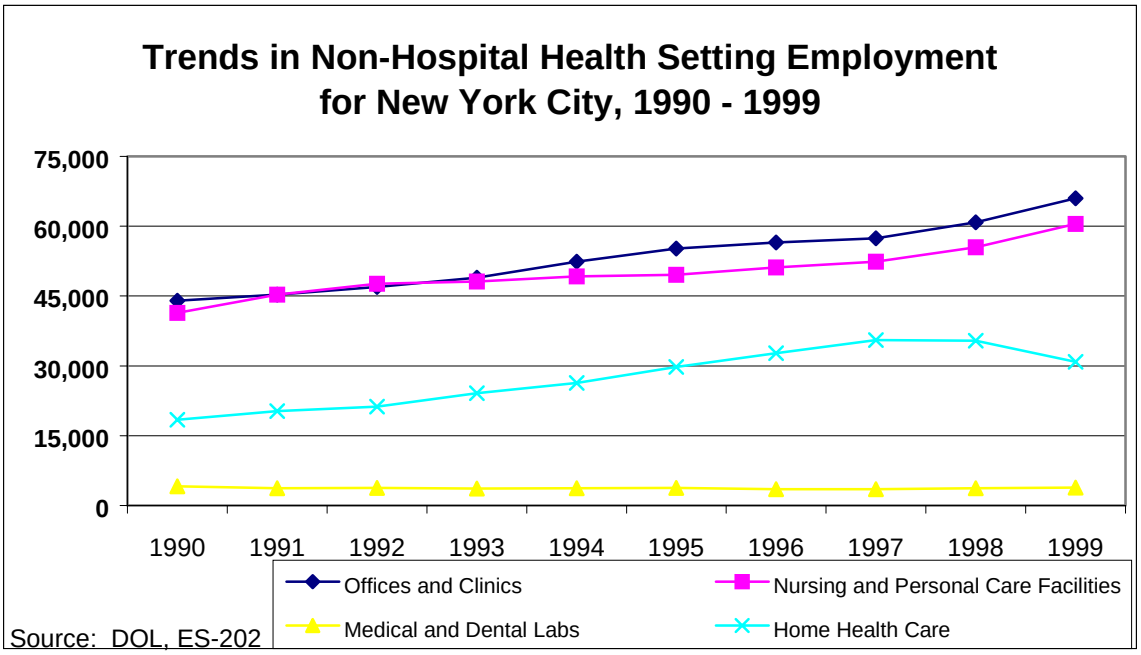


Non-Hospital Health Setting Employment Trends in New York City

For most non-hospital health setting employment, the 1990's showed steady increases throughout the decade as follows:

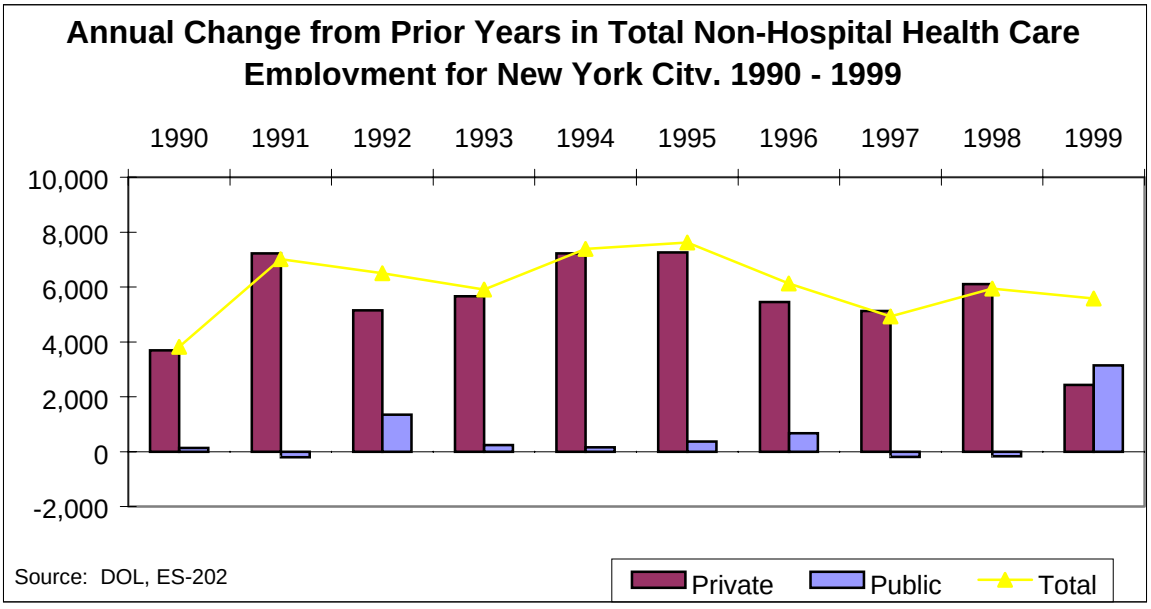
- "Offices and Clinics" and "Nursing and Personal Care Facilities" increased 56% and 48%, respectively, throughout the decade.
- Home health care employment increased by 68% between 1990 and 1999, but employment in this setting declined 13% between 1997 and 1999.
- Employment in medical and dental laboratories decreased 9.4% between 1990 and 1999, with fluctuations throughout the decade. Employment in medical and dental laboratories declined between 1990 and 1993, rose slightly in 1994 and 1995, declined again in 1996 and 1997, and began rising again in 1998 and 1999 but still remains under its high employment mark of over 4,000 individuals in 1990 (Chart 14).

Chart 14



Annual change in non-hospital setting employment in New York City was driven by substantial increases in private sector employment throughout the 1990s. Public sector employment showed changes throughout the 1990s, except for 1999, when increases in public sector employment out-paced increases in private sector employment for non-hospital settings (Chart 15).

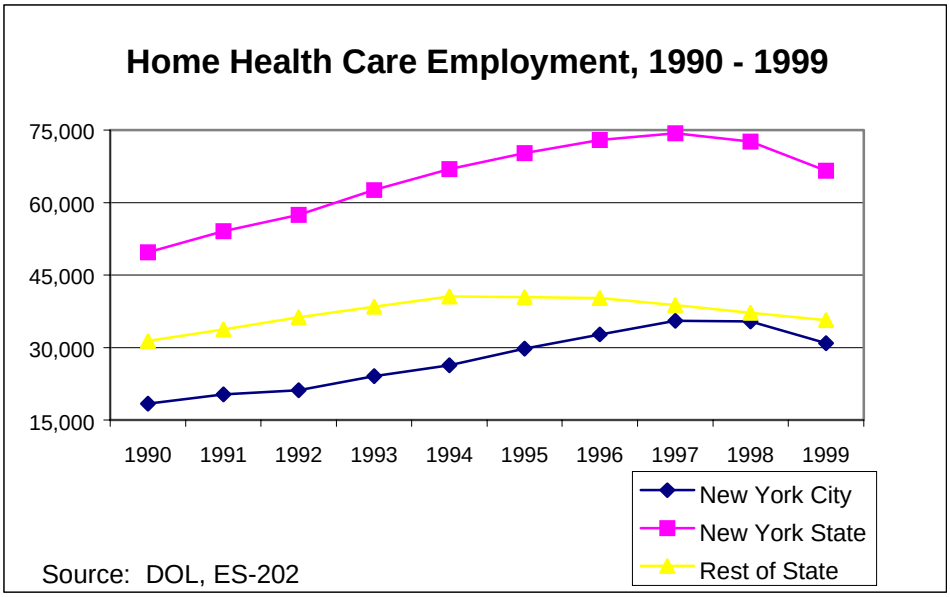
Chart 15



Home Health Care Employment Trends

Employment in home health care settings increased overall both in the City and upstate between 1990 and 1999, with growth during the first part of the decade and declines during the later part of the decade. New York City home health care employment increased by 93% between 1990 and 1997 and declined 13% between 1997 and 1999. The rest of New York State showed an increase of 29% between 1990 and 1994, virtually no growth in 1995 and 1996, and a decline of 11% between 1996 and 1999 (Chart 16). This shift from rapid growth to decline is inconsistent with Bureau of Labor Statistics projections indicating that home health will be one of the fastest growing industries between 1998 and 2008. The decline may, in part, reflect changes in government reimbursement policies that have reduced demand for services. More recently, home health agencies report increasing difficulty filling vacancies for RNs and home health aides.

