Allied Health
in Tennessee

A Supply and Demand Study 2010

Center for Health and Human Services
Middle Tennessee State University

Funded in part by the Tennessee Department of Labor and Workforce Development, the Nashville Career Advancement Center is an equal opportunity employer/program. Auxiliary aids and services will be provided upon request to persons with disabilities. Coni Caudle, 862-8890, TTY 1-800-848-0298.

A Supply and Demand Study 2010

Center for Health and Human Services
Middle Tennessee State University

Allied Health in Tennessee

Foreword

Allied health workers constitute the largest component of the U.S. health care workforce, but this group is often one of the least studied. Consequently, having accurate and comprehensive information and data about this collection of disciplines is vital to effective operations and planning on the part of employers and education and government leaders. Over the years Tennessee has been well served by Dr. Jo Edwards and her collaborators who have monitored and reported on the status of allied health workforce supply and demand in the state. This fourth edition of *Allied Health in Tennessee* provides an indispensable reference of interest and use to a wide audience.

This publication is especially timely in view of the ongoing evolution of health care in the U.S. and concerns about the need for various types of health reform—all of which impact supply and demand for allied health professionals. While data on health workforce needs and supply at the national level are useful, it is important to remember that health care is delivered at local and regional levels. Thus, having relevant information at the local and state level is essential for good planning. In general, the lower the educational level of the allied health worker, the more place-bound or less mobile is that individual. As a result, the location of academic programs has a great influence on the availability or lack thereof of an adequate health care workforce.

Even with a national economic slowdown over the last few years, health care remains one of the strongest components of the U.S. economy, with continued growth expected. It is also anticipated that many who have either returned to the health care workforce over the last few years (or those who might have retired but did not) will most likely retire when the economy improves, creating again the prospect of significant worker shortages.

This book, by offering a compilation of academic programs and their location in Tennessee as well as pertinent information about each field, should be of great value to potential students, educational planners, and state officials.

Stephen N. Collier, Ph.D.
Director and Professor
Office of Health Professions Education and Workforce Development
School of Health Professions
The University of Alabama at Birmingham

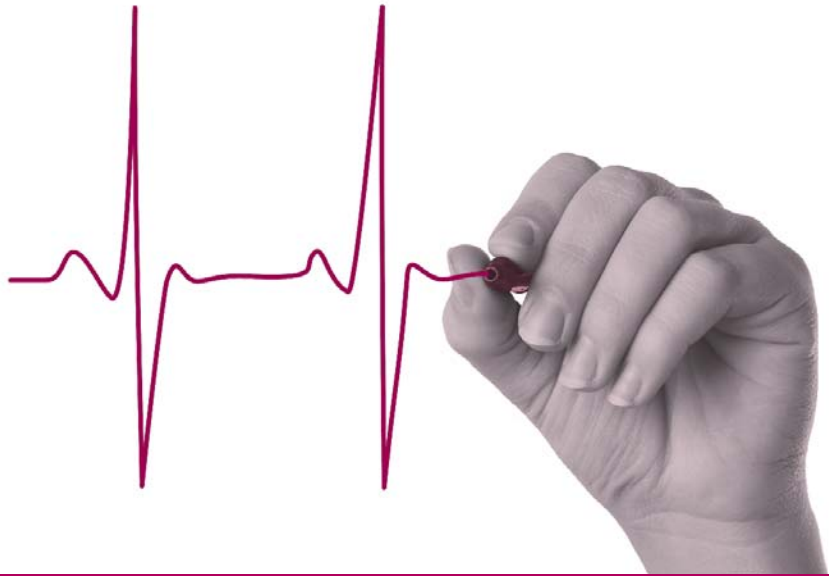


Table of *Contents*

Introduction

Therapeutic Services

Diagnostic Services

Health Informatics (Medical Records)

Support Services

References and Appendices

Acknowledgements

A project of this complexity relies on the efforts of many, including task force members and their institutions; allied health administrators and faculty; and state, regional, and national agencies and associations. A large number of professionals in the various occupational areas provided information, read drafts of the report sections, and provided valuable advice and suggestions. We gratefully acknowledge the contributions of all these individuals and organizations.

Funding for the printing of the fourth edition was provided by the Center for Health Workforce Development in Tennessee of the Tennessee Hospital Association (THA) and by the Nashville Career Advancement Center (NCAC). This study is a major project of the Adams Chair of Excellence in Health Care Services at Middle Tennessee State University.

Jo Edwards, Ed.D.
Adams Chair of Excellence in Health Care Services
Center for Health and Human Services
Middle Tennessee State University

Kaylene Gebert, Ph.D.
Professor
Department of Speech and Theatre
Middle Tennessee State University

Cynthia Chafin, M.Ed., CHES
Project Director
Center for Health and Human Services
Middle Tennessee State University

Stephen N. Collier, Ph.D.
Director and Professor
Office of Health Professions Education and Workforce Development
School of Health Professions
University of Alabama at Birmingham

Executive Summary

This study responds to the general question, "What is the supply and demand for various allied health personnel in Tennessee and in the nation in 2010?" The study provides an update to the trends described in the first three editions of this book, published in 1993, 2000, and 2004. This edition is important because of changes in national health care policy, with passage of legislation for health reform, and further changes in Tennessee, including continuing modifications to TennCare, first implemented in 1994. Some of these changes will have significant effects on the demand for certain health care professionals.

As this study has been underway, many changes have occurred. The economy has taken a downturn and employment figures have been slow to recover. Health care reform passed as the United States economy and society can no longer sustain the cost of the way health care is organized and delivered.

At the national level, according to the Bureau of Labor Statistics (BLS) Occupational Employment Projections to 2018 (November 2009), employment among health care practitioners, a subgroup of the professional and related category is expected to increase by 21 percent, resulting in a projected 1.6 million health care jobs over the next ten years. Among service occupation subgroups, the largest number of new jobs will occur in health care support occupations. This subgroup is expected to increase by 29 percent, with more than 1.1 million new jobs, largely due to an expanding elderly population that will require more care. The health care and social assistance industry—which includes public and private hospitals, nursing and residential care facilities, and individual and family services—is expected to create 26 percent of all new jobs in the United States economy—or 4 million new jobs—with a growth rate of 24 percent. An increased demand for health care services, an aging population, and technological advances in the medical field will lead to increased demand for individuals trained for health care occupations in each of these subgroups. Medical advances also contribute to higher survival rates and longer lives—sometimes with more health issues—so growth in health care occupations will remain strong.

As states have faced decreasing resources for higher education, expensive and limited enrollment programs, such as allied health, are under consideration for closure. Program closures would affect the progress that has been made to address the need for qualified professionals. The number of degrees awarded in allied health and health sciences areas for the ten-year period from 1997 to 2007 shows significant increases in comparison with data from the late 1990s.

Although regional data for the professions are not included in this edition, there has been a significant investment in allied health in all of the SREB (Southern Regional Education Board) states. Data reported by the SREB indicates a significant increase in the number of allied heath and health science graduates from 1997 to 2007. In the U.S., the number of baccalaureate allied health graduates has increased by 18.9 percent, and the SREB states have experienced a 21.4 percent increase. Tennessee has experienced a 29.2 percent increase during the same period.

Tennessee has seen an increase in associates degrees awarded in allied health of 84.6 percent during the 1997–2007 period. Private schools began to offer allied health programming within the last five years adding to the increase in the number of graduates at both the baccalaureate and associate degree level. These increases have reduced the demand in some occupational areas but have only slightly addressed the fast-growing demand in others. Associate degrees awarded in the allied health and health sciences have increased 48.4 percent nationally and 53.4 percent in SREB states. This report details the occupational areas of greatest demand statewide, which are summarized below.

The Joint Annual Report (JAR) of hospital vacancy data for selected occupations appears in Appendix D. Data is organized by county and by Tennessee Hospital Association districts.

This report provides national, state, and local data and information intended to assist institutions and the higher education system in making responsible decisions about programming in the allied health field. The report also serves as a career-counseling guide for use in high schools and health care institutions.

Allied Health in Tennessee: A Supply and Demand Study 2010 shows that recent academic programming initiatives have addressed

some of the critical programming needs in allied health care areas that existed in 1993. For example, the shortage of physical therapists trained in Tennessee has significantly decreased. With some occupations, students are now being educated at a rate that balances annual demand, yet regional shortages still exist.

According to recent data from the Tennessee Department of Labor and Workforce Development's "The Source," allied health professions in which the supply of state graduates does not meet current annual demand includes:

- respiratory therapy;
- health information administration;
- health information technology;
- nursing assisting;
- medical imaging (diagnostic medical sonography, nuclear medicine technology, radiation therapy, and diagnostic radiologic technology);
- physical therapy assisting;
- occupational therapy assisting;
- laboratory services (medical technologist, medical laboratory technician);
- dental hygiene;
- physician assisting; and
- recreation therapy (based on the United States Department of Labor, Bureau of Labor Statistics data).

Nationally, the highest employment projections within allied health from 2008–2018 according to the BLS projections include:

- Dietietics/Nutrition
- Physician Assisting
- Occupational Therapy
- Physical Therapy
- Respiratory Therapy
- Medical Technology
- Dental Hygiene
- Dental Assisting
- Radiology
- Surgical Technology
- Nursing Assistant
- Medical Assistant

Hospitals employ 60 percent of the allied health workforce. The JAR of hospital vacancy rates for selected allied health fields include statewide shortages greater than 4 percent in 2008 for the following fields (only six fields are included in JAR data):

- Medical Technology
- Physical Therapy
- Occupational Therapy
- Respiratory Therapy

Population ratios are broad measures of provider densities for selected occupations. Fields that are under-represented in Tennessee as compared to the national ratios include:

- Athletic Training
- Dental Hygiene
- Dental Assisting
- Occupational Therapy
- Occupational Therapy Assisting
- Epidemiology
- Physician Assisting
- Dietetics/Nutrition
- Speech Language Pathology

More work is needed to address programmatic needs in these areas of allied health. It is important to note that local demands may change within a short period of time and may not always reflect state workforce data.

According to a 2005 report from the University of California San Francisco's Center for Health Professions, allied health occupations represent 60 percent of all health occupations. More than 60 percent of United States health care workers are classified under allied health in more than 200 occupational categories (Health Professions Network, "What Is Allied Health? What's in It for Me?" at www.healthpronet.org/students/index.html). In the previous editions of this study, 26 occupations were grouped into three of the occupational clusters as identified by the National Health Care Skills Standards Project: therapeutic, diagnostic, and information services (Far West Laboratory, 1995, 2001). The other cluster, environmental services, was not included.

For this study, changes have been made to reflect the groupings of specific occupations as identified in the Tennessee Programs of Study, Health Science from the Tennessee Department of Education and the Tennessee Board of Regents (http://pathways.tbr.edu/programs.php?cluster=8). These groupings also reflect career technical education categories from the Tennessee Department of Labor and Workforce Development (www.state.tn.us/labor-wfd/Publications/EmploymentSecurity/CareerCluster/Health.pdf). This year, physician assistants and epidemiologists have been included in the study.

In Tennessee, public institutions are supplying large numbers of allied health care providers. With the rapidly changing context of health care delivery and services and the economic challenges, educational institutions and health care employers will need to use a variety of data sources as they review and jointly plan academic programming in the allied health fields to meet Tennessee's needs.

Introduction

Background

The allied health field is multidisciplinary, and the choices of scope and methodology made to assess supply and demand by the authors are described in this section. The background describes the objectives, rationale, scope, and methodology of the study and the organization of the report. Allied health supply and demand data are not always comparable for the various professions, and some sources of data are not widely available. The diversity and number of fields in allied health contribute to recruiting difficulties as well as gathering consistent occupational and other data. The multiplicity of credentialing and accrediting organizations also adds complexity.

The recommendations following the analysis of supply and demand are not definitive since data sources are often not in agreement, and factors that affect supply and demand in the health care field are varied and changing. Also, in some fields, the demand is for replacement workers rather than a reflection of overall job growth, and sometimes the expressed demand is a combination of these two factors. Constant monitoring of external conditions and constraints is necessary to ensure that academic programming is responding to student, marketplace, and societal needs. The report identifies sources of data that institutions can use as they assess program needs. For example, the Bureau of Labor Statistics *Occupational Outlook Handbook* is a standard source.

This report is being made available generally in the belief that it will be of interest to others involved in the education, training, and employment of allied health professionals and that it will be a resource for career counseling and advisement. **The report describes the employment status of various allied health professions at the national and state levels, provides current supply information at the state level, identifies areas of need, and gives general state and national employment projections.**

Earlier editions also reported regional program data, but the SREB (Southern Regional Education Board) no longer reports data by allied health programs in the same way as in the past. Some regional data may be found by searching individual state data as reported by state departments of education or workforce development, health-related agencies, or national associations and organizations for specific professional areas.

In recent years, states including Tennessee have developed programs and Web sites to assist students in identifying possible careers. Health science is one such career cluster (www.state.tn.us/labor-wfd/Publications/EmploymentSecurity/CareerCluster/Health.pdf), and, additionally, high school programs of study are linked to career options (http://pathways.tbr.edu).

Objectives of the Study

This report is the fourth edition of a study originally requested in 1993 by the chancellor of the Tennessee Board of Regents (TBR) to determine supply and demand for allied health programming in Tennessee. A task force of TBR allied health faculty and staff members was charged to develop the original report. (See Appendix H for a list of task force members.) Many changes have occurred since the original report in 1993, most notably the implementation of TennCare. A reassessment of the supply and demand for allied health professions in Tennessee in 2000, 2004, and 2010 provides an opportunity to look at trends. Many of the same data sources were used for all editions and new sources have been added as they have become available.

Allied health is a high-cost academic area that has significant implications for the quality of life of Tennessee citizens. In times of economic uncertainty and fiscal constraint, changing demographics, and technology, postsecondary institutions and their partners in the health care industry must carefully plan to meet public needs and expectations for improved health care.

What Is Allied Health?

The designation of "allied health professional" encompasses individuals in health care settings who provide diagnostic, therapeutic, support services, or work in health informatics and biotechnology research and development. Generally, anyone working in a health-related field who is not identified as a doctor or a pharmacist or a nurse is likely to be an allied health professional. There are over 200 categories of allied health professionals, and they often have extended contact with patients and play a crucial role in producing positive health outcomes.

Allied health practitioners have formal education and clinical training and are credentialed through certification, registration, and/or licensure (www.healthpronet.org/students/html). According to the BLS ("Occupational Employment Projections to 2018," *Monthly Labor Review*, November 2009), health care practitioners and technical occupations are projected to add 1.6 million jobs between 2008 and 2018, a growth rate that is nearly "twice as fast as the average for all occupations," a 21 percent increase. Health care support occupations are projected to grow by 29 percent during the 10-year period.

Tennessee Metropolitan Statistical Areas in the Top 100 U.S. Labor Markets 2008–2009

The economy may be struggling, but hiring continues in health services and education, which has added almost a quarter-million jobs in the nation's 100 biggest labor markets between June 2008–2009. As a whole, the group of 100 has added 232,600 jobs in the fields of education and health since mid-2008 representing a gain of 1.8 percent.

Tennessee Metropolitan Statistical areas (MSA) included in the Top 100 U.S. Labor Markets with related gains in health services and education jobs from June 2008–June 2009 are as shown below.

MSA: Gain in Number of Jobs in Health Services and Education June 2008–June 2009	
Knoxville	200
Chattanooga	400
Nashville	900
Memphis	1,900

Source: Puget Sound Business Journal, Seattle, Washington, August 11, 2009, reporting data from the U.S. Bureau of Labor Statistics.

Estimates for non-farm employment in MSA and subMSA areas can be found on page 167.

The category of personal and home care aides, which requires shorter terms of training, is projected to show a 50 percent growth rate. This growth will be fueled by an increase in home care, shorter institutional stays, and a growing elderly population.

Rationale for the Study

Health reform, past and proposed, has significant effects on programs that prepare health professionals. The increased use of nurse practitioners and physician assistants to provide primary care is a good example of the impact of the changing health care management system. Additionally, certified assistants and aides now provide increased amounts of quality care to patients, reducing the demand for health professionals prepared at the master's and doctoral levels. Delivery systems, payment systems, and levels of care required by federal and state programs all affect the demand for various health care disciplines and the levels of training required for them. Allied health workers are being asked to be more flexible and to perform a variety of tasks (multiskilling), and educators are challenged to keep the curriculum up-to-date in an environment of constant change.

The implementation of TennCare had a tremendous impact on allied health. When the state's Medicaid beneficiaries were switched to a managed care system in 1994, 50 percent more individuals were covered for the same cost. Managing growth has been and will continue to be a challenge for TennCare. The increased number of those served without a corresponding increase in the budget has had an impact on all health care workers and specifically on allied health professionals as their scope of services changes.

Academic studies are relevant because they often influence state policy decisions and workforce initiatives. In 1989 a Tennessee Board of Regents study, "Nursing in Tennessee," indicated a shortage of nursing personnel, and the system responded by approving additional programming. A June 2009 report by the Tennessee Center for Nursing, "Forecasting Supply, Demand, and Shortage of Nurses in Tennessee," noted that in 2004 the projected shortage of RNs was 35,000. The current projections are not as severe but are still significant: a shortage of 2,800 in 2008 that will grow to nearly 15,000 in 12 years (www.centerfornursing.org/currentresearch.htm).

The State of North Carolina also worked to identify allied health demand through reports in May of 2005, 2006, 2007, and 2008. These reports focused on tracking vacancies by reviewing classified advertisements to identify need.

The demand for allied health practitioners reflects the trend in the health care industry for additional assistants and technicians, under the supervision of therapists, to perform more of the procedures that therapists have performed in the past. For example, while the BLS projects a growth rate of 15.6 percent (2008–2018) in the number of dentists, the number of hygienists and dental assistants is projected to grow at a 36.1 percent rate (2008–2018). The distribution of workers in health care practitioners and technical occupations is also changing, with more jobs opening up in offices of health practitioners, in home health services, and in individual and family services, rather than in costly in-patient facilities such as hospitals.

In Tennessee, allied health represents a large and increasingly important employment sector and an engine for economic growth. Between 2003 and 2008, allied health employment in Tennessee grew 24.3 percent. Overall, health care jobs grew 18.25 percent, and total employment grew 5.44 percent. In 2008 in Tennessee, allied health professions comprised 34 percent of the health care jobs compared to physicians at 4 percent; RNs at 25 percent; LPNs at 10 percent; and nurse aides, orderlies, and attendants at 23 percent.

An extensive review of specific health science occupations and a high-skill, high-wage, high-demand matrix is published by the Tennessee Department of Labor and Workforce Development at "The Source" (www.sourcetn.org). Annual median wage and numbers of projected new jobs are also presented. "The Source" is the most comprehensive and user-friendly source of labor market data in the state. It also provides information about nearly 92,000 Tennessee employers.

In 2002, the THA received federal funding to initiate the Center for Health Workforce Development in Tennessee. The center was established to achieve an abundant, competent, and motivated health care workforce through statewide collaborations, strategies, and solutions. The Center for Health and Human Services at MTSU, which produces this report, and the Tennessee Center for Nursing are part of the advisory committee of the Center for Health Workforce Development (www.healthworkforce.org).

In the allied health area, Tennessee offers more than 139 programs at all levels, from area vocational technical schools to two- and four-

year schools. (See Appendix A for a list of programs by school.) These programs have both credit and noncredit offerings and range from certificate- to doctorate-level. Some programs are based on a partnership model, with clinical instruction delivered by other educational and medical institutions outside the higher education system.

Scope of the Study

The original study covered selected occupations in the allied health field that were grouped into three health care and occupational clusters as identified by the National Health Care Skills Standards Project (Far West Laboratory, 1995). The new study reflects the clusters as identified by the Tennessee Department of Education's and the Tennessee Board of Regents' *Tennessee Career Cluster Guide* for 2008–09 (www.state.tn.us/labor-wfd/Publications/EmploymentSecurity/CareerCluster/Health.pdf). These clusters are consistent with the health science career clusters taught in Tennessee high schools (http://pathways.tbr.edu) and also reflect career technical education categories from the Tennessee Department of Labor and Workforce Development (http://www.state.tn.us/labor-wfd/Publications/EmploymentSecurity/CareerCluster/Health.pdf).

"Therapeutic" professionals provide treatment and work on maintaining and/or changing patient health status over the long term; "diagnostic" professionals create a picture of client health at a single point in time; "informatics" professionals document client care, and "support" professionals provide services that support the work of others on the health care team. Each allied health profession in this study is included in one of these clusters according to primary function.

Therapeutic Services

The **rehabilitation field** includes physical therapy, occupational therapy, physical therapy assisting, occupational therapy assisting, athletic training, recreational therapy, speech-language pathology and audiology, respiratory therapy, dietetics, and surgical technology. Other occupations in the therapeutic services cluster include physician assisting, emergency medical services, and dental services.

Diagnostic Services

The **medical imaging field** includes diagnostic radiologic technology, radiation therapy, nuclear medicine technology, and diagnostic medical sonography.

The **clinical laboratory services field** includes clinical medical technology, clinical medical laboratory technology, and phlebotomy.

The **dental services field** includes dental hygiene and dental assisting.

Health Informatics

The **health information services field** includes health information administration, health information technology (formerly medical records administrators and managers), medical transcription, and epidemiology.

Support Services

The "**support services" field** includes all health care support workers including medical assisting and nursing assisting.

Educational Guide

Projected growth is reported in some occupational areas, although factors used to predict future growth—such as repayment systems and level of access—are rapidly changing.

The supply and demand information presented in this report will be useful as a student counseling guide as well as a guide for higher education and for employers. Labor market factors such as supply and demand are only one part of the academic program planning and decision-making process. Allied health programming must be evaluated in the context of an institution's overall mission. As an institution pursues its academic goals, a number of factors must be analyzed and considered including a variety of academic programming needs; student interests; the availability of qualified faculty; accessibility to appropriately equipped classrooms, laboratories, and clinical education sites; accreditation fees and other recurring costs; and the program mix of the institution.

Methodology

This section presents the six research questions that guide the study and briefly describes the supply/demand data sources that were used.

Research Questions

1. What is the supply of selected allied health personnel from Tennessee schools?
2. What is the demand for various allied health care professionals in Tennessee?
3. What is the relationship between the Tennessee supply and the national supply of allied health professionals?
4. What is the relationship of the Tennessee demand to the national demand?
5. If the demand is greater than the supply, what are the recommendations to address this situation?
6. Where can students be directed for health career planning?

The answers to the first four questions are found in the occupational report. The recommendations given in answer to question five are found in the status summaries. The references and appendices respond to question six.

Issues Surrounding Allied Health Supply and Demand Studies and Data

As the Institute of Medicine (IOM) study noted (1989), the allied health field "comprises occupations with varying labor market characteristics," including levels of education and responsibility, work sites, paths of entry, wages, and job titles and descriptions; therefore, each occupation must be considered separately.

The diversity of the fields and the lack of federal investment to establish national databases contribute to the lack of consistent national data (IOM, 1989, p. 445). Although several projects have been initiated to address these data issues, such as the Hidden Health Care Workforce, 1999; the Health Professions Workforce Data Collaborative Project, 1999; and the 2001 funding of four regional Centers for Health Workforce Studies by HRSA (http:/bhpr.hrsa.gov/healthworkforce), these observations still hold true in 2010.

Demand, if expressed as "need," quickly becomes a qualitative question. For example, how many respiratory therapists are "needed" to provide a "quality" level of health care for Tennesseans is a different question than how many respiratory therapy positions are currently available. The definition of demand as identified by "The Source," Tennessee Department of Labor and Workforce Development, was used instead of attempting to survey qualitative need. Demand was determined by looking at the growth rate and job openings expected. Demand was also determined in some fields by hospital vacancy rate data.

According to the BLS, allied health professions are generally expected to grow faster than the average for all occupations through 2018. In some disciplines, there are more program completers than there are expected job openings. This situation is described as a competitive market. Supply and demand are not always perfectly balanced geographically and local demands may change within a short period of time.

As with previous editions, this study (1) used primarily existing data, (2) selected several allied health fields to study in depth, (3) identified "demand" rather than "need" in looking at health care, and (4) took into account general trends and available data to make a "best guess" at recommendations for programming and student recruitment.

Description of Supply and Demand Data Types

The description of national, state, and local data sources is intended to assist the reader in evaluating the data. Institutions and others who would consider proposing additional programming in this area may use these sources. Counselors for career guidance can use them for students; human resource offices can use them to identify potential sources of graduates.

While the information contained in this document will be useful to institutions as they consider program planning, other considerations must also be a part of the process. Some local data is available as part of this report in the appendices, including service-area data. Regional and service area needs assessments must be made to ensure a long-term demand for program graduates as local demands may change in a short period of time and may not always reflect state work force data. The authors urge institutions to make use of the data sources identified to help assess need. Local surveys of employers, careful attention to technological advances, and tendencies of local populations to avail themselves of health care opportunities must also be considered.

All data sources in supply and demand studies have strengths and weaknesses. No single source should be used as a determining or deciding factor. To increase reliability and validity, a variety of sources must be considered in this type of study, and conclusions should be made based on aggregate information from within an occupational area and across several areas.

Occupations Not Included in This Study

Public health, health services administration, opticians, community health education, music therapy, cardiopulmonary technology, orthotic/prosthetic, pharmacy assistant, substance abuse, and environmental health are areas that may be considered allied health, but they are not included in this study. We have excluded the preprofessional categories such as premedical because students often transfer to other institutions for professional programs.

Institutions of Learning Included in This Study

Proprietary institutions that have earned programmatic accreditation are included in this study and are referenced where appropriate. It is beyond the scope of this project to be inclusive of all proprietary institutions.

Four Sources Used in this Study

2008-2018 National Bureau of Labor Statistics Projections of Supply and Demand in the Allied Health Professions

Every other year the U.S. Department of Labor's Bureau of Labor Statistics (BLS) publishes its employment outlook for a ten-year period. The latest BLS projections, which are for the period 2008-2018, were released on December 10, 2009. For many of the allied health professions covered in this publication, those data are reflected in Appendix G, page 183.

The BLS data are a primary source of information about the demand for allied health professionals.

The ten-year BLS projections constitute national data and estimates of employment need, but national data may be of somewhat limited help when attempting to assess what the local or regional need will be over such an extended period of time. Health care is primarily a local market and there will sometimes be significant differences not only from one state to another, but among sub-state regions and local areas as well.

Population density, location and number of health facilities, location of educational programs, location of four-year institutions, and the program mix and number of graduates of the educational institutions all contribute to variance from one geographic area to another.

The latest BLS projections for 2008-2018, as was true for the previous 2006-2016 projections, show continued strong growth in the health professions and occupations. With a growth rate of 10.1 percent in overall U.S. employment during the 2008-2018 period, the category of "health care practitioners and technical occupations" is projected to grow over twice that rate at 21.4 percent, with the

"health care support occupations" projected to grow almost triple the overall rate at 28.8 percent.

The Tennessee Department of Labor and Workforce Development

Through "The Source," the most comprehensive and user-friendly source of labor market data in the state, the Tennessee Department of Labor and Workforce Development provides a variety of labor market information and data. The interactive system contains a vast amount of information covering areas such as job demand, economic indicators, wages, census data, and education/training programs. It also provides information on nearly 92,000 Tennessee employers. Area profiles are also available by local workforce investment areas, metropolitan areas, and counties.

The Tennessee Department of Labor and Workforce Development produces "The Labor Market Report," which includes estimates of employment and rates of change for the 2008 and 2009 years for educational and health services professions. Data indicate that statewide, all non-farm employment decreased by 13.2 percent, while educational and health services increased by 9.7 percent from 2008-2009. Data are provided by metropolitan statistical area (MSA), with each MSA showing decreases in all non-farm employment, and increases in educational and health services employment for all but two MSAs (Appendix D).

Joint Annual Report of Hospitals, Tennessee Department of Health, Vacancy Rates

The Joint Annual Report of Hospitals indicates a need for selected allied health personnel based on vacancy rates, with some Tennessee Hospital Association districts and individual counties having greater needs than others. For 2008, statewide vacancy rates were greater than 4 percent for occupational therapists (9.7 percent) and for physical therapists (7.8 percent). Data are provided for medical technologist, radiologic technologist, surgical technologist, occupational therapist, physical therapist, and respiratory therapist. While not all allied health occupations are included in this data set, hospitals employ 60 percent of allied health workers. Therefore, these figures may correlate well with other allied health professions. Data by hospital district and by county are available (see Appendix D) to assess need at the regional and local levels.

2008 Population Ratio Data

Population ratios are broad measures of provider densities for selected occupations. Data from the U.S. Bureau of Labor Statistics and the Tennessee Department of Labor and Workforce Development indicate for some professions a population ratio for the state that is less than that of the United States. This data should be used with caution and not in isolation, however, as there are multiple factors that influence whether the supply of providers is appropriate. Occupational therapy, occupational therapy assistants, speech language-pathologists, dental hygienists, dental assistants, and physician assistants each had lower population ratios than that of the nation. There were other professions such as athletic trainer, recreational therapist, dietitian, and epidemiologists with slightly lower population ratios than that of the nation. Population ratios for each of the selected professions are included as Appendix F.

Therapeutic Services

Rehabilitation Professions

- Physical Therapist and Physical Therapist Assistant
- Occupational Therapist and Occupational Therapist Assistant
- Athletic Trainer
- Recreational Therapist
- Speech-Language Pathologist and Assistant and Audiologist
- Respiratory Therapist and Respiratory Therapist Technician
- Dietitian and Dietetic Technician
- Surgical Technologist

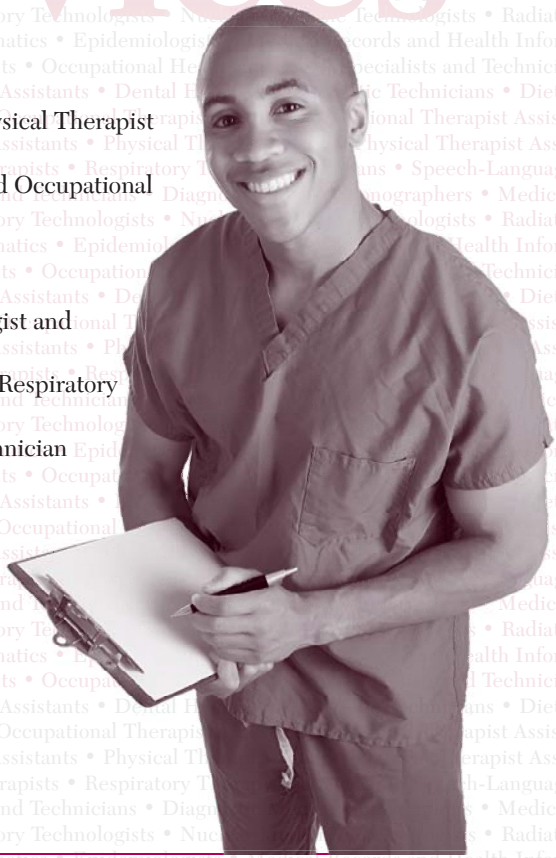
Physician Assistant

Emergency Medical Services

- Emergency Medical Technician (EMT)

Dental Services

- Dental Hygienist
- Dental Assistant



Physical Therapist and Physical Therapist Assistant

Physical therapists (PT) evaluate and treat patients with the goal to prevent, detect, eliminate, or minimize pain and physical dysfunction. Physical therapist assistants (PTA) provide physical therapy services under the direction and supervision of physical therapists.

Status

- Employment of physical therapists (PT) is projected to increase by 30.3 percent during 2008–2018 (3 percent annually) according to BLS.
- As of July 2009, 201 physical therapy programs nationally converted to the doctor of physical therapy (D.P.T.). By 2008 all programs in Tennessee converted to D.P.T. Physical therapists must also pass a licensure examination before practicing.
- In Tennessee, there are five accredited physical therapy programs and seven physical therapist assistant programs.
- The outlook for physical therapists in Tennessee is a competitive market with the number of training completers greater than job openings expected.
- Physical therapist assistants in Tennessee is rated as a favorable market with more job openings expected annually than training completers in a recent year.
- JAR hospital vacancy data indicates a shortage of PT/PTA of 7.8 percent for 2008. Local vacancy rates may vary (Appendix D) with some districts, such as West and Chattanooga showing 23.7 percent and 9.7 percent vacancy rates respectively.
- Population ratio data indicate a higher ratio for physical therapists and physical therapist assistants in Tennessee than that of the nation.

Description

The field of physical therapy requires the evaluation and treatment of patients with movement dysfunctions such as those

resulting from accidents, trauma, stroke, multiple sclerosis, cerebral palsy, nerve injuries, amputations, fractures, arthritis, and heart and respiratory diseases. Treatment is designed to relieve pain, improve functional mobility, maintain cardiopulmonary functioning, and limit the disabilities of people suffering from these injuries or diseases.

Physical therapists (PT) evaluate and treat patients with the goal to prevent, detect, eliminate, or minimize pain and physical dysfunction. Physical therapists provide inpatient, outpatient, and community-based services for patients and educate family members to provide therapy at home.

Physical therapist assistants (PTA) provide physical therapy services under the direction and supervision of a physical therapist. Under supervision, physical therapist assistants treat patients according to a plan of care, train patients in exercises and activities of daily living, use special equipment, administer modalities and other treatment procedures, and report to the physical therapist on the patient's response.

Physical therapist and physical therapist assistant positions exist in a variety of settings and facilities. Individuals may work in rehabilitation, community health, industry, sports, research, education, or administration.

Educational Preparation

Professional preparation for physical therapists is typically obtained in doctoral degree programs accredited by the American Physical Therapy Association's Commission on Accreditation in Physical Therapy Education. In 1998 Tennessee's state supported programs in physical therapy were converted to entry-level master's programs and by 2008 all programs have converted to doctor of physical therapy (D.P.T.) programs. Nationally in 2002, all physical therapy programs were required to offer master's or doctor of physical therapy degrees. As of July 2009, 201 physical therapy programs nationally have converted to the D.P.T. Physical therapists must also pass a licensure examination before practicing.

Physical therapist assistants receive training from associate degree programs that are accredited by the Commission on Accreditation in Physical Therapy Education.

National Supply and Demand

BLS data for 2008 indicates that physical therapists held about 249,300 jobs nationally, with over two-thirds of them being in hospitals or physical therapist's offices. The number of jobs is greater than the number of practicing physical therapists because some physical therapists hold two or more jobs. For example, some may work in a private practice but also work part-time in another health facility. Physical therapists held 185,500 jobs in 2008. Both positions are expected to grow with projections of 241,700 physical therapists and 85,000 physical therapist assistants by the year 2018.

The Balanced Budget Amendment of 1997 resulted in cutbacks in physical therapists' hours in skilled nursing facilities and home health care. The change in reimbursement regulations has slowed the demand for physical therapists, resulting in a moderation of the earlier predictions of long-term shortages.

Reimbursement issues and the proliferation of physical therapy programs are part of the formula used by the American Physical Therapy Association (APTA) to predict the surplus.

In 2009 there are 201 accredited physical therapy programs with an additional 8 under development and 247 accredited physical therapy assistant programs. This is a significant increase from 143 total programs in 1991 and only 48 in 1970 (APTA). While the number of physical therapists continues to grow, the conversion to the D.P.T. may result in fewer graduates per year.

Even with these changes, physical therapy still offers very good job opportunities nationwide, and employment is expected to increase faster than the average. According to the Bureau of Labor and Statistics *Occupational Outlook Handbook*, the elderly population, which has a high rate of illness and disabilities that require therapeutic intervention, continues to grow. The baby boomers are entering the stage of life where heart attacks and stroke often occur. Increasing numbers of children with medical problems who might not have survived without recent medical advances will now survive and may require physical therapy. In addition to clinical work, many therapists are increasingly taking on supervisory roles.

State Supply and Demand

The Tennessee Department of Employment Security defines supply as the number of graduates from public institutions and demand as the average annual openings. Using these definitions, a comparison of data from 1993 to 1996 indicated an undersupply in physical therapists and physical therapy assistants, prompting programs in Tennessee to increase class size and initiate new programs. In 2008, there were 4,048 physical therapists and 1,923 physical therapy assistants employed in Tennessee.

Information from APTA indicates that the market for physical therapists in Tennessee has tightened; although there is still room for growth, the gap between supply and demand has been reduced. APTA issued a position paper stating that the organization "recommends against the development of new physical therapist and physical therapist assistant education programs and the expansion of existing programs until June 2002" (*PT Bulletin,* July 5, 1999). The recent move to the doctorate has resulted in fewer graduates during the transition. These program changes have served to balance the supply with a decreased demand.

In Tennessee, there are five accredited physical therapy programs: four are at state institutions and one is private. The University of Tennessee at Chattanooga, University of Tennessee Health Science Center in Memphis, Tennessee State University, and East Tennessee State University offer doctoral programs in physical therapy (D.P.T.). Students may gain acceptance into the program after completing the prerequisites. Belmont University is the only private institution in the state that offers a D.P.T. These programs last between 30 and 36 months. The maximum capacity for these programs in Tennessee is 146 students per year. The number of graduates for 2001–02 declined by 48 percent due to a reduction in the number of applicants and the conversion of the programs to the D.P.T. as shown in Table 2.3. Data is presented for the most recent year, 2008, as part of Tables 2.1 and 2.2., along with historical data from 1988-2008 in Table 2.3. Licensure data shows steady increases for both physical therapists and physical therapist assistants from 1996-2009 (Table 2.4).

There are seven physical therapist assistant programs in Tennessee. Programs are located at Chattanooga State Technical Community College, Jackson State Community College, Roane State

Community College, South College in Knoxville, Southwest Tennessee Community College, Volunteer State Community College, and Walters State Community College. All offer either an A.A.S. or A.S. degree and last between 18 and 24 months. The number of graduates from PTA programs declined due to decreased student and workplace demand.

TABLE 2.1
Completers of Physical Therapist Programs in Tennessee for the Year 2008

Title	Credential Attained	Completers
Physical Therapy/Therapist	Doctoral Degree	116
Physical Therapy/Therapist	Master's Degree	59
TOTAL		**175**

TABLE 2.2
Completers of Physical Therapist Assistant Programs in Tennessee for the Year 2008

Title	Credential Attained	Completers
Physical Therapist Assistant	Associate's Degree	122

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed August 2009. "Licensed" refers to the number holding active licenses on December 31 of the year.

TABLE 2.3
Tennessee Physical Therapist/Physical Therapist Assistant Graduates, 1988–2008

Period Year	Physical Therapists	Physical Therapist Assistants
1988	38	58
1989	46	49
1990	51	69
1991	84	80
1992	93	111
1996	133	138
1998	130	121
2000	187	150
2002	97	59
2008	175	122

Source: "The Source," Health Professions Education Directories, 1988–2002; 2008 data is from the Tennessee Department of Labor and Workforce Development, "The Source," accessed August 2009.

TABLE 2.4
License History

Period Year	Physical Therapists	Physical Therapist Assistants
1996	2,871	1,338
1997	3,067	1,458
1998	3,188	1,605
2000	3,263	1,746
2001	3,304	1,772
2002	3,409	1,828
2003	3,501	2,287
2004	3,573	2,341
2005	3,586	2,375
2009	4,894	2,686

Source: Tennessee Dept. of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses on Dec. 31 of the year for years 1996-2005. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed November 23, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

The outlook for physical therapists in Tennessee is competitive. Occupations in this field are not expected to be in great demand with employers. The growth rate is positive. There were more training completers in a recent year than job openings expected. No placement data is available for physical therapists. Total annual openings from 2008-2018 are projected to be 78.6 per year.

The outlook for physical therapist assistants in Tennessee is favorable. Occupations in physical therapy are expected to be in demand with employers. The growth rate is positive. There were more job openings expected annually than training completers in a recent year. Total annual average openings from 2008-2018 are projected to be 30.5.

TABLE 2.5

Placement Rate for Tennessee: Physical Therapist Assistant for 2008

	Completers Available	Completers Employed	Rate
All Schools	106	102	96.2

Placement rates shown are for all Tennessee schools reporting placement rates for each program. LWIA records show the placement rate for each school. Placement rate is the percentage of graduates available for work (not in the military or pursuing further education) who are employed.

Summary

In 2009 there were 4,894 licensed physical therapists and 2,686 physical therapist assistant positions in Tennessee. In 2016 that number is projected to increase with a 20.5 percent growth rate and 120 average annual job openings for physical therapists. For physical therapist assistants, the projections for 2016 are 2,260 with a growth rate of 29.1 percent and 75 annual average job openings per year. The outlook for physical therapists in Tennessee is competitive. Physical therapists are not expected to be in great demand with employers, as the number of training completers is greater than job openings expected. The reverse is true for physical therapist assistants in Tennessee, which is rated as favorable. Physical therapist assistants are expected to be in demand with employers, as there are more training completers in a recent year than job openings expected annually. Local demands may change within a short period of time and may not always reflect state workforce data.

Occupational Therapist and Occupational Therapist Assistant

Occupational therapists work with individuals who suffer from a mentally, physically, developmentally, or emotionally disabling condition. Occupational therapists use treatments to develop, recover, or maintain the daily living and work skills of their patients. Occupational therapist assistants work under the supervision of occupational therapists to carry out rehabilitation programs that help disabled persons learn or regain their ability to lead constructive lives.

Status

- Aides are normally trained on the job at a given facility.
- Nationally, the BLS indicates employment of occupational therapist assistants and aides is projected to increase by 30.5 percent from 2008-2018 (3.0 percent annually), which is faster than the average of all occupations (1.0 percent). Projected employment for 2018 is expected to be 44,800 (34,600 assistants and 10,200 aides).
- Education data for 2008 shows the outlook for occupational therapists in Tennessee as a competitive market. There were more training completers in a recent year than job openings expected annually.
- Tennessee data for occupational therapy assisting indicates a favorable outlook.
- Population ratios indicate that OTAs are underrepresented in Tennessee and JAR data indicates a 9.7 percent vacancy rate for the OT/OTA category with some districts, such as West (40 percent) and Chattanooga (15.2 percent), having higher vacancy rates.
- Tennessee currently has five professional occupational therapist programs and four occupational therapist assistant programs.

Description

The field of occupational therapy (OT) prepares providers who help patients improve their ability to perform tasks in living and working environments. Occupational therapists work with

individuals who suffer from a mentally, physically, developmentally, or emotionally disabling condition. Occupational therapists use treatments to develop, recover, or maintain the daily living and work skills of their patients. The therapist helps clients not only to improve their basic motor functions and reasoning abilities but also to compensate for permanent loss of function. The goal is to help clients have independent, productive, and satisfying lives. Occupational therapist assistants work under the supervision of occupational therapists to carry out rehabilitation programs that help disabled persons learn or regain their ability to lead constructive lives.

Educational Preparation

Occupational therapists must be licensed, and the occupation requires a master's degree in occupational therapy, six months of supervised fieldwork, and passing scores on national and state examinations The Accreditation Council for Occupational Therapy Education (ACOTE) currently accredits programs for the preparation of occupational therapists. Occupational therapists must pass a national certification examination before practicing. Preparation for occupational therapist assistants occurs primarily in programs offering the associate's degree or certificate from an accredited community college or technical school. This position is different than that of an occupational therapist aide, for which most of the training occurs on the job.

National Supply and Demand

Occupational therapists work in a variety of settings. BLS data shows that there were approximately 131,300 jobs nationally for occupational therapists in 2008. More than a quarter of occupational therapists work part-time. About one out of ten occupational therapists held more than one job. Most jobs were in hospitals, including many in rehabilitation and psychiatric hospitals. Other major employers were offices of other health practitioners (including offices of occupational therapists), public and private educational services, and nursing care facilities. Some occupational therapists were employed by home health care services, outpatient care centers, offices of physicians, individual and family services, community care facilities for the elderly, and government agencies. A small number of occupational

therapists were self-employed in private practice. These practitioners treated clients referred by other health professionals. They also provided contract or consulting services to nursing care facilities, schools, adult day care programs, and home health care agencies.

A master's degree or higher in occupational therapy is the minimum requirement for entry into the field. In 2007, 124 master's degree programs offered entry-level education, 66 programs offered a combined bachelor's and master's degree, and 5 offered an entry-level doctoral degree. Most schools have full-time programs, although a growing number are offering weekend or part-time programs as well. Coursework in occupational therapy programs includes the physical, biological, and behavioral sciences as well as the application of occupational therapy theory and skills. Programs also require the completion of six months of supervised fieldwork.

Employment of occupational therapist assistants and aides is projected to increase by 30.5 percent from 2008 to 2018 (3.0 percent annually), faster than the average of all occupations (1.0 percent). Projected employment for 2018 is expected to be 46,800 (34,600 assistants and 10,200 aides). In 2008, occupational therapist assistants held 26,600 jobs, and aides held 7,800 jobs. About 29 percent worked in hospitals and about 21 percent worked in nursing and personal care facilities. About 23 percent worked primarily in offices of occupational therapists. The remainder worked in the offices and clinics of physicians, social service agencies, outpatient rehabilitation centers, and home health agencies.

The American Occupational Therapy Association (AOTA) passed a resolution that calls for the essential installation of a postbaccalaureate entry-level requirement for professional OT practice.

In 2007, there were 195 accredited occupational therapist programs and 126 occupational therapist assistant programs nationally. This is compared to 98 occupational therapist programs and 108 occupational therapist assistant programs in 1995.

The outlook for employment as an occupational therapist is good, according to the Bureau of Labor Statistics, due to medical advances which make it possible for patients with critical problems to survive. Employment is projected to increase faster than the average. Due

to industry growth and more intensive care, hospitals will continue to employ a large number of occupational therapists to staff their growing health care and outpatient rehabilitation programs.

State Supply and Demand

In 2008, there were 1,643 occupational therapist positions in Tennessee. In 2000, the estimated employment was 1,380. The projected employment in 2018 is 1,830, with a growth rate of 20.4 percent (1.9 percent annual average)—faster than the 1.0 percent growth rate for all occupations—and 55 average annual openings. Licensure information for occupational therapists and occupational therapist assistants is available in Table 2.6 and demonstrates that we have exceeded the projected growth rate.

The same pattern is true for occupational therapist assistants and aides. In 2008, there were 382 positions for occupational therapist assistants and only 2 for aides. In 2018, the projected employment is 440 for assistants, which represents a growth rate of 21 percent (1.9 percent annual average), and 70 for aides, which represents a growth of 11.7 percent (1.1 percent annual average).

Tennessee currently has five professional occupational therapy programs. Belmont University offers entry-level, master's, and doctorate-level degrees, and Milligan College offers an M.O.T. (Master of Occupational Therapy). Tennessee State University, the University of Tennessee Health Science Center, and an off-campus site at the University of Tennessee at Chattanooga offer entry-level degrees.

Roane State Community College and Nashville State Community College offer occupational therapy assistant programs, graduating 38 occupational therapist assistants annually. Both offer either A.A.S. or A.S. degrees and last between 20 and 24 months.

Programs preparing occupational therapist assistants combined with in-migration are meeting workforce needs in Tennessee as projected by the OIS.

TABLE 2.6
License History

Period Year	Occupational Therapist	Occupational Therapist Assistant
1996	1,014	459
1997	1,180	543
1998	1,307	581
2000	1,287	595
2001	1,321	623
2002	1,401	626
2003	1,493	674
2004	1,572	720
2005	1,599	754
2009	2,253	1,051

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

TABLE 2.7
Completers of Occupational Therapist Programs in Tennessee for the Year 2008

Title	Credential Attained	Completers
Occupational Therapy/Therapist	Bachelor's Degree	32
Occupational Therapy/Therapist	Doctoral Degree	16
Occupational Therapy/Therapist	Master's Degree	69

TABLE 2.8
Completers of Occupational Therapist Assistant Programs in Tennessee for the Year 2008

Title	Credential Attained	Completers
Occupational Therapist Assistant	Associate's Degree	33

Source: "The Source," Tennessee Department of Labor and Workforce Development.

Education data for 2008 shows the outlook for occupational therapists in Tennessee is a competitive market, though the growth rate is positive. There were more training completers in a recent year than job openings expected annually (from 1.5 to 3 times as many training completers as job openings).

Education data for 2008 for occupational therapy assisting shows a favorable outlook. Occupational therapist assistants are expected to be in demand with employers. Based on a low number of job openings expected, or a poor supply-to-demand ratio, the outlook for occupational therapist assistants would be less than favorable. However, available placement rates show that the number of program training completers who obtained jobs has been high.

TABLE 2.9

Placement Rates for Tennessee: Occupational Therapist Assistant is 90 percent for the year 2008.

	Completers Available	Completers Employed	Rate (Percent)
All Schools	30	27	90.0

Placement rates shown are for all Tennessee schools reporting placement rates for each program. LWIA records show the placement rate for each school. Placement rate is the percentage of graduates available for work (not in the military or pursuing further education) who are employed.

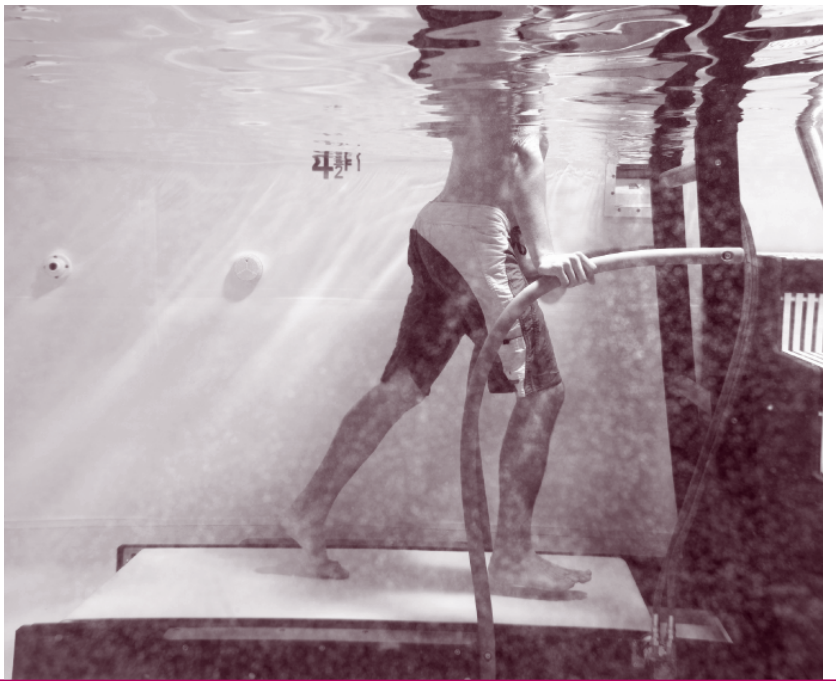
Source: The "Source," Tennessee Department of Labor and Workforce Development.

Summary

The demand for occupational therapy providers has steadily increased over the years. Rehabilitative and long-term care needs are projected to grow due to the aging population, increased chronic debilitating conditions, federal legislation supporting expanded services to the disabled, and increased survival rates for trauma victims and low birth weight infants.

Future growth of this health care specialty will be determined by mental health insurance coverage, the availability of publicly sponsored programs, and the evolution of treatment modalities. However, unless occupational therapy can be established as facilitating early discharge of patients, the services could be subject to funding cuts if facility operating margins continue to be threatened. Changes in reimbursement for rehabilitation in long-term care facilities have

also reduced demand in this sector. The outlook for occupational therapists in Tennessee is a competitive market, while the outlook for occupational therapist assistants is favorable and expected to be in demand with employers. Both are projected to experience growth. Local demands may change within a short period of time and may not always reflect state workforce data.



Athletic Trainer

The certified athletic trainer (ATC) is an educated and skilled professional specializing in the prevention, treatment, and rehabilitation of injuries.

Status

- The BLS projects employment of athletic trainers is expected to grow 36.9 percent from 2008 to 2018 (3.7 percent annually)—faster than the average for all occupations (1.0 percent)—with projected employment in 2018 of 22,400. It is estimated that at the national and state levels, the demand will continue to grow.
- Most athletic training employment in Tennessee is at the university and college level and in sports medicine clinics. Demand is high for athletic trainers in the state's secondary schools.
- From 1996 to 2009, an increasing number of individuals each year have become licensed in the state of Tennessee as athletic trainers.
- There are eight accredited programs in Tennessee, seven offering bachelor's degrees and one offering an entry-level master's degree.
- With more licensed athletic trainers in Tennessee than employment positions identified and a slow growth rate for open positions predicted, the employment outlook for athletic trainers would be improved by combining this certification with other professional certifications.
- Population ratios for this field are slightly lower than that of the nation.

Description

The certified athletic trainer (ATC) is an educated and skilled professional specializing in the prevention, treatment, and rehabilitation of injuries. In cooperation with physicians and other allied health personnel, the ATC functions as an integral member of the athletic health care team in secondary schools, colleges and universities, sports medicine clinics, professional sports programs,

industrial settings, and other health care environments. In 1990, the American Medical Association recognized athletic training as an allied health profession.

Educational Preparation

A bachelor's degree in athletic training from a National Athletic Trainer's Association (NATA) Commission on Accreditation of Athletic Training Education (CAATE) accredited entry-level program is required to be eligible for Board of Certification (BOC) for athletic training examination candidacy. Presently, over 344 colleges and universities offer CAATE-approved curricula. The curriculum requires an intense and holistic didactic and clinical component. The clinical component requires practicums within a variety of clinical settings and sports and with physically active individuals of all ages.

Certified athletic trainers assist in the prevention, identification, management, and rehabilitation of injuries to athletes and the physically active population. They have formal training in anatomy, physiology, exercise science, psychology, emergency medicine, kinesiology, and athletic training.

National Supply and Demand

NATA reports more than 32,269 members as of November 2009, with over 26,219 certified. The Board of Certification reported 2,380 athletic trainers were certified during the 2009 year. Athletic trainers held about 16,300 jobs in 2008. Employment of athletic trainers is expected to grow 36.9 percent from 2008 to 2018 (3.7 percent annually)—faster than the average for all occupations (1.0 percent)—with projected employment in 2018 of 22,400. Most athletic trainer jobs are related to sports, although an increasing number are found in nonsports settings. About 34 percent of athletic trainers worked in health care, including positions in hospitals, physician offices, and offices of other practitioners. About 34 percent were found in public and private educational services, primarily colleges, universities, and high schools. About 20 percent worked in recreational sports centers and fitness centers.

About 3.5 percent worked in professional sports. About 9.7 percent worked in the industrial/occupational setting and as

independent contractors. And more recently, new professional opportunities for athletic trainers have resulted in about 1 percent working in a military, government, or law enforcement arena.

State Supply and Demand

To practice athletic training in the state of Tennessee a person must be a BOC-certified athletic trainer and must pass a Tennessee athletic training licensure examination. The Board of Certification reported 42 athletic trainers were certified during the 2009 year. Athletic training licensure is obtained through the Tennessee Board of Medical Examiners. In 2009, there were 1,019 licensed athletic trainers in Tennessee. Most athletic training employment in Tennessee is at the university and college level and in sports medicine clinics. Demand is high for athletic trainers in the state's secondary schools. It is estimated that at the national and state levels, the demand will continue to grow. Although opportunities with professional sports franchised teams are increasing, most future employment for ATCs will be in high schools.

The estimated employment in 2008 for athletic trainers in Tennessee was 314. The projected employment for 2016 is 360, representing a 22.4 percent growth rate (2.2 percent annual average) with 15 average annual openings. In 2009, there were 1,019 licensed athletic trainers in Tennessee. This is compared to 541 licensed athletic trainers in Tennessee in 2008 and 484 in 2007. The outlook for this field in Tennessee is competitive, though the growth rate is positive. There were more training completers in a recent year than job openings expected annually.

There are eight accredited programs in Tennessee, seven offering bachelor's degrees and one offering an entry-level master's degree. The undergraduate programs are at Lincoln Memorial University, Middle Tennessee State University, Union University, Carson-Newman College, Cumberland University, Lee University, and Tusculum College. The University of Tennessee at Chattanooga offers an entry-level master's program.

TABLE 2.10
License History

Period Year	Athletic Training
1996	221
1997	267
1998	300
2000	356
2001	379
2002	444
2003	512
2004	546
2005	446
2006	452
2007	484
2008	541
2009	1,019

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

Summary

National data indicates growth of 36.9 percent through 2018, while growth at the state level for 2016 is 22.4 percent (2.2 percent annually). There are more licensed athletic trainers in Tennessee than employment positions identified and a slow growth rate for open positions is predicted in Tennessee. The employment outlook for athletic trainers in the state would be improved by combining this certification with other professional certifications. Local demands may change within a short period of time and may not always reflect state workforce data. See Table 2.10 for additional license history.

Recreational Therapist

Recreational therapists, also referred to as therapeutic recreation specialists, provide treatment services and recreation activities to individuals with disabilities, illnesses, or other disabling conditions.

Status

- BLS employment data indicates a growth rate of employment of 14.6 percent for 2008–2018 (1.5 percent annually) for recreational therapists.
- Overall employment of recreational therapists is expected to grow more than the average for all occupations through the year 2018.
- Growth in assisted living and comprehensive long-term care facilities in Tennessee is expected as the aging population grows.
- State trends are likely to follow national trends, with nursing care facilities employing the largest number of recreational therapists, and with the number of such positions increasing slightly faster than positions in the occupation as a whole. Employment is expected to decline in hospitals as services shift to outpatient settings and employers emphasize cost containment.
- There are two programs offered in recreational therapy in Tennessee: Middle Tennessee State University and the University of Tennessee at Knoxville.
- Population ratio data for the state are slightly lower than that of the nation.

Description

Recreational therapists, also referred to as therapeutic recreation specialists, provide treatment services and recreation activities to individuals with disabilities, illnesses, or other disabling conditions. Therapists treat and maintain the physical, mental, and emotional well-being of clients using a variety of techniques including arts and crafts, animals, sports, games, dance and movement, drama, music, and community outings. Therapists help individuals reduce depression, stress, and anxiety. They also help individuals recover

basic motor functioning and reasoning abilities, build confidence, and socialize effectively to enable greater independence and reduce or eliminate the effects of illness or disability. Recreational therapists should not be confused with recreation and fitness workers, who organize recreational activities primarily for enjoyment. In acute health settings, such as hospitals and rehabilitation centers, recreational therapists treat and rehabilitate individuals with specific health conditions, usually in conjunction or collaboration with physicians, nurses, psychologists, social workers, and physical and occupational therapists. In long-term and residential care facilities, recreational therapists use leisure activities—especially structured group programs—to improve and maintain their clients' general health and well-being. They also may provide interventions to prevent the client from suffering further medical problems and complications.

Educational Preparation

According to the BLS *Occupational Outlook Handbook*, a bachelor's degree in therapeutic recreation, or in recreation with a concentration in therapeutic recreation, is the usual requirement for entry-level recreational therapist positions. Persons may qualify for paraprofessional positions with an associate's degree in therapeutic recreation or a health care–related field. An associate's degree in recreational therapy; training in art, drama, or music therapy; or qualifying work experience may be sufficient for activity director positions in nursing homes. There are approximately 130 programs that prepare recreational therapists. Most offer bachelor's degrees, although some also offer associate's, master's, or doctoral degrees.

The National Council for Therapeutic Recreation Certification (NCTRC) certifies therapeutic recreation specialists. While certification is voluntary, most employers prefer to hire candidates who are certified therapeutic recreation specialists. To become certified, specialists must have a graduate or bachelor's degree from an accredited institution, pass a written certification examination, and complete an internship of at least 480 hours. Prior to 2003, specialists were required to complete an internship of at least 360 hours in addition to the degree and examination requirements.

National Supply and Demand

Recreational therapists held about 23,300 jobs in 2008. Almost 70 percent of salaried jobs for therapists were in nursing and residential care facilities and hospitals. Others worked in state and local government agencies and in elder-care facilities, including assisted-living facilities. The rest worked primarily in residential mental retardation, mental health, and substance abuse facilities; individual and family services; federal government agencies, educational services, and outpatient care centers. Overall employment of recreational therapists is expected to grow more than the average for all occupations through the year 2018. Projected employment for 2018 is 26,700, a 14.6 percent increase from 2008 to 2018 (1.5 percent annually), though growth is not considered as large compared to that of other occupations.

State Supply and Demand

There are two programs offered in recreational therapy in Tennessee: Middle Tennessee State University and the University of Tennessee at Knoxville.

Middle Tennessee State University and the University of Tennessee at Knoxville report the following numbers of recreational therapy graduates:

TABLE 2.11
Graduate History

Period Year	Recreational Therapy
2005	19 (MTSU)
2006	16 (MTSU)
2007	31 (MTSU 11, and UT 20)
2008	29 (MTSU 15, and UT 14)
2009	23 (MTSU 10, and UT 13)

Currently, there are 43 students in the therapeutic recreation concentration for 2009–2010 at MTSU and 43 at UT.

In 2008 there were 467 recreational therapist positions in Tennessee according to "The Source," with projected employment

of 410 positions in 2016, representing a 4.7 percent growth rate (.5 annual average) with an average of 10 openings annually.

Summary

Growth in the number of assisted living and comprehensive long-term care facilities in Tennessee is expected as the aging population grows. State trends are likely to follow national trends, with nursing care facilities employing the largest number of recreational therapists, and with the number of such positions increasing slightly faster than positions in the occupation as a whole. Fast employment growth is expected in residential and outpatient settings that serve people who are physically disabled or cognitively disabled or the elderly or those who have mental illness or substance abuse problems. Employment is expected to decline in hospitals as services shift to outpatient settings and employers emphasize cost containment. Local demands may change within a short period of time and may not always reflect state workforce data.

Speech-Language Pathologist, Speech-Language Pathology Assistant, and Audiologist

Speech-language pathologists (SLP) assess, treat, and facilitate prevention of speech, language, cognitive communication, voice, fluency, and other related disorders. A speech-language pathology assistant performs related tasks under the direction and supervision of a speech-language pathologist. Audiologists identify, assess, and manage auditory, balance, and other neural systems. They use testing devices to measure the ability of a person to hear sounds and to determine the nature and extent of hearing loss. Audiologists frequently work in tandem with speech-language pathologists to assess auditory processing capabilities.

Status

- According to the BLS, the national employment rate of speech-language pathologists is expected to demonstrate growth with an increase of 18.5 percent through the year 2018 (1.8 percent annually). The employment rate of audiologists is expected to increase by 25 percent through the year 2018 (2.5 percent annually).
- State data indicate a 12.4 percent growth rate through 2016 (1.2 percent annually) for speech-language pathologists and a 17.5 percent growth rate through 2016 (1.8 percent annually) for audiologists.
- Factors that are affecting employment of speech-language pathologists and audiologists continue to be derived from the 1998 implementation and subsequent renewal of Medicare's prospective payment system for nursing homes.
- Employment of speech-language pathologists and audiologists in the health care arena is projected to continue to grow because of the graying of the baby boomers, who will increasingly become prone to medical conditions that result in hearing and speech problems.
- The outlook for this field in Tennessee is a competitive market with more training completers in a recent year than job openings expected annually.

- In Tennessee, there are five universities that offer speech-language pathology and/or audiology programs.
- Speech-language pathologists are underrepresented by population ratio in Tennessee, while the ratios are more favorable for audiologists.

Description

Speech-language pathologists (SLP) assess, treat, and facilitate prevention of speech, language, cognitive communication, voice, fluency, and other related disorders. These health care professionals work with people who cannot adequately produce speech sounds, people with difficulty understanding and/or expressing language, and those with cognitive communication impairments. They may also work with people who have oral motor problems that result in eating and swallowing difficulties.

Audiologists identify, assess, and manage auditory, balance, and other neural systems. They use testing devices to measure the ability of a person to hear sounds and to determine the nature and extent of hearing loss. Audiologists frequently work in tandem with speech-language pathologists to assess auditory processing capabilities.

The American Speech-Language Hearing Association (ASHA) developed a voluntary registration program for speech-language pathology assistants (SLPA) effective January 2003 but abandoned the effort around 2005, when it became apparent that academic institutions had failed to create sufficient training programs to credential SLPAs. Several states took up the concept; for instance, in 2006, the Tennessee Health-Related Boards' Communication Disorders and Sciences Board created a training registry from which a limited supervision paradigm and limited scope of practice was applied. The SLPA is not trained for independent practice but rather has a limited scope of practice under supervision by a duly licensed SLP. The "early wave" of SLPAs was primarily practicing in health care; however, in 2008, the State Board of Education created and launched a two-tier licensure system for practice in the schools. This consists of an ASHA-credentialed SLP holding Professional School Services Personnel (PSSP) licensure, and a bachelor's level graduate

of a communication disorders program (with certain courses taken beyond the requirements for graduation) qualifying for licensure as a School Speech-Language Teacher (SSLT).

Educational Preparation

A master's degree in speech-language pathology is the entry-level credential in this profession, and the doctor of audiology degree is required as entry level for audiologists. While there are numerous programs in communication sciences and disorders at the baccalaureate level, they are regarded as preprofessional preparation for graduate study and credentialing. At present, graduates of baccalaureate-level programs with additional coursework in clinical practice in the schools are licensed as SSLTs, permitted to practice in the public school system under supervision of a licensed and certified SLP. Likewise, an SLPA may be registered to practice in nursing homes and other settings under the supervision of a licensed and certified SLP. There are no audiology assistants; however, hearing instrument specialists (those not holding the doctorate), are licensed by the State of Tennessee as limited practitioners in the hearing aid industry.