Chart 16



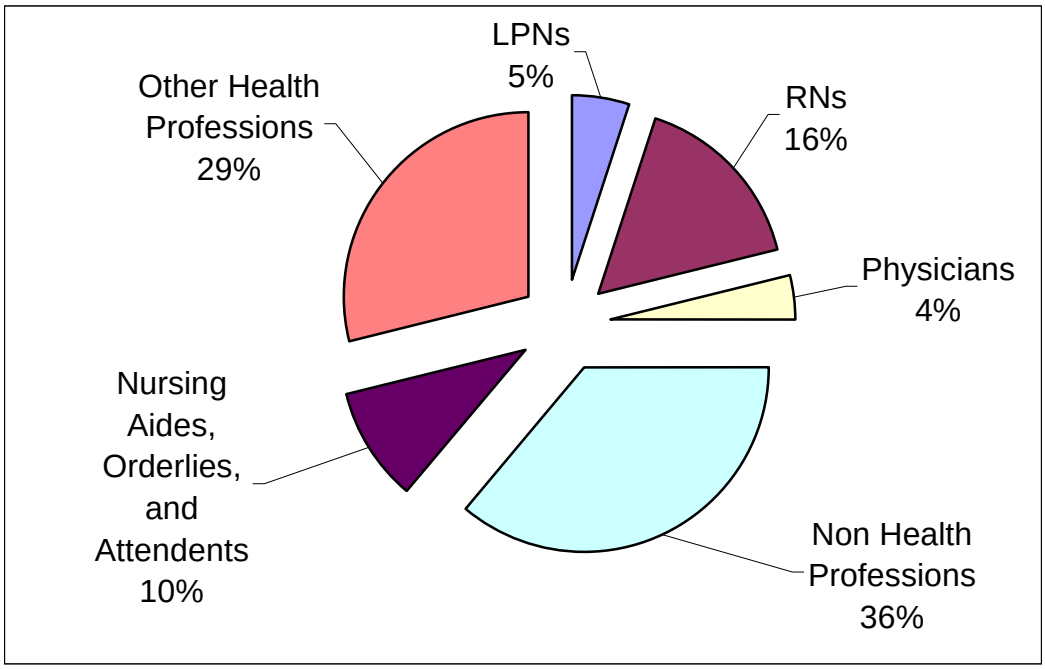
The Health Workforce by Occupation

Supply

1. Introduction

In order to understand workforce imbalances, it is important to know the composition of the health workforce. As illustrated in Chart 17, the majority of these workers are in health occupations. Registered nurses, nurse aides and LPNs constitute nearly one-third of health service sector employees.

Chart 17
Health Services Employment in the US, 1998[8]



2. Number of Workers in Selected Health Occupations

The growth of workers in health care occupations between 1997 and 1998 in New York State and in the New York City PSMA varied by occupation (Table 3).

[8] Includes all workers in health sector employment. It does not include health professionals working outside of the health sector.

Table 3

Number of Workers in Selected Health Occupations For New York State and New York City PSMA, 1997 and 1998

	New York State			New York City PSMA		
	1997	1998	% Change	1997	1998	% Change
HEALTHCARE TECHNICIANS/TECHNOLOGISTS						
Licensed Practical Nurses	47,080	48,760	3.6%	19,490	20,710	6.3%
Radiologic Technologists	12,220	12,510	2.4%	5,320	5,690	7.0%
Medical and Clinical Laboratory Technologists	10,760	10,710	-0.5%	5,660	5,510	-2.7%
Medical and Clinical Laboratory Technicians	10,740	10,050	-6.4%	4,930	4,600	-6.7%
Pharmacy Technicians and Aides	6,780	8,420	24.2%	2,720	3,290	21.0%
Medical Records Technicians	4,590	4,400	-4.1%	2,200	2,100	-4.6%
Surgical Technologists and Technicians	3,330	3,150	-5.4%	1,770	1,660	-6.2%
Psychiatric Technicians	3,180	2,940	-7.6%	1,780	1,740	-2.3%
Dietetic Technicians	2,320	1,790	-22.8%	760	630	-17.1%
Cardiology Technologists	1,080	1,140	5.6%	550	610	10.9%
Electrocardiograph Technicians	1,080	940	-13.0%	620	480	-22.6%
Nuclear Medicine Technologists	770	970	26.0%	330	540	63.6%
Electroneurodiagnostic Technologists	340	360	5.9%	150	170	13.3%
HEALTHCARE PROFESSIONALS						
Registered Nurses	151,150	150,760	-0.3%	69,250	72,310	4.4%
Social Workers, Medical and Psychiatric	17,150	16,830	-1.9%	8,860	8,500	-4.0%
Pharmacists	11,480	12,640	10.1%	5,000	5,860	17.2%
Dental Hygienists	9,420	9,920	5.3%	3,360	3,250	-3.3%
Physical Therapists	7,860	7,570	-3.7%	3,370	3,360	-0.3%
Speech-Language Pathologists and Audiologists	6,430	7,610	18.4%	N/a	2,760	N/a
Physician Assistants	5,350	4,510	-15.7%	2,360	1,830	-22.5%
Physical and Corrective Therapy Assts and Aides	5,160	4,840	-6.2%	1,760	1,960	11.4%
Occupational Therapists	4,490	4,600	2.5%	N/a	N/a	N/a
Dietitians and Nutritionists	4,440	4,120	-7.2%	1,950	1,810	-7.2%
Respiratory Therapists	4,340	5,140	18.4%	2,120	2,960	39.6%
Opticians, Dispensing and Measuring	2,850	2,650	-7.0%	1,280	1,120	-12.5%
Recreational Therapists	2,460	2,470	0.4%	1,170	1,190	1.7%
Occupational Therapy Assistants and Aides	1,380	1,370	-0.7%	540	540	0.0%
Radiation Therapists	520	720	38.5%	290	490	69.0%
MANAGEMENT/ADMINISTRATIVE SUPPORT						
Medicine and Health Services Managers	17,140	17,110	-0.2%	9,660	9,930	2.8%
Medical Secretaries	16,240	17,600	8.4%	6,030	7,530	24.9%
HEALTH CARE PARAPROFESSIONALS						
Nursing Aides, Orderlies, and Attendants	106,180	101,050	-4.8%	55,680	52,010	-6.6%
Home Health Aides	60,970	60,070	-1.5%	38,480	39,240	2.0%
Psychiatric Aides	20,050	19,750	-1.5%	6,650	6,040	-9.2%
Dental Assistants	15,390	14,710	-4.4%	6,880	6,650	-3.3%
Medical Assistants	13,460	17,770	32.0%	6,280	9,530	51.8%

Source: BLS, OES

Changes of note between 1997 and 1998 include:

- The number of RNs declined by .3% statewide but increased in the PSMA by 4.4%;
- The number of LPNs increased by over 3% statewide and by more than 6% in the PSMA;
- The number of pharmacy technicians and aides increased by over 24% statewide and by almost 21% in the PSMA;
- The number of pharmacists increased by over 10% statewide and by more than 17% in the PSMA;
- The number nuclear medicine technologists increased by 26% statewide and by more than 63% in the PSMA;
- The number of medical and clinical laboratory technicians and technologists declined both statewide and in the PSMA;
- The number of respiratory therapists increased by over 18% in statewide and by more than 39% in the PSMA; and
- The number of medical assistants increased by 32% statewide and by almost 52% in the PSMA.

3. Licensure Data for Selected Health Professions

State licensure data are a source of information on the supply of health professionals. Data are available from the New York State Education Department (SED) on the number of individuals actively licensed in a health profession. By law, SED licenses more than 25 health professions, and individuals must secure a New York State license before practicing in one of these health professions. *Licensure data in a health profession represents the upper limit on the number of individuals in the state who can practice in the profession.* It is important to recognize the limitations of these data:

- Some individuals who are licensed in a health profession may be working either less than full time or not at all in the profession; and
- Licensure counts by county reflect mailing addresses and not necessarily practice addresses and many workers live in different counties than where they work. Thus, the data are presented for the region rather than just for New York City.

Licensure data can, however, provide information on major trends in the supply of a health profession in a region. Table 4 presents the number of licensees in selected occupations in April 1998 and April 2001 that listed the greater New York City area as their address in the licensure file.