Tennessee currently operates a registry for SLPAs practicing in the state. While there are no SLPA training programs in Tennessee, required coursework is available through undergraduate communication disorders programs (ETSU, UTK, MTSU, TSU, and Vanderbilt). The SLPA receives on-the-job training from the SLP licensee employed by the employer or service-delivery organization.

While not explicitly written into statute (Title 63, Chapter 17, Tennessee Code Annotated) speech-language pathology assistants by rule (Chapter 1370-1-.13) must possess the following minimum qualifications, beginning January 1, 2005: the applicant must have earned sixty (60) college-level semester credit hours in a program of study that includes twenty (20) semester hours of general education and at least twenty (20) semester hours in the specific knowledge and skills for an SLPA. This requirement shall be in technical content, which is detailed in Chapter 1370-1-.13. The training program shall include a minimum of one hundred (100) clock hours of field experiences supervised by a licensed speech-language pathologist.

An SLPA **shall be clearly identified as an assistant by a badge worn during all contact with clients**.

Under all circumstances, it is incumbent upon the supervising licensee to make all decisions regarding the diagnosis, management, and future disposition of the client

National Supply and Demand

In 2005, the most recent demographic information from ASHA shows that there were 12,798 audiologists, 106,105 speech-language pathologists, and 1,305 holders of dual certification. Audiologists were more likely to work in independent health care offices or private practice settings; speech-language pathologists worked primarily in school settings (over 50 percent). About one-half of speech-language pathologists and/or audiologists provided services in preschools, elementary schools, secondary schools, or university clinics. Other work settings included, but were not limited to, hospitals, resident and nonresident health care facilities, speech-language-hearing centers, home health care agencies, or private practice.

The U.S. Bureau of Labor Statistics monitors the supply and demand for more than 800 occupations. According to the BLS, the national employment rate for speech-language pathologists is expected to grow with an increase of 18.5 percent through 2018, with an estimated 141,000 jobs in 2018. In occupational projection estimates for 2004 to 2014, speech-language pathology ranked 17th out of the 20 large-growth occupations that usually require a master's, doctoral, or first-professional degree. According to the BLS, an estimated 43,800 additional speech-language pathologists will be needed to fill the demand between 2008 and 2018—an 18.5 percent increase in job openings. Openings are due to growth and net replacements (ASHA, 2009).

Supply and demand for audiologists was reported by the BLS in November 2009: the national employment rate for audiologists is expected to grow with an increase of 25 percent through 2018. According to the BLS, an estimated 5,800 additional audiologists will be needed to fill the demand between 2006 and 2018—a 25 percent increase in job openings. Openings are due to growth and net replacements (ASHA, 2009). *U.S. News and World Report*

selected "audiologist" as one of its "30 Best Careers of 2009." The article is available at www.usnews.com/articles/business/best-careers/2008/12/11/bestcareers-2009-audiologist.html.

Nationally, as of March 2009 there were approximately 244 institutions of higher education that offer Council on Academic Accreditation (CAA) accredited or candidate graduate programs in speech-language pathology and 71 CAA-accredited institutions that offer programs in audiology. Speech-language pathologists can acquire the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP) offered by the American Speech-Language-Hearing Association (ASHA), and audiologists can earn the Certificate of Clinical Competence in Audiology (CCC-A). According to ASHA, as of 2012 audiologists will have to earn a doctoral degree in order to be certified. These data may be compared to 2002, when ASHA reported that there were 229 accredited speech-language pathology programs and 107 audiology programs.

Factors affecting employment of speech-language pathologists and audiologists continue to be derived from the 1998 implementation and subsequent renewal of Medicare's prospective payment system for nursing homes. Many of the high-paying positions were eliminated, and school systems benefited from the cutbacks. That said, schools continue to be in dire straits in rural areas, with many SLP positions remaining unfilled. In Tennessee, the solution was a two-tiered licensure system, with SLPs supervising service delivery by bachelor's-level personnel holding licensure as speech teachers.

Employment of speech-language pathologists and audiologists in the health care arena is projected to continue to grow because of the graying of the baby boomers, who will increasingly become prone to medical conditions that result in hearing and speech problems. As late as 2002, ASHA had hoped to fill the gap with credentialed SLPAs working under the direction of SLPs. As of May 2002, ASHA was aware of 30 operational associate degree programs for speech-language pathology assistants (SLPA). Fifty-five institutions were, at the time, considering development or were developing such programs. In 2005, ASHA abandoned its quest to credential SLPAs because demand for the associate's degree failed to materialize. Today, a handful of states (including Tennessee) have taken up

registration of speech-language pathology assistants, and the training is a hybrid of academic preparation and on-the-job training.

State Supply and Demand

In 2008, there were 1,873 SLPs in the state of Tennessee and 3,133 holding licenses, not counting personnel in the schools, who are not required to hold a license beyond teacher licensure. The projected employment in 2016 for licensed speech-language pathologists is approximately 1,960, representing a 12.4 percent growth rate (1.2 percent annual average) with 55 average annual openings. In 2009, there were 632 licensed audiologists in the state. The projected employment in 2016 for audiologists is 620, representing a 17.5 percent growth rate (1.7 percent annual average) with 15 average annual openings.

TABLE 2.12
Licensure Information for Speech-Language Pathologists and Audiologists in Tennessee

Period Year	Audiologists	Speech-Language Pathologists
1996	212	996
1997	216	1,132
1998	245	1,185
2000	245	1,113
2001	274	1,204
2002	296	1,372
2003	288	1,400
2004	287	1,490
2005	265	1,555
2009	632	3,133

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

TABLE 2.13
Completers for Speech-Language Pathology Programs in Tennessee for the Year 2008

Title	Credential Attained	Completers
Audiology/Audiologist and Speech-Language Pathology/Pathologist	Doctoral Degree	4
Audiology/Audiologist and Speech-Language Pathology/Pathologist	Master's Degree	59
Speech-Language Pathology/Pathologist	Master's Degree	20

Source: Tennessee Higher Education Commission; Tennessee Board of Regents; Tennessee Departments of Labor and Workforce Development and Education; IPEDS; NOICC.

In Tennessee, there are five universities that offer speech-language pathology and/or audiology programs. East Tennessee State University offers a master's degree in speech-language pathology and a doctoral degree in audiology. Tennessee State University offers a master's degree in speech-language pathology. The University of Memphis offers a master's degree in speech-language pathology and a doctoral degree in audiology. The University of Tennessee at Knoxville offers a master's degree in speech-language pathology and a doctoral degree in audiology, as does Vanderbilt University. The University of Memphis, the University of Tennessee, and Vanderbilt University also offer a Ph.D. in speech and hearing science (or hearing and speech science). Several universities offer B.S. degrees in communication disorders to prepare students for graduate school.

Roane State Community College originally developed a training program for the SLPA but abandoned the effort in 2005 due to "lack of interest" on the part of the prospective student population.

The outlook for this field in Tennessee is a competitive market. Occupations in speech-language pathology and audiology are not expected to be in great demand with employers, though the growth rate is positive. There were more training completers in a recent year than job openings expected annually.

Summary

According to the BLS occupational outlook for 2008–2018, the employment of audiologists and speech-language pathologists is expected to grow faster than the average for all occupations through the year 2018. Tennessee nursing homes, home care agencies, and hospitals must compete with educational institutions and other private practice settings for speech-language-hearing professionals. While growth is positive both nationally and at the state level, the field remains a competitive market, with more training completers in a recent year than job openings expected for the state. Local demands may change within a short period of time and may not always reflect state workforce data. Local demands may change within a short period of time and may not always reflect state workforce data.

Respiratory Therapist and Respiratory Therapist Technician

Respiratory therapists and respiratory therapist technicians evaluate, treat, and care for patients with breathing or other cardiopulmonary disorders under the direction of a physician. Respiratory therapist technicians follow specific, well-defined respiratory care procedures under the direction of respiratory therapists and physicians.

Status

- The BLS expects employment of respiratory therapists to increase faster than the average of all occupations, increasing 20.9 percent from 2008 to 2018 (2.0 percent annually). The data for Tennessee mirrors the national data showing a similar increase.
- Tennessee has a high rate of tobacco-using citizens and a high prevalence rate of cardiovascular and lung disease. These factors may contribute to the increased demand for respiratory therapists and respiratory therapist technicians.
- There are eight respiratory therapist (advanced) programs in Tennessee offering A.A.S. degrees and three respiratory therapist (advanced) programs offering B.S. degrees. The program at East Tennessee State University also provides a track leading to an M.S. degree in allied health leadership. Several four-year institutions in the state have developed formal A.A.S.-to-B.S. tracks.
- Respiratory therapists and technicians are expected to be in demand with employers. The growth rate is positive.
- The JAR hospital vacancy rate data indicates a 3.8 percent vacancy for 2008 with a 13.4 percent vacancy in the West district, 8.3 percent in the South Middle district, and 5.4 percent in the Chattanooga district.
- The population ratio for respiratory therapists in Tennessee is greater than that of the nation.

Description

Respiratory therapists and respiratory therapist technicians, also known as respiratory care practitioners, evaluate, treat, and care for patients with breathing or other cardiopulmonary disorders. Practicing under the direction of a physician, respiratory therapists assume primary responsibility for all respiratory care therapeutic treatments and diagnostic procedures, including the supervision of respiratory therapist technicians. Respiratory therapist technicians follow specific, well-defined respiratory care procedures under the direction of respiratory therapists and physicians.

In clinical practice, many of the day-to-day duties of therapists and technicians may overlap. Generally, therapists have greater responsibility than technicians. For example, respiratory therapists consult with physicians and other health care staff to help develop and modify patient care plans. Respiratory therapists also are more likely to provide complex therapy requiring considerable independent judgment and decision making, such as caring for patients on life support in intensive care units of hospitals.

Respiratory therapists evaluate and treat all types of patients, ranging from premature infants whose lungs are not fully developed to elderly people whose lungs are diseased. Respiratory therapists provide temporary relief to patients with chronic asthma or emphysema, and they give emergency care to patients who are victims of a heart attack, stroke, drowning, or shock.

Educational Preparation

Training is offered at two- and four-year colleges and universities. In 2009, there were 30 entry-level training programs nationwide awarding associate's degree and 347 advanced-level programs awarding either associate's, bachelor's, or master's degrees. Entry-level programs prepare individuals to earn the CRT (certified respiratory therapist) credential. Advanced-level programs prepare individuals to earn the RRT (registered respiratory therapist) credential. All respiratory care educational programs are accredited by CAAHEP, the Committee on Accreditation of Allied Health Educational Programs.

In 2002, the CAAHEP educational process changed and required all programs to award graduates at least an associate's degree. All respiratory care educational programs in Tennessee are advanced-practice programs and grant an associate's degree or higher. There are no entry-level programs in Tennessee. An associate's degree is the minimum educational requirement, but a bachelor's or master's degree may be important for advancement. All states except Alaska and Hawaii require respiratory therapists to be licensed.

The registered respiratory therapist, RRT, is prepared to assume the primary responsibility for all respiratory care modalities and may be expected to exercise considerable independent clinical judgment in the respiratory care of patients. The certified respiratory therapist, CRT, may be expected to adjust or modify therapeutic techniques within well-defined procedures based on a limited range of patient responses.

In order to become a CRT, the graduate must take the entry-level examination from the National Board for Respiratory Care. To become an RRT, graduates must first obtain the CRT credential then take two advanced-practice exams, the written registry exam and the clinical simulation exam, both from the NBRC.

National Supply and Demand

The Respiratory Therapist Human Resource Study (2005) by the American Association of Respiratory Care (AARC) reported that the job vacancy rates for respiratory therapists increased from 2000 to 2005. The job vacancy rate was 6,510 positions in 2000 (5.96 percent) and increased to 11,695 in 2005 (8.65 percent).

According to the BLS, respiratory therapists held about 105,900 jobs in 2008. Seventy-nine percent of jobs were in hospital departments of respiratory care, anesthesiology, or pulmonary medicine. Clinics, physician offices, nursing homes, and home care equipment companies accounted for most of the remaining jobs. The BLS expects employment of respiratory therapists to increase faster than the average of all occupations, increasing 20.9 percent from 2008 to 2018, with a projected employment in 2018 of 128,100, which is a faster rate of increase than the average for all occupations (1.0 percent).

In 2000, according to the American Association of Respiratory Care (AARC), the mean age for respiratory therapists was 40 years old. In 2005, this rose to 44.6 years. These numbers suggest the profession is aging and tracks closely with similar statistics of other professions. It is anticipated that the demand for respiratory therapists will continue to rise because of the aging population and breathing disorders associated with aging, increased rates of asthma, the continued development of neonatal and pediatric intensive care units, and the retirement of the current workforce over the next 10 years.

State Supply and Demand

It is interesting to note that Tennessee has a high rate of tobacco-using citizens and a high prevalence rate of cardiovascular and lung disease. These factors may contribute to the increased demand for this profession.

The estimated employment in 2008 for respiratory therapists in Tennessee was 2,812. The projected employment for 2016 is 3,280, representing a growth rate of 24.6 percent (2.2 percent annual average), with an average of 105 openings annually. These numbers are consistent with the national trend. The outlook for respiratory therapists in Tennessee is favorable and occupations in the field are expected to be in demand with employers. The growth rate is positive. There were more job openings expected annually than training completers in a recent year.

There are eight respiratory therapist (advanced) programs in Tennessee offering A.A.S. degrees. These programs last between 21 and 24 months. There are three respiratory therapist (advanced) programs in Tennessee offering B.S. degrees. The program at East Tennessee State University also provides a track leading to an M.S. degree in allied health leadership. See Table 2.14.

Several four-year institutions in the state have developed formal A.A.S.-to-B.S. tracks. These tracks typically can be completed traditionally or online.

TABLE 2.14
A.A.S. and B.S. Programs in Tennessee

A.A.S. Programs in Tennessee	B.S. Programs in Tennessee
Chattanooga State Technical Community College	Baptist College of Health Sciences
Columbia State Community College	East Tennessee State University
Concorde Career College	Tennessee State University
Miller-Motte Technical College	
Roane State Community College	
Jackson State Community College	
Volunteer State Community College	
Walter State Community College	

Summary

Respiratory therapists are specialists focusing on the diagnosis and care of patients with breathing disorders. The demand for respiratory therapists is expected to increase at a pace faster than the average of all occupations—20.9 percent between 2008 and 2018 (2.0 percent annually) according to the BLS. The increasing demand will come from an aging population, which increases the incidence of cardiopulmonary disease. Also, advances in inhalable medications and in the treatment of lung transplant patients, heart attack and accident victims, and premature infants will increase the demand for the services of respiratory care practitioners. Hospitals employ the majority of therapists.

According to "The Source," there were 156 associate's degree completers in 2008 and 20 bachelor's degree completers. This is an increase from the 81 total completers in 2000.

The outlook for this field in Tennessee is favorable, and occupations in respiratory therapy are expected to be in demand with employers. The growth rate is positive. There were more job openings expected annually than training completers in a recent year. Local demands may change within a short period of time and may not always reflect state workforce data.

Dietitian/Nutritionist and Dietetic Technician

Dietitians/nutritionists are health professionals who deal with human nutrition. A registered dietitian/nutritionist meets requirements that are established by the American Dietetic Association. Dietitians/nutritionists help individuals and families of all ages, cultures, and economic means in choosing foods for adequate nutrition in health or illness throughout the life cycle. Dietitians/nutritionists also supervise the preparation and service of food to groups, develop modified diets, participate in nutrition research, and supervise the nutritional aspects of health care. Dietetic technicians work under the direction of dietitians/nutritionists.

Status

- Nationally, the demand for registered dietitians/nutritionists is expected to increase almost as fast as the average for all occupations through 2018 as a result of increasing emphasis on disease prevention through improved dietary habits and due to increased public awareness of diabetes and obesity and general public interest in nutrition. Demand for dietetic technicians is expected to increase faster than the average for all occupations. State data mirrors that of the nation for both occupations.
- Medicare coverage may be expanded to include medical nutrition therapy for renal and diabetic patients, creating job growth for dietitians and nutritionists specializing in those diseases.
- Job prospects for dietitians/nutritionists in Tennessee will be limited because there are more training completers than there are open positions, although population ratios in this area as compared to the United States are less than the national average.
- Employment is expected to grow faster in contract providers of food services, social services agencies, and offices and clinics of physicians than in hospitals and nursing care facilities, which will be contracting out more services.

Description

Dietitians/nutritionists may work in hospitals and other health care facilities or in private practice. They may work for government or community agencies, food industries, restaurants, schools, universities, or the military or in communications, sales, or a variety of other situations. Major areas of practice include clinical, community, management, and consultant dietetics.

Registered dietetic technicians work independently or in teams with registered dietitians in a variety of employment settings including health care, business and industry, public health, food service, and research.

Educational Preparation

The Commission on Accreditation for Dietetics Education (CADE) currently accredits programs for the preparation of registered dietitians/nutritionists and dietetic technicians. Dietitians and nutritionists need at least a bachelor's degree in an accredited program in dietetics, foods and nutrition, food service systems management, or a related area. After completing the degree, individuals must complete a CADE-accredited supervised practice program at a health care facility, community agency, or food service corporation or must complete a supervised practice program in combination with undergraduate or graduate studies. Typically, a practice program lasts six to twelve months. The final requirements are to pass a national examination administered by the Commission on Dietetics Registration (CDR) and the completion of continuing professional education requirements to maintain registration.

To become a registered dietetic technician, individuals must obtain at least a two-year associate's degree and complete a dietetic technician program accredited by CADE including 450 hours of supervised practice experience in various community programs, health care, and food service facilities. The individual must then pass a national written examination administered by the CDR and complete continuing professional education requirements to maintain registration.

National Supply and Demand

The Bureau of Labor Statistics reported that dietitians and nutritionists held about 60,300 jobs in 2008 with projections of 65,800 for 2018. More than half were in hospitals, nursing homes, or offices and clinics of physicians. State and local governments provided additional jobs—mostly in correctional facilities, health departments, and other public health-related areas.

Other jobs were found in restaurants, social service agencies, residential care facilities, diet workshops, physical fitness facilities, school systems, colleges and universities, and the federal government—mostly in the Department of Veterans Affairs. Some dietitians and nutritionists were employed by firms that provide food services on contract to such facilities as colleges and universities, airlines, correctional facilities, and company cafeterias. Some dietitians are self-employed, working as consultants to facilities such as hospitals and nursing homes or providing dietary counseling to individual clients.

As of 2008, there were 227 bachelor's and master's degree programs approved by CADE. Supervised practice experience can be acquired in two ways. The first requires completion of a CADE-accredited coordinated program. As of 2001, there were 55 accredited programs, which combined academics and supervised practice experience and generally lasted four to five years. The second option requires completion of 900 hours of supervised practice experience in any of the 252 CADE-accredited internships. Internships may be full-time programs lasting 6 to 12 months or part-time programs lasting two years. Students interested in research, advanced clinical positions, or public health may need an advanced degree.

According to the Bureau of Labor Statistics, employment of dietitians/nutritionists is expected to increase by 9.2 percent during the 2008–2018 period (9 percent annually), about as fast as the average for all occupations, because of increased emphasis on disease prevention, an expanding aging population, and public interest in nutrition. Employment projections for dietitians for 2018 are 65,800 and 28,700 for dietetic technicians.

Employment growth may be constrained if some employers substitute other workers—such as health educators, food service

managers, and dietetic technicians—to do work related to nutrition. Also, demand for nutritional therapy services is related to the ability of patients to pay, either out-of-pocket or through health insurance, and although more insurance plans now cover nutritional therapy services, the extent of such coverage varies among plans. Growth may be curbed by limitations on insurance reimbursement for dietetic services.

Hospitals will continue to employ a large number of dietitians and nutritionists to provide medical nutritional therapy and to plan meals. But hospitals also will continue to contract with outside agencies for food service and move medical nutritional therapy to outpatient care facilities, slowing job growth in hospitals as compared to food service, outpatient facilities, and other employers.

The number of dietitian/nutritionist positions in nursing care facilities is expected to decline because these establishments continue to contract with outside agencies for food services. However, employment is expected to grow rapidly in contract providers of food services in outpatient care centers and in offices of physicians and other health practitioners.

Finally, with increased public awareness of obesity and diabetes, Medicare coverage may be expanded to include medical nutrition therapy for renal and diabetic patients, creating job growth for dietitians and nutritionists specializing in those diseases.

State Supply and Demand

Approximately 1,157 registered dietitians/nutritionists were employed in the state of Tennessee during 2008. The distribution of jobs follows the national average of approximately 33 percent employed in hospitals, 10 percent in long-term care facilities, 9 percent in community and public health, 10 percent in clinics and ambulatory care, and 11 percent in private practice as consultants. The number of registered dietetic technician positions in Tennessee during 2008 was 840. Total average job openings are 40 for dietitians/nutritionists representing 9.5 percent overall growth (.9 percent annual average) and dietetic technicians 40 openings representing 17.1 percent growth (1.6 percent annual average). This increase from the 2004 Allied Health study of less than 100 technicians may be due

to changing requirements in the certification process. Certification is no longer limited to those graduates with associate degrees but is also open to those with baccalaureate degrees.

There are ten private colleges and public universities in the state that offer didactic programs in dietetics, including the University of Tennessee at Chattanooga, Tennessee Technological University, Carson-Newman College, East Tennessee State University, the University of Tennessee at Knoxville, the University of Tennessee at Martin, the University of Memphis, Middle Tennessee State University, Lipscomb University, and Tennessee State University.

In Tennessee, there are seven postgraduate dietetic internships that provide the supervised practice component of dietetics training. These programs are at East Tennessee State University, the University of Tennessee at Knoxville, the University of Tennessee at Martin, the University of Memphis, National Health Corporation, Lipscomb University, and Vanderbilt University Medical Center. These programs accept 66 students per year, with Vanderbilt having the largest program.

There is only one dietetic technician training program in Tennessee, indicating an unmet need in providing opportunities for dietetic technician positions in the state. An associate's degree is offered at Shelby State Community College, with an enrollment of 21 students annually.

Summary

The demand for registered dietitians/nutritionists and dietetic technicians is expected to increase faster than the average for all occupations through 2018 as a result of increasing emphasis on disease prevention through improved dietary habits and due to increased public awareness of diabetes and obesity and general public interest in nutrition. A growing and aging population will increase the demand for meals and nutritional counseling in nursing homes, schools, prisons, community health programs, and home health care agencies. In addition to employment growth, job openings also will result from the need to replace experienced workers who leave the occupation.

The number of dietitian/nutritionist positions in hospitals and nursing care facilities is expected to grow slowly as these organizations continue to contract out food service operation and move medical nutrition therapy to outpatient care facilities. On the other hand, employment is expected to grow quickly in contract providers of food services, social services agencies, and offices and clinics of physicians. Medicare coverage may be expanded to include medical nutrition therapy for renal and diabetic patients, creating job growth for dietitians and nutritionists specializing in those diseases.

The outlook for this field in Tennessee is a competitive market, although the growth rate is positive. There were more training completers in a recent year than job openings expected annually for the state, although population ratios in this area as compared to the United States are less than the national average for dietitians/nutritionists. The reverse is true for dietetic technicians. Local demands may change within a short period of time and may not always reflect state workforce data.

Surgical Technologist

Surgical technologists work with surgical personnel delivering patient care and assuming appropriate responsibilities before, during, and after surgery.

Status

- Growth for surgical technologists at both the state and national level is expected to be positive, with a national growth rate of 25.3 percent between 2008 and 2018 (2.5 percent annually). The state rate of growth mirrors that of the nation.
- Growth is expected as the number of surgeries increases due to an aging population. Technological advances will permit an increasing number of new surgical procedures to be performed and will also allow surgical technologists to assist with a greater number of procedures.
- Hospitals will continue to be the primary employer of surgical technologists, with increased growth expected in physicians' offices and in outpatient care centers.
- JAR hospital vacancy data indicates a vacancy rate of 2.4 percent in 2008, with a vacancy rate of 9.1 percent in the West district, while other local vacancy rates vary (Appendix D).
- Population ratios for the state are higher than that of the nation.

Description

Surgical technologists, also called scrubs and surgical or operating room technicians, work with surgical personnel delivering patient care and assuming appropriate responsibilities before, during, and after surgery. They prepare the operating room by selecting and opening sterile supplies. Preoperative duties also include assembling, adjusting, and checking nonsterile equipment to ensure that it is in proper working order. Common duties include operating sterilizers, lights, suction machines, electrosurgical units, and diagnostic equipment. During surgery, technologists pass instruments and other sterile supplies to surgeons; help prepare, care for, and dispose of specimens taken for laboratory analysis; and help apply dressings. Postoperatively, surgical technologists may help transfer patients to the recovery room and clean and restock the operating

room. Certified surgical technologists with additional specialized education or training may also act in the role of the surgical first assistant or circulator. These duties include providing aid in exposure, hemostasis, and other technical functions under the surgeon's direction. The circulating technologist is the "unsterile" member of the surgical team who interviews the patient before surgery, prepares the patient, and helps with anesthesia.

Educational Preparation

Certificate programs for surgical technology are offered in hospitals, the military, vocational schools, technical schools, community colleges, and universities. Programs vary from 9 to 24 months and lead to a certificate, diploma, or associate's degree. Programs provide classroom education and supervised clinical experiences. Certification also can be obtained from the National Center for Competency Testing (NCCT). To qualify to take the exam, candidates follow one of three paths: completing an accredited training program; undergoing a two-year hospital on-the-job training program; or acquiring seven years of experience working in the field. After passing the exam, individuals may use the designation "Tech in Surgery-Certified," TS-C (NCCT). This certification must be renewed every five years through either continuing education or reexamination. Most employers prefer to hire certified technologists. Surgical technologists advance by specializing in a particular area of surgery.

National Supply and Demand

In 2006, there were 400 accredited surgical technologist programs. This is up from a previous figure of 363 programs. Hospitals will continue to be the primary employers, although much faster employment growth is expected in other health care industries. Surgical technologists held about 91,500 jobs in 2008 with almost 70 percent employed by hospitals, mainly in operating and delivery rooms. Others are employed in physicians' offices and by dentists who perform outpatient surgery and in outpatient surgery centers, including ambulatory surgical centers. A few technologists are employed directly by surgeons who have special surgical teams, such as those for liver transplants. Employment of surgical technologists is expected to grow 25.3 percent between 2008 and 2018, faster than the average, with projected jobs in 2018 of 114,700. This is

due to the increasing and aging population. Older people, including those of the baby boomer generation, who generally require more surgical procedures, will account for a larger portion of the general population. In addition, technological advances will permit an increasing number of new surgical procedures to be performed and will also allow surgical technologists to assist with a greater number of procedures. Hospitals will continue to be the primary employer of surgical technologists, with increased growth expected in physicians' offices and in outpatient care centers.

State Supply and Demand

The number of employed surgical technologists in 2008 was 3,281 with projected employment in 2016 of 3,900, representing a 2.5 percent annual average growth rate. The number of surgical procedures is expected to rise as the population grows and ages. The growth plus replacement needs for surgical technologists are estimated to average about 175 openings per year from 2008 to 2018.

Accredited surgical technologist programs are located at Concorde Career College, Cumberland School of Technology, Dyersburg State Community College, High-Tech Institute of Nashville, Miller-Motte Business College, Nashville State Community College, Northeast State Technical Community College, and the Tennessee Technology Centers in Chattanooga, Crossville, Dickson, Hohenwald, Jackson, Knoxville, McMinnville, Memphis, Murfreesboro, and Paris. These programs either lead to a certificate or diploma.

Summary

Hospitals will continue to be the primary employer of surgical technologists, with increased growth expected in physicians' offices and in outpatient care centers, According to the state economic outlook, this field in Tennessee is a competitive market. Growth in demand for surgical technologists is expected due in part to an aging population and an increased number of surgeries within this group. Technological advances allow for an increasing number of new procedures to be performed. Growth is expected at both the state and national level. The outlook for this field in Tennessee is a competitive market with more training completers than job openings expected annually in the state. Local demands may change within a short period of time and may not always reflect state workforce data.

Physician Assistant

Physician assistants practice medicine in conjunction with a supervising physician. They are licensed to work in primary care settings as well as in medical and surgical specialties.

Status

- With an impending national physician shortage, especially in primary care, there will be an increased demand for physician assistants.
- The BLS projects a 39 percent growth in employment for physician assistants through 2018 (3.9 percent annually).
- Tennessee is well below the national average in the number of practicing physician assistants per population. With several new programs in the state, that situation may change in the coming years.

Description

Physician assistants (PAs) practice medicine under the supervision of a physician. They are educated to diagnose and treat medical conditions. They exercise supervised prescriptive authority, order and interpret various medical and laboratory tests, and conduct physical exams. They are trained to deliver a wide array of medical and surgical services. PAs work in both primary care and medical specialties. The work settings vary and include solo physician practices and multispecialty group practices, hospitals (including inpatient units, emergency rooms, outpatient units, and operating rooms), community health centers, and other settings. A little over one-third of PAs work in primary care fields (family/general medicine, general internal medicine, general pediatrics, or obstetrics/gynecology) and the remainder work in medical or surgical specialty fields. Approximately two-thirds of practicing PAs are women. Physician assistants are certified by the National Commission on Certification of Physician Assistants with the PA-C credential (Physician Assistant-Certified). All 50 states, the District of Columbia, and most U.S. territories regulate the practice of PAs through licensure.

Educational Preparation

Most physician assistants are educated at the master's degree level. In the past decade, many baccalaureate-level programs have transitioned to the graduate level. Currently, there are about 145 programs in the U.S. accredited by the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA). Programs average about 25 to 27 months in length. Nationally, most PA programs enroll 35 to 45 students in each entering class. Generally, the competition for admission is keen with many programs having five or more applicants per entering space. In all programs, students complete clinical education rotations in the medical specialties of family medicine, internal medicine, geriatric medicine, pediatrics, obstetrics and gynecology, surgery, and emergency medicine.

National Supply and Demand

According to the American Academy of Physician Assistants (AAPA), there are slightly more than 80,000 physician assistants eligible to practice in the U.S., and approximately 75,000 are actually employed and in practice. Employment projections by the BLS for 2018 are 103,900. The median age of PAs is approximately 39 and the mean age at time of graduation from a PA educational program is 30 years. The BLS in November 2009 estimated that there will be a need for an additional 42,800 PAs in the workforce by 2018 due to job growth and replacements for those retiring or leaving the workforce. It should be noted that the BLS estimates were made prior to the existing initiatives for health reform or the continuing concern about decreasing numbers of medical graduates entering primary care. Based on more recent developments, the need for PAs may exceed BLS projections.

State Supply and Demand

The AAPA estimates the number of physician assistants in clinical practice in Tennessee as of December 31, 2008, to be 954. Per capita, there were 156 PAs per million in population, resulting in a national ranking of 43rd, well below the national average. Occupations in this cluster are expected to be in demand with employers with a positive growth rate. There are four PA programs

in Tennessee, and two of the four have provisional accreditation. The accredited PA programs are at Trevecca Nazarene University and South College, and the programs with provisional accreditation are at Bethel University and Lincoln Memorial University. According to the accrediting agency, ARC-PA, "Provisional accreditation is granted for a limited, defined period of time to a new program that has demonstrated its preparedness to initiate a program in accordance with the Standards." Bethel University's program was open from 2001 to 2006. It started again and was reaccredited in 2008. With several new programs initiated within the last few years, the supply of PAs from Tennessee institutions should increase significantly. In comparing data from AAPA regarding national and Tennessee characteristics, by most measures Tennessee PAs are very similar to their national counterparts except that there is a greater proportion of male PAs in Tennessee (50 percent in Tennessee versus 36 percent nationally); they are more likely to work in hospital emergency rooms as a primary site for work (15 percent versus 10 percent); they are more likely to work in a single specialty physician group practice (28 percent versus 23 percent), including family/general medicine (31 percent versus 26 percent); and they are more likely to work in a non-metropolitan area.

Summary

Educational programs for PAs have increased over the last few decades both at the national level and in Tennessee. At the end of 2008, there were 142 PA programs in the U.S. The accredited PA programs in Tennessee are at Trevecca Nazarene University, a program which began in 1978 and graduates approximately 25 students per year, and South College which began in 2007. The newer programs with their dates of initial accreditation are Bethel University, 2008, and Lincoln Memorial University, 2009. The outlook for this field in Tennessee is favorable. Health care reimbursement and the receptivity of physicians to utilize physician assistants cause rather wide variation in the number of PAs in practice in any given state. Local demands may change within a short period and may not always reflect state workforce data.

Emergency Medical Services

Emergency medical service providers give care to people in pre-hospital emergencies and transport them to hospitals or other health care institutions.

Status

- The BLS projects that employment of emergency medical technicians (EMTs) will grow less than the average for all occupations through the year 2018, at a rate of 9 percent (.9 annually).
- Some of the state will grow at a rate of 2 percent annually as positions change from volunteer to paid positions. Additional openings may occur because of the limited potential for advancement and modest pay and benefits.
- An aging population will be more likely to have medical emergencies, resulting in an increased demand for EMTs and paramedics
- Emergency medical technicians and paramedics need formal training and certification or licensure, though requirements vary by state. Specific responsibilities of EMTs and paramedics depend on their level of qualification and training.
- Private ambulance companies compete for emergency service personnel with fire departments and hospitals.
- The National Registry of Emergency Medical Technicians (NREMT) certifies emergency medical service providers at five levels: First Responder, EMT-Basic, EMT-Intermediate/85, EMT-Intermediate/99, and Paramedic.
- Population ratios indicate a state ratio much greater than that of the nation.

Emergency Medical Technician (EMT)

Emergency medical service providers give care to people in pre-hospital emergencies and transport them to hospitals or other health care institutions. In Tennessee, there are three classifications in EMS

licensure: EMT-IV, EMT-Paramedic, and Critical Care Paramedic. In Tennessee, EMTs may also initiate IV lines; there are no intermediate EMTs; and the critical care paramedic is a person who is licensed as a Tennessee paramedic.

Description

The National Registry of Emergency Medical Technicians (NREMT) certifies emergency medical service providers at five levels: First Responder, EMT-Basic, EMT-Intermediate/85, EMT-Intermediate/99, and Paramedic. Some states have their own certification programs with distinct names and titles. In Tennessee, there are three classifications in EMS licensure: EMT-IV, EMT-Paramedic, and Critical Care Paramedic.

Specific responsibilities of EMTs and paramedics depend on their level of qualification and training. All EMTs may open airways, restore breathing, control bleeding, treat for shock, assist in childbirth, bandage wounds, treat and assist heart attack victims, give initial care to poison and burn victims, and use external defibrillators to care for patients experiencing cardiac arrest (BLS, 2003). In Tennessee, EMTs may also initiate IV lines.

Intermediate EMTs have more advanced training that allows them to administer intravenous fluids, use advanced airway techniques to assist patients experiencing respiratory emergencies, and use other intensive care procedures. Tennessee does not have intermediate EMTs.

EMT-paramedics provide the most extensive pre-hospital care. They may administer drugs orally and intravenously, perform and interpret electrocardiograms, perform intubations, use complex equipment, and perform and interpret 12-lead electrocardiograms (BLS, 2003).

In Tennessee, the critical care paramedic is a person who is licensed as a Tennessee paramedic and has successfully completed a critical care paramedic program recognized by the Division of Emergency Medical Services. A critical care paramedic may access existing and manage invasive lines such as, but not limited to, parenteral internal central catheters (PICC), Hickman catheters, Portacaths, central, and arterial lines; initiate and manage ventilators;

manage care of tracheostomy tubes; initiate and manage surgical airways and chest tubes; provide care for cardiac patients with cardiac interventions and advanced therapeutic devices (among other procedures and equipment); and perform and interpret 12-lead electrocardiograms.

Educational Preparation

Nationally, training is offered at three progressive levels: EMT basic, intermediate, and paramedic. EMT training is offered in all 50 states and the District of Columbia by police, fire, and health departments; training may also be provided in hospitals and through nondegree courses in colleges and universities. Tennessee does not, however, offer training at the basic EMT level but rather at the EMT-IV level. Tennessee also does not offer training at the intermediate EMT level.

EMT basic is the minimum training needed to qualify for an EMT job. The basic training focuses on emergency skills such as managing respiratory, trauma, and cardiac emergencies and patient assessment. The program provides instruction and practice in dealing with bleeding, fractures, airway obstruction, cardiac arrest, and emergency childbirth. Graduates of approved EMT basic training programs must pass a written and practical examination administered by the state certifying agency or the National Registry of Emergency Medical Technicians.

Intermediate EMT training requirements vary from state to state. Most graduates of intermediate EMT training continue their education and receive the paramedic EMT certification. These programs last about two years and typically require 30–350 hours of training based on scope of practice. Students learn advanced skills such as the use of advanced airway devices, intravenous fluids, and some medications.

EMT-paramedic licensure requires training in anatomy and physiology as well as advanced medical skills. Typically, this training is conducted in community colleges and technical schools over one to two years and an associate's degree is awarded. These programs prepare the graduate to take the NREMT examination to become certified as a paramedic. Extensive related coursework and clinical and field experience is required.

All 50 states possess a certification procedure. In 42 states and the District of Columbia, registration with the National Registry is required at some or all levels of certification. Other states require their own certification examination or provide the option of taking the National Registry exam. To maintain certification, EMTs and paramedics must renew their certification or licensure, usually every two years (BLS, 2008–2009).

National Supply and Demand

The BLS projects that employment of EMTs will grow less than the average for all occupations through the year 2018, at a rate of 9 percent, with projections of 62,000 jobs due to growth and replacement needs in 2018. Some growth will occur as positions change from volunteer to paid positions. It is becoming difficult for emergency medical services to recruit and retain unpaid volunteers because of the amount of training and the large time commitment these positions require. There will still be demand for part-time and volunteer EMTs in rural areas and smaller metropolitan areas. Additional openings may occur because of the limited potential for advancement as well as the modest pay and benefits. Additionally, an aging population will become more likely to have medical emergencies, resulting in an increased demand for EMTs and paramedics.

EMTs held about 210,700 jobs in 2008. About four in ten worked in local and suburban transportation or private ambulance services. About three in ten worked in fire, public ambulance, and emergency medical services (EMS). About two in ten worked in hospitals, and one in ten worked in various other industries providing emergency services. In addition, there are many volunteer EMTs.

In 2008 there were 239 paramedic EMT programs in the United States (Source: Annual JEMS Resource Guide, www.jems.com/resources/directory/Accredited_EMT_and_Paramedic_Programs.html, accessed August 2009). The number of accredited programs has continually grown since 1985, as Table 2.16 illustrates.

TABLE 2.15
Industries with the Highest Levels of Employment in This Occupation

Industry	Employment
Other Ambulatory Health Care Services	96,050
Local Government (OES designation)	58,100
General Medical and Surgical Hospitals	40,090
Offices of Physicians	1,960
Outpatient Care Centers	1,850

TABLE 2.16
National Accredited Paramedic Emergency Medical Technicians Programs

Year	Number of Programs
1985	20
1990	72
1995	96
1998	109
2002	149
2008	239

Source: Health Professions Education Directory, 2007–08.

State Supply and Demand

The estimated employment for EMTs and paramedics in Tennessee in 2008 was 6,837. The projected employment growth for 2016 is an average of 2 percent annually, with 195 average annual openings. Licensing data is available in Table 2.17.

Tennessee offers nine paramedic EMT programs. Five of the programs offer a certificate. These programs are located at Northeast State Technical Community College, Chattanooga State Technical Community College, Columbia State Community College, Tennessee Tech University, and Southwest Tennessee Community College. The four certificate and A.A.S. degree programs are through Volunteer State Community College, Jackson State Community College, Roane State Community College, and Walters State Community College. These programs last between 12 and 24 months.

TABLE 2.17
License History

Period Year	EMT	EMT-IV	Paramedic
1996	9,351	—	—
1997	10,251	—	—
1998	10,214	—	—
1999	4,868	3,072	3,117
2000	4,634	2,949	2,948
2001	4,796	3,052	3,053
2002	4,963	3,158	3,159
2003	11,801	—	—
2004	12,354	—	—
2005	7,652	—	—
2009	29,598	—	—

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

In 2008 there were 382 paramedic EMT completers in Tennessee. The outlook for this field in Tennessee is a competitive market, though the growth rate is positive. There were more training completers in a recent year than job openings expected annually.

Summary

While growth is below the average for all occupations, demand is expected to grow as paid positions replace volunteer positions and as workers leave due to limited potential for advancement and modest pay. The expanding population, particularly in older age groups that are the greatest users of emergency medical services, will also play a part in the growth in this field. Local demands may change within a short period of time and may not always reflect state workforce data.

Dental Hygienist and Dental Assistant

The registered dental hygienist is a licensed, professional, oral health educator and clinician, who, as a co-therapist with the dentist, provides preventive, educational, and clinical services in a variety of settings including private dental practices, public health clinics, public schools and hospitals, and at research facilities, in business, and in industry. Dental assistants perform their primary duties chair-side with the dentist, and they also perform a variety of related office and laboratory procedures under the direction or supervision of the dentist. Many dental assistants learn their skills on the job, but an increasing number are trained in dental assisting programs; most programs take less than one year to complete.

Status

- Currently in Tennessee, both dental hygienists and dental assistants should expect excellent job prospects.
- Dental hygienists and dental assistants are increasingly responsible for patients' routine dental care so that dentists may focus on more complex procedures. This has increased the demand for hygienists and assistants.
- BLS data indicate a 62.9 percent increase for dental hygienists through 2018 (6.2 percent annually) and 35.8 percent for dental assistants (3.5 percent annually), which are both underrepresented in population ratio data for the state.
- State data indicate a growth rate through 2016 of 24.8 percent (2.4 percent annually for dental hygienists) and 24.5 percent (2.4 percent annually) for dental assistants.

Description

The three basic dental auxiliary categories that make up the dental team are the dental hygienist, dental assistant, and dental laboratory technician. Data are reported on the dental hygienist and dental assistant as there are currently no accredited dental laboratory technician schools in Tennessee.

The registered dental hygienist is a licensed, professional, oral health educator and clinician, who, as a co-therapist with the dentist, provides preventive, educational, and clinical services in a variety of settings including private dental practices, public health clinics, public schools and hospitals, and at research facilities, in business, and in industry. Dental hygienists' duties may include patient-screening procedures, taking and developing dental radiographs, removing calculus and plaque from all surfaces of the teeth, applying preventive materials to teeth, making impressions of patients' teeth for study casts, and counseling patients on good dental health.

Depending upon the state in which the hygienist practices, supervision by a licensed dentist occurs at one of three levels: general supervision, meaning that the dentist does not have to be physically present; indirect supervision, meaning the dentist is in the facility; and direct supervision, when the dentist must evaluate each patient at the end of the dental hygiene procedure.

Dental assistants perform their primary duties chair-side with the dentist, and they also perform a variety of related office and laboratory procedures under the direction or supervision of the dentist. Duties of dental assistants include preparing and sterilizing equipment, assisting the dentist during a variety of treatment procedures, asking about the patient's medical history, and taking impressions of patients' teeth for study casts. In addition, dental assistants often perform office management tasks such as scheduling and billing.

Educational Preparation

A minimum of two years of college education is necessary to become a dental hygienist. The majority of community college dental hygiene programs take two years to complete, with graduates receiving associate's degrees. University dental hygiene programs may offer baccalaureate and master's degrees, which generally require at least two years of additional schooling. Programs are accredited by the Commission on Dental Accreditation of the American Dental Association.

Almost all states require that dental hygienists be graduates of commission-accredited dental hygiene programs to be eligible for state licensure. Additionally, nearly all states require candidates for

licensure to obtain a passing score on the National Board Dental Hygienic Examination in addition to passing the state exam.

Dental assistants receive their formal training through academic programs at community colleges, vocational schools, technical institutes, universities, or dental schools. The Commission on Dental Accreditation also accredits these programs. Academic dental assisting programs range from earning an associate's degree of applied science in two years to earning a technical certificate in 9 to 11 months. In some areas of the country, dental assistants can begin their careers with on-the-job training and without a college degree; however, education is encouraged in order to ensure training in the latest procedures and techniques.

National Supply and Demand

The BLS predicts that dental hygiene will be one of the 30 fastest-growing occupations in the coming years. Job opportunities are expected to remain excellent.

The number of dental hygienists employed in 2008 reached 174,100. Projecting a 36.1 percent increase over ten years with 62,900 more hygienists, that number is expected to rise to 237,000 by 2018 (3.6 percent annually).

Over one-half of dental hygienists work part-time. Almost all dental hygienists work in private dental offices. Others work for employment services, in physicians' offices, or in industries. Because multiple job holding is not unusual, the number of jobs exceeds the number of hygienists. A distinctive feature about this job is the flexible scheduling it allows.

BLS predicts that dental assistants should expect to be hired more often to perform routine dental tasks so that dentists may devote their time to more complex procedures. Job opportunities are expected to remain excellent.

The number of dental assistants employed in 2008 reached 295,300. That number is expected to increase, raising the number of dental assistants to 400,900 in 2018, an increase of 35.8 percent over ten years (3.5 percent annually). In fact, dental assistants are expected to be among the fastest-growing occupations over the 2008–2018 projection period.

Almost all positions for dental assistants are in dentists' offices. A small number of jobs are in federal, state, and local governments or in physicians' offices. About 35 percent of dental assistants work part-time, sometimes in more than one dental office.

TABLE 2.18
Accredited Dental Assistant and Dental Hygienist Programs in the United States

Year	Dental Assistant	Dental Hygienist
1985	290	198
1990	244	202
1995	229	212
2002	260	267
2009	280	304

Source: Health Professions Education Data Book, 2003–2004.
**Source: American Dental Association, January 2009.*

State Supply and Demand

According to the Tennessee Department of Workforce Development, "The Source," there were 3,252 dental hygienists and 5,386 dental assistants employed during 2008. "The Source" also reports that in 2008 there were 28 completers of all dental hygiene programs in Tennessee. All 28 completers were employed, making the employment rate 100 percent. This growth rate is positive and the outlook is favorable, showing that dental hygienists are expected to be in demand with employers. That same year, there were 88 completers of the dental assisting program. Seventy-seven were employed, making the employment rate 87.5 percent. This growth rate is still considered positive within a competitive market.

TABLE 2.19
Tennessee Supply and Demand Data

Opportunities	Dental Hygienist	Dental Assistant
Estimated Openings 2008	3,252	5,386
Estimated Openings 2010	3,568	5,897
Estimated Openings 2016	3,800	6,290
Annual Average Growth	2.2	2.2

Source: Tennessee Department of Labor and Workforce Development, 2006.

In 2008, the estimated employment of dental hygienists in Tennessee was 3,252. The projected number of dental hygienists in 2010 is 3,568. The overall growth rate is 24.8 percent (annual average of 2.5 percent), with 135 average annual openings. The estimated employment of dental assistants in 2008 in Tennessee was 5,386. The projected employment for 2010 is 5,897. The growth rate is 24.5 percent (2.5 percent annual average) with 120 average annual openings in Tennessee. Projections for 2016 are included in Table 2.19.

TABLE 2.20
Number of Licensed Dental Hygienists and Dental Assistants in Tennessee in 2000, 2001, 2002, and 2009

Year	Dental Assistant	Dental Hygienist
2000	3,720	2,920
2001	3,814	3,011
2002	4,018	3,090
2009	6,657	3,887

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

Tennessee has seven programs in dental hygiene: Chattanooga State Community College, East Tennessee State University, Concorde Career College/Memphis, University of Tennessee College of Allied Health/Memphis, Remington College/Nashville, Tennessee State University, and Roane State Community College. All programs last between 17 and 24 months.

There are nine dental assistant programs in Tennessee: Chattanooga State Technical Community College, Tennessee Technology Center/Dickson, Northeast State Technical Community College, Volunteer State Community College, Tennessee Technology Center/Knoxville, Concorde Career Center/Memphis, Tennessee Technology Center/Memphis, Tennessee Technology Center/Murfreesboro and Kaplan Career Institute. All programs last between nine months and two years.

The Tennessee Department of Labor Assessment rated the growth rate for both dental hygienists and dental assistants as positive.

Summary

The BLS predicts that dental hygiene will be one of the 30 fastest growing occupations in the coming years. The BLS also predicts that dental assistants will be hired more often to perform routine dental tasks so that dentists may devote their time to more complex procedures. According to the state economic outlook, dental hygienists are in demand with employers and the outlook for this occupation is favorable. The outlook for dental assistants is considered a competitive market, though growth is expected. Almost all jobs for dental hygienists and assistants are in dentists' offices. Employment services, physicians' offices, and federal, state, and local governments employ a smaller number of individuals in these occupations. Local demands may change within a short period of time and may not always reflect state workforce data.

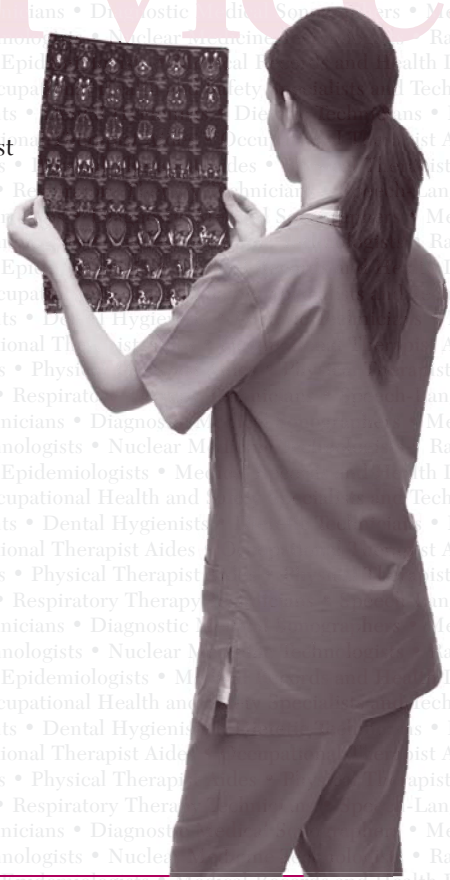
Diagnostic Services

Medical Imaging

Diagnostic Radiologic Technologist
Radiation Therapist
Nuclear Medicine Technologist
Diagnostic Medical Sonographer

Laboratory Services

Medical Technologist
Medical Laboratory Technician
Phlebotomist



Medical Imaging

Medical imaging professions include diagnostic radiologic technologist, radiation therapist, nuclear medical technologist, and diagnostic medical sonographer. They use noninvasive techniques to produce intended images for diagnosis and to treat disease.

Radiologic technologists, also referred to as radiographers, provide patient services using imaging equipment as directed by physicians qualified to order and/or perform radiologic procedures. Radiation therapists administer radiation treatments to patients using a planned design to treat cancers in the body that have been previously diagnosed. Nuclear medical technologists (NMTs) prepare stock solutions of radioactive materials and calculate doses to be administered for imaging.

Sonographers, also known as ultrasound technologists, direct nonionizing, high-frequency sound waves into areas of a patient's body; the equipment then collects reflected echoes to form an image. The image is viewed on a screen and may be recorded or photographed for interpretation and diagnosis by physicians.

Status

- Tennessee's radiography programs are adequate to meet current and projected needs, although hospital vacancies in excess of 4 percent are reported in the THA West and Middle districts.
- Numbers of graduates in Tennessee continue to increase, which may result in an oversupply in radiography and radiation therapy.
- The ARRT has formally approved the associate degree as the minimum education requirement for radiography, nuclear medicine, and radiation therapy beginning January 2015.
- Federal studies to determine the impact of educational standards on the quality of care in ultrasound are underway and may lead to increased federal regulations.
- Population ratios in Tennessee exceed the national ratio for all of the medical imaging fields.

Description

The medical imaging field encompasses a range of occupations that primarily use noninvasive techniques to produce internal images of the body and to treat diseases. Imaging professionals operate in a variety of settings including hospitals, freestanding clinics, and outpatient clinics, where they provide medical imaging and therapeutic services. These occupations emerged from x-ray technology and evolved from using radiation to create a simple internal body image to methods as varied as using radionuclides, sound waves, and magnetic fields to visualize internal organs, bones, and tissues.

Imaging professions reported in this study include diagnostic radiologic technology (radiography), including computed tomography (CT) and magnetic resonance imaging (MRI); radiation therapy; nuclear medicine technology; and diagnostic medical sonography. Radiographers are also trained to perform specific studies on breast tissue and vascular tissues and to detect osteoporosis.

For the purposes of this section, these occupations are grouped as follows: (A) diagnostic radiologic technology, including CT and MRI; (B) radiation therapy; (C) nuclear medicine technology; and (D) diagnostic medical sonography.

Diagnostic Radiologic Technologist (including CT and MRI)

Description

Radiologic technologists, also referred to as radiographers, provide patient services using imaging equipment as directed by physicians qualified to order and/or perform radiologic procedures. For radiographers, a gradual shift has taken place toward expanded job responsibilities and increased diagnostic latitude. Radiologic technologists who perform imaging examinations are responsible for accurately positioning patients and ensuring that a quality diagnostic image is produced. They work closely with radiologists, the physicians who interpret medical images, to either diagnose or rule out disease or injury. For the images to be interpreted correctly by the radiologist, the imaging examination must be performed properly by a radiologic technologist

Educational Preparation

Over time, radiography programs, which are two or four years in length, have moved from being hospital-based to predominantly college-based programs. Graduates from 721 approved programs sat for the American Registry of Radiologic Technologists (ARRT) examination in 2008. This represents a 24 percent growth rate in the number of programs in five years.

The Joint Review Committee on Education in Radiologic Technology (JRCERT) accredited 585 programs in 2003, and as of August 2009 the number has grown to 628 radiography programs. Graduates from regionally accredited programs also qualify to sit for the ARRT examination, bringing the total of approved programs to 721 nationally (www.arrt.org, accessed August 8, 2009).

In 2002, programs prepared 8,168 graduates who sat for the ARRT examination. In 2004, there were 11,860 graduates, which represents a significant growth in only two years. The number rose to 14,210 in 2008, indicating a slowing rate of growth in the number sitting for the primary radiography examination from 2004 to 2008.

The ARRT offers 12 postprimary certifications for those with advanced preparation and training: mammography, computed tomography, magnetic resonance imaging (both a primary and postprimary track), quality management, bone densitometry, cardiac-interventional radiography, vascular-interventional radiography, cardiovascular-interventional radiography (no longer available for new candidates), sonography (both a primary and postprimary track), vascular sonography, breast sonography, and radiologist assistant (postprimary certificate).

In 2003, four universities began radiologist assistant (RA) programs: now there are nine. The RA is an advanced clinical role for an ARRT-certified radiographer. The two newest programs were added in August 2009—Bloomsburg and Quinnipiac. These programs support the RA initiative by preparing individuals who are eligible for ARRT's registered radiologist assistant certification program. The RA extends the capacity of the radiologist by performing patient assessment, patient management, and fluoroscopy and by making initial observations of diagnostic images.

To be recognized by ARRT, RA programs must meet recognition criteria that include accreditation, clinical education, and preceptorship requirements.

National Supply and Demand

According to the BLS, in 2008 there were 214,200 radiologic technologists and technicians working in the U.S. with 251,700 projected for 2018. The ARRT reports that today there are more than 290,000 registrants.

The *Journal of the American Society of Radiologic Technologists* reported in April 1999 that the "current rate of growth in the number of new RTs was not sufficient to replace normal attrition from the profession, let alone the impending large-scale declines due to retirements. The ARRT 2002 annual report indicated an overall increase of 9.6 percent in first-time candidates, which was the second consecutive increase. An increased growth rate of almost 25 percent was noted in 2004. The sharp increase of graduates seen over several years appears to have leveled off: the 2008 figure indicates slower growth in the number sitting for the primary radiography examination than had been seen in the previous four years. This may be due, in part, to economic conditions.

TABLE 3.1
Certificate History – National

Year	Radiography
1994	10,628
1995	10,330
1996	9,427
1997	8,691
1998	8,146
1999	7,595
2000	7,149
2001	7,434
2002	8,168
2003	7,595
2004	11,860
2005	13,200
2006	14,061
2007	14,142
2008	14,210

Source: ARRT Annual Report, 1994–2009.

Even with these increases, the BLS expects that employment of radiologic technologists will increase by about 17.2 percent from 2008 to 2018, which is faster than average for all occupations. Although hospitals remain the principal employers—more than 60 percent—a number of new jobs will be found in physician's offices and diagnostic imaging centers. The American Society of Radiologic Technologists (ASRT) continues to track vacancy rates to assess staffing levels in medical imaging departments nationwide. Their 2006 data showed that vacancy rates for most specialty areas fell for the third year in a row, narrowing the gap between supply and demand.

In the last edition of this study, it was reported that the Department of Labor estimated that the annual graduation rate would not satisfy the need created by increased demand and attrition and that 50,000 more radiologic technologists would be needed within the next 10 years. This is contradicted by a 2008 ASRT study of the labor workforce, which estimates that between 2006 and 2016 a total of about 69,671 radiographers—almost 25 percent more than the BLS-estimated need—will have been added to (and remain in) the labor pool of radiographers. The study also noted that 7 percent of radiography program directors plan to increase their enrollments and 9 percent plan to decrease them. Schools and employers should use ASRT's data to set admissions and recruitment policies and to forecast workforce trends (www.asrt.org/Media/pdf/Research/EnrollmentSurvey08.pdf, accessed August 9, 2009).

State Supply and Demand

There are currently 7,184 registered technologists in good standing with the ARRT who reside in Tennessee, with 7,032 who identify radiography as their primary area of practice (www.arrt.org/registration/rtcensus.htm, accessed August 9, 2009). The Tennessee Department of Labor and Workforce Development reports 6,235 employed in Tennessee during 2008.

The Joint Annual Review reports vacancy rates for hospitals by county. They reported a 13 percent vacancy rate for hospitals in Tennessee in the last edition of this study. Their latest report indicates only a 3.32 percent vacancy rate. Considering there were only 259 new technologists prepared in Tennessee during 2004 and over 372 new

technologists in 2008, the present supply of new technologists may change the occupational outlook for Tennessee in this field.

TABLE 3.2
Tennessee Registered Radiographers, 1989–2009

Year	Radiography
1988	2,997
1989	3,255
1990	3,446
1991	3,557
1992	3,907
1999	4,891
2003	5,367
2008	7,184
2009	7,032

Source: American Registry of Radiologic Technology, 1988–2009 annual reports.

In Tennessee, there are 15 radiography programs. Nine of the 15 offer an A.A.S. degree, and four offer a B.S. degree. These programs are located at Chattanooga State Technical Community College, Columbia State Community College, Volunteer State Community College, Jackson State Community College, Southwest Tennessee Community College, Roane State Community College, Med Vance Institute in Nashville and Cookeville; certificate programs are at the University of Tennessee Medical Center at Knoxville, Metropolitan Nashville General Hospital, and Methodist Healthcare in Memphis; and baccalaureate programs are at the Baptist College of Health Sciences in Memphis, Austin Peay State University in Clarksville, East Tennessee State University of Elizabethton, and South College in Knoxville.

TABLE 3.3
Tennessee Radiography Programs and Graduates, 1989–2008

Year	Programs	Graduates
1989	11	120
1990	11	172
1991	13	179
1992	13	189
1999	12	160
2001	11	148*
2004	12	259**
2008	15	372**

Source: THEC graduation data, 2002.
**Graduation rates from THEC*
***New registrant data, ARRT annual reports*

The ARRT annual report indicated that 179 candidates in Tennessee sat for the ARRT exam in 1999, and 202 candidates each year sat for the ARRT exam in 2000, 2001, and 2002. This represented no growth in supply for that three-year period in Tennessee. However, within the past five years four new programs have opened, and the state and class size for most programs are at capacity with record applicant pools. Tennessee is producing a record number of graduates, resulting in a low vacancy rate in this field. According to the JAR, which records only vacancies in hospitals, there was only a 3.3 percent vacancy rate in Tennessee in 2007 and 2.8 in 2008, with regional shortages in the Middle and West THA districts (Appendix D).

Postprimary examinations offered through the American Registry of Radiologic Technology include computed tomography (CT), magnetic resonance imaging (MRI), cardiovascular-interventional technology, mammography, quality management, sonography, vascular cardiac-interventional technology, vascular-interventional technology, and bone densitometry. Formal training programs for these areas have been initiated in some institutions that also offer entry-level programs. Chattanooga State, Volunteer State, and most of the B.S. programs offer either online or traditional programs of varying length in several of the postprimary areas.

A limited practice x-ray technician is allowed to practice in Tennessee. These personnel are prepared through a 40-clock-hour course approved through the Tennessee Board of Medical Examiners, and completers take a state exam. The limited areas of practice presently include examinations of the chest and extremities.

Technicians and technologists must be licensed to work in most office settings. The Tennessee Occupational Information System reports continued growth, with a 2 percent growth rate expected until 2010 for technicians.

The advanced practice practitioner in Tennessee, the radiologist assistant, is regulated by the Board of Medical Examiners under Medical Doctor for Medical Operators. No programs are available in middle Tennessee

According to the state economic outlook, this field in Tennessee is a competitive market. Occupations in this field report more training completers than job openings expected annually.

Summary

Tennessee is educating an adequate number of radiographers as indicated by hospital vacancy rate data, population ratio data, and state supply and demand data. National shortages are not being recorded; there is an increase in the number of radiography applicants and graduates. A telephone survey of the programs in Tennessee indicates they are at capacity for the number of funded faculty positions.

Tennessee has converted two programs to baccalaureate-level, and two new baccalaureate-level programs in radiography have opened. Baccalaureate-level programs are sources of graduates who may be potential faculty members or managers in this discipline. Local demands may change within a short period of time and may not always reflect state workforce data.

Radiation Therapist

Status

- Tennessee is educating an adequate supply of radiation therapist to meet the demand.
- There are three radiation therapy programs in Tennessee.
- In 2008, 29 graduates sat for the ARRT registration examination.
- The Tennessee population ratio exceeds the population ratio for this discipline nationally.

Description

Radiation therapists administer radiation treatments to patients using a planned design to treat cancers in the body that have been previously diagnosed. The progressive improvement in the technology has led to a gradual increase in both the cognitive abilities and the general knowledge necessary to perform the tasks.

Educational Preparation

The increase in role requirements caused the professional organization ASRT to support a minimum requirement of a bachelor's degree for entry into the field. Although many programs now offer a B.S. degree, no mandate by the ARRT has been approved. ARRT registration following completion of an accredited bachelor's degree, associate's degree, or certificate in radiation therapy is required for practice.

National Supply and Demand

According to the BLS, employment is expected to increase much faster than the average, growing 27.1 percent from 2008 to 2018 (2.7 percent annually), and job prospects should be good, with 19,400 projected employment. As the population grows and an increasing share is in the older age group, the number of people needing treatment is expected to increase and to spur demand for radiation therapists.

According to an ASRT 2009 staffing study, it is estimated that 7.6 percent of all FTEs budgeted for radiation therapists are currently vacant and recruiting: 8.2 percent of dosimetrist positions,

12.1 percent of medical physicist positions, 9.2 percent of radiation oncologist positions, 7.1 percent of nursing positions, 6.1 percent of ancillary staff positions, and 10.2 percent of administrative staff FTEs in U.S. radiation therapy facilities are unfilled. Staffing shortages could affect patient care and increase the number of hours worked and the quality of patient care. Current BLS data suggests that there are around 15,300 working radiation therapists, most of whom are in hospitals (www.asrt.org/media/pdf/research/RTTStaffingReport2009.pdf, accessed August 9, 2009).

In 1985, there were 101 accredited radiation therapy programs nationally. In 1990, the number increased to 104 programs. In 1995, there were 120 accredited programs nationally, but the number dropped to 71 in 2002. As of 2009, there were 80 programs although more total graduates are recorded.

TABLE 3.4
Radiation Therapy – National

Year	Programs	Graduates
1985	101	—
1990	104	—
1991	111	659
1992	121	792
1994	—	1,045
1998	84	388
1999	—	389
2000	80	399
2001	79	579
2002	71	652
2008	80	1,008

Source: Health Professions Education Directory, 1991–2002, Annual Report to Radiologic Technologists, www.arrt.org, accessed August 7, 2009.

State Supply and Demand

In 2008, there were 408 estimated radiation therapists in Tennessee. The number needed was projected to be 480 in 2016. This represents a growth rate of 2.4 percent. By May of 2009, there were 400 registered radiation therapists which equals the projected growth rate, and represents more than the projected need (www.arrt.org/registration/rtcensus.htm).

In 2009, there were three accredited radiation therapy programs in Tennessee. There are two certificate programs, which last 12 months: Chattanooga State Technical Community College and Vanderbilt University Medical Center. Vanderbilt is also affiliated with Middle Tennessee State University to offer a B.S. degree. Vanderbilt recently restarted their program after a two-year inactive period. A program leading to a B.S. degree is also offered at Baptist College of Health Sciences in Memphis.

According to the *Health Professions Education Data Book* for 2007–2008, 36 students graduated from these programs in Tennessee and qualified to sit for the radiation therapy ARRT registration examination. In 2008, 29 graduates sat for the ARRT examination in Tennessee.

Summary

Tennessee has made progress toward educating an adequate supply of radiation therapists. One of the three programs in the state is sponsored by a medical center, and one is at a public community college that prefers certification in radiography for admission. Although this add-on approach provides career change opportunities for the radiographer, the national trend has been to provide training for radiation therapists at the bachelor's or associate's degree for entry-level, with bachelor's degree programs showing the most growth.

According to the state economic outlook, this field in Tennessee is a competitive market. Occupations in radiation therapy report more training completers than job openings expected annually. Local demands may change within a short period of time and may not always reflect state workforce data.