Table 4

Change in Number of Selected Licensed Health Services Professionals For Greater New York City, April 1998 and April 2001			
Occupation	**April 1998**	**April 2001**	**Percent Change April 1998 to April 2001**
Registered Nurse	102,114	102,715	.6%
LPN	29,731	29,833	.3%
Social Worker	22,784	25,010	9.8%
Physical Therapist	4,860	6,698	37.8%
Speech and Language Pathologist	3,845	4,864	26.5%
Occupational Therapist	2,556	3,498	36.9%
Physician Assistant	2,170	3,047	40.4%
Respiratory Therapist	2,150	2,232	3.8%
Physical Therapy Asst	1,401	1,886	34.8%
Occupational Therapy Asst	711	1,105	55.4%

As indicated in the Table 4, the number of licensed occupational therapist assistants grew more than 55% and the number of physician assistants increased by over 40%. Registered nurses and licensed practical nurses increased the least at .6% and .3% respectively.

4. Trends in Nursing Education in New York State

To help understand trends in the supply of RNs in New York, the Center surveyed the registered nursing (RN) education programs in the state in each of the past two years. The latest survey was conducted in the fall and winter of 2000.[9]

Overall, the number of graduates of RN education programs in New York State declined by 25% between 1996 and 2000. Graduations from bachelor degree RN programs declined 11% during that time period, while graduations from associate degree RN programs declined 32%.

Chart 18 presents graduations from New York City RN education programs, beginning in 1991 and projected through 2002. Trends in New York City RN graduations are comparable to statewide trends during that time period. Key findings are summarized below.

- The number of total RN graduates declined 26% in New York City between 1996 and 2000, compared to a 25% decline statewide. The decline is projected to continue in 2001, but total RN graduations both statewide and in New York City are projected to increase slightly in 2002, relative to 2001.
- Bachelor degree RN graduates declined over 10% in New York City between 1996 and 2000.
- Between 1996 and 2000, the production of associate degree nurses in New York City declined by over 39%.

[9] "Trends in Nursing Education in New York State, 1991-2002", Center for Health Workforce Studies, School of Public Health, University at Albany, SUNY, August, 2001.

Chart 18

RN Graduations in New York City, 1991 - 2002

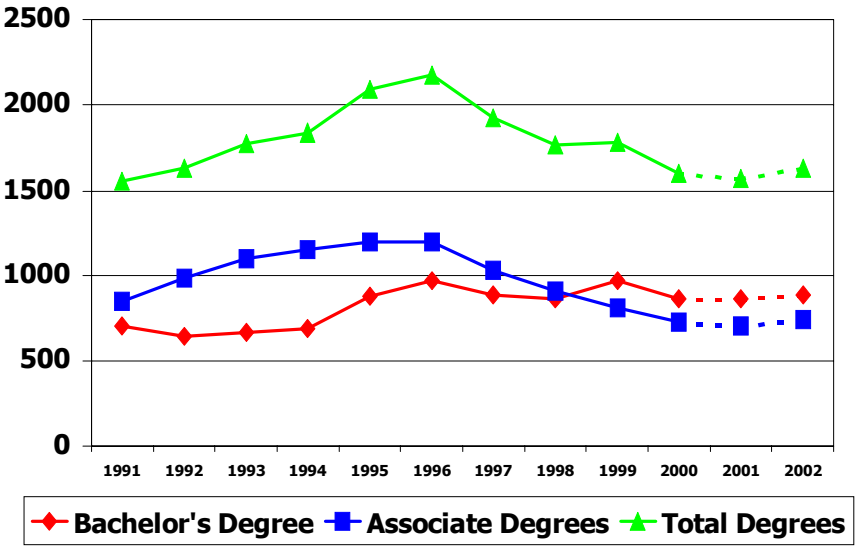
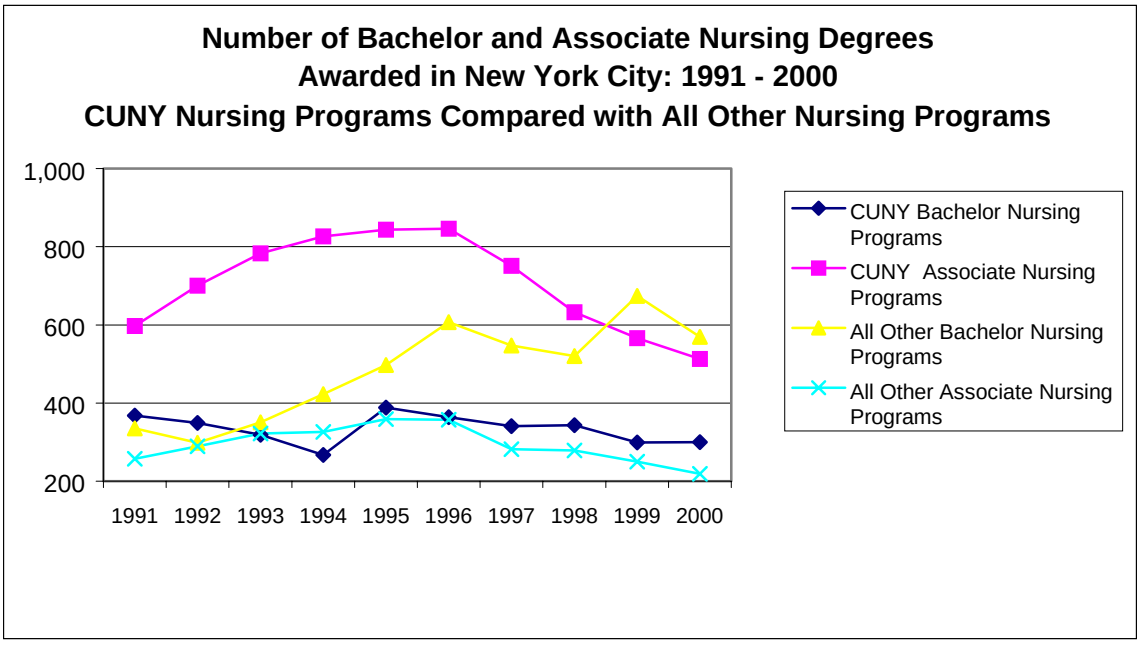


Chart 19 shows trends in bachelor and associate degree RN graduations for New York City between 1991 and 2000, comparing CUNY nursing education programs with all other nursing education programs. Significant findings include:

- The biggest decline in RN graduations in New York City has occurred in CUNY nursing education programs. Since 1996, graduations from CUNY's bachelor and associate degree RN programs have declined almost 33%, while graduations from all other nursing education programs in New York City declined only 18%.
- The number of RN graduations from CUNY's bachelor degree programs declined almost 18% between 1996 and 2000, compared to a 6% decline in RN graduations from all other bachelor degree programs in New York City.
- The number of RN graduations from CUNY's associate degree programs declined by over 39% between 1996 and 2000, comparable to decline in RN graduations from all other associate degree programs in New York City.
- CUNY accounted for over 61% of all New York City nursing graduates in 1991; 56% of all New York City nursing graduates in 1996 and only 51% of all New York City nursing graduates in 2000. By 2002, it is projected that only 48% of all New York City nursing graduates will come from CUNY programs.

Chart 19



In 2000, nursing deans reported modest increases in applications and enrollments that will lead to small increases in the number of future graduates. While the end of the decline in the number of graduates is welcome, the small increase expected in 2002 indicates that the health care industry cannot expect immediate relief from shortages. Even with the modest increase in graduates in 2000, there will still be fewer new RN graduates than in 1996.

5. The Demand for Healthcare Workers

a) Survey of Human Resources Directors

As part of the Health Workforce Tracking System, seven Human Resource Directors from a sample of voluntary hospitals agreed to participate in a semi-annual telephone survey on hospital employment trends and needs. Survey topics include:

- Types of workers the facility is actively hiring;
- The occupations that are most difficult to recruit;
- Changes in service (shifts, expansions, reductions) that will impact on the workforce; and
- The impact of new credentialing or certification requirements.

Key findings from the survey conducted in the first quarter of 2001 are summarized below:

- Most hospitals reported increasing difficulty recruiting RNs, especially those with specialty care experience (e.g., experience in intensive care, coronary care, operating room, emergency room, neonatal intensive care);
- Most hospitals experienced difficulty recruiting pharmacists, medical records coders, and senior secretaries;

- Hospitals that were not outsourcing their hospital information systems reported difficulty recruiting information systems staff, particularly those with greater technical skills;
- Some recruitment difficulties were noted for licensed practical nurses, radiologic technicians, mammographers, and dieticians;
- Many hospitals reported difficulty finding bi-lingual or multi-lingual workers, especially social workers (identified needs include health workers fluent in Spanish, Russian, French, Chinese, Korean, and Hindi);
- Some hospitals indicated that their existing workers needed better computer skills and customer service skills; and
- Some hospitals reported difficulty recruiting entry-level workers, indicating that in the current labor market, less people were available for employment and those who were available were less qualified.