Nuclear Medicine Technologist

Status

- There is no overall shortage of Nuclear Medicine Technologists in Tennessee, although regional shortages may still be reported.
- In 2008 there were 23 new ARRT Nuclear Medicine candidates in Tennessee.
- There are five border states for Tennessee and they produce fewer graduates in this area and may be recruiting from Tennessee's graduation pool.
- The BLS projects that the outlook for this discipline is excellent and in demand through the year 2018.

Description

Nuclear medicine technology is the medical specialty that uses the nuclear properties of radioactive nuclides to make diagnostic evaluations of the anatomic or physiologic conditions of the body and to provide therapy with unsealed radioactive sources. These procedures typically involve preparing radioactive substances or isotopes, administering them to patients, operating equipment that takes images of radioactive substances within the body, and reading the results. Nuclear medical technologists (NMTs) prepare stock solutions of radioactive materials and calculate doses to be administered. They execute blood volume, red cell survival, and fat absorption studies following standard laboratory procedures. They operate cameras that detect or map the radioactive drug in a patient's body to create diagnostic images. The images are produced on computer screens for a physician to interpret. The skills of nuclear medicine technologists complement those of nuclear medicine physicians and other professionals in the field.

Nuclear medicine technology has been dramatically altered by computer enhancement. At the same time, government regulation has continued to grow, increasing the knowledge that the technologist must have of regulatory areas and radioactive materials management. The use of new technologies such as CT, MRI, and Positron Emission Tomography (PET) has reduced the number and types of studies performed by the nuclear medicine technologist. The expanded

approval of PET by the Centers for Medicare and Medicaid Services will increase the use of this imaging technology but may reduce other nuclear medicine imaging studies.

Professional Education

The professional portion of the program is one to four years long. Institutions offering accredited programs may provide an integrated educational sequence leading to a certificate, an associate's degree, or a baccalaureate degree over one to four years. Courses cover physical sciences, the biological effects of radiation exposure, radiation protection and procedures, the use of radiopharmaceuticals, imaging techniques, and computer application. Certification is voluntary. The two organizations that currently certify technologists in nuclear medicine are the Nuclear Medicine Technology Certification Board (NMTCB) and the American Registry of Radiologic Technology (ARRT). Many NMTs will have both certifications.

The NMTCB was formed for the purpose of creating and maintaining examinations for nuclear medicine technologists. Since 1978, the NMTCB has offered a high-quality certification exam for NMTs. More recently, it has provided specialty exams for NMTs who have a high level of knowledge in nuclear cardiology (the NCT exam) and NMTs, radiographers, and radiation therapists who have a high level of knowledge in positron emission tomography (the PET exam).

To sit for the certification examination, the NMTCB requires that one graduate from a program accredited by the Joint Review Committee on Educational Programs in Nuclear Medicine Technology (JRCNMT) or the six regional accrediting bodies. In 2006, there were about 100 accredited programs in the continental United States and Puerto Rico.

National Supply and Demand

The Department of Labor has indicated that the supply of nuclear medicine technologists has varied widely. The supply of technologists increased rapidly in the 1980s but declined in the middle and late 1990s. Technological innovations such as positron emission tomography (PET) and single photon emission tomography (SPECT) have expanded the diagnostic uses of nuclear medicine.

Another example of this expansion is the use of radiopharmaceuticals in combination with monoclonal antibodies to detect cancer at far earlier stages and without resorting to surgery. Another is the use of radionuclides to examine the heart's ability to pump blood. Wider use of nuclear medical imaging to observe metabolic and biochemical changes for neurology, cardiology, and oncology procedures will also spur some demand for these professionals, according to the BLS.

According to the BLS, employment for NMTs is expected to grow faster than the average for all occupations through the year 2018. Growth will arise from an increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures including nuclear medicine tests.

In 2008, there were 21,800 nuclear medicine technologists in the United States. Two-thirds were employed in hospitals, and the rest worked in physician's offices and diagnostic imaging centers.

In 1985, there were 141 accredited nuclear medicine technology programs, but this number dropped to 107 in 1990. The number rose in 1995 to 120 programs but dropped in 2002 to 92 accredited programs. There are 100 accredited programs in 2009, according to the Joint Review Committee on Education Programs in Nuclear Medicine Technology.

TABLE 3.5

U.S. Nuclear Medicine Technologists

Year	ARRT	NMTCB
1988	9,491	—
1989	9,784	—
1990	10,815	—
1993	11,022	—
1999	11,109	—
2000	—	—
2003	10,634	21,989
2008	12,678	25,230

Source: ARRT annual report of registered technologists, April 1999, 2001, 2003, 2009.

State Supply and Demand

Certification is voluntary; however, as of 2009 a total of 699 nuclear medicine technologists in Tennessee held certificates in NMTCB. According to the ARRT, there were 279 NMTs certified by the ARRT as of May 2009 who identified nuclear medicine technology as their primary practice. Two agencies provide certification/registration, ARRT and NMTCB, and practitioners often hold both. Accurate data on the total number of practitioners is not available.

In 2008, the estimated employment for nuclear medicine technologists in Tennessee was 558, and the number was projected to be 589 in 2018, representing an annual growth rate of 2.7 percent with 31 annual job openings.

In 2009, there were 40 new registrants from six nuclear medicine technology programs in Tennessee; 23 registered through ARRT and 35 certified through NMTCB. Many of these may hold dual certificates. Three programs are hospital-based and offer certificates and/or bachelor's degrees. Methodist Hospital of Memphis awards a certificate, Vanderbilt University Medical Center awards a certificate but articulates with several universities which offer the bachelor's degree upon completion, and the University of Tennessee Medical Center at Knoxville awards certificate and bachelor's degrees. One nonhospital-based program at Chattanooga State Technical Community College prefers the applicant be a radiographer and offers a certificate program. Baptist Memorial College of Health Sciences in Memphis offers a baccalaureate degree, and South College in Knoxville offers a certificate or baccalaureate degree.

There is no overall shortage of nuclear medicine technologists in Tennessee although some regions report vacancies. The supply of these professionals is currently provided by six programs that graduate a number equal to the projected state demand. The five border states produce fewer graduates in these areas and migration of Tennessee's graduates to other states may be occurring.

TABLE 3.6
Tennessee New ARRT Candidates

Year	Nuclear Medicine Technologist	Radiologic Technologist (Radiographer)	Radiation Therapist
1993	23	189	32
1998	30	160	13
1999	8	171	7
2000	8	202	9
2001	11	202	25
2002	37*	202	39
2008	23	372	29

Source: Telephone survey, ARRT.
**ARRT and NMTCB (some may hold both certifications)*
ARRT accessed December 2009

Summary

According to the BLS, the employment outlook for nuclear medical technologists is expected to grow faster than the average for all occupations through the year 2018. An increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures, coupled with an increase in technological innovations that have expanded the diagnostic uses of nuclear medicine contribute to the growth rate of this occupational cluster. The outlook for this field in Tennessee is considered excellent and in demand with employers. Local demands may change within a short period of time and may not always reflect state workforce data. Most nuclear medicine technologists are employed in hospitals, with some working in physicians' offices and diagnostic imaging centers.

Diagnostic Medical Sonographer

Status

- Diagnostic medical sonography in Tennessee is being supplied by graduates of five accredited programs.
- Population ratio, although a crude measure of need, indicates that the number of sonographers in Tennessee exceed the national ratio.
- Since licensure is not required in this field in Tennessee, an accurate recording of those in practice in Tennessee is difficult to determine.
- Anecdotal reports by hospital departments of human resources indicate shortages in less metropolitan areas.
- BLS data predicts that this field will continue to grow, although at a slightly less rate than in the past.

Description

Sonographers, also known as ultrasound technologists , provide imaging services using directing no ionizing high frequency sound waves into areas of the patients body. Sonographers have a high degree of autonomy in performing and evaluating the images, using critical thinking and eye hand coordination to produce and evaluate the images. The low cost, high accuracy, and improved computerized reconstruction of real time imaging, makes it a procedure of choice for many diagnostic studies.

Sonography can be used to examine many parts of the body, such as the abdomen, breasts, female reproductive system, prostate, heart and blood vessels, and more. Sonographers explain the procedure, record additional medical history, and then position the patient for testing. Viewing the screen as the scan takes place, sonographers look for subtle differences between healthy and pathological areas, decide which images to include, and judge whether the images are satisfactory for diagnostic purposes. Sonographers may specialize in abdomen, breast, neurosonology, obstetrics and gynecology; adult and pediatric echocardiography (RDCS); or noninvasive vascular technology (RVT). The relative low risk of the procedure makes it a choice for diagnosis during pregnancy. The low cost and high accuracy makes it a procedure of choice in many other areas.

The rapid growth of high-frequency ultrasound and real-time imaging for diagnostic purposes has demonstrated a need for quality education in this field. The initiation of prospective payment systems fostered the establishment of freestanding imaging centers and satellite diagnostic centers. An increasing number of private offices installing ultrasound scanners for their own use has increased the demand for highly trained sonographers.

The net effect of new providers and the expanded use of this modality has resulted in a marked increase in the number of patients being examined with ultrasound because of the reduced risks associated with the imaging modality.

Educational Preparation

Program length ranges from one to four years. In 2008, there were about 50,300 diagnostic medical sonographers. More than half worked in hospitals. Many sonographers, like radiologic technologists, have moved from hospitals to outpatient practices. Ultrasound has been used in medical diagnosis since 1970, and training initially consisted of one or two weeks of in-hospital instruction. Because licensure to practice is not required, sonographers often are still trained in short programs that are started and stopped based on local need, making determination of supply and demand difficult. There are four-year programs that result in certificate or baccalaureate degrees. One-year programs are for applicants who already possess qualifications in a clinically related allied health profession.

National Supply and Demand

In 2000, there were 38,594 diagnostic medical sonographers, and in 2008 there were 50,300 according to the BLS. Projected employment in 2018 is 59,500, a projected increase of 18.3 percent. More than half worked in hospitals. Many sonographers, like radiologic technologists, have moved from hospitals to outpatient practices.

There are 168 programs accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP), reflecting an increase from 147 programs in 2006 (www.caahep.org/Find-An-Accredited-Program/, accessed August 10, 2009).

Sonographers can obtain national credentialing from the American Registry of Diagnostic Medical Sonographers (ARDMS), Cardiovascular Credentialing International (CCI), or the American Registry of Radiologic Technologists (ARRT). Although certification is not nationally required, the ARDMS recorded 18,264 registered sonographers in June 1993 and 38,594 in March 2000. This represents a significant increase in the use of the imaging modality and a trend toward more persons in the occupation seeking national certification.

From 1988 to 1998, the number of sonography programs nationally grew from 34 to 77, an increase of over 100 percent. Now, more than 168 programs are accredited

TABLE 3.7

U.S. Diagnostic Medical Sonography Programs, 1988–2009

Year	Total Programs	Total Enrollment	Graduates
1988	34	461	264
	38	567	316
	43	635	338
	47	887	443
	56	977	565
1998	77	1,366	730
	96	1,452	829
	147	—	—
2009	168	—	—

Source: AMA Allied Health Education Fact Sheet, 1990 and 1992; Allied Health Education Directory, 1993; and AMA Health Professions Education Directory, 1999–2000, 2003–2004, 2009.

State Supply and Demand

Many sonographers have been trained on the job and are not registered. 2009 data from ARDMS shows 1,263 in Tennessee holding certification. The 2008 estimated employment is around 1,292, and that number is expected to increase to 1,366 by 2010. This shows a 2.8 percent annual percent change, while the national growth rate is projected to be 1.8 percent. The Tennessee Department of Employment Security does not keep figures on supply and demand

in this category. Local demands may change within a short period of time and may not always reflect workforce data.

Tennessee has five accredited sonography programs: Chattanooga State Technical Community College offers a certificate based on a 12-month program. The program alternates between instruction in general sonography and echocardiography/vascular sonography. Baptist Memorial College of Health Sciences in Memphis offers a bachelor's degree preparing students for general sonography and vascular and echocardiography sonography. Methodist Le Bonheur Healthcare in Memphis offers a 15-month certificate for general sonography and echocardiography sonography. Vanderbilt University in Nashville offers an 18-month certificate in general sonography. Volunteer State Community College in Gallatin offers a 15-month certificate program in general sonography.

Summary

While statewide statistics help clarify the supply and demand situation, consideration must be given to the mobility of graduates, which contributes to regional shortages. Sonography is showing growth, and this growth is being met in Tennessee by five accredited programs and local training opportunities. Directors of human resources have reported shortages across the state. Since neither registration nor licensure is required, the supply/demand data is difficult to assess except through anecdotal reports of shortages from hospital human resource officers. Local demands may change within a short period of time and may not always reflect state workforce data.

Laboratory Services

Clinical laboratory services professions include **medical technologist**, **medical laboratory technician**, and **phlebotomist**. All perform a wide array of tests that are used to help physicians prevent, detect, diagnose, and treat diseases. Phlebotomists are limited-practice, certificate-prepared practitioners who draw blood for lab analysis and collect blood samples. Technologists are expected to recognize the interdependency of tests and have knowledge of physiological conditions affecting test results that allows them to confirm results and develop data useful to a physician in determining the presence, extent, and (as far as possible) the cause of disease. Generally, technicians perform routine tests under the supervision or direction of pathologists or other physicians, scientists, or experienced medical technologists.

Status

- New, more powerful diagnostic tests will encourage more testing and spur employment.
- The surge of retiring baby boomers from the ranks of laboratory personnel poses yet another staffing challenge for the clinical laboratory field. It is estimated that an average of 13 percent of current laboratory staff is likely to retire within the next five years.
- National shortages in laboratory personnel are becoming significant according to the results of a survey conducted by the American Society of Clinical Pathologists' Board of Registry.
- Tennessee's hospital vacancy rate for medical technologists and medical technicians is 3.8 percent statewide for 2008. Local vacancy rates vary and are reported by county (Appendix D).
- Nationally there has been a dramatic decline in medical technology programs. Tennessee State University has announced that they will close their program.

Description

Laboratory testing plays a crucial role in the detection, diagnosis, and treatment of disease by examining and analyzing body fluids and cells. Personnel look for bacteria, parasites, and other microorganisms; analyze the chemical components of fluids; match blood for transfusions; and test for drug levels in the blood that show how a patient is responding to treatment.

Laboratory technologists are also referred to as laboratory scientists or medical technologists (MTs). Laboratory technicians are also known as medical technicians or medical laboratory technicians (MLTs). All perform a wide array of tests that are used to help physicians prevent, detect, diagnose, and treat diseases. The generalized medical technologist is the most widely recognized practitioner in this field, but there are many specialties within the field: cytotechnologists (CTs) specialize in cytotechnology (the study of body cells), specialists in blood banking specialize in hematology (the study of blood), and histotechnicians/histotechnologists (HTs/HTLs) specialize in histology (the study of tissue specimens). Others include laboratory assistants (LAs) and pathologist assistants (PAs).

The laboratory services occupations surveyed for this report include medical technologist, medical laboratory technician, and phlebotomist.

Educational Preparation

Laboratory technologists (medical technologists) and laboratory technicians (medical laboratory technicians) are divided into two broad categories: (1) baccalaureate-prepared technologists and (2) technicians who are prepared with associate degrees or certificates. Technologists are expected to recognize the interdependency of tests and have knowledge of physiological conditions affecting test results that allows them to confirm results and develop data useful to a physician in determining the presence, extent, and (as far as possible) the cause of disease. Generally, technicians perform routine tests under the supervision or direction of pathologists or other physicians, scientists, or experienced medical technologists.

There are three models for training medical technologists: the university-based model, the hospital-based model, and university/

hospital partnerships. University-based programs educate baccalaureate-prepared technologists and develop relationships with area hospitals to provide appropriate clinical practicum opportunities. Hospital-based programs accept students with B.S. degrees and certain prerequisites into a one-year professional curriculum. Sponsored by hospitals or clinics that hold the program accreditation, partnership programs develop 3 plus 1 agreements with universities that provide three years of preprofessional academic preparation with the hospital or clinic that provides the fourth year of professional curriculum, and the degree is awarded by the university.

Medical laboratory technicians are prepared at the associate degree or certificate program level. Sponsored by community/technical colleges or hospitals, these graduates complete one- or two-year programs. These technicians perform less complex laboratory procedures than technologists do.

Phlebotomists are limited-practice, certificate-prepared practitioners who draw blood for lab analysis and collect blood samples. Programs for the education of phlebotomists may be started or discontinued based on local need. Little information is available on national supply and demand. The one phlebotomist program in Tennessee is at Southwest Tennessee Community College.

Other occupations in this category include cytotechnologist, blood bank technologist, and histologic technician/technologist. The numbers of positions needed in these categories are relatively small, and programs usually address a specific regional need. No programs in Tennessee are available for specialists in blood bank technology or for histologic technicians or technologists. There is a cytotechnologist program at the University of Tennessee Health Science Center in Memphis that lasts 12 months after three years of general studies and prerequisites and awards a B.S. degree.

National Supply and Demand

In 2008, there were an estimated 328,100 laboratory technologists and technicians employed in the United States, more than half of whom worked in hospitals.

Technological advances have two opposing effects on employment and will continue to have those effects through 2018

with a growth rate of 13.9 percent (1.4 percent annually) for both laboratory technologists and laboratory technicians according to the BLS. New, more powerful diagnostic tests will encourage more testing and spur employment. However, advances in genomics and laboratory automation are redefining the workforce skills necessary to meet the demand of tomorrow's laboratories.

The surge of retiring baby boomers from the ranks of laboratory personnel poses yet another staffing challenge for the clinical laboratory field. According to laboratory managers, it is estimated that an average of 13 percent of current laboratory staff is likely to retire within the next five years.

A biannual survey sponsored by the American Society of Clinical Pathologists (ASCP) showed that job vacancy rates are high in medical laboratories. The data presented in Table 3.8 includes hospital, blood bank, clinic, and independent clinical medical laboratories. ASCP has targeted recruitment of qualified students and retention of practicing professionals as ways to reduce shortages.

TABLE 3.8
National Vacancy Rates for Clinical Laboratory Positions, 1988–2009

	1988	1990	1994	1996	1998	2002	2009
Medical Technologists							
Staff	9.3	11.6	9.6	8.2	10.2	7.2	10.4
Supervisor	5.0	10.2	10.3	8.6	9.3	5.8	1.4
Manager	5.2	7.1	15.4	7.7	15.4	3.1	3.7
Medical Lab Technicians	6.5	11.1	14.8	12.5	12.3	8.3	6.4
Phlebotomists	8.2	12.2	14.8	12.5	12.3	9.0	5.9
Cytotechnologists	13.6	27.3	19.2	7.1	10.5	6.3	4.8
Histologic Technologists	—	14.3	17.4	5.3	10.3	10.9	8.0
Histologic Technicians	6.2	9.5	8.7	13.0	12.9	9.1	7.2

Source: American Society of Clinical Pathologists, 1999 and 2002, "Hospital Vacancy Rates"; LabMedicine, March 2009, www.ascp.org/pdf/Membership-Communications/Wage-and-Vacancy-Survey.aspx, accessed August 24, 2009.

The decline in the number of medical technology (MT) programs, as shown in Table 3.10, has been dramatic. In the seven-year period from 1984 to 1991, 205 programs closed, resulting in a decline from 615 programs to 410. From 1990 to 1992, ten programs closed. In 1998, there were 288 active programs; by 2003, the number of active programs had declined to 254. Today the decline continues. There were 223 CLS/MT programs in the U.S. in 2009.

Medical laboratory technician (MLT) programs increased by 21.3 percent in the 10-year period from 1981 to 1991. From 1991 to 1998, the number of programs fluctuated and in 1998 returned to approximately the same number that existed in the early 1990s. Some increase in the number of programs was seen from 2002 to 2003 but by 2009 the number of programs had declined to 203 programs.

TABLE 3.9

U.S. Trends in Clinical Laboratory Programs: Number of Programs

Year	CLS/Medical Technologist	CLT/Medical Lab Technician
1971	773	212
1976	696	191
1981	640	211
1986	516	261
1991	410	256
1992	404	255
1995	357	223
1998	288	249
2002	238	222
2003	254	226
2009	223	203

Source: SREB Dat-Ex, 1993; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004, 2009, www.naacls.org/search/programs.asp, accessed August 24, 2009.

TABLE 3.10
U.S. Clinical Laboratory Graduates

Year	Medical Technologist	Medical Lab Technician
1989	3,148	2,292
1990	3,024	2,292
1991	2,932	2,437
1992	3,201	2,559
1998	2,667	2,412
2002	1,836	1,961
2007	2,706	2,416

Source: Allied Health Education Directory, 1993; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004; NAACLS Survey Data, 2007

According to the March 2009 issue of *LabMedicine*, the ASCP Wage and Vacancy Survey of U.S. Medical Laboratories reported the overall vacancy rate for staff-level certified MTs was 10.4 percent, the highest across all the surveyed positions. The MLT staff-level position vacancy rate was 6.4 percent. In 2008 there were 4,233 medical technologists and 5,077 medical technicians employed in Tennessee according to "The Source."

State Supply and Demand

Using a projection matrix, the number of medical technologists projected to be needed in 2010 is 4,452 and in 2014 is 4,860. The estimated number of medical and clinical laboratory technicians needed in Tennessee for 2014 is 5,520 and in 2016 is 3,979 (www.state.tn.us/labor-wfd/outlooks/statewide.pdf).

Licensure information for each category is found in Table 3.11.

TABLE 3.11
Number of Licensed Medical and Clinical Laboratory Technologists and Medical and Clinical Laboratory Technicians

Year	Medical and Clinical Laboratory Technologists	Medical and Clinical Laboratory Technicians
1999	2,128	1,716
2000	2,737	1,980
2001	2,664	1,952
2002	2,562	1,942
2003	2,499	1,941
2004	2,471	1,957
2005	1,873	1,523
2009	4,233	3,781

Source: Tennessee Department of Labor and Workforce Development, "The Source," accessed December 16, 2009. "Licensed" refers to the number holding active licenses as of the date data was accessed for the years 1996–2008. 2009 data from the Tennessee Department of Health, Health Professional Licensing Reports, accessed December 16, 2009. "Licensed" for the year 2009 refers to the number holding active licenses as of the date data was accessed.

There are six programs for laboratory scientists/medical technologists (CLS/MT) in Tennessee. Vanderbilt University Medical Center offers a certificate, and the program lasts 12 months. Austin Peay State University and the University of Tennessee Medical Center at Knoxville offer certificates and B.S. degrees. These programs last 12 or 13 months. Lincoln Memorial University and Tennessee State University offer B.S. degrees, though the program at Tennessee State University is expected to close. University of Tennessee Health Science Center in Memphis offers a B.S. degree through a 21-month program and an M.S. degree through a 48-month program.

There are six programs for laboratory technicians/medical laboratory technicians (CLT/MLT, associate degree) in Tennessee. These programs are at MedVance Institute in Cookeville, Northeast State Technical Community College, Jackson State Community College, and Southwest Tennessee Community College. (Both Roane State Community College and Columbia State Community College discontinued their programs in 2000 due to budget cuts and enrollment issues.) These programs offer A.A.S. degrees and last between 18 and 24 months.

According to the *Health Professions Education Data Book*, 2007–2008, Tennessee graduated 62 medical technologists and 60 medical laboratory technicians in 2005–2006.

In 2001, hospital vacancy rates in Tennessee were 13 percent, according to a THA study. The 2007 JAR data identifies a vacancy rate of 7.92 percent for 2007 and 3.8 percent for 2008, which is less than the national average but still indicates the difficulty in recruitment for this category of hospital employment. The JAR data indicates a vacancy rate of 12.8 percent in the THA's South Middle district and some counties are reporting up to 50 percent vacancies.

For laboratory technologists, the outlook for this field in Tennessee is very good, and occupations in this field are expected to be in demand with employers with positive growth. There are more job openings expected annually than there were training completers in a recent year. For laboratory technicians, the outlook in Tennessee is excellent and in demand with employers, The growth rate is positive, and there are more job openings expected annually than there were training completers in a recent year. There is no demand data available for phlebotomists.

Summary

The licensure data indicates a continued increase in the number of technologists employed in Tennessee in both the MT and MLT categories. Austin Peay State University has increased its enrollment capacity due to outside funding and partnership with the Tennessee Hospital Association. Other creative partnerships with clinical agencies and academic institutions have been employed to reduce the vacancy rate for these categories. Local demands may change within a short period of time and may not always reflect state workforce data.

Health Informatics
(Medical Records)

Health Information Services

Health Information Administrator

Health Information Technician

Medical Transcriptionist

Epidemiologist

Health Information Services

Health information services professionals include **Health Information Administrators** (HIAs), **Health Information Technicians** (HITs), and **Medical Transcriptionists**. HIAs are trained in data collection, interpretation, and analysis. They often serve as managers and participate in staffing, budgetary, and evaluation procedures. HITs ensure the quality of medical records by verifying their completeness, accuracy, and proper entry into the computer systems. They often specialize in coding diagnoses for reimbursement and research. Medical transcriptionists listen to recordings by physicians and other health care professionals dictating a variety of medical reports such as medical room visits, chart reviews, and treatment summaries.

Status

- The health care industry continues to expand and diversify, requiring more health care administrators to handle business operations.
- Managers in all settings will be needed for the improvement of quality and efficiency and the controlling of costs because third-party payors will require higher levels of accountability.
- Computerization of patient records and the accompanying security required by law will also require additional personnel, especially in the transition to electronic health records.
- In 2013, the Department of Health and Human Services (HHS) will move from the International Classification of Diseases (ICD-9-CM) system of disease classification to ICD-10-CM and ICD-10-PCS, a much more complex system that reflects recent advances in disease detection and treatment through biomedical informatics, genetic research, and international data sharing. This change will require more health information technicians to perform the more complex coding needed.
- The BLS reports growth for these occupations through 2018, with state growth mirroring that of the nation.

- Hospitals will continue to employ a large percentage of medical transcriptionists, but job growth there will not be as fast as in other settings. Voice recognition technology will lead to a change in the role of transcriptionists. An increasing demand for standardized records should result in rapid employment growth in physician's offices, especially large group practices.
- Nationally, numbers of health information technician programs and health information administration programs have increased. In Tennessee, the numbers have remained stable.
- The health information management profession (HIM) is concerned primarily with the management of patient records and involves medical, administrative, ethical, and legal requirements in the storage and safekeeping of physical records.
- Job openings for HIAs and HITs are projected to grow faster than the Tennessee average for all professions.
- The population ratios for these fields exceed the national ratio.

Description

The health information management profession (HIM) is concerned primarily with the management of patient records and involves medical, administrative, ethical, and legal requirements in the storage and safekeeping of paper and electronic health records. Patient records include medical histories, the results of physical examinations, reports of x-ray and laboratory tests, diagnosis and treatment plans, physicians' orders and notes, and other sources of information. Although the record is primarily used for the medical care of the patient, the information is also used for legal, financial, research, and other purposes.

The field has undergone significant change in recent years due to stricter reimbursement requirements, an expanded regulatory scope, new technologies, greater demand for information, and cost-containment mandates.

The health information management field consists of baccalaureate-degreed health information administrators (HIA) and associate-degreed health information technicians (HIT). Each level has a national examination to achieve the credentials of registered

health information technician (RHIT) or registered health information administrator (RHIA).

HIAs are trained in data collection, interpretation, and analysis. They often serve as managers and participate in staffing, budgetary, and evaluation procedures. Some of the most common positions for these professionals are system manager, data quality manager, information security officer, college instructor, and consultant. As more facilities integrate patient records into the national health information infrastructure, HIAs will increasingly have roles that contribute to the electronic health record, data vital for patient care.

HITs ensure the quality of medical records by verifying their completeness, accuracy, and proper entry into computer systems. They often specialize in coding diagnoses for reimbursement and research. Common position titles for these professionals are health data analyst, insurance claims analyst, records technician specialist, clinical coding specialist, and patient information coordinator.

A few programs also offer master's degrees in health information management and health informatics. There is an effort in the profession to move toward a greater number of master's-prepared professionals.

In addition to administrators and technicians, medical transcriptionists also play an important role in health information management. Medical transcriptionists listen to recordings by physicians and other health care professionals dictating a variety of medical reports such as medical room visits, chart reviews, and treatment summaries. These reports eventually become part of patient records. According to the BLS, employers prefer medical transcriptionists who have completed a vocational school or community college program. As voice recognition technology improves, the transcriptionist will be moving toward a role resembling that of an editor to ensure the accuracy of the document produced.

National Supply and Demand

While hospitals are still one of the primary employers of health information professionals, HMOs, ambulatory care facilities, nursing homes, group practices, insurance agencies, accounting companies, and law firms also employ these personnel. Organizations not

involved in direct care, such as insurance companies and health insurance agencies, employ medical records specialists to help set policy, analyze data, and evaluate provider performance. Other employers, such as contract agencies and consulting firms, supply medical records personnel to these institutions and organizations, usually on a temporary and intermittent basis. Vendors are employing health information administrators in the move toward electronic health records.

Health information administrators (included in the medical and health services managers/administrators category by the Bureau of Labor Statistics) held about 262,000 jobs in 2008. Of these, 37 percent work in hospitals. About 22 percent were in nursing and personal care facilities or physician offices and clinics. The remainder worked in home health care, federal government health care facilities, and outpatient care centers or for insurance companies, vendors, or long-term care facilities. Recent federal initiatives to help facilities implement electronic health records will require the HIA competencies in privacy and security and health record content as well as health information systems.

The BLS also projects the need for 45,400 new medical and health services managers, the category that includes health information administrator with bachelor's or higher degrees, between 2008 and 2018. That number represents a 16 percent growth rate (1.6 annually). Total job openings due to growth and replacement are 99,400.

Medical records and health information technicians held about 172,500 jobs in 2008 and projects 207,600 in 2018. About four out of ten jobs were in hospitals. The rest were mostly in nursing homes, medical group practices, clinics, and home health agencies. The BLS projects a 20.8 percent growth for new medical record and health information technicians through 2018 (2.0 percent annually). This translates to a need for 70,000 health information technicians to fill new jobs and replace workers who leave the field, making this one of the fastest growing health occupations.

Medical transcriptionists held about 105,200 jobs in 2008. About 41 percent worked in hospitals and another 29 percent in physician offices and clinics. Hospitals will continue to employ a large percentage of medical transcriptionists, but job growth there will not

be as fast as in other settings. An increasing demand for standardized records should result in rapid employment growth in physician's offices, especially large group practices. The BLS reports that the demand for medical transcriptionists is expected to grow as well. Projected employment for 2018 is expected to be 116,900, an 11.1 percent increase during the 2008–2018 period (1.1 percent annually). Those who earn an associate's degree or an American Association for Medical Transcriptionist certification should have favorable job prospects.

The BLS data represent an estimated need of 7,300 HIA and HIT graduates per year. According to the Commission on Accreditation of Health Informatics and Information Management Education (CAHIIM), HIA and HIT programs in 2008 graduated about 3,038 HIM professionals per year, 40 percent of the number needed.

In 2009, there were 55 CAHIIM-accredited health information administration programs and 213 health information technician programs.

TABLE 4.1
U.S. Accredited Health Information Administrator (HIA) and Health Information Technician (HIT) Programs

Year	Health Information Administrators	Health Information Technicians
1990	55	108
1995	53	142
2002	49	175
2003	47	186
2009	55	213

Source: Health Professions Education Data Book, 2003–2004, www.caahep.org, www.cahiim.org.

The number of CAAHEP-accredited programs in health information administration went down from 1990 but has increased back to 55 in 2009, the 1990 level. From 1990 to 2009, the number of CAHIIM-accredited HIT programs increased from 108 to 213.

State Supply and Demand

The Tennessee Department of Employment Security reported that the employment base for health information technicians in 2008 was 3,781. That number is expected to increase to 4,280 in 2016, with an annual growth rate of 2 percent. In 2006, the supply or number of graduates for the health information technology area was 84 and the average annual openings were 170, so there is an unmet need of approximately 86. The Tennessee Department of Employment Security does not collect data on HIAs. The employment base for medical and health services managers, the category that includes health information administrators, is 5,330 with an expected increase to 6,290 by 2016 for an average annual increase of 1.7 percent. Tennessee graduated 21 in 2002 and 30 in 2006 from its two HIA programs.

In Tennessee, there are two baccalaureate programs in HIA and five programs in health information technology. The administration programs are located at Tennessee State University and the University of Tennessee Health Science Center at Memphis. The health information technician programs award both a certificate and an A.A.S. degree and are located at Chattanooga State Technical Community College, Dyersburg State Community College, Walters State Community College, Volunteer State Community College, and Roane State Community College. These programs last between 21 and 24 months. There were 55 graduates in HIT programs in 2002 and 84 in 2006.

In 2008, the estimated employment of medical transcriptionists in Tennessee was 2,326. The projected employment for 2016 is 2,420, representing an average annual percent increase of 1.0 percent and 55 average annual openings. Projected 10-year additional openings for medical transcriptionists in Tennessee are 270. Because this field does not require certification or licensure, vacancies are not easily identified.

For medical transcriptionists, the outlook in Tennessee is a competitive market. Occupations in this field are not expected to be in demand with employers, though the growth rate is positive. There were more training completers in a recent year than job openings expected annually.

For health information administrators and technicians, the outlook is excellent, with more job openings expected annually than training completers in a recent year.

TABLE 4.2
Tennessee Graduates in Health Information Management

Year	HIA	HIT	Medical Transcriptionist
1988	23	25	11
1989	26	26	8
1990	24	20	4
1991	20	33	12
1992	28	18	14
1998	29	44	—
2002	11	63	37
2003	21	55	—
2008	30	84	

Source: THEC, SIS, 1992, 2003; Health Professions Education Directory, 1999; Health Professions Education Data Book, 2003–2004, 2007–2008

Summary

In general, the reports discussed in this section indicate an increased need for health information technicians as well as health information administrators. The number of assistant-level HIT graduates continues to increase while HIA graduate numbers remain relatively unchanged.

With emphasis on health care reform and its reliance on information technology, the national demand is projected to increase rapidly, and regional reports appear to follow national trends. There should also be an increased need for coders and/or health information technicians and medical transcriptionists. In Tennessee, the outlook is excellent for health information administrators and technicians, though for medical transcriptionists the outlook is a more competitive market. Local demands may change within a short period of time and may not always reflect state workforce data.

Epidemiologist

Epidemiologists investigate and describe the determinants of disease, disability, and other health outcomes and develop the means for prevention and control. Epidemiologists may study many different diseases, such as tuberculosis, influenza, or cholera, often focusing on epidemics. Epidemiologists may work in research or clinical practice.

Status

- The BLS reports expected growth in employment for epidemiologists at a rate of 13.5 percent through 2018 (1.3 percent annually). The state growth rate for this occupation is similar to that of the nation.
- A heightened awareness of bioterrorism and rare but infectious diseases such as West Nile Virus or severe acute respiratory syndrome (SARS) should spur demand for epidemiologists. As hospitals enhance their infection control programs, many will seek to boost the quality and quantity of their staff.
- Epidemiologists are less likely to lose their jobs during recessions than are those in many other occupations because they are employed for long-term research projects.
- The number of epidemiologists employed in Tennessee in 2006 was 60. It is projected that in 2016 there will be 70. This represents an annual average growth rate of 1.3 percent, and the field is considered competitive.
- The long-term growth rate for epidemiologists in Tennessee is predicted to be stable. It is estimated that Tennessee will have an average of about five openings per year from 2006 to 2016.
- The population ratio for epidemiologists in Tennessee is slightly less than that of the nation.

Description

Some medical scientists specialize in epidemiology. This branch of medical science investigates and describes the determinants of disease, disability, and other health outcomes and develops the means for prevention and control. Epidemiologists may study many different diseases such as tuberculosis, influenza, or cholera, often focusing on epidemics.

Epidemiologists can be separated into two groups—research and clinical. Research epidemiologists conduct research in an effort to eradicate or control infectious diseases that affect the entire body, such as AIDS or typhus. Others may focus only on localized infections of the brain, lungs, or digestive tract, for example.

Clinical epidemiologists work primarily in consulting roles at hospitals, informing the medical staff of infectious outbreaks and providing containment solutions. These epidemiologists sometimes are referred to as infection control professionals, and some of them are also physicians. Epidemiologists who are not physicians often collaborate with physicians to find ways to contain diseases and outbreaks. In addition to their traditional duties of studying and controlling diseases, clinical epidemiologists also may be required to develop standards and guidelines for the treatment and control of communicable diseases.

Educational Preparation

A Ph.D. in a biological science is the minimum education required for most prospective medical scientists, except epidemiologists. Epidemiologists typically need at least a master's degree in public health, but some work requires a Ph.D. or medical degree.

There are no formal degree programs in epidemiology in Tennessee. Several universities offer a concentration in epidemiology for undergraduate programs, usually consisting of 43 semester hours of public health and epidemiology courses. Three universities offer a postbaccalaureate certificate in epidemiology: East Tennessee State University, the University of Tennessee at Knoxville, and the University of Tennessee at Memphis. The certification program requires obtaining 15 total credit hours beyond a bachelor's degree. Study includes courses in public health and epidemiology. East Tennessee State University offers a doctorate in public health with a concentration in epidemiology. Completion of the Dr.P.H. requires a minimum of 58 semester hours beyond the master's degree. Epidemiologists with both a Ph.D. and M.D. are likely to find very good opportunities for work.

National Supply and Demand

Epidemiologists account for about five percent of the total of medical scientists in 2008—or a total of 4,800 jobs—with projections for 2018 of 5,500 jobs. Among epidemiologists, 57 percent were employed in government; 12 percent were employed in hospitals; 11 percent were employed in colleges and universities; and 9 percent were employed in scientific research and development services. Employment as an epidemiologist is expected to increase 13.5 percent over the 2008–2018 decade (1.4 percent annually), faster than the average. An increasing focus on monitoring patients at hospitals and health care centers to ensure positive patient outcomes will contribute to job growth for epidemiologists. In addition, a heightened awareness of bioterrorism and rare but infectious diseases such as West Nile Virus or severe acute respiratory syndrome (SARS) should spur demand for these workers. As hospitals enhance their infection control programs, many will seek to boost the quality and quantity of their staff. Epidemiologists are less likely to lose their jobs during recessions than are those in many other occupations because they are employed for long-term research projects. As funding for research becomes more difficult to obtain, those with both a biological and professional medical background will have a distinct advantage. Opportunities in epidemiology should be highly competitive because the number of available positions will continue to be limited.

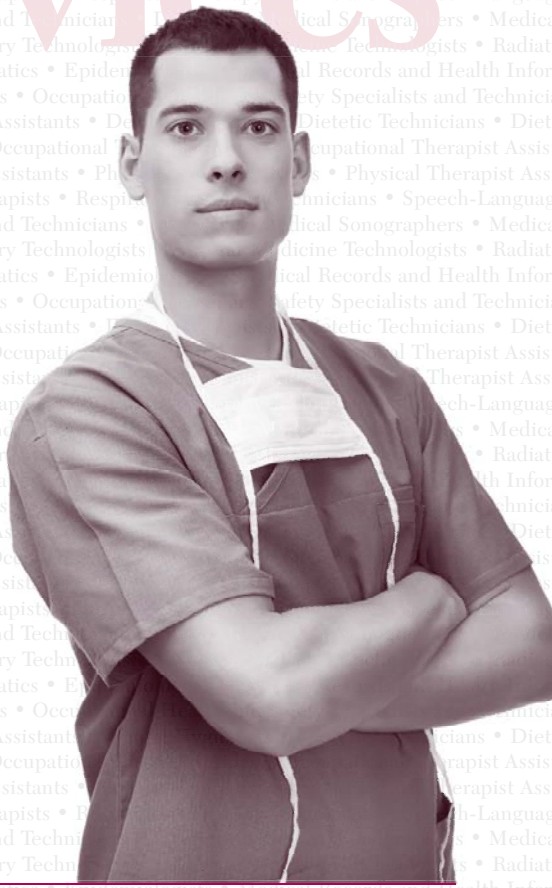
State Supply and Demand

The number of epidemiologists employed in Tennessee in 2008 was 64. It is projected that in 2016 there will be 70. This represents an annual average growth rate of 1.3 percent or overall growth of 14.1 percent. According to the state economic outlook, this field in Tennessee is a competitive market. Occupations in epidemiology report more training completers than job openings expected annually. Local demands may change within a short period of time and may not always reflect state workforce data. The long-term growth rate for epidemiologists in Tennessee is predicted to be stable. It is estimated that Tennessee will have an average of about five openings per year from 2006 to 2016.

Summary

An increasing focus on monitoring patients at hospitals and health care centers to ensure positive patient outcomes will contribute to job growth for epidemiologists, as well as a heightened awareness of bioterrorism and infectious diseases such as West Nile Virus or severe acute respiratory syndrome (SARS). Growth is projected for the national and state level, though it is, according to the state economic outlook, a competitive market in Tennessee for this cluster. Occupations in this field report more training completers than job openings expected annually. Local demands may change within a short period of time and may not always reflect state workforce data. Epidemiologists may be employed by hospitals, colleges and universities, or scientific research and development services.

Support Services



Medical Assisting

Medical Assistant

Nursing Assistant

Medical Assisting

Medical assisting personnel (medical assistants) perform routine administrative and clinical tasks to keep clinics, home health agencies, private medical practices, and other health care facilities running smoothly.

Status

- Nationally, the BLS reports that medical assisting is expected to be one of the 10 fastest-growing occupations through the year 2018, growing much faster than the average for all occupations. Employment of medical assistants is expected to grow 33.9 percent from 2008 to 2018 (3.4 percent nationally). State data also indicates growth.
- As the health care industry expands because of technological advances in medicine and the growth and aging of the population, there will be an increased need for all health care workers. Helping drive the job growth is the increasing number of group practices, clinics, and other health care facilities that need a high proportion of support personnel, particularly medical assistants who can handle both administrative and clinical duties.
- Some 5.7 million to 6.5 million long-term care workers will be required to meet the needs of American seniors by 2050, up from 1.9 million employed in 2000 (HHS Secretary Tommy Thompson, 2003).
- Medical assisting personnel (medical assistants) perform routine administrative and clinical tasks to keep clinics, home health agencies, private medical practices, and other health care facilities running smoothly.
- Population ratios for medical assistants is higher for the state than that of the nation.

Medical Assistant

Description

Medical assistants perform a variety of administrative and clinical duties in accordance with the regulations of the state in which

they practice. Administrative duties may include scheduling and receiving patients, maintaining medical records, preparing patients for examinations, and assisting physicians during examinations. Medical assistants may also collect and prepare laboratory specimens, dispose of contaminated supplies, and sterilize medical instruments. They instruct patients about medication and special diets, prepare and administer medications as directed by physicians, telephone prescriptions to pharmacies, draw blood, prepare patients for x-rays, take electrocardiograms, remove sutures, and change dressings.

Educational Preparation

Most employers prefer to hire graduates of formal programs in medical assisting, according to the BLS. Postsecondary programs usually last one year and result in a certificate or diploma or last two years and result in an associate's degree. Accredited programs ensure entry-level competencies and require an internship.

National certification is provided by two recognized associations: the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and the Accrediting Bureau of Health Education Schools (ABHES). Medical assistants can advance to other occupations through experience or additional training. Administrative medical assistants may advance to become office managers or qualify for a variety of other administrative support occupations.

National Supply and Demand

In 2008, medical assistants held approximately 483,600 jobs. About 62 percent were in physicians' offices, 12 percent in hospitals, and 11 percent other health care offices. Employment of medical assistants is expected to grow 33.9 percent from 2008 to 2018 (3.4 percent annually). As the health care industry expands because of technological advances in medicine and the growth and aging of the population, there will be an increased need for all health care workers. Helping drive the job growth is the increasing number of group practices, clinics, and other health care facilities that need a high proportion of support personnel, particularly medical assistants who can handle both administrative and clinical duties.

State Supply and Demand

The estimated employment in Tennessee for medical assistants was 9,927 in 2008. Growth plus replacement needs for medical assistants in Tennessee are estimated to average about 455 openings per year from 2006 to 2016. Of these estimated 455 openings per year, 74.7 percent are due to growth (new positions), and 25.3 percent are due to the replacement of workers leaving the occupation. By comparison, of all occupations in Tennessee, 37.4 percent of annual openings are due to growth (new positions), and 62.6 percent of annual openings are due to the replacement of workers who have left their occupations. The outlook for this field in Tennessee is very competitive, though the growth rate is positive. There were three times (or more) as many training completers in a recent year as job openings expected annually.

There are 25 accredited programs for medical assisting in Tennessee. Graduates of the programs receive a certificate, diploma, or an associate's degree. The certificate and diploma programs last between 8 and 15 months. The programs that award an associate's degree last 24 months.

TABLE 5.1
Tennessee Medical Assisting Programs

School	Program Offers
Academy of Allied Health	Workforce Investment Act
Chattanooga State Technical College	Certificate/Diploma
Concorde Career College	A.A.S., Certificate/Diploma
Draughons Junior College–Clarksville	A.A.S., Certificate/Diploma
Draughons Junior College of Business	A.A.S., Certificate/Diploma
Fugazzi College	A.A.S.
Institute of Allied Health and Commerce	Certificate/Diploma
Knoxville Business College	A.A.S
Miller Motte Business College	A.A.S.
Nashville College	Certificate

Cont.

National College of Business and Technology–Nashville	A.A.S.
Northeast State Technical Community College	A.A.S.
Remington College–Memphis	Diploma
Southeastern Paralegal Institute	Diploma
South College	A.A.S.
Tennessee Technology Center–Chattanooga	Diploma
Tennessee Technology Center–Hartsville	Certificate/Diploma
Tennessee Technology Center–Knoxville	Certificate/Diploma
Tennessee Technology Center–McMinnville	Certificate/Diploma
Tennessee Technology Center–Ripley	Certificate/Diploma
Tennessee Technology Center–Shelbyville	Certificate/Diploma
Vatterott College–Memphis	A.A.S./Diploma
West Tennessee Business College	Diploma

Source: Health Professions Education Directory

Summary

Technological advances in medicine along with the growth of an aging population indicates an increased need for all health care workers, including medical assistants. Though the national outlook for medical assistants is expected to be one of the 10 fastest-growing occupations through the year 2018, the outlook for this cluster in Tennessee is very competitive. Local demands may change within a short period of time and may not always reflect state workforce data.

Nursing Assistant

(Nursing, Psychiatric, and Home Health Aides)

Nursing assistants (also known as nursing aides, certified nursing assistants, geriatric aides, etc.) provide basic patient care under the supervision of nursing and medical staff. Specific tasks vary, and assistants handle many aspects of a patient's care.

Status

- The job opportunities are excellent for this field due to a combination of rapid employment growth and the need to replace the many workers who leave the occupation each year.
- Nationally, the BLS reports employment for nursing assistants is expected to grow faster than the average in response to the long-term needs of an increasing elderly population. There is a clear "care gap" emerging between the number of those requiring long-term care assistance and those available to provide that assistance. State data also reflects growth.
- Some 5.7 million to 6.5 million long-term care workers will be required to meet the needs of American seniors by 2050, up from 1.9 million employed in 2000 (HHS Secretary Tommy Thompson, 2003).
- Helping drive the job growth is the increasing number of group practices, clinics, and other health care facilities that need a high proportion of support personnel, including nursing assistants.
- Nursing assistants (also known as nursing aides, certified nursing assistants, geriatric aides, etc.) provide basic patient care under the supervision of nursing and medical staff. Specific tasks vary, and assistants handle many aspects of a patient's care.
- The population ratio for nursing assistants is higher for the state than that of the nation.

Description

Nursing assistants (also known as nursing aides, certified nursing assistants, geriatric aides, etc.) provide basic patient care under the supervision of nursing and medical staff. Specific tasks vary, and assistants handle many aspects of a patient's care. They answer patients' call bells, deliver messages, serve meals, make beds,

and help patients eat, dress, and bathe. Nursing assistants may be employed in hospitals, nursing homes, and home health agencies.

Educational Preparation

Most nursing assistants receive their training in hospital or long-term care programs averaging 6 to 12 weeks in length. Students receive a certificate of completion and must take the state-administered nursing assistant test to practice in the state of Tennessee.

There is a "care gap" emerging between the number of those requiring long-term care assistance and those available to provide that assistance. Long-term care providers serve the fastest growing population group—the elderly. A 2003 report prepared by the Department of Health and Human Services for Congress stated, "The total number of Americans in need of long-term care is expected to rise from 13 million in 2000 to 27 million in 2050, an increase of over 100 percent."

National Supply and Demand

Nursing, psychiatric, and home health aides held about 2.5 million jobs in the U.S. in 2008. Nursing assistants held the most jobs (approximately 1.5 million). About 52 percent of nursing aides worked in nursing and residential care facilities and another 29 percent worked in hospitals. The job opportunities are excellent for this field due to a combination of rapid employment growth and the need to replace the many workers who leave the occupation each year.

Employment for nursing assistants is expected to grow faster than the average in response to the long-term needs of an increasing elderly population. The Bureau of Statistics projects a 30.2 percent increase through 2018 (3.0 percent annually). Financial pressures on hospitals to discharge patients as soon as possible should greatly increase admissions to nursing care facilities. As a result, job openings will be more numerous in nursing and residential care facilities than in hospitals.

State Supply and Demand

This field is predicted to grow in Tennessee. The number of nurse aides, orderlies, and attendants employed in Tennessee in 2006 was 34,043. It is projected that there will be 39,370 by 2016.

This represents a 1.9 percent annual average growth rate, or an overall growth rate of 21.1 percent. The long-term growth for nursing assistants, orderlies, and attendants in Tennessee is estimated to average about 975 openings per year from 2006 to 2016. Of these estimated 975 openings per year, 70.3 percent are due to growth (new positions), and 29.7 percent are due to the replacement of workers leaving the occupation. Nursing care facilities have the highest employment in this area, with 37.9 percent of the total employment; hospitals follow with 22.7 percent.

Nursing assistant programs are located in a variety of settings in Tennessee: high school vocational programs, area technology centers, acute and long-term care centers, and private training programs. Licensure or registration in these areas varies and is not required, although a certificate of completion and an exam is mandatory for nursing assistants to practice.

Home health aides vary in background and training. The long-term growth for home health aides in Tennessee is predicted to grow. The number of home health aides employed in Tennessee in 2008 was 11,832. It is projected that in 2016 there will be 15,650. This represents an annual average growth rate of 3.8 percent (or 4.5 percent overall growth rate), which is faster than the 1.0 percent growth rate for all occupations in Tennessee. Growth plus replacement needs for home health aides in Tennessee are estimated to result in an average of about 585 openings per year from 2006 to 2016. Of these estimated 585 openings per year, 82.9 percent are due to growth (new positions), and 16.2 percent are due to the replacement of workers leaving the occupation. According to the state economic outlook, this cluster in Tennessee is excellent. Occupations in this cluster report more job openings annually than training completers. Local demands may change within a short period of time and may not always reflect state workforce data.

Summary

Employment for nursing assistants is expected to grow faster than the average in response to the long-term needs of an increasing elderly population. Job openings will be more numerous in nursing and residential care facilities than in hospitals given the financial pressures on hospitals to discharge patients as soon as possible, which leads to increased admissions to nursing care facilities. According to

the Bureau of Labor Statistics, a 30.2 percent increase is projected through 2018 (3.0 percent annually) for this occupational cluster. According to the state economic outlook, this field in Tennessee is expected to grow rapidly. Occupations in this field report more job openings annually than training completers. Local demands may change within a short period of time and may not always reflect state workforce data.

TABLE 5.2

Tennessee Supply and Demand Data for Medical Assisting Personnel 2006–2016

	Medical Assistant	Surgical Technologist	Nursing Assistant
Total Annual Average Openings	455	175	975
2016 Projected Employment	12,710	107,000	39,370

Source: Tennessee Department of Labor and Workforce Development, "The Source," www.sourcetn.org/analyzer/session/session.asp?cat=OCC, accessed August 2009.

References and Appendices

References and Bibliography

American Association for Respiratory Care, www.aarc.org/.

American Dental Hygienists Association, www.adha.org/.

American Medical Association. (2007–2008). Health professions education directory. Chicago, IL: AMA Press.

American Physical Therapy Association, www.apta.org/.

American Society for Clinical Pathology, www.ascp.org/.

American Speech-Language-Hearing Association, www.asha.org/.

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2008-09 Edition, on the Internet at www.bls.gov/oco/ (accessed August, September, October, November, December 2009).

Center for the Health Professions. (1999). The hidden healthcare workforce: Recognizing, understanding, and improving the allied and auxiliary healthcare workforce. Executive summary available at www.futurehealth.ucsf.edu/Public/Publications-and-Resources/Content.aspx?topic=The_Hidden_Health_Care_Workforce_Recognizing_Understanding_and_Improving_the_Allied_and_Auxiliary_Workforce (accessed August, September, October, November, December 2009).

Health Professions Network, www.healthpronet.org (accessed August, September, October, November, December 2009).

Health Resources and Services Administration. (1999). www.hrsa.gov (accessed August, September, October, November, December 2009).

North Carolina Health Professions Data System, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Health Professions Data Book (2005, 2006, 2007, 2008). Available at www.shepscenter.unc.edu (accessed December 2009).

SREB Fact Book, June 2009, Tables 42 and 44. The Southern Regional Education Board links leaders and agencies that are working on similar issues throughout its member states. The SREB covers 16 states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.Tennessee Board of Regents. Tennessee Careers Health Science Career Cluster Guide, www.pathways.tbr.edu/career_clusters.php (accessed August, September, October, November, December 2009).

Tennessee Department of Health Licensing Information. http://health.state.tn.us/licensing.htm (accessed August, September, October, November, December 2009).

Tennessee Department of Labor and Workforce Development. (2009). Available at www.state.tn.us/labor-wfd/source (accessed August, September, October, November, December 2009).

Tennessee Higher Education Commission (THEC). *www.tennessee.gov/thec/ (accessed August 2009.)*

U.S. Department of Labor, Bureau of Labor Statistics. (2010–2011). Outlook: 2008–2018. www.bls.gov/oco.

WestEd Regional Research Laboratory (formerly Far West Lab). (1995, 2001). National health care skill standards.

Appendix A

Tennessee Programs

Bartlett

National College of Business and Technology
http://ncbt.edu/
5760 Stage Rd
Bartlett, TN 38134
(901) 213-1681
Adrena Jackson, director of admissions

Program/Department Title	Degree/Certification
Health Information Technology	Associates
Medical Assisting	Associates
Medical Office Assistant	Diploma
Medical Office Specialist	Diploma
Pharmacy Technician	Associates

Blountville

Northeast State Technical Community College
www.northeaststate.edu
Division of Health-Related Professions
P.O. Box 246
Blountville, TN 37617-0246
Phone: (423) 323-0238 or (423) 323-0248
Fax: (423) 279-7653
Donald S. Coleman, dean, health-related professions
E-mail: dscoleman@northeaststate.edu

Program/Department	Degree/Certification	Director/Chair
Cardiovascular Technology	A.A.S.	Connie Marshall
Invasive		Connie Marshall
Noninvasive Option		Cynthia Norris
Vascular Option		Connie Marshall
Dental Assisting	Certificate/A.A.S.	Paulette Kehm-Yelton
EMT/Paramedic	Certificate	Darren Ellenburg
Basic		David Bryant
Paramedic		Darren Ellenburg

Medical Laboratory	A.A.S.	Linda Lahr
Nursing	A.A.S.	Melissa Webb
Pre Allied Health		Lana Hamilton
Speech Communication	A.A./A.S.	Dr. Xiaoping Wang
Surgical Technology	A.A.S.	Laurie Bollman
Vascular Option		Connie Marshall

Bristol

National College of Business and Technology
http://ncbt.edu/
1328 Highway 11W
Bristol, TN 37620
(423) 848-4440
Sherri Jesse, healthcare education department chair

Program/Department	Degree/Certification	Director/Chair
Medical Assisting	Associates Degree	Sheri Jesse
Medical Billing and Coding	Diploma	
Medical Office Assistant	Diploma	
Medical Office Specialist	Diploma	
Medical Transcription	Diploma	
Pharmacy Technician	Diploma	

Chattanooga

Chattanooga State Technical Community College
www.chattanoogastate.edu
Division of Nursing and Allied Health
4501 Amnicola Highway
Chattanooga, TN 37406
Phone: (423) 697-4450
Fax: (423) 634-3071

Program/Department	Degree/Certification	Director/Chair
Dental Assisting	Technical Certificate, R.D.A., C.D.A.	Karen Castleberry
Dental Hygiene	A.A.S.	Joseph H. Varnell
Diagnostic Medical Sonography	Advanced Certificate	Jody Arnold-Hancock
EMT/Paramedic	Adv./Tech. Certificate, A.A.S.	Robert Prytula
Health Information Management	A.A.S.	Kay McMillan

Health Information Technology	A.A.S.	
Magnetic Resonance Imaging	Technical Certificate	
Medical Assistant	Technical Diploma	
Nuclear Medicine Technology	Advanced Certificate	Leesa Ress
Nursing	A.A.S.	Cynthia Swafford
Pharmacy Technician	Technical Certificate	Nancy Watts
Physical Therapist Assistant	A.A.S.	Laura Warren
Radiation Therapy Technology	Advanced Certificate	Lisa Legg
Radiologic Technology	A.A.S.	Margery Sanders
Respiratory Care	A.A.S.	Sharon Hall

Miller-Motte Technical College
www.miller-motte.com
6020 Shallowford Road Suite 100
Chattanooga, TN 37421
Phone: 1-888-794-9357 or (423) 510-9675

Department	Degree/Certification	Director/Chair
Dental Assisting	A.A.S.	Donna Cochrell
Massage Therapy	A.A.S./Diploma	Angie Jaggers
Medical Assisting	A.A.S.	Shirley Cross
Surgical Technology	A.A.S.	Barbara Kitchens

University of Tennessee at Chattanooga
www.utc.edu
College of Health, Education, and Professional Studies
615 McCallie Avenue
Chattanooga, TN 37403
Phone: (423) 425-4249
Fax: (423) 425-4044
Mary Tanner, dean
E-mail: mary-tanner@utc.edu

Program/Department	Degree/Certificate	Director/Chair
Athletic Training	M.S.	
Dietetics	B.S.	Holly Dieken
Health and Human Performance	B.S., M.S.	Greg Heath
Nursing	B.S.N.	Kay Lindgren
Nursing	M.S.N.	Kay Lindgren
Occupational Therapy	M.O.T.	Susan McDonald
Physical Therapy	D.P.T.	Randy Walker
Social Work	B.S.W.	Valerie Radu

Clarksville

Austin Peay State University
www.apsu.edu
College of Science and Mathematics
P.O. Box 4538
Clarksville, TN 37044
Phone: (931) 221-7971
Fax: (931) 221-7984
Jaime Taylor, interim dean
E-mail: taylorjr@apsu.edu
Allied Health Sciences Department

Program/Department	Degree/Certification	Director/Chair
Diagnostic Medical Sonography	B.S.	Rex Ameigh
Medical Technology	B.S.	Robert Robison
Nuclear Medical Technology	B.S.	Rex Ameigh
Radiologic Technology	B.S.	Rex Ameigh

Miller-Motte Technical College
www.miller-motte.com/clarksville-index.htm
1820 Business Park Dr
Clarksville, TN 37040
(931) 553-0071
1-888-796-9524

Department	Degree/Certification	Director/Chair
Healthcare Assistant	Diploma	Sharon Shinn-Bolander
Healthcare Technology	A.A.S.	Sharon Shinn-Bolander
Medical Assisting	A.A.S.	Sharon Shinn-Bolander
Medical Office Assisting	Diploma	Sharon Shinn-Bolander
Respiratory Therapy	A.A.S.	Nikki England
Surgical Technology	A.A.S.	Kelly England

Cleveland

Cleveland State Community College
www.clscc.cc.tn.us
Division of Health and Wellness
P.O. Box 3570
Cleveland, TN 37320-3570
Phone: (423) 472-7141 or 800-604-2722
Fax: (423) 614-8722
Nancy LaBine, dean/director of nursing
E-mail: nlabine@clevelandstatecc.edu
Joyce Brock, secretary, Department of Health and Wellness

Program/Department	Degree/Certification	Director/Chair
EMT	Certificate	Janie New
Health, Physical Education, Recreation	A.S.	Aaron Bryant

Lee University
www.leeuniversity.edu
1120 North Ocoee Street
Cleveland, TN 37320
College of Arts and Sciences
Phone: (423) 614-8115
Fax: (423) 614-8625

Program/Department	Degree/Certification	Director/Chair
Athletic Training	B.S.	
Healthcare Administration	B.A.	
Medical Technology	B.S.	

Columbia

Columbia State Community College
www.columbiastate.edu
Walter Building 112, Health Sciences Division
1665 Hampshire Pike
Columbia, TN 38401
Phone: (931) 540-2600
Fax: (931) 540-2794
Kae Fleming, chair
(931) 540-2595
E-mail: efleming@columbiastate.edu

Patricia Bowman, secretary
(931) 540-2600
E-mail: pbowman@columbiastate.edu
Laura Watt, secretary
(931) 540-2599
lwatt@columbiastate.edu

Program/Department	Degree/Certification	Director/Chair
EMT-Paramedic	Certificate	Jeffrey Guy
Nursing	A.A.S.	Barbara Blum
Radiology Technology	A.A.S.	Brenda Coleman
Respiratory Care	A.A.S.	David Johnson
Veterinary Technology	A.A.S.	Boyce Wanamaker

Cookeville

Medvance Institute
www.medvance.edu
1025 Hwy 111
Cookeville, TN 38501
Phone: (931) 526-3660
Fax: (931) 372-2603

Department	Degree/Certification	Director/Chair
Medical Assistant		Cindy Woody
Medical Billing and Coding Specialist		Regina Meadows
Medical Laboratory Technology	A.A.S.	Chris Seazell
Medical Office Administration		Brenda Hofer
Pharmacy Technician		Linda Kelly
Radiologic Technology	A.A.S.	Bill May
Surgical Technology	Diploma	Jerry Ware

Tennessee Technological University
www.tntech.edu
Room 205, Foster Hall
Cookeville, TN 38505-5006
Fax: (931) 372-3434
Eugene Kline, pre-professional advisor
Phone: (931) 372-3422
E-mail: ekline@tntech.edu
Mary Helen Saunders, pre-professional health sciences secretary
Phone: (931) 372-3093
E-mail: msaunders@tntech.edu

Program/Department	Degree/Certification	Director/Chair
Emergency Medical Services		Dennis Parker
Food, Nutrition and Dietetics	B.S.	Cathy Hix-Cunnigham
Pre-Professional Health Science		Paul Semmes
School of Nursing	B.S.N., MSN	Sheila Green
Social Work	B.S.	James Raymondo

Crossville

Tennessee Technology Center
www.ttcc.edu/
910 Miller Avenue
Crossville, TN 38555
Phone: (931) 484-7502

Program/Department	Degree/Certification	Director/Chair
Practical Nursing	Diploma	Rose Smalley Betty Baxter
Surgical Technology	Diploma	Melissa Pelfrey Stephanie Austin

Dickson

Tennessee Technology Center
www.ttcdickson.edu
740 Highway 46
Dickson, TN 37055
Phone: (615) 441-6220
Fax: (615) 441-6223

Program/Department	Degree/Certification	Director/Chair
Dental Assisting	Diploma	Laura Travis
Medical Coding	Diploma	Gary Fouts
Practical Nursing	Diploma	Gary Fouts
Surgical Technology	Diploma	Laura Travis

Dyersburg

Dyersburg State Community College
www.dscc.edu
Division of Nursing and Allied Health
1510 Lake Road
Dyersburg, TN 38024
Phone: (731) 286-3390
Fax: (731) 288-7744
Faye Sigman, dean
E-mail: sigman@dscc.edu
Robin Privett, secretary
E-mail: privett@dscc.edu

Program/Department	Degree/Certification	Director/Chair
Emergency Medical Technology	Certificate	Tom Coley
Health Information Technology	A.A.S.	Doug Teague
Medical Coding	Certificate	Doris Robinson
Medical Transcription	Certificate	Susan Osborne
Medical Office Technology	A.A.S.	Peggy Rue
Nursing	A.A.S.	Robin Privett

Gallatin

Volunteer State Community College
www.volstate.edu
Division of Allied Health
1480 Nashville Pike
Gallatin, TN 37066-3188
Phone: (615) 230-3330 or 1-888-335-8722, ext. 3330
Fax: (615) 230-3331
Elvis Brandon, dean
E-mail: Elvis.brandon@volstate.edu

Program/Department	Degree/Certificate	Director/Chair
Allied Health General	A.A.S.	Elvis Brandon
Center for Emphasis		Kevin Alspaugh
Dental Assistant Program	Certificate, A.A.S.	Desiree Sutphen
Diagnostic Medical Sonography	Certificate, A.A.S.	Monica Pipkins
Emergency Medical Services (Basic and Paramedic)	Certificate, A.A.S.	Richard Collier
Fire Science Technology	Certificate/A.A.S.	Travis Ford
Health Information Technology	A.A.S.	Valerie Bowling

Medical Laboratory Technology	A.A.S.	Lisa Lee-Biggs
Medical Terminology	A.A.S.	Jona Allen
Ophthalmic Medical Technology	A.A.S.	Alisha Cornish
Physical Therapist Assistant	A.A.S.	Carolyn Moore
Radiologic Technology	A.A.S.	Monica Korpady
Respiratory Care Technology	A.A.S.	Cory Martin
Sleep Diagnostics Center	Certificate	Mel Matthews

Greeneville

Tusculum College
www.tusculum.edu
60 Shiloh Road
Greeneville, TN 37743
(423) 636-7300

Program/Department	Degree/Certificate	Director/Chair
Medical Pre-Professional	B.A.	
Medical Technology	B.A.	