Human Resources Directors at NYC Health and Hospitals Corporation hospitals identified all the occupations listed above as hard to recruit, as well as:

- Masters prepared social workers;
- Dieticians;
- Licensed Practical Nurses; and
- Nurse practitioners.

b) Greater New York Hospital Association (GNYHA) Survey of Nurse Staffing in Hospitals

The GNYHA conducted a survey in January 2001 to learn more about nurse staffing at their member hospitals within the New York City region.[10] Major findings are summarized below:

- The overall vacancy rate for direct patient care RNs was 7.8%, an increase from the 5.4% average vacancy rate reported in 1999.
- Hospitals reported experiencing the most difficulty recruiting RNs for critical care, perioperative and emergency services. More than 60% of hospitals reported taking over three months to fill RN vacancies in specialty areas.
- Thirty-three percent of hospitals reported vacancy rates of 10% or higher for direct care RNs, compared to 9% of hospitals in 1999.
- Vacancy rates for licensed practical nurses (LPNs) remained stable at 12%, compared to 12.5% in 1999.

[10]"Survey of Nurse Staffing in Hospitals in the New York City Region", Greater New York Hospital Association, April, 2001.

c) Greater New York Hospital Association (GNYHA) Survey on Continuing Care Staffing in the New York City Region, 2001

In a recently completed staffing survey of its member residential health care facilities located in New York City, Long Island, and Westchester[11], the GNYHA found:

- Nearly 40% of respondents reported vacancy rates of 10% or higher for management RNs, staff RNs, LPNs, and certified nurse aides (CNAs).
- The largest number of vacancies was for staff RNs (16%) and LPNs (15.6%), followed by management RN vacancies (10.5%) and CNA vacancies (6.7%).
- Nearly one-third of facilities reported actively recruiting for more than 10 CNAs and over one-third of facilities used agency CNAs to fill vacancies.
- The vast majority of facilities reported having the most difficult time recruiting staff RNs (80%), LPNs (72%) and management RNs (70%).

d) Tracking of *New York Times* Classified Advertisements by Occupation in Healthcare

As noted above, all classified advertisements for health care and related positions listed on-line in the *New York Times* from September 1999 to August 2000 were reviewed on the first Sunday of each month and classified by setting and occupation. Table 5 depicts the most frequently advertised occupations by setting.

The following summarizes the findings by occupation:

- Over 15% of the classified advertisements (430) were recruiting registered nurses for jobs in a variety of settings. Staffing agencies had the largest number of RN job postings (23%), followed by offices and clinics (21%) and nursing and personal care facilities (18%). Hospitals accounted for only 8% of RN job postings.
- Positions for secretaries accounted for nearly 12% of the classified ads, with the majority of jobs (63%) in offices and clinics.
- More than 8% of the classified ads were recruiting medicine and health services managers, primarily in offices and clinics (28%), staffing agencies (16%), hospitals (11%), and nursing and personal care facilities (10%).
- Over 5% of the classified ads were recruiting social workers, with 29% of the jobs in mental health settings.

Compared to last year's analysis of classified advertisements for health care and related positions listed on-line in the *New York Times*, the largest number of ads continue to target positions for RNs and secretaries. There were fewer classified advertisements for LPNs and more for social workers and medicine and health service managers.

[11] Skyline News, Greater New York Hospital Association, May 28, 2001.

Table 5

New York Times Classified Ads by Selected Employment Setting for Selected Occupations
September 1999 - August 2000

	Ambulatory Care, Offices, and Clinics	Home Health Care Services	Hospital	Managed Care	Mental Health	Nursing & Personal Care Facilities	Other Health & Allied Services NEC	School or Other Education - Related	Staffing Agency	Total
Registered Nurses	99	33	33	6	9	79	33	3	100	395
Secretaries	215	1	24	2	4	6	15	1	32	300
Medicine and Health Service Managers	71	5	25	7	11	24	30	9	37	219
Bill and Account Collectors	98	2	4	0	2	1	13	0	37	157
Social Workers	22	8	15	2	45	25	22	0	2	141
Licensed Practical Nurses	21	6	9	2	6	30	10	1	20	105
Medical Assistants	68	0	5	1	0	0	5	2	23	104
Medical and Clinical Lab Technicians	17	0	15	0	0	2	9	2	12	57
Receptionists and Information Clerks	29	0	3	0	1	0	5	0	15	53
Radiologic Technologists	22	0	4	1	0	0	9	0	15	51
Medical Records Technicians	13	0	5	0	0	2	4	0	12	36
Nurse Practitioners	9	0	2	2	0	1	2	0	5	21

Source: *New York Times*

e) Tracking Job Vacancies Reported to Local 1199 in 1999 and 2000

Under an agreement between Local 1199 and the League of Voluntary Hospitals, when a hospital is seeking to fill a vacancy in a title covered by their collective bargaining agreement, the facility must notify the union to give union members priority consideration for the position. As part of the Health Workforce Tracking System, all job vacancies in titles represented by Local 1199 reported to the union by its facilities in 1999 and 2000 were reviewed. Table 6 depicts the most frequently reported job vacancies by title. A limitation of this data source is that it represents titles of unionized workers and does not represent the full range of vacant positions at the reporting facilities. In addition, data on the total number of positions in each occupation covered by 1199 is not available, so it is not possible to compare the number of job vacancies to the total number of positions.

Table 6

Job Vacancies in Titles Covered Under Collective Bargaining
Reported to 1199 in 1999 and 2000

	1999		2000		
	Number of Vacancies	**% of Total Vacancies**	**Number of Vacancies**	**% of Total Vacancies**	**Percent Change 1999 to 2000**
Nursing Attendant/ Certified Nurse Aide	927	11.9%	969	12.7%	4.5%
Housekeeping Worker	636	8.2%	572	7.5%	(10.1%)
Licensed Practical Nurse	590	7.6%	514	6.7%	(12.9%)
Dietary Worker	464	6.0%	523	6.9%	12.7%
Registered Nurse	432	5.6%	440	5.8%	1.9%
Ward Clerk/ Unit Clerk/ Unit Secretary	279	3.6%	268	3.5%	(3.9%)
Social Worker/C.S.W.	178	2.3%	236	3.1%	32.6%
Laboratory Technologist	175	2.0%	154	2.0%	(12.0%)
Clerk	158	2.0%	164	2.2%	3.8%
Nursing Tech/ Patient Care Associate	124	1.6%	130	1.7%	4.8%
All Others	3,821	49.0%	3,655	48.0%	(4.3%)
TOTALS	**7,784**	**100.0%**	**7,625**	**100.0%**	**(2.0%)**

Source: Local 1199

- The ten health worker titles listed represent over half of all vacancies reported to 1199 in 1999 and 2000.
- Nurse attendant/certified nurse aide was the title with the highest number of reported vacancies in both 1999 and 2000, accounting for nearly 12% of vacancies in 1999 and almost 13% in 2000.
- Housekeeping workers accounted for the second highest number of vacancies reported, with more than 8% in 1999 and nearly 8% in 2000.
- The third highest number of vacancies reported was for licensed practical nurses, accounting for nearly 8% of the 1999 vacancies reported and almost 7% of vacancies reported in 2000.
- Dietary workers accounted for the fourth highest number of vacancies, with 6% in 1999 and nearly 7% in 2000.
- The number of social worker vacancies increased sharply in 1999 by 32.6%
- Registered nurse was the title with the fifth highest number of reported vacancies, accounting for nearly 6% of total vacancies reported in 1999 and in 2000.

7. Special Study: The Impact of Information Systems Technology on the Education and Training Needs of Hospital Workers in New York City[12]

The Center for Health Workforce Studies recently completed a study on the impact of medical information technology on healthcare workers in New York City. The study examined the impact of information technology on the training and education needs of information systems staff, medical records staff, and front line clerical staff (e.g., receptionists, registrar, and unit clerks) and was supported by and conducted for the 1199 Hospital League Health Care Industry Planning and Placement Fund, Inc.

For this study, Human Resources (HR), Medical Records (MR)and Information Systems (IS) Directors at four hospitals in New York City were interviewed. These interviews focused on the changes in facility staffing and the skill sets needed by workers in order to keep pace with the changes in their jobs brought about by the growing use of new information technology. The study also included a series of structured discussion group meetings with health workers in medical records and front line clerical positions. These meetings focused on workers' experiences using new technology; their perceptions of changing workplace demands resulting from increased use of information technology; and their perceptions of training and education needs related to using information technology.

Key findings are highlighted below.

- Expanded use of medical information technology by hospitals has not reduced staffing levels for front-line clerical staff or medical records staff, and in some instances may have actually increased the number of information systems staff;
- Increasing use of medical information technology by hospital staff requires more highly skilled workers who are capable of using computers in their day-to-day work;
- Increased proficiency in using medical information technology is not always tied to advancement opportunities for health care workers;
- Increased use of medical information technology does not have a significant impact on the recruitment or the retention of either medical records staff or front-line clerical workers;
- There is an inadequate supply of medical records coders that affects both recruitment and retention of workers in this title; and
- The demand for entry-level and senior-level information systems staff is very high and this affects recruitment and retention in these titles.

The study identified a series of recommendations based on its finding:

- Information systems training should be ongoing, affordable, and accessible to health care workers;

[12] The full report is available on-line at the following website: http://chws.albany.edu/.

- The potential for cross-training workers in titles that require comparable proficiency in automated tasks should be explored;
- Health workers should be given incentives to train in high need occupations (e.g., medical records coders, senior secretaries); and
- Career advancement opportunities should be developed for clerical workers who increase their proficiency in information systems technology.

8. Future Demand for Health Workers

According to the Bureau of Labor Statistics (BLS), in the decade from 1988 to 1998, nearly 1 in 8 new jobs was in a health occupation. This trend is expected to continue in the ten-year period beginning in 1998, with over 2.8 million of the 20.2 million new jobs projected to be in health occupations. Additionally, "baby boomer" (those persons born between 1946 ad 1964) retirements will affect the need for new health care workers.

While New York City projections were not available at the time of publication for 1998 – 2008, BLS projections for 1997 – 2007 show remarkable growth in New York City for many health occupations, including:

- Occupational therapy assistants; personal and home care aides; medical assistants; dental hygienists; emergency medical technicians; and medical records technicians. The projected annual growth rate for these occupations ranges from 5% (occupational therapy assistants) to 3.1% (medical records technicians).
- The occupations with the most job openings projected in New York City include nurse aides and orderlies (11,360 openings) and personal care and home health aides (9,650 openings).

BLS also projects nation-wide that over 330,000 registered nurses will need to be replaced due to retirement between 1998 and 2008.

Healthcare Employment Forecasts

Initial efforts in the tracking project to forecast the demand for health services employment and hospital employment in New York City identified some promising models for one or two year forecasts. Two of these models, both based on simple formulas driven by readily available data (historical employment, unemployment rates, and consumer price index) two years earlier, have been monitored for several years, and they have proved to be surprisingly accurate predictors of New York City health care employment trends. A third model has provided relatively accurate forecasts of hospital employment in New York City. Appendix 2 provides a detailed description of the demand models used in this analysis.

Despite the limitations of these models (e.g., a limited time horizon of two years, reliance on data sets that are often slow becoming available, no specific occupational detail), the resulting forecasts can help policy makers to adjust plans and budgets to better reflect upcoming realities. The latest models predict a slight downturn in health care employment of between -0.5% and -1.3% in New York City between 2000 and 2001.

The hospital models also predict a downturn, although the data requirements don't yet permit projections for 2001. Work is now underway on separate models for public and private hospitals, which have behaved very differently over the past decade.

Appendix I

Description of Standard Industrial Classification for the Health Care Industry

Offices and Clinics

- Doctors of medicine and osteopathy practicing alone and in groups of practitioners who have the same or different specialties;
- Group medical practices including clinics, free standing emergency care centers, and ambulatory surgical centers;
- Offices and clinics of dentists;
- Offices and clinics of other health practitioners such as chiropractors, optometrists, and podiatrists, as well as occupational and physical therapists, psychologists, audiologists, speech-language pathologists, dietitians, and other miscellaneous health practitioners.

Hospitals

Hospitals include facilities providing a range of services from diagnostic services to surgery and continuous nursing care. Some hospitals specialize in treatment of the mentally ill, cancer patients, or children.

Nursing and Personal Care Facilities

Nursing facilities provide inpatient nursing, rehabilitation, and health-related personal care to those who need continuous health care, but do not require hospital services. Nursing aides provide the vast majority of direct care. Other facilities, such as convalescent homes, help patients who need less assistance.

Medical and Dental laboratories

Medical laboratories provide professional analytic or diagnostic services to the medical profession or directly to patients following a physician's prescription. Workers analyze blood, take x-rays, or perform other clinical tests. In dental laboratories, workers make dentures, artificial teeth, and orthodontic appliances.

Home Health Care Services

Skilled nursing or medical care is provided in the home, under a physician's supervision.

Health and allied services, not elsewhere classified

This category includes kidney dialysis centers, outpatient facilities such as drug treatment clinics and rehabilitation centers, and other miscellaneous service providers such as blood banks and providers of childbirth preparation classes.

Appendix II

Models to Predict Demand

Along with experimenting with potential indicators of current health services employment and workforce conditions, endeavors at developing quantitative forecasting models for estimating future employment trends have also been undertaken. In the *First Annual Report*, model development focused solely on total NYC health services employment. In the *Second Annual Report*, the health services model was reviewed and updated and a similar preliminary model for total NYC hospital employment was presented. In this third annual report, we continue to assess and revise these efforts.

The initial step in model development is to locate appropriate sources of supplementary data about the population served by the health care system. Along with the sources already identified for their inclusion of health workforce specific data, additional data are compiled based on their potential for contributing to useful health workforce models. These sources include historical U.S. Bureau of the Census data on population and age structure at various geographic specificity levels, BLS CPI figures, and BEA employment cost and production price indices for health services industries.

Health Services

As reported in the *First and Second Annual Reports*, after scrutinizing a succession of bivariate and partial correlations, a series of one- and two-year lagged effect linear regression models for health services employment were developed and tested for predictive adequacy using historical data spanning 1988-1998. Two models, hereafter referred to as Model 1 (A) and Model 1 (D), were selected based on principles of simplicity as well as quantitative measures of predictive capacity (adjusted R-squared, etc.). Both models used total NYC health services employment (as reported in the 1989-1997 ES-202 data and derived from the preliminary 1998 BLS SA estimates) as the dependent variable.

The independent variables in Model 1 (A) are 2-year lags of total US health services employment, the NYC unemployment rate, and the NY-LI-NJ CMSA CPI. The independent variables in Model 1 (D) are simply the latter two in Model 1 (A). Thus:

Model 1 (A)

$$\text{NYC Hlth Svcs Employment}_t = ß_1\,(\text{US Hlth Svcs Employment})_{t-2} + ß_2\,(\text{NYC Unemp Rate})_{t-2} + ß_3\,(\text{CMSA CPI})_{t-2} + c$$

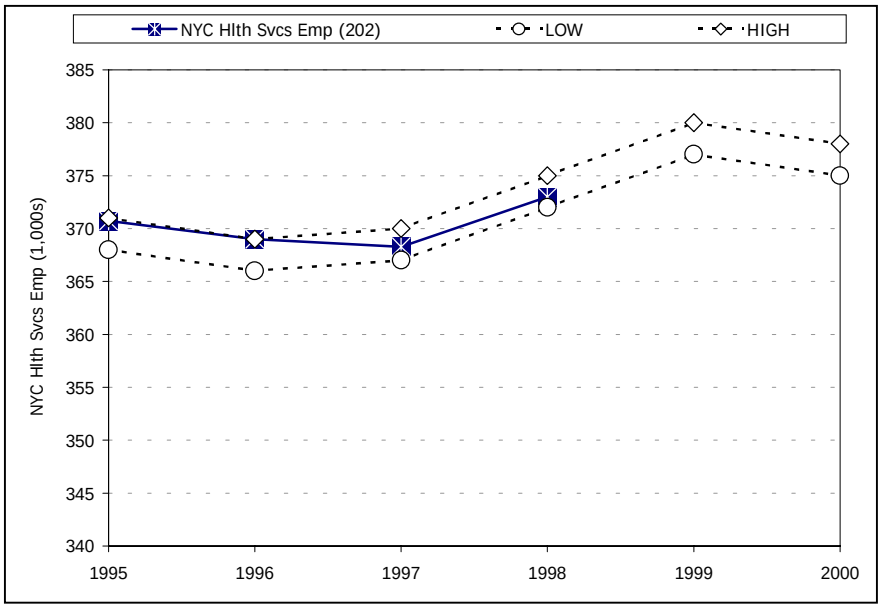
Model 1 (D)

$$\text{NYC Hlth Svcs Employment}_t = ß_1\,(\text{NYC Unemp Rate})_{t-2} + ß_2\,(\text{CMSA CPI})_{t-2} + c$$

Follow-up assessments of the two models found that their predictive capacity remained high (an adjusted R-squared of 0.97 for each). However, Model 1(D) appeared to be the more stable and reliable of the two. [See *Second Annual Report*.]