Harriman

Roane State Community College
www.rscc.cc.tn.us
Allied Health Sciences Division
276 Patton Lane
Harriman, TN 37748
Phone: (865) 882-4594
Fax: (865) 882-4535
Michael Laman, dean
E-mail: lamanma@roanestate.edu
Office: (865) 539-6904
Amy Bowman, secretary
(865) 539-6904

Progam/Department	Degree/Certification	Director/Chair
Dental Hygiene Technology	A.A.S.	Michael Curran
Diagnosis and Procedural Coding	Certificate	Karen Feltner
Emergency Medical Technician (EMT)/Paramedic	Certificate	Danny Sheckles
Health Information Technology	A.A.S.	Karen Feltner
Massage Therapy	Certificate	Gary Genna

Medical Transcription	Certificate	Linda Marsh
Occupational Therapy Assistant	A.A.S.	Theresa Gergen
Opticianry	A.A.S.	Michael Goggin
Pharmacy Technician	Certificate	Marianna Mabry
Physical Therapist Assistant	A.A.S.	Kurt Backstrom
Polysomnography	Certificate	Donna Plumlee
Radiologic Technology	A.A.S.	Vickie Hensley
Respiratory Therapy Technology	A.A.S.	Lesha Hill
Ultrasound	Certificate	Joe Rothgeb

Harrogate

Lincoln Memorial University
www.lmunet.edu
6965 Cumberland Gap Parkway
Harrogate, TN 37752
School of Allied Health Sciences
Randy Evans, dean
Phone: (423) 869-7150
Fax : (423) 869-7151
E-mail: revans@inetlmu.lmunet.edu
Department of Allied Health
Vina Faulkner
Phone: (423) 869-6407
E-mail: Vina.faulkner@lmunet.edu

Program/Department	Degree/Certification	Director/Chair
Department of Allied Health		Vina Faulkner
Athletic Training	B.S.	Jack Mansfield
Medical Technology	B.S.	Bill Engle
Nursing	A.S.N., B.S.N., M.S.N.	
Physician Assistant Studies	M.M.S.	
Veterinary Technology	A.S., A.A.S., B.S.	Mary Hatfield

Hohenwald

Tennessee Technology Center
www.hohenwald.tec.tn.us
813 West Main St
Hohenwald, TN 38462
Phone: (931) 796-5351
Fax: (931) 796-4892

Program/Department	Degree/Certification	Director/Chair
Certified Nursing Assistant	Certificate	
Practical Nursing	Diploma	Julie Estes
Surgical Technology	Diploma	Jacqueline Coble

Jackson

Jackson State Community College
www.jscc.edu
2046 North Parkway
Jackson, TN 38301
Phone: (731) 425-2612
Fax: (731) 425-9551
Barry Jennison, dean, professional and technical studies
E-mail: bjennison@jscc.edu
Allied Health Department
Cathy Garner, administrative coordinator,
E-mail: cgarner@jscc.edu

Program/Department	Degree/Certification	Director/Chair
EMT/Paramedic	Certificate	Gina Pearson
Medical Laboratory Technician	A.A.S.	Peter P. O'Brien
Nursing	A.A.S.	Mimi Bowling
Physical Therapist Assistant	A.A.S.	Jane David
Radiography	A.A.S.	Gerald Graddy
Respiratory Therapy Technology	A.A.S.	Cathy Garner

Tennessee Technology Center
www.jackson.tec.tn.us
2468 Technology Center Dr.
Jackson, TN 38301
Phone: (731) 424-0691

Program/Department Title	Degree/Certification	Director/Chair
Pharmacy Tech		
Surgical Technology	Diploma	Barbara Avent

Union University
www.uu.edu
1050 Union University Drive
Jackson, TN 38305
Phone: (731) 668-1818
College of Education and Human Studies
Thomas Rosebrough, dean, Department of Physical Education, Wellness, and Sport
trosebrough@uu.edu
(731) 661-5374

Program/Department Title	Degree/Certification	Director/Chair
Athletic Training	B.S.	Linn Stranak
Exercise Science	B.S.	Linn Stranak
Medical Technology	B.S.	Randy Johnston
Nursing	L.P.N., B.S.N., R.N., M.S.N.	Timothy Smith

Jefferson City

Carson-Newman College
www.cn.edu
1646 Russell Avenue
P.O. Box 557
Jefferson City, TN 37760
Phone: (865) 475-9061
Fax: (865) 471-3502
Kitty Coffey, dean
Phone: (865) 471-3295
E-mail: kcoffey@cn.edu
School of Family and Consumer Sciences
School of Natural Sciences and Mathematics
Faye France, secretary
E-mail: ffrance@cn.edu

Program/Department	Degree/Certification	Director/Chair
Athletic Training		
Dietician		Catherine Burchell
Nursing		Melina Rogers
Pre Health Professions		

Joelton

Meridian Institute of Surgical Assisting
www.meridian-institute.com
P.O. Box 758
1264 Jackson Felts Rd.
Joelton, TN 37080
Phone: (877) 954-1500
Dennis.stover@meridian-institute.com

Program/Department	Degree/Certification	Director/Chair
Surgical Assistant	Certificate	Denis Stover

Johnson City

East Tennessee State University
www.etsu.edu
College of Nursing
310 Roy S. Nicks Hall
P.O. Box 70617
Johnson City, TN 37614-0617
Student Inquiries: (423) 439-4578, *888-37-NURSE
Phone: (423) 439-7199, Fax: (423) 439-4522
Dean's Office Fax: (423) 439-4543
College of Clinical and Rehabilitative Health Sciences
Box 70282
Johnson City, TN 37614-1700
Phone: (423) 439-7457, Fax (423) 439-4240
Nancy J. Scherer, dean and professor, scherern@etsu.edu
Crystal Gilland, office coordinator, gilland@etsu.edu

Program/Department	Degree/Certification	Director/Chair
Allied Health Sciences.		Don Samples
Allied Health Leadership	B.S.A.H.	Don Samples
Dental Hygiene Program	B.S.A.H	Charles Faust
Polysomnographic Tech	B.S.	Charles Faust
Radiologic Technology	B.S.A.H.	Shirley Cherry
Respiratory Therapy	B.S.A.H.	Shane Keene
Biomedical Science	M.S., Ph.D.	Alok Agrowan
Communicative Disorders		Marc Fagelson
Speech-Audiology Pathology	Au.D., M.S.	
Nursing	B.S.N., R.N., L.P.N.	Susan Grover
Physical Therapy	D.P.T.	David Arnall

College of Public Health
Box 70623
Johnson City, TN 37614-1709
Phone: (423) 439-4243, Fax: (423) 439-5238
Randy Wykoff, dean, wykoff@etsu.edu
Rob Pack, associate dean for academic affairs, packr@etsu.edu
Betty Grice, office coordinator, grice@etsu.edu

Program/Department	Degree/Certification	Director/Chair
Biostatistics/Epidemiolgy		James Anderson
Biostatistics	M.P.H., Certificate	
Epidemiology	M.P.H., Dr.P.H., Certificate	
Community Health	B.S., M.P.H., Dr.P.H.	James Florence
Gerontology	Certificate	
Rural Health	Certificate	
Dietetic Internship		Elizabeth Lowe
Environmental Health	B.S.E.H., M.S.E.H., M.P.H., Ph.D.	Phillip Scheuerman
Health Care Management	Certificate	Brian Martin
Health Sciences		Ranjan Chakraborty
Human Health	B.S.	
Microbiology	B.S., M.S.	
Health Services Administration	B.S., M.P.H.	Amal Khoury

Knoxville

South College
www.southcollegetn.edu
3904 Lonas Drive
Knoxville TN 37909
Phone: (865) 251-1800
Kenneth Harbert, dean

Program/Department	Degree/Certification	Director/Chair
Health Science		
Radiography Concentration		
Nuclear Medicine Concentration		
Health Science in Physician's Assistant Studies	Master	Kenneth Harbert
Medical Assisting	Associates Degree	Anna Fritz
Nuclear Medicine	Certificate/B.S.	Lisa Satterfield

Physical Therapist Assistant	Associates Degree	Kelly Nash
Radiography		Lisa Satterfield
Nuclear Medicine	Certificate	Lisa Satterfield
Nursing	B.S.N.	

Tennessee Technology Center
www.ttcknoxville.edu
1100 Liberty Street
Knoxville, TN 37919
Phone: (865) 546-5567
Fax: (865) 971-4474

Program/Department	Degree/Certification	Director/Chair
Dental Assistant	Diploma	Mary Ellen Vaughn
Medical Assistant	Diploma	Christina Raley
Medical Billing and Coding	Diploma	Denise Butler
Medical Office Information Technology	Diploma	Martha Woodall
Medical Terminology	Diploma	Vicki Aube
Practical Nursing	Diploma	April Bryant
Surgical Technology	Diploma	Vicki Aube
Technology Foundations	Diploma	Doris Rugby

University of Tennessee at Knoxville
www.utk.edu
College of Nursing
1200 Volunteer Boulevard,
Knoxville, TN 37996-4180
Phone: (865) 974-4151, Fax: (865) 974-3569

Program/Department	Degree/Certificate	Director/Chair
Nursing	B.S.N., R.N., M.S.N., Ph.D.	Joan Creasia

College of Education, Health, and Human Sciences
335 Claxton Complex
1122 Volunteer Boulevard
Knoxville, TN 37996
Phone: (865) 974-2201
Fax: (865) 974-8718
Bob Rider, dean

Program/Department	Degree/Certificate	Director/Chair
Health and Exercise Science		Tom George
Community Health	B.S., Ph.D.	
Community Health Education	M.P.H.	
Gerontology	M.P.H.	
Health Education and Health Promotion	M.S.	
Health Planning and Administration	M.P.H.	
Nutrition	B.S., M.S., Ph.D.	Jay Whelan
Dietetics	B.S.	
Public Health Nutrition	M.S.	
Public Heath/Public Health Nutrition	M.S./M.P.H.	

University of Tennessee Medical Center-Knoxville
www.utmedicalcenter.org
1924 Amnicola Highway
Knoxville, TN 37920
Phone: (865) 544-9726
Fax: (865) 544-9074
Gary Smith, medical director

Program/Department	Degree/Certification	Director/Chair
Medical Technology		Sharon Wierwille
Nuclear Medicine	Certificate/B.S.	Glenn Hathaway
Radiologic Technology	Certificate	Clyde Hembree

National College of Business and Technology
http://ncbt.edu/locations/knoxville/index.htm
8415 Kingston Pike
Knoxville, TN 37919
(865) 539-2011
Rhonda Epps, director for healthcare education

Program/Department	Degree/Certification	Director/Chair
Medical Assisting	Associates Degree	
Medical Billing and Coding	Diploma	
Medical Office Assistant	Diploma	
Medical Office Specialist	Diploma	
Medical Transcription	Diploma	
Pharmacy Technician	Diploma	

Lebanon

Cumberland University
www.cumberland.edu
One Cumberland Square
Lebanon, TN 37087-3408
Phone: (615) 444-2562
Fax: (615) 444-2569

Program/Department	Degree/Certification	Director/Chair
Athletic Training	B.S.	Danna Johnson Danny Rogers
Nursing	B.S.N.	Carol Bach

Madison

National College of Business and Technology
http://ncbt.edu/locations/madison/index.htm
900 Madison Square
Madison, TN 37115
(615) 612-3015
Junior Basant, director for healthcare education

Program/Department	Degree/Certification
Health Information Technology	Associates Degree
Medical Assisting	Associates Degree
Medical Office Assistant	Diploma
Medical Office Specialist	Diploma
Pharmacy Technician	Associates Degree
Pharmacy Technician	Diploma

Martin

University of Tennessee at Martin
www.utm.edu
Department of Biological Studies
248 Brehm Hall
Martin, TN 38238-5011
Phone: (731) 881-7171 and (731) 881-7170
Fax: (731) 881-7187
Randy Cate, chair, Pre Health Science Program Advising
Linda Little, secretary

Program/Department	Degree/Certification	Director/Chair
Pre-Professional Health Science		
Nursing	B.S.N.	Nancy Warren

McKenzie

Bethel College
www.bethel-college.edu
Department of Nursing
325 Cherry Avenue
McKenzie, TN, 38201
(731) 352-4000
Sandy Atwill, admissions director/office coordinator, (731) 352-5708
Johnna Tanner, PA-C-PA program director (731) 352-4595

Program/Department	Degree/Certification	Director/Chair
Physician Assistant	M.S.	

McMinnville

Tennessee Technology Center
http://ttcmcminnville.edu/
241 Vo-Tech Drive
McMinnville, TN 37110
Phone: (931) 473-5587 or (931) 474-TECH
Fax: (931) 473-6380

Program/Department	Degree/Certification	Director/Chair
Medical Assistant	Diploma	Deborah Womack
Practical Nursing	Diploma	Trudy Kettenbach

Memphis

Baptist Memorial College of Health Sciences
www.bchs.edu
1003 Monroe Avenue
Memphis, TN 38104-3104
Phone: (901) 575-2468 or 866-575-2247
Fax: (901) 572-2750
Division of Allied Health
Linda E. Reed, dean
(901) 572-2640
E-mail: linda.reed@bchs.edu
Maggie James, coordinator of academic operations
E-mail: maggie.james@bchs.edu

Program/Department	Degree/Certification	Director/Chair
Diagnostic Medical Sonography	B.S.	Mitzi Roberts
Health Care Management	B.S.	Reagan Caldwell
Nuclear Medicine Technology	B.S.	Kathy Hunt
Nursing	B.N.S.	Anne Plumb
Radiologic Technology	B.S.	Beverly Coker Wanda Lillie
Respiratory Care	B.S.	Brian Parker

Concorde Career Center
www.concorde.edu/memphis
5100 Poplar Avenue Suite 132
Memphis TN 38137
(901) 761-9494
Cliff Custer, director

Program/Department	Degree/Certification	Director/Chair
Advanced Respiratory Care	Diploma	
Dental Assisting	Diploma	Christine Felchner
Dental Hygiene	A.A.S.	Lynn Russell
Massage Therapy	Diploma	
Medical Assistant	Diploma	
Medical Office Professional	Diploma	
Patient Care Assistant	Diploma	
Pharmacy Technician	Diploma	
Respiratory Therapy	A.A.S.	Winston Granville
Surgical Technology	Diploma	Scott Geist

Methodist Le Bonheur Healthcare
www.methodisthealth.org
1265 Union Avenue
Memphis, TN 38104
Phone: (901) 516-8099
Fax: (901) 516-2870
School of Radiologic and Imaging Sciences

Department	Degree/Certification	Director/Chair
Diagnostic Medical Sonography	Certificate	Tamera Ghelichkhani
Nuclear Medicine Technology	Certificate	
Radiologic Technology	Certificate	Melissa Yarbro

Southwest Tennessee Community College
www.southwest.tn.edu
Division of Mathematics, Natural Sciences and Health Sciences
P.O. Box 780
Memphis, TN 38101-0780
Phone (901) 333-5733
Fax (901) 333-5102
Glenn Swinny, dean
E-mail: gswinny@southwest.tn.edu
Darius Wilson, chair, Allied Health Department
Phone: (901) 333-5400
Fax : (901) 333-5391
E-mail: dwilson@southwest.tn.edu

Program/Department	Degree/Certification	Director/Chair
Allied Health Science	A.A.S.	
Dietetic Technician	A.A.S.	Linda Pope
Emergency Medical Science Paramedic	A.A.S.	Glenn Faught
Emergency Medical Technology	A.A.S.	Glenn Faught
Medical Administrative Assistant	A.A.S.	Cecilia Jacob
Medical Laboratory Technician	A.A.S.	Darius Wilson
Nursing	A.A.S.	Mary Vines
Pharmacy Technician	Certificate	Osborne Burks
Phlebotomist	Certificate	Darius Wilson
Physical Therapist Assistant	A.A.S.	Edward Zeno
Radiologic Technology	A.A.S.	Thomas Wolfe
University Parallel Natural Sciences	A.S.	Betty Rosenblatt

Tennessee Technology Center
www.ttcmemphis.edu
550 Alabama Ave
Memphis, TN 38105
Phone: (901) 543-6100

Program/Department	Degree/Certification	Director/Chair
Dental Assisting	Diploma	Bettie Brooks Janice Harper
Dental Laboratory Technology		Donna Karney
Pharmacy Technology	Certificate	Olivia Bowden
Practical Nursing	Certificate	Theresa Isom

University of Memphis
www.memphis.edu
Department of Health and Sport Sciences
106 Fieldhouse
Memphis, TN 38152
Phone: (901) 678-4316
Fax: (901) 678-3591
Robin Roach, interim chair and professor
E-mail: rroach@memphis.edu
Maurice Mendel, director and chair, audiology and speech language pathology
E-mail: mmendel@memphis.edu

Program/Department	Degree/Certification	Director/Chair
Advanced Practice Nursing	M.S.N.	Mary Hammons
Audiology and Speech	M.S.	Ruth Williams
Clinical Nutrition	M.S.	Ruth Williams
Health and Human Performance	B.S.Ed.	Richard Bloomer
Dietetics	B.S.Ed.	Robin Roach
Fire Prevention Technology	B.S.Ed.	
Human Movement Sciences	M.S.	
Exercise and Sport Science	M.S.	Lawrence Weiss
Health Promotion	M.S.	Barbara McClanahan
Physical Ed. Teacher Ed.	M.S.	Ben Dyson
Sport and Leisure Commerce	M.S.	Richard Irwin
Health Services Administration	B.S.Ed., M.S.	Lisa Klesges
Language Pathology	M.A., Ph.D.	Maurice Mendel
Nursing	B.S. Ed.	Mary Hammons
Physical Education Teacher Ed.	B.S.Ed.	Paul Wright
Sports and Leisure Studies	B.S.Ed.	Richard Irwin

University of Tennessee Health Science Center
www.utmem.edu
College of Allied Health Sciences
930 Madison Avenue, Suite 631
Memphis, TN 38163
Phone: (901) 448-5581
Fax: (901) 448-7545
Barbara Connolly, interim dean
E-mail: bconnolly@utmem.edu
Sherry Gooch, assistant to the dean

Program/Department	Degree/Certificate	Director/Chair
Clinical Doctorate in Audiology	Au.D.	Ashley Harkrider
Cytotechnology	M.S./M.C.P.	Barbara Bernstein
Dental Hygiene	B.S.	Susan Crim Cassandra Holder-Ballard
Health Informatics and Information Management	B.S./M.H.I.I.M.	Beth Bowman
Master of Dental Hygiene	M.D.H.	Nancy Williams
Medical Technology	B.S., B.S.N.	Linda Ross
Occupational Therapy	M.O.T.	Ann Nolen
Physical Therapy	D.P.T./T.D.P.T.	Barbara Connolly
Advanced	M.S.P.T./ Sc.D.P.T.	Carol Likens
Speech and Hearing	Ph.D.	Ashley Harkrider
Speech Pathology	M.S.	Ashley Harkrider

National College of Business and Technology

http://ncbt.edu/
3545 Lamar Avenue, Suite 1
Memphis, TN 38118
(901) 363-9046
Morris Butcher, director of healthcare education

Program/Department	Degree/Certification
Health Information Technology	Associates Degree
Medical Assisting	Associates Degree
Medical Office Assistant	Diploma
Medical Office Specialist	Diploma
Pharmacy Technician	Associates Degree
Surgical Technology	Associates Degree

Milligan

Milligan College
www.milligan.edu
Occupational Therapy Department
P.O. Box 130
Milligan College, TN 37682
Phone: (423) 975-8010 or 800-262-8337
Fax: (423) 975-8019
E-mail: msot@milligan.edu
Jeff Snodgrass, program director
E-mail: jsnograss@milligan.edu

Program/Department	Degree/Certification	Director/Chair
Human Performance and Exercise Science	B.A., B.S.	
Occupational Therapy	M.S.O.T.	Jeff Snodgrass
Nursing	B.S.N.	

Morristown

Walters State Community College
www.wscc.cc.tn.us
Health Programs Division
500 S. Davy Crockett Parkway
Morristown, TN 37813-6899
Phone: (423) 585-6981
Fax: (423) 585-6955
Marty Rucker, dean of health programs
E-mail: marty.rucker@ws.edu

Program/Department	Degree/Certificate	Chair/Director
EMT-Paramedic	Certificate, Associate	Tim Strange
Health Information Technology	A.A.S.	Gail Winkler
Medical Coding	Technical Certificate	Gail Winkler
Medical Insurance Specialist	Technical Certificate	Gail Winkler
Medical Transcription	Technical Certificate	Gail Winkler
Nursing	A.A.S.	Cheryl McCall
Pharmacy Technician	Technical Certificate	Kimberly Brown
Physical Therapist Assistant	A.A.S.	Ann Lowdermilk
Respiratory Care Technician	A.A.S.	Donna Lilly

Murfreesboro

Middle Tennessee State University
www.mtsu.edu
Center for Health and Human Services (Affiliated Program)
MTSU Box 99
1301 E. Main St.
Murfreesboro, TN 37132
Phone: (615) 898-2905
Fax: (615) 898-4803
M. Jo Edwards, professor and chairholder,
Adams Chair of Excellence in Health Care Services
E-mail: mjedward@mtsu.edu

Phone: (615) 898-2905
Jeannie Paul, executive assistant
E-mail: jpaul@mtsu.edu
Phone: (615) 494-8919

Program/Department	Degree/Certificate	Chair/Director
Aging Studies	Minor	J. Brandon Wallace
Athletic Training	B.S.	Helen Binkley
Communication Disorders	B.S.	Rebecca Fischer
Exercise Science	B.S., M.S.	Jennifer Caputo
Health Education	B.S.	Scott Colclough
Nursing	B.S.N., M.S.N.	Lynn Parsons
Nutrition and Food Science	B.S.	Dellmar Walker
Pre-Professional Health Sciences		Jennifer Braswell, advisor
Medical Technology	B.S. (affiliated)	Anthony Farone
Radiation Therapy Technologist	B.S. (affiliated)	D. Andrew Burden
Nuclear Medicine Technologist	B.S. (affiliated)	D. Andrew Burden
Pre-Diagnostic Medical Sonography	B.S. (affiliated)	D. Andrew Burden
Psychology	B.S., M.S.	Dennis Papini
Recreational Therapy	B.S.	Victoria Shelar

Tennessee Technology Center
www.ttcmurfreesboro.edu
1303 Old Fort Parkway
Murfreesboro, TN 37129
Phone: (615) 898-8010
Fax: (615) 893-4194
Carol Puryear, director

Program/Department	Degree/Certification	Director/Chair
Biomedical Technology	Diploma	
Dental Assisting	Diploma	Suzanne Dowdle
Pharmacy Technician	Diploma	
Phlebotomy	Diploma	
Practical Nursing	Diploma	
Surgical Technology	Diploma	Mike Ford

Nashville

Belmont University
www.belmont.edu
Gordon E. Inman College of Health Sciences and Nursing
1900 Belmont Boulevard
Nashville, TN 37212
Phone: (615) 460-6000
Fax: (615) 460-6125
Jack Williams, dean
E-mail: williamsj@mail.belmont.edu

Program/Department	Degree/Certification	Director/Chair
Exercise Science		Sarah Adams
Nursing	R.N., B.S.N.	Ruby Dunlap
Occupational Therapy	M.S.O.T.	Ruth Ford
		Lorry Liotta-Kleinfield
Pharmacy	PharmD.	Phillip Johnston
Physical Therapy	D.P.T.	John Halle
Social Work	B.S.W. M.S.S.W.	Lorraina Scholten

Lipscomb University
www.lipscomb.edu
One University Park Drive
Nashville, TN 37204-3951
College of Pharmacy
Roger L. Davis, dean
Phone: (615) 966-7160
pharmacy@lipscomb.edu

Program/Department	Degree/Certification	Director/Chair
Pharmacy	Doctor of Pharmacy	Roger Davis

College of Natural and Applied Sciences
Ben Hutchinson, dean
Phone: (615) 966-6042
ben.hutchinson@lipscomb.edu

Program/Department	Degree/Certification	Director/Chair
Dietetics	B.S.	
Department of Kinesiology		Kent Johnson
Exercise Science	M.S.	
Health and Physical Education		
Coaching		
Nursing	B.S.N., M.S.N.	Leanne Busby

Kaplan Career Institute
www.kci-nashville.com
750 Envious Lane
Nashville, TN 37217
Phone: (615) 279-8322 or 800-989-2378

Program/Department	Degree/Certification	Director/Chair
Dental Assisting	Diploma	Rachel Obptande
Medical Assistant	Diploma	
Medical Billing and Coding Specialist	Diploma	
Medical Office Specialist		

Medvance Institute
www.medvance.edu
3354 Perimeter Hill Drive, Suite 105
Nashville, TN 37211
Phone: (615) 320-5917
Fax: (615) 320-5918

Department	Degree/Certification	Director/Chair
Medical Assistant	Diploma	Tiffany Dragavon
Medical Billing and Coding Specialist	Diploma	
Medical Office Administration	Diploma	
Radiologic Technology	Diploma	Craig Shephard
Sterile Processing Technician	Diploma	
Surgical Technology	Diploma	Jeffery Perkins

Nashville General Hospital
www.nashvilleha.org
School of Radiologic Technology
1818 Albion Street
Nashville, TN 37208
Phone: (615) 341-4440
Fax: (615) 341-4906
Kenneth Jones, director
E-mail: kenneth.jones@nashvilleha.org

Program/Department	Degree/Certification	Director/Chair
Radiologic Technology	Certificate	Kenneth Jones

Nashville State Community College
www.nscc.edu
120 White Bridge Road
Nashville, TN 37209
Phone: (615) 353-3333 or (615) 353-3382
Fax: (615) 353-3608
Donna Whitehouse, health science programs coordinator
E-mail: donna.whitehouse@nscc.edu

Program/Department	Degree/Certification	Director/Chair
Healthcare Management	A.A.S.	Eli Alvarado
Medical Coding	Certificate	Eli Alvarado
Occupational Therapy Assistant	A.A.S.-O.T.	Donna Whitehouse
Surgical Technology	Certificate	Van Bates

Tennessee Board of Regents
1415 Murfreesboro Road, Suite 324
Nashville, TN 37217
Phone: (615) 366-4442
Fax: (615) 366-3903
Treva Berryman, associate vice chancellor for academic affairs
E-mail: treva.berryman@tbr.edu

National College of Business and Technology
http://ncbt.edu
1638 Bell Road
Nashville, TN 37211
(615) 333-3344
A'Donni Samuels, director of healthcare education

Program/Department	Degree/Certification	Director/Chair
Medical Assisting	Associates Degree	A'Donni Samuels
Medical Billing and Coding	Diploma	
Medical Office Assistant	Diploma	
Medical Office Specialist	Diploma	
Medical Transcription	Diploma	
Pharmacy Technician	Diploma	

Tennessee State University
www.tnstate.edu
College of Health Sciences
3500 John Merritt Boulevard
Box 9639
Nashville, TN 37209-1561
Phone: (615) 963-5871
Fax: (615) 963-5926
Kathleen McEnerney, Interim Vice President for Academic Affairs
E-mail: kmcenerney@tnstate.edu
Charlene Matlock, office supervisor

Program/Department	Degree/Certification	Director/Chair
Dental Hygiene	A.A.S., B.S.	Marian Patton
Health Care Administration/ Planning	B.S.	Rosemary Theriot
Health Information Management	B.S.	Elizabeth Kunnu
Health Sciences	B.S.	Rosemary Theriot
Occupational Therapy	M.O.T.	Larry Snyder
Physical Therapy	D.P.T.	Rosalyn Pitt
Respiratory Care	A.S.	Thomas John
Speech-Language Pathology	M.S.	Harold Mitchell

Tennessee Technology Center
http://ttcnashville.edu/
100 White Bridge Road
Nashville, TN. 37209
Phone: (615) 425-5500
Fax: (615) 425-5581
E-mail: info@ttcnashville.edu

Program/Department	Degree/Certification	Director/Chair
Dental Lab Technology	Diploma	Jeff Riek
Pharmacy Technician	Diploma	Stacia Fontenot
Phlebotomy	Diploma	Mary Armbrecht
Practical Nursing	Diploma	

Trevecca University
www.trevecca.edu
Division of Natural and Applied Sciences
333 Murfreesboro Road
Nashville, TN 37210
Phone: (615) 248-1225
Fax: (615) 248-1622
G. Michael Moredock, chair
E-mail: mmoredock@trevecca.edu

Program/Department	Degree/Certification	Director/Chair
Physician Assistant	M.S.-Medicine	G. Michael Moredock

Vanderbilt University Medical Center
www.mc.vanderbilt.edu
1211 Medical Center Drive
Nashville, TN 37232
(615) 322-5000
Allied Health Programs (hospital-based)

Program/Department	Degree/Certificate	Director/Chair
Cardiovascular Perfusion Technology	Certificate	David Webb
Dietetic Internship	M.S., R.D.	Elizabeth Wolff-Robinson
Medical Sonography	Certificate	Jill Trotter
Medical Technology	M.S., M.T.	Katherine Karas Hopper
Nuclear Medicine Technology	Certificate	James Patton
Radiation Therapy	Certificate	Adrian Newson
Speech-Language Pathology	M.S., Ph.D.	

Paris

Tennessee Technology Center
http://ttcparis.edu/
W. J. Neese Campus
312 S. Wilson St.
Paris, TN 38242
Phone: (731) 644-7365
Fax: (731) 644-7368

Program/Department	Degree/Certificate	Director/Chair
Practical Nursing	Certificate	Alice McCutcher

Appendix B

Websites of Interest

American Occupational Therapy Association
www.aota.org

American Medical Association
www.ama-assn.org

Association of Schools of Allied Health
www.asahp.org

Health Careers in Tennessee
www.tnhealthcareers.com

Tennessee Department of Health
http://health.state.tn.us/

Tennessee Department of Health Licensing Information
http://health.state.tn.us/licensing.htm

Tennessee Department of Labor and Workforce Development
www.tn.gov/labor-wfd/

Tennessee Health Careers
www.tnhealthcareers.com

Tennessee Higher Education Commission
www.state.tn.us/thec

U.S. Department of the Census
www.census.gov

U.S. Department of Labor and Statistics Occupational Outlook Handbook 2010-2011
www.bls.gov/oco

Athletic Trainers

National Athletic Trainers Association
www.nata.org

National Strength and Conditioning Association
www.nsca-lift.org

Dental Hygienists, Assistants, and Laboratory Technicians

American Dental Association
www.ada.org

American Dental Assistants Association
www.dentalassistant.org

American Dental Hygienists Association
www.adha.org

National Association of Dental Laboratories
www.nadl.org

National Board for Certification in Dental Laboratory Technology
www.nbccert.org

Diagnostic Medical Sonographers

American Registry for Diagnostic Medical Sonography
www.ardms.org

Diagnostic Radiologic Technologists and Radiation Therapists

American Association of Medical Dosimetrists
www.medicaldosimetry.org

American Society of Radiation Oncology
www.astro.org

Association for Medical Imaging Management
www.ahraonline.org

Association of Educators in Imaging and Radiological Sciences
www.aers.org

Dieticians and Dietetic Technicians

American Dietetic Association
www.eatright.org)

U.S. Food and Drug Administration (FDA)
www.fda.gov

Emergency Medical Technicians

National Center for Emergency Medicine Informatics
Emergency Medicine on the Web
www.ncemi.org

National Registry of Emergency Medical Technicians
www.nremt.org

Health Education

National Commission on Health Education Credentialing
www.nchec.org

Health Information Administrators and Technicians

American Health Information Management Association (AHIMA)
www.ahima.org

American Medical Informatics Association
www.amia.org

Medical Assistants

American Association of Medical Asistants
www.aama-ntl.org

Tennessee Society of Medical Assistants
www.tnsma.org

Medical Technologists and Medical Laboratory Technicians

American Medical Technologists
www.amtl.com

American Society for Clinical Pathology
www.ascp.org

Clinical Laboratory Management Association
www.clma.org

Medical Transcriptionists

Medical Transcription Industry Association
www.mtia.com

MT Daily
www.mtdaily.com

Nuclear Medical Technologists

American Registry of Radiologic Technologists
www.arrt.org

American Society of Radiologic Technology
www.asrt.org

Nuclear Medicine Technology Certification Board
www.nmtcb.org.