It is important to note that all of these comparisons amount to post-hoc validations. More than anything else, model validation will require the continued accuracy of these predicted values into the future. Accordingly, since figures for all the independent variables included in Model 1 (D) were available through 1998[13] for the *Second Annual Report*, projections through 2000 were calculated using the standard error of the estimate[14] generated by the analysis of variance from the model to construct a range of predicted values. These projections were presented in the *Second Annual Report* and are reproduced below in Chart 20.

Chart 20
Predicted New York City Health Services Employment, Model 1 (D), 1995-2000



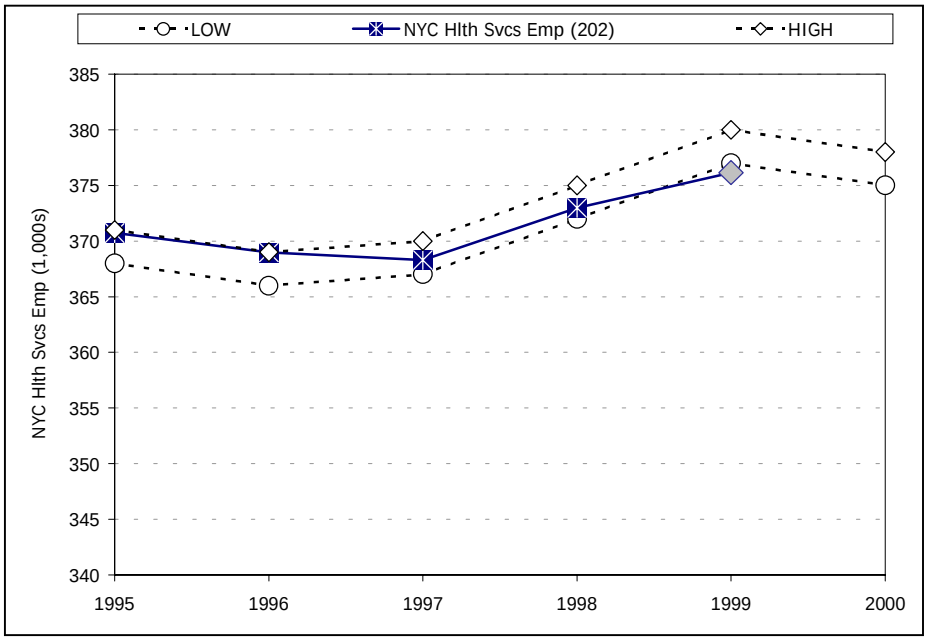
Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

The predicted trend was a modest 1998-1999 increase followed by a potential 1999-2000 decrease. Since 1999 data are now available, it is possible to assess at least the first part of this projection. As Chart 21 demonstrates, while the direction of the trend anticipated by the model was accurate, the model 's predicted range overestimated 1999 health services employment in NYC (albeit by only 0.2%). Interestingly, the predicted range generated by Model 1(A), which had been suspected of a lack of stability, did include the actual 1999 estimate for NYC health services employment. This suggests that both models deserve continued assessment.

[13] Though all of these are subject to revision.
[14] This produces a somewhat more conservative range than would construction of confidence intervals.

Chart 21

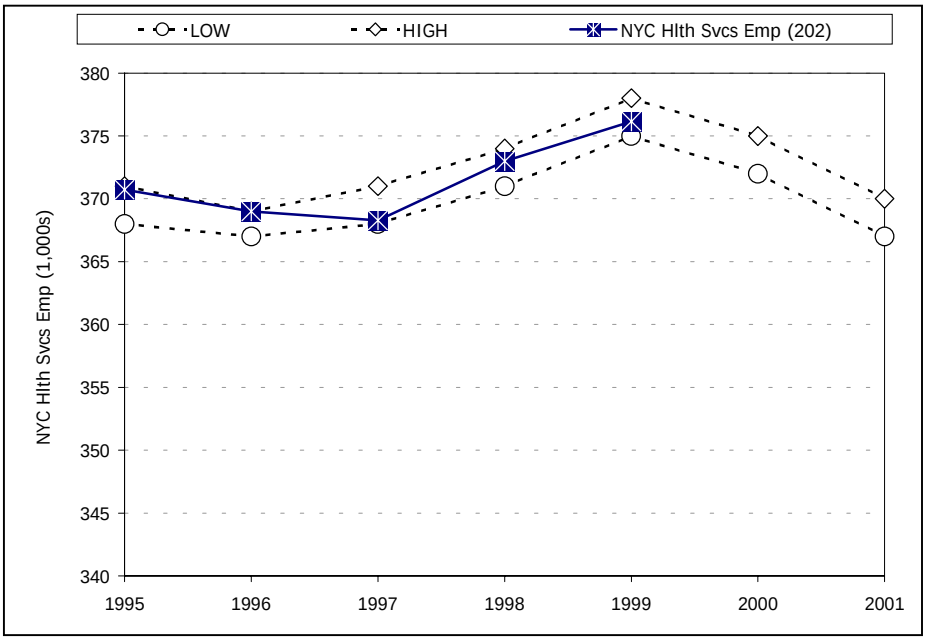
Comparison of Predicted and Estimated New York City Health Service Employment, Model 1(D)



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

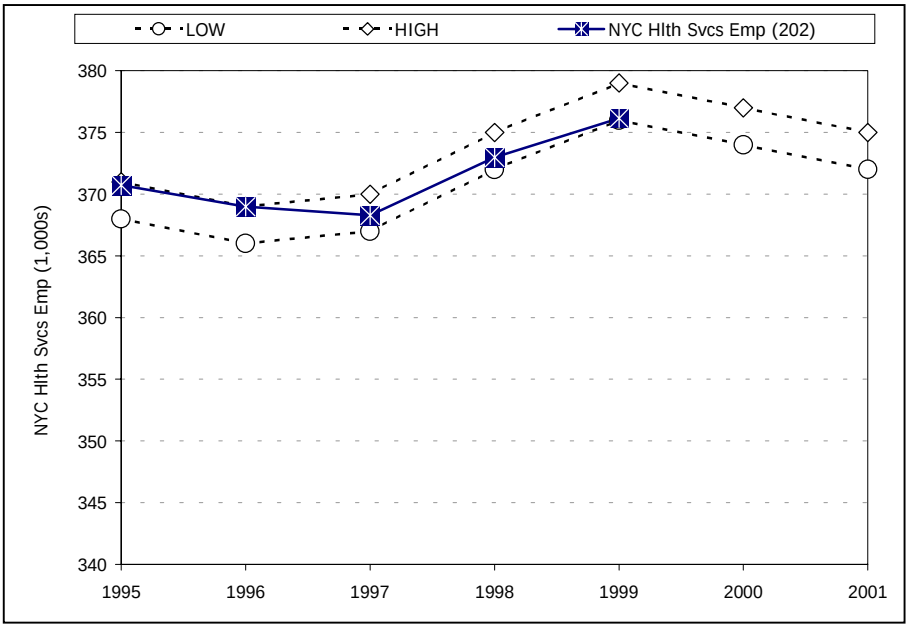
In order to continue to assess the strength of these models over time, predicted ranges for NYC health services have been calculated for 2000 and 2001 utilizing both Model 1(A) and Model 1(D). (See Charts 22 and 23.)

Chart 22
Predicted New York City Health Services Employment, Model 1(A)[15], 1995-2001



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

Chart 23
Predicted New York City Health Services Employment, Model 1(D)[16], 1995-2001



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

[15] $ß_1 = 57$; $ß_2 = 2{,}950$; $ß_3 = -2{,}702$.
[16] $ß_1 = 2{,}805$; $ß_2 = 667$.

Even after updating these models with 1999 data, both Model 1(A) and Model 1(D) continue predict a slight decline in NYC health services employment between 1999 and 2000 (-0.8% and –0.5%, respectively). The models also predict a continued drop through 2001 (-1.3% and -0.5%, respectively, between 2000 and 2001).

Hospitals

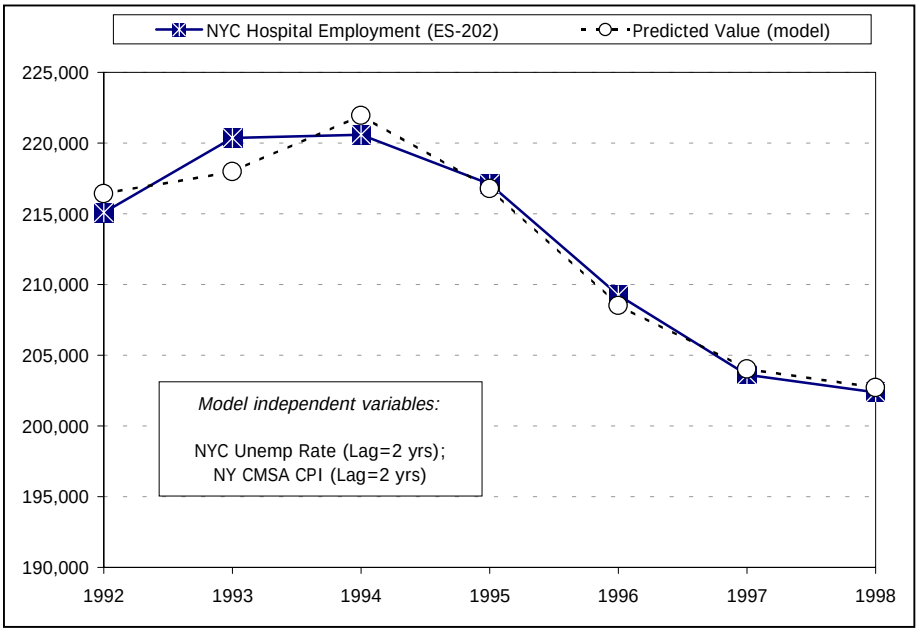
This same modeling process was applied to total NYC hospital employment in the *Second Annual Report*. Since hospitals represented over half of all NYC health services employment during the 1992-1999 period, this may not be surprising, but again the influence of the general economy *appears* to be quite strong.

The independent variables that emerged after reviewing the relevant bivariate and partial correlations were once again the NYC unemployment rate and the NY CMSA CPI at a two-year lag interval:

$$\text{NYC Hospital Employment}_t = ß_1\,(\text{NYC Unemp Rate})_{t-2} + ß_2\,(\text{CMSA CPI})_{t-2} + c$$

The adjusted R-squared for this model was also quite high (0.96) and the predicted values it generated for 1992-98 varied from ES-202 figures by 1.1% or less (Chart 24). As noted in the *First and Second Annual Reports*, NYC hospital and total health services employment did not follow the same trends over the 1992-1998 interval. While both rose during the first 2-3 years of the period, hospital employment increased at less than the rate of total health services and its later rate of decline exceeded that for health services as a whole. In addition, total health services employment in NYC rose from 1997 to 1998, while hospital employment declined. Accordingly, while hospital employment represents the majority of NYC health services employment, the economy impacts it quite differently (*if* the theorized relationships presented hold true).

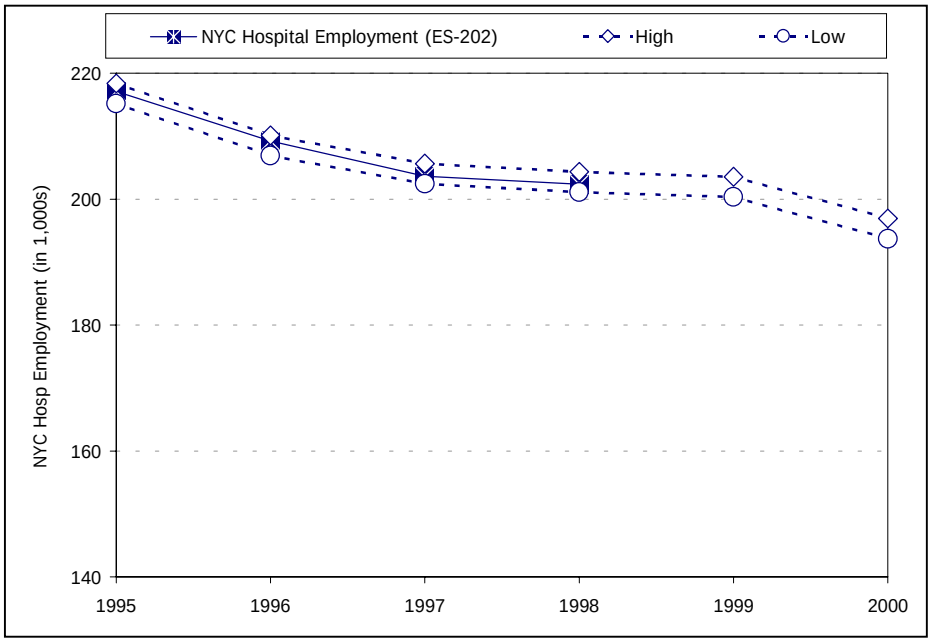
Chart 24
Comparison of Predicted Values and New York City Hospital Employment, 1992 – 1998



Source: NYS DOL (ES-202); BLS (LAUS & CPI); CHWS.

As with the health services model, validation of the hospital employment model will require continued accuracy over time. Projection ranges through 2000 were thus produced using the same standard error of the model estimation method used for the health services employment projections (Chart 25). The resulting predicted values suggested that there would be little change in NYC hospital employment between 1998 and 1999 (less than 1.0% up or down), followed by a decline in NYC hospital employment between 1999 and 2000.

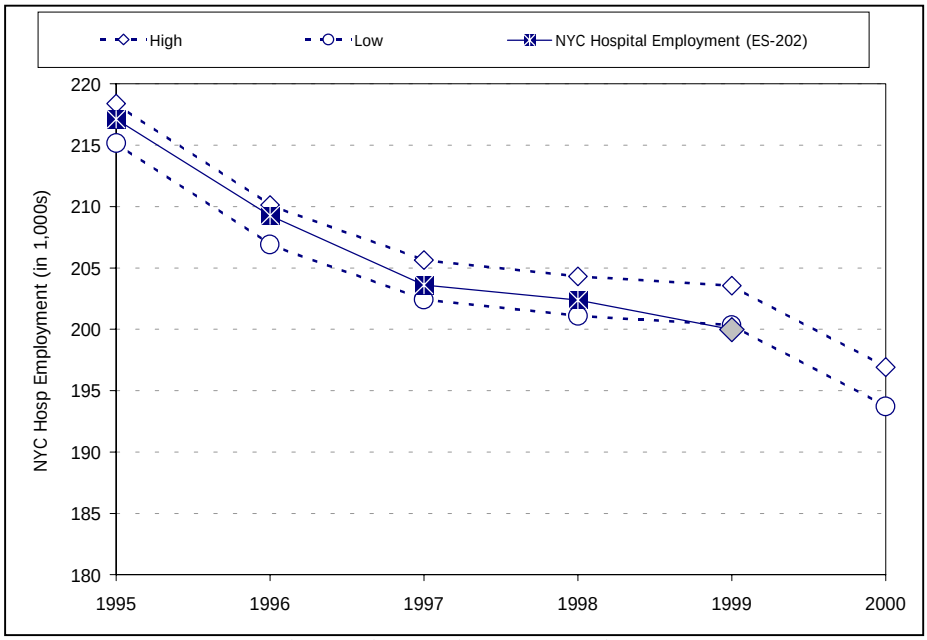
Chart 25
Predicted New York City Hospital Employment, 1995 - 2000



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

As with the models for total NYC health services employment, that for NYC hospital employment overestimated the 1999 employment level. Rather than a one-year change of less than 1%, the actual estimate is a 1.2% decline in NYC hospital employment between 1998 and 1999. Interestingly, the change in private sector hospital employment in NYC was 1.0% (an increase) but the public hospital employment in NYC decline between 1998 and 1999 of 7.9% represented the largest single year drop in NYC public hospital employment since 1989 (Chart 26).

Chart 26
Comparison of Predicted and Estimated New York City Hospital Employment, 1995 - 2000

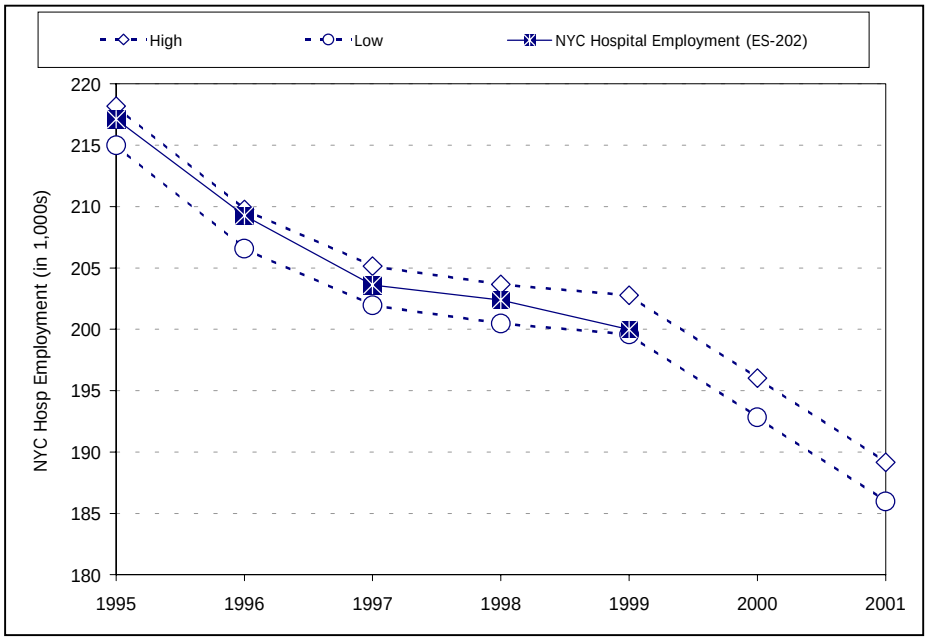


Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

The conclusion to be reached is that while the overall model for NYC hospital employment bears continued evaluation, separate models for the public and private sectors in hospital employment may be warranted.

Using 1999 data, the model continues to anticipate a decline in overall NYC hospital employment between 1999 and 2000, with this trend extending into the 2000-2001 year (Chart 27).

Chart 27
Predicted New York City Hospital Employment[17], 1995 - 2001



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

Applying the same model development strategy to private and public hospital employment separately produces a model for private sector hospital employment in NYC that has only the two-year lagged unemployment rate as its independent variable:

$$\text{NYC Pvt Hosp Employment}_t = ß_1 (\text{NYC Unemp Rate})_{t-2} + c$$

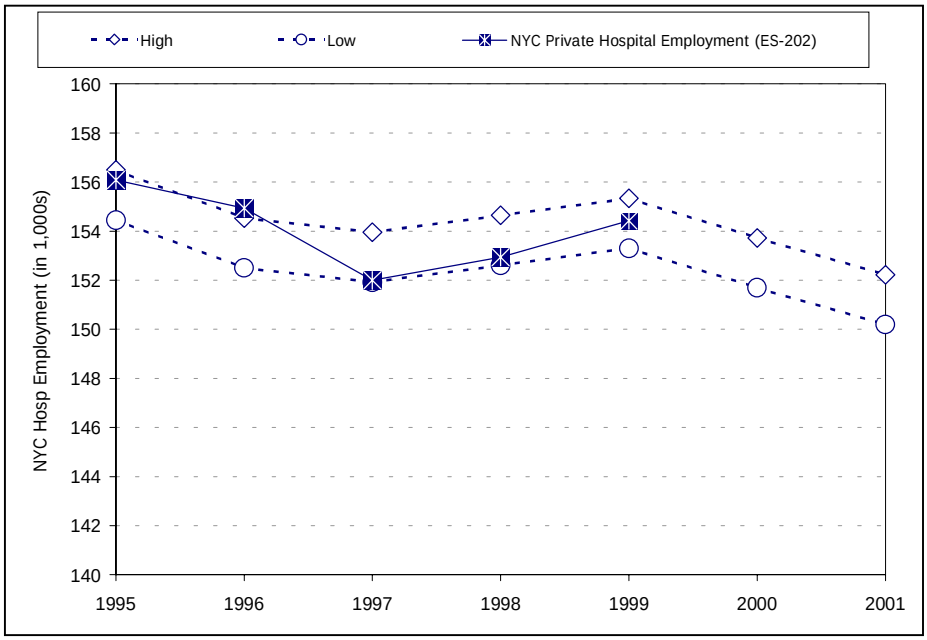
This model has an adjusted R-squared of only 0.66. However, a model predicting public hospital employment in NYC is generated as follows:

$$\text{NYC Pub Hosp Employment}_t = ß_1 (\text{CMSA CPI})_{t-2} + ß_2 (\text{NYC Unemp Rate})_{t-2} + ß_3 (\text{CMSA CPI})_{t-2} + c$$

The adjusted R-squared for this model is 0.98. The predicted ranges for both preliminary models, private and public sector hospital employment, for the 1995 - 2001 period are presented in Chart 28 and Chart 29, respectively.

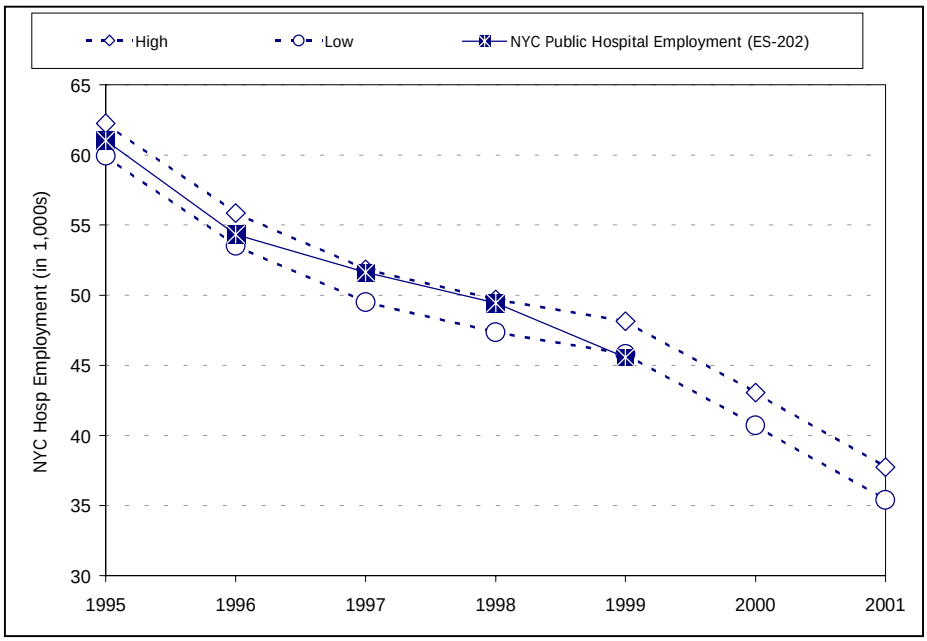
[17] $ß_1 = 3{,}336$; $ß_2 = -741$.

Chart 28
Predicted New York City Private Hospital Employment[18], 1995 - 2001



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

Chart 29
Predicted New York City Public Hospital Employment[19], 1995 - 2001



Source: DOL (ES-202); BLS (LAUS & CPI); CHWS.

[18] $ß_1$ = 1,152.
[19] $ß_1$ = -733; $ß_2$ = 2,167.

The model for private sector hospitals in NYC thus predicts a switch back to declining employment between 1999 and 2001, while the public sector model expects employment there to continue its downward trend over the same period.

It is important that these kinds of empirical models be used with caution. Neither these models nor their possible implications should be applied to other setting-specific or occupation-specific employment trends. Such factors were not considered and therefore should not be included in considering these models. Moreover, the test of time has begun to be applied. It remains to be seen if the models' expected values over the 1998-2000 period will hold true, and further validation using more extended historical data is currently pending. If both of these tests are passed, perhaps the models presented here can be considered seriously as potential workforce indicators.