Occupational Therapists and Assistants

American Occupational Therapy Association
www.aota.org

Tennessee Occupational Therapy Association
www.tnota.org

Phlebotomists

American Society of Phlebotomy Technicians
www.aspt.org

Physical Therapists and Assistants

American Physical Therapy Association
www.apta.org

Physician Assistants

National Commission on Certification for Physician Assistants
www.nccpa.net

Recreational Therapists

American Therapeutic Recreation Association
www.atra-online.com

Respiratory Therapists and Technicians

American Association for Respiratory Care
www.aarc.org

Commission on Accreditation for Respiratory Care
www.coarc.com

National Board for Respiratory Care
www.nbrc.org

Speech-Language Pathologists, Aides, and Audiologists

American Speech-Language Hearing Association
www.asha.org

Association for Education and Rehabilitation of the Blind and Visually Impaired (AERBVI)
www.aerbvi.org
Rehabilitation Professions

Tennessee Association of Audiologists and Speech-Language Pathologists
www.taaslp.org

Surgical Technologists

Association of Surgical Technologists
www.ast.org

National Board of Surgical Technology and Surgical Assisting
www.nbstsa.org

Appendix C

Accreditation Information

Accreditation Council for Occupational Therapy Education (ACOTE)
www.aota.org/educate/accredit.aspx
Occupational Therapist, Occupational Therapy Assistant

Accreditation Review Commission on Education for the Physician Assistant (ARC-PA)
www.arc-pa.org
Physician Assistant

Accreditation Review Council on Education in Surgical Technology and Surgical Assisting
www.arcst.org

American Art Therapy Association (AATA)
www.arttherapy.org
Recreational Therapist

American Physical Therapy Association (APTA) Commission on Accreditation in Physical Therapy Education (CAPTE)
www.apta.org
Physical Therapist, Physical Therapist Assistant

Commission on Accreditation for Dietetics Education (CADE) of the American Dietetic Association
www.eatright.org/cade
Dietetic Technician, Dietitian/Nutritionist

Commission on Accreditation of Allied Health Education Programs (CAAHEP)
www.caahep.org
Diagnostic Medical Sonographer, Emergency Medical Technician-Paramedic, Medical Assistant, Respiratory Therapist, Surgical Technologist

Commission on Accreditation of Athletic Training Education
www.caate.net

Commission on Dental Accreditation (CODA)
of the American Dental Association
www.ada.org
Dental Assistant, Dental Hygienist, Dental Laboratory Technician

Council on Academic Accreditation in Audiology
and Speech-Language Pathology
www.asha.org/academic/accreditation/
Audiologist, Speech-Language Pathologist

Council on Accreditation of the
National Recreation and Park Association
www.nrpa.org/coa/
Recreational Therapist

Council on Rehabilitation Education (CORE)
www.core-rehab.org
Rehabilitation Professions

Joint Review Committee on Education
in Radiologic Technology (JRCERT)
www.jrcert.org
Radiologic Technologist

Joint Review Committee on Educational Programs
in Nuclear Medicine Technology (JRCNMT)
www.jrcnmt.org
Nuclear Medicine Technologist

National Accrediting Agency for
Clinical Laboratory Sciences (NAACLS)
www.naacls.org
Clinical Laboratory Scientist/Medical Technologist (CLS/MT), Clinical Laboratory Technician/Medical Laboratory Technician (CLT/MLT), Phlebotomist

National Association for Schools of Music (NASM)
www.arts-accredit.org
Recreational Therapist

Appendix D

Estimated Non-farm Employment (in thousands) by Metropolitan Statistical Area (MSA)

MSA (with counties listed)	Educational and Health Services 2008	All 2008	Educational and Health Services 2009	All 2009	Educational and Health Services Percent change	All Percent change
Tennessee — All	356.1	2,782.3	365.8	2,655.1	9.7	-13.2
Chattanooga — (Hamilton, Marion, Sequatchie)	29.6	245.2	30.0	237.2	0.4	-8.0
Knoxville (Anderson, Blount, Knox, Loudon, Union)	43.6	335.7	43.8	322.5	0.2	-13.2
Memphis — (Shelby, Tipton, Fayette)	79.3	629.7	81.2	616.8	1.9	-12.9
Nashville — Davidson, Cannon, Cheatham, Dickson, Hickman, Macon, Robertson, Rutherford, Smith, Sumner, Trousdale, Williamson, Wilson)	111.2	758.1	112.1	725.3	0.9	-32.8
Clarksville —(Montgomery)	9.8	84.4	10.3	80.1	0.5	-4.3
Cleveland — (Bradley, Polk)	5.7	40.5	4.9	38.8	-0.8	-1.7
Jackson — (Madison, Chester)	8.5	62.9	8.2	59.3	-0.3	-3.6
Johnson City — (Carter, Unicoi, Washington)	12.8	79.2	13.0	77.3	0.2	-1.9
*Kingsport/Bristol — (Sullivan, Hawkins)	18.4	121.4	18.6	118.8	0.2	-2.6
Morristown — (Grainter, Hamblen, Jefferson)	5.4	49.5	5.8	47.2	0.4	-2.3

**MSA includes Scott Co., Virginia; Washington Co., Virginia; and Bristol City, Virginia*

Source: Tennessee Department of Labor and Workforce Development, "The Labor Market Report," June 2008 and 2009.

Tennessee Hospital Association Membership Districts and Comprising Counties	MEDICAL TECHNOLOGIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	574.2	93.4	16.3%	379.5	10.6	2.8%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	181.6	12.7	7.0%	183.5	13.9	7.6%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	555.3	13.6	2.4%	558.4	22.2	4.0%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	122.4	14	11.4%	121	15.5	12.8%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	135.8	2	1.5%	119.7	0.5	0.4%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	172.6	15.9	9.2%	152.9	2.7	1.8%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	303.2	10	3.3%	287.2	1.2	0.4%
Northeast District (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	74	6.2	8.4%	74.6	5.3	7.1%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Tennessee Hospital Association Membership Districts and Comprising Counties	RADIOLOGIC TECHNOLOGIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	534.6	10.2	1.9%	457.3	7.6	1.7%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	281.9	20.6	7.3%	296.1	13.2	4.5%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	679	39.2	5.8%	656.7	33.6	5.1%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	174.9	6	3.4%	201.4	8	4.0%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	196.9	7.4	3.8%	215.1	7	3.3%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	189.1	4.3	2.3%	162.3	6.2	3.8%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	489.2	2.5	0.5%	483.8	0	0.0%
Northeast District — (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	243.9	2.3	0.9%	194.6	0.2	0.1%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Tennessee Hospital Association Membership Districts and Comprising Counties	SURGICAL TECHNOLOGIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	372.8	4.6	1.2%	336.4	3.9	1.2%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	110.1	8	7.3%	112	10.2	9.1%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	601.4	22.2	3.7%	589.7	20.1	3.4%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	79.5	1	1.3%	86.2	1	1.2%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	75.2	0	0.0%	86.8	0.3	0.3%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	178.4	4.9	2.7%	182.7	2.7	1.5%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	344.8	11.9	3.5%	348.8	6.5	1.9%
Northeast District — (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	143.6	0	0.0%	154.9	0	0.0%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Tennessee Hospital Association Membership Districts and Comprising Counties	OCCUPATIONAL THERAPIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	73.8	12.2	16.5%	80	5.4	6.8%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	29.7	9.6	32.3%	41.3	16.5	40.0%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	84.4	4.6	5.5%	80	2.1	2.6%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	13.3	0	0.0%	16	1	6.3%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	14.2	1.5	10.6%	12.2	0.5	4.1%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	33	1.3	3.9%	33	5	15.2%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	60.5	4	6.6%	58	1	1.7%
Northeast District — (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	243.9	2.3	0.9%	194.6	0.2	0.1%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Tennessee Hospital Association Membership Districts and Comprising Counties	PHYSICAL THERAPIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	159	10	6.3%	155.7	3	1.9%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	116.2	21.5	18.5%	131.8	31.3	23.7%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	203	10.9	5.4%	213.5	17	8.0%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	57.7	2	3.5%	74.4	5	6.7%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	42.5	0.5	1.2%	37.3	1	2.7%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	67.3	6.5	9.7%	62.1	6	9.7%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	153.3	4.2	2.7%	138.8	3.2	2.3%
Northeast District — (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	143.6	0	0.0%	154.9	0	0.0%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Tennessee Hospital Association Membership Districts and Comprising Counties	RESPIRATORY THERAPIST					
	2007			2008		
	Total Positions	Vacant Positions	Vacancy Rate	Total Positions	Vacant Positions	Vacancy Rate
Memphis District — (Shelby)	264.8	25.3	9.6%	200.4	4	2.0%
West District — (Benton, Carroll, Chester, Crockett, Decatur, Dyer, Fayette, Gibson, Hardeman, Hardin, Haywood, Henderson, Henry, Lake, Lauderdale, Madison, McNairy, Obion, Tipton, Weakley)	133.1	7.9	5.9%	162.1	21.7	13.4%
Middle District — (Cheatham, Davidson, Dickson, Hickman, Houston, Humphreys, Macon, Montgomery, Perry, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, Wilson)	501.7	22.6	4.5%	489	13.1	2.7%
South Middle District — (Bedford, Cannon, Coffee, DeKalb, Franklin, Giles, Grundy, Lawrence, Lewis, Lincoln, Marshall, Maury, Moore, Smith, Warren, Wayne)	99	9	9.1%	108	9	8.3%
Mid-East District — (Bledsoe, Clay, Cumberland, Fentress, Jackson, Loudon, McMinn, Meigs, Monroe, Morgan, Overton, Pickett, Polk, Putnam, Rhea, Roane, Scott, White)	109.8	4	3.6%	134.8	3	2.2%
Chattanooga District — (Bradley, Hamilton, Marion, Sequatchie, Van Buren)	200.7	18.3	9.1%	179.1	9.7	5.4%
Knoxville District — (Anderson, Blount, Campbell, Clairborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Sevier, Union)	227.4	4.4	1.9%	221	2	0.9%
Northeast District — (Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, Washington)	177.3	2	1.1%	159.3	1	0.6%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.
Tennessee Hospital Association Membership Districts January 2010, www.tha.com/tha-membership-districts.htm, accessed January 2010.
Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.
Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.
Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates – Calculations

	2007	2007	2007	2008	2008	2008
	Total Positions	Personnel budgeted vacancies	Vacancy rate	Total Positions	Personnel budgeted vacancies	Vacancy rate
Medical Technologist						
Anderson	24.1	2.0	8.3%	19.7	0.0	0.0%
Bedford	28.0	14.0	50.0%	27.0	14.0	51.9%
Benton	2.5	0.0	0.0%	3.3	0.4	12.1%
Bledsoe	2.5	0.5	20.0%	2.5	0.5	20.0%
Carter	4.1	1.0	24.4%	7.1	0.0	0.0%
Cumberland	22.5	1.5	6.7%	11.6	0.0	0.0%
Davidson	363.1	6.6	1.8%	371.2	17.5	4.7%
Franklin	13.0	0.0	0.0%	13.0	0.5	3.8%
Gibson	10.3	0.0	0.0%	14.9	3.9	26.2%
Hamblen	29.0	2.0	6.9%	24.4	0.2	0.8%
Hamilton	129.6	15.9	12.3%	119.8	2.7	2.3%
Hancock	2.0	0.0	0.0%	2.0	0.0	0.0%
Hardeman	4.7	0.0	0.0%	5.6	1.0	17.9%
Haywood	11.1	5.4	48.6%	3.0	0.0	0.0%
Henry	10.2	0.0	0.0%	12.2	1.0	8.2%
Johnson	4.6	2.0	43.5%	3.7	0.1	2.7%
Knox	174.5	6.0	3.4%	143.1	1.0	0.7%
Madison	64.6	5.5	8.5%	68.0	7.6	11.2%
Maury	22.0	0.0	0.0%	25.0	1.0	4.0%
Montgomery	29.4	1.0	3.4%	28.1	1.0	3.6%
Obion	12.8	1.8	14.1%	15.0	0.0	0.0%
Rutherford	40.5	4.0	9.9%	24.7	0.7	2.8%
Shelby	574.2	93.4	16.3%	379.5	10.6	2.8%
Sullivan	15.0	0.0	0.0%	13.2	2.9	22.0%
Sumner	29.3	2.0	6.8%	39.5	0.0	0.0%
Unicoi	4.0	2.0	50.0%	2.0	0.0	0.0%
Washington	23.5	1.2	5.1%	26.8	2.3	8.6%
Williamson	27.4	0.0	0.0%	24.6	1.0	4.1%
Wilson	13.0	0.0	0.0%	15.0	2.0	13.3%

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates - Calculations (continued)

	2007	2007	2007	2008	2008	2008
	Total Positions	Personnel budgeted vacancies	Vacancy rate	Total Positions	Personnel budgeted vacancies	Vacancy rate
Radiologic Technologist						
Bedford	10.0	5.0	50.0%	13.0	8.0	61.5%
Benton	5.2	0.0	0.0%	7.1	1.0	14.1%
Bledsoe	4.0	0.4	10.0%	4.0	1.0	25.0%
Carter	10.2	0.6	5.9%	11.2	0.0	0.0%
Clay	14.0	6.0	42.9%	14.0	6.0	42.9%
Cumberland	18.0	1.0	5.6%	16.4	0.0	0.0%
Davidson	396.0	25.7	6.5%	382.3	24.9	6.5%
Gibson	15.8	0.5	3.2%	17.6	0.3	1.7%
Hamilton	131.4	4.3	3.3%	118.7	6.2	5.2%
Haywood	16.3	8.3	50.9%	6.0	0.0	0.0%
Henry	21.3	0.0	0.0%	28.2	2.0	7.1%
Hickman	4.5	0.0	0.0%	5.0	2.0	40.0%
Jefferson	11.3	1.5	13.3%	14.7	0.0	0.0%
Johnson	4.5	1.7	37.8%	2.9	0.1	3.4%
Knox	255.0	1.0	0.4%	243.3	0.0	0.0%
Madison	110.5	11.8	10.7%	114.2	9.9	8.7%
Maury	35.0	1.0	2.9%	51.0	0.0	0.0%
Montgomery	29.9	0.0	0.0%	40.7	1.0	2.5%
Rutherford	42.3	1.0	2.4%	71.2	3.7	5.2%
Shelby	534.6	10.2	1.9%	457.3	7.6	1.7%
Sumner	51.3	8.0	15.6%	25.0	0.0	0.0%
Washington	29.9	0.0	0.0%	35.5	0.1	0.3%
Williamson	44.0	2.5	5.7%	48.0	1.0	2.1%
Wilson	38.0	2.0	5.3%	35.0	1.0	2.9%

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates - Calculations (continued)

	2007	2007	2007	2008	2008	2008
	Total Positions	Personnel budgeted vacancies	Vacancy rate	Total Positions	Personnel budgeted vacancies	Vacancy rate
Surgical Technologist						
Anderson	25.9	1.0	3.9%	23.6	0.0	0.0%
Clay	0.0	0.0	0.0%	0.6	0.3	50.0%
Davidson	469.2	21.2	4.5%	441.5	15.0	3.4%
Gibson	2.4	0.5	20.8%	2.4	0.4	16.7%
Hamblen	16.5	1.0	6.1%	23.0	1.5	6.5%
Hamilton	161.8	4.9	3.0%	167.8	2.7	1.6%
Haywood	2.7	1.5	55.6%	2.0	0.0	0.0%
Jefferson	6.1	0.8	13.1%	4.3	0.0	0.0%
Knox	262.5	8.0	3.0%	258.8	5.0	1.9%
Madison	74.7	6.0	8.0%	78.0	9.8	12.6%
Maury	29.0	1.0	3.4%	35.0	1.0	2.9%
Montgomery	19.8	0.0	0.0%	21.6	0.5	2.3%
Rutherford	18.9	1.0	5.3%	37.7	4.6	12.2%
Sevier	8.2	1.1	13.4%	9.0	0.0	0.0%
Shelby	372.8	4.6	1.2%	336.4	3.9	1.2%

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates - Calculations (continued)

	2007 Total Positions	2007 Personnel budgeted vacancies	2007 Vacancy rate	2008 Total Positions	2008 Personnel budgeted vacancies	2008 Vacancy rate
Occupational Therapist						
Anderson	4.0	1.0	25.0%	4.0	0.0	0.0%
Cumberland	3.5	1.5	42.9%	4.0	0.5	12.5%
Davidson	58.5	2.6	4.4%	55.0	2.1	3.8%
Greene	8.9	0.0	0.0%	8.0	1.0	12.5%
Hamilton	32.0	1.3	4.1%	32.0	5.0	15.6%
Hardeman	0.2	0.1	50.0%	0.1	0.1	100.0%
Knox	36.8	3.0	8.2%	35.0	1.0	2.9%
Madison	20.7	3.5	16.9%	33.0	15.4	46.7%
Maury	3.0	0.0	0.0%	8.0	1.0	12.5%
Shelby	73.8	12.2	16.5%	80.0	5.4	6.8%
Sumner	8.5	2.0	23.5%	5.0	0.0	0.0%
Washington	14.6	0.9	6.2%	10.0	2.5	25.0%
Weakley	6.0	6.0	100.0%	6.0	1.0	16.7%

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates - Calculations (continued)

	2007	2007	2007	2008	2008	2008
	Total Positions	Personnel budgeted vacancies	Vacancy rate	Total Positions	Personnel budgeted vacancies	Vacancy rate
Physical Therapist						
Bedford	2.0	1.0	50.0%	2.0	1.0	50.0%
Bradley	7.0	1.0	14.3%	6.0	0.0	0.0%
Campbell	8.0	1.0	12.5%	2.7	0.0	0.0%
Cannon	1.0	0.0	0.0%	1.6	1.0	62.5%
Cumberland	9.0	1.0	11.1%	6.7	1.0	14.9%
Davidson	131.0	7.0	5.3%	135.9	6.7	4.9%
Franklin	6.0	0.0	0.0%	6.0	1.0	16.7%
Gibson	4.0	2.0	50.0%	8.1	0.5	6.2%
Greene	8.0	0.0	0.0%	7.4	1.0	13.5%
Hamblen	5.0	1.0	20.0%	4.4	0.2	4.5%
Hamilton	58.0	6.0	10.3%	55.1	6.0	10.9%
Hardeman	2.0	0.0	0.0%	3.0	1.0	33.3%
Haywood	4.0	3.0	75.0%	2.0	1.0	50.0%
Henry	10.0	2.0	20.0%	6.0	1.0	16.7%
Johnson	0.0	0.0	0.0%	2.0	0.5	25.0%
Knox	92.0	2.0	2.2%	88.8	3.0	3.4%
Madison	62.0	9.0	14.5%	74.7	26.3	35.2%
Maury	21.0	1.0	4.8%	36.0	2.0	5.6%
Montgomery	10.0	0.0	0.0%	10.4	3.0	28.8%
Obion	3.0	0.0	0.0%	4.0	1.0	25.0%
Rutherford	23.0	0.0	0.0%	19.4	4.3	22.2%
Shelby	159.0	10.0	6.3%	155.7	3.0	1.9%
Sullivan	56.0	1.0	1.8%	45.9	0.7	1.5%
Sumner	13.0	2.0	15.4%	16.0	0.0	0.0%
Washington	28.0	1.0	3.6%	27.0	1.3	4.8%
Weakley	9.0	6.0	66.7%	8.6	0.5	5.8%
Williamson	7.6	0.0	0.0%	8.0	2.0	25.0%
Wilson	9.0	2.0	22.2%	9.0	1.0	11.1%

Joint Annual Report Data for Selected Occupations by Occupation and County Vacancy Rates - Calculations (continued)

	2007 Total Positions	2007 Personnel budgeted vacancies	2007 Vacancy rate	2008 Total Positions	2008 Personnel budgeted vacancies	2008 Vacancy rate
Respiratory Therapist						
Anderson	26.7	2.2	8.2%	27.5	0.0	0.0%
Bedford	14.0	7.0	50.0%	16.0	9.0	56.3%
Bradley	18.0	2.0	11.1%	18.0	0.0	0.0%
Carter	6.5	0.0	0.0%	8.8	0.9	10.2%
Clay	8.0	3.0	37.5%	8.0	3.0	37.5%
Cumberland	11.0	1.0	9.1%	19.4	0.0	0.0%
Davidson	339.7	5.9	1.7%	368.1	9.2	2.5%
Gibson	6.9	0.3	4.3%	6.6	0.2	3.0%
Hamblen	7.7	0.2	2.6%	9.7	0.0	0.0%
Hamilton	176.9	16.3	9.2%	157.6	9.7	6.2%
Hardeman	1.4	0.7	50.0%	1.0	0.7	70.0%
Haywood	4.4	2.9	65.9%	0.0	0.0	0.0%
Hickman	1.5	0.0	0.0%	2.5	0.5	20.0%
Jefferson	3.3	1.0	30.3%	2.5	0.0	0.0%
Knox	154.6	1.0	0.6%	144.7	2.0	1.4%
Lawrence	6.0	1.0	16.7%	6.0	0.0	0.0%
Madison	66.3	3.3	5.0%	100.0	20.8	20.8%
Marshall	7.0	1.0	14.3%	5.7	0.0	0.0%
Montgomery	25.5	2.7	10.6%	23.7	1.0	4.2%
Rutherford	47.2	10.0	21.2%	20.4	2.4	11.8%
Shelby	264.8	25.3	9.6%	200.4	4.0	2.0%
Sullivan	87.6	2.0	2.3%	72.3	0.0	0.0%
Sumner	23.9	4.0	16.7%	17.0	0.0	0.0%
Washington	64.3	0.0	0.0%	59.0	0.1	0.2%
Weakley	5.1	0.7	13.7%	5.7	0.0	0.0%

Sources: 2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.

U.S. Department of Commerce, U.S. Census Bureau, County and City Data Book: 2007 – A Statistical Abstract Supplement, www.census.gov. (accessed December 2009)

Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.

Not all allied health occupations are included in this data set; however, hospitals employ 60 percent of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.

Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Appendix E

Joint Annual Review Data for Selected Occupations by Occupation – Statewide Vacancy Rates

	2007	2008
	Vacancy rate– Percentage positions vacant	Vacancy rate– Percentage positions vacant
Medical Technologist	7.92%	3.80%
Radiologic Technologist	3.32%	2.80%
Surgical Technologist	2.76%	2.40%
Occupational Therapist	9.63%	9.70%
Physical Therapist	6.47%	7.80%
Respiratory Therapist	5.46%	3.80%

Sources:

2007 and 2008 Joint Annual Report of Hospitals, Tennessee Department of Health, Nashville, Tennessee.

Vacancy rates calculated by dividing number of budgeted vacancies by the number of positions; physical therapy and physical therapy assistants are combined; occupational therapy and occupational therapy assistants are combined.

Not all allied health occupations are included in this data set, however hospitals employ 60% of all allied health workers and these figures may be used as a barometer for similar measures in other occupations.

Data should be interpreted with caution, as the current economic climate is a variable which should be considered when looking at changes in vacancy rates between the years included in this chart.

Appendix F

Numbers and Population Ratios of Professionals in Selected Allied Health Professions*

	U.S.	Per 100,000	TN	Per 100,000
Physical Therapist	185,500	61.0	4,048	65.9
Physical Therapist Assistant	63,800	21.0	1,923	31.3
Occupational Therapist	104,500	34.4	1,643	26.7
Occupational Therapist Assistant	26,600	8.7	382	6.2
Athletic Trainer	16,300	5.4	314	5.1
Recreational Therapist	23,300	7.7	467	7.6
Speech-Language Pathologist	119,300	39.2	1,873	30.5
Audiologist	12,800	4.2	570	9.3
Respiratory Therapist	105,900	34.8	2,812	45.8
Respiratory Therapist Technician	16,500	5.4	563	9.2
Dietitian	60,300	19.8	1,157	18.8
Dietetic Technician	25,200	8.3	840	13.7
Surgical Technologist	91,500	30.1	3,281	53.4
Physician Assistant	74,800	24.6	947	15.4
Emergency Medical Technician (EMT)	210,700	69.3	6,837	111.3
Dental Hygienist	174,100	57.3	3,252	52.9
Dental Assistant	295,300	97.1	5,386	87.7
Diagnostic Radiologic Technologist	214,700	70.6	6,235	101.5
Radiation Therapist	15,200	5.0	408	6.6
Nuclear Medicine Technologist	21,800	7.2	558	9.1
Diagnostic Medical Sonographer	50,300	16.5	1,243	20.2
Medical Technologist	172,400	56.7	4,233	68.9
Medical Technician	155,600	51.2	5,077	82.6
Health Information Technician	172,500	56.7	3,781	61.5
Medical Transcriptionist	105,200	34.6	2,326	37.9
Epidemiologist	4,800	1.6	64	1.0
Medical Assistant	483,600	159.0	9,927	161.6
Nursing Assistant	1,469,800	483.4	34,043	554.0
POPULATION:	US: 304,059,724		TN: 6,144,738	

**U.S. and Tennessee Based on 2008 U.S. Census and Tennessee Department of Health population estimates.*

*Sources: U.S. Bureau of Labor Statistics, "Employment and job openings by occupation and occupational group, 2008 and projected 2018", Monthly Labor Review, November 2009; Tennessee Department of Labor and Workforce Development, "Short Term Occupational Employment Projections in Tennessee for a base year of 2008 and a projected year of 2010", "The Source," www.sourcetn.org; *American Registry of Diagnostic Medical Sonographers.*

Population ratios are calculated by taking the total number of providers in a given occupation and dividing by the total population for the state and the nation. These figures may be used to support community health planning with institutions of higher learning and employers as it relates to human resource needs. Although provider density ratios are useful indicators of changes in provider numbers relative to the population, inference from total numbers or ratios as to the adequacy of health care providers for a given occupation should not be made. Several factors influence whether the supply of health care providers is appropriate including distribution and location of providers within a region, level of service provided (full-time versus part-time, by an assistant or a higher level provider), age and gender of the provider, the population's access to hospitals, health care facilities, technology and other types of health care providers; population needs (demographic characteristics and health problems); and society's perceptions and expectations. In some regions, health facilities and personnel provide services to a larger community than the residents of the immediate region. In others, residents may seek care from providers outside the region where they live. The population ratios reflect the number of providers in a region and have not been adjusted to take these situations into account.

Appendix G

BLS 2008–2018 Employment Projections

Code	Health Profession	Employment Change		Percent Change	Total job openings due to growth and net replacements
		2008	2018	2008-18	2008-18
29-1031	Dietitian and Nutritionist	60.3	65.8	9.2	25.7
29-1071	Physician Assistant	74.8	103.9	39.0	42.8
29-1121	Audiologist	12.8	16.0	25.0	5.8
29-1122	Occupational Therapist	104.5	131.3	25.6	45.8
29-1123	Physical Therapist	185.5	241.7	30.3	78.6
29-1124	Radiation Therapist	15.2	19.4	27.1	6.9
29-1125	Recreational Therapist	23.3	26.7	14.6	11.6
29-1126	Respiratory Therapist	105.9	128.1	20.9	41.4
29-1127	Speech-Language Pathologist	119.3	141.4	18.5	43.8
29-2011	Medical and Clinical Laboratory Technologist	172.4	193.0	11.9	53.3
29-2012	Medical and Clinical Laboratory Technician	155.6	180.7	16.1	54.6
29-2021	Dental Hygienist	174.1	237.0	62.9	98.4
29-2032	Diagnostic Medical Sonographer	50.3	59.5	18.3	16.5
29-2033	Nuclear Medicine Technologist	21.8	25.4	16.3	6.7
29-2034	Radiologic Technologists and Technician	214.7	251.7	17.2	68.0
29-2051	Dietetic Technician	25.2	28.7	13.9	9.9
29-2054	Respiratory Therapy Technician	16.5	16.4	-1.1	4.2

Cont.

BLS 2008–2018 Employment Projections

Code	Health Profession	Employment Change 2008	Employment Change 2018	Percent Change 2008-18	Total job openings due to growth and net replacements 2008-18
29-2055	Surgical Technologist	91.5	114.7	25.3	46.3
29-9091	Athletic Trainer	16.3	22.4	36.9	11.5
31-1011	Home Health Aide	921.7	1382.6	50.0	552.7
31-1012	Nursing Aide, Orderly, and Attendant	1469.8	1745.8	18.8	422.3
31-2011	Occupational Therapist Assistant	26.6	34.6	29.8	11.8
31-2021	Physical Therapist Assistant	63.8	85.0	33.3	30.5
31-9091	Dental Assistant	295.3	400.9	35.8	161.0
31-9092	Medical Assistant	483.6	647.5	33.9	217.8
31-9094	Medical Transcriptionist	105.2	116.9	11.1	23.5

Source: Table prepared by Stephen N. Collier using data from "Occupational Employment Projections to 2018" by T. Alan Lacey and Benjamin Wright, Monthly Labor Review, November 2009, pages 107–109, Bureau of Labor Statistics, U.S. Department of Labor.

Data for Emergency Medical Services (EMS) occupations are not provided because individual figures for each level of EMS providers are not available.

BLS Projected Employment Change 2000–2018

Code	Health Profession	Projected Percent Change in Employment During 10-Year Period				
		2000-10	2002-12	2004-14	2006-16	2008-18
29-1031	Dietitian and Nutritionist	15.2	17.8	18.3	8.6	9.2
29-1071	Physician Assistant	53.5	48.9	49.6	27.0	39.0
29-1121	Audiologist	44.7	29.0	9.1	9.8	25.0
29-1122	Occupational Therapist	33.9	35.2	33.6	23.1	25.6
29-1123	Physical Therapist	33.3	35.3	36.7	27.1	30.3
29-1124	Radiation Therapist	22.8	31.6	26.3	24.8	27.1
29-1125	Recreational Therapist	8.6	9.1	5.7	3.7	14.6
29-1126	Respiratory Therapist	34.8	34.8	28.4	22.6	20.9
29-1127	Speech-Language Pathologist	39.2	27.2	14.6	10.6	18.5
29-2011	Medical and Clinical Laboratory Technologist	17.0	19.3	20.5	12.4	11.9
29-2012	Medical and Clinical Laboratory Technician	19.0	19.4	25.0	15.0	16.1
29-2021	Dental Hygienist	37.1	43.1	43.3	30.1	62.9
29-2032	Diagnostic Medical Sonographer	26.1	24.0	34.8	19.1	18.3
29-2033	Nuclear Medicine Technologist	22.4	23.6	21.5	14.8	16.3
29-2034	Radiologic Technologists and Technician	23.1	22.9	23.2	15.1	17.2

Cont.

BLS Projected Employment Change 2000–2018

Code	Health Profession	Projected Percent Change in Employment During 10-Year Period				
		2000-10	2002-12	2004-14	2006-16	2008-18
29-2051	Dietetic Technician	27.6	20.2	19.1	14.8	13.9
29-2054	Respiratory Therapy Technician	34.6	34.2	3.3	0.9	-1.1
29-2055	Surgical Technologist	34.7	27.9	29.5	24.4	25.3
29-9091	Athletic Trainer	18.5	29.9	29.3	24.3	36.9
31-1011	Home Health Aide	47.3	48.1	56.0	48.7	50.0
31-1012	Nursing Aide, Orderly, and Attendant	23.5	24.9	22.3	18.2	18.8
31-2011	Occupational Therapist Assistant	39.7	39.2	34.1	25.4	29.8
31-2021	Physical Therapist Assistant	44.8	44.6	44.2	32.4	33.3
31-9091	Dental Assistant	37.2	42.5	42.7	29.2	35.8
31-9092	Medical Assistant	57.0	58.9	52.1	35.4	33.9
31-9094	Medical Transcriptionist	29.8	22.6	23.3	13.5	11.1

Source: Table prepared by Stephen N. Collier using data from "Occupational Employment Projections to 2018" by T. Alan Lacey and Benjamin Wright, Monthly Labor Review, November 2009, and counterpart articles November 2007, November 2005, February 2004, and November 2001.

Data for Emergency Medical Services (EMS) occupations are not provided because individual figures for each level of EMS providers are not available.

Appendix H

Contributors

1992 TBR Allied Health Task Force Members

M. Jo Edwards
Barbara Baker
Brenda Coleman
Tom Coley
Donna Pierce
Tonya Purdie
Robert Crews
Glen Swinny
Sandra Wakefield
Guy Lanza
Betty Dandridge
David Esa
George Malo
Kaylene Gebert

Allied Health Professionals

Helen Binkley
Middle Tennessee State University, Health and Human Performance

Elizabeth Bowman
University of Tennessee–Memphis

Elvis Brandon
Volunteer State Community College

Janie Burney
University of Tennessee–Knoxville

David Johnson
Columbia State Community College

Jennifer Murray
Tennessee Center for Nursing

Ann Nolen
University of Tennessee Health Science Center–Memphis

Leif Penrose
Coosa Valley Technical College

Melinda Richards
Middle Tennessee State University, Speech and Theatre

Victoria Shelar
Middle Tennessee State University, Health and Human Performance

Delmar Walker
Middle Tennessee State University, Human Sciences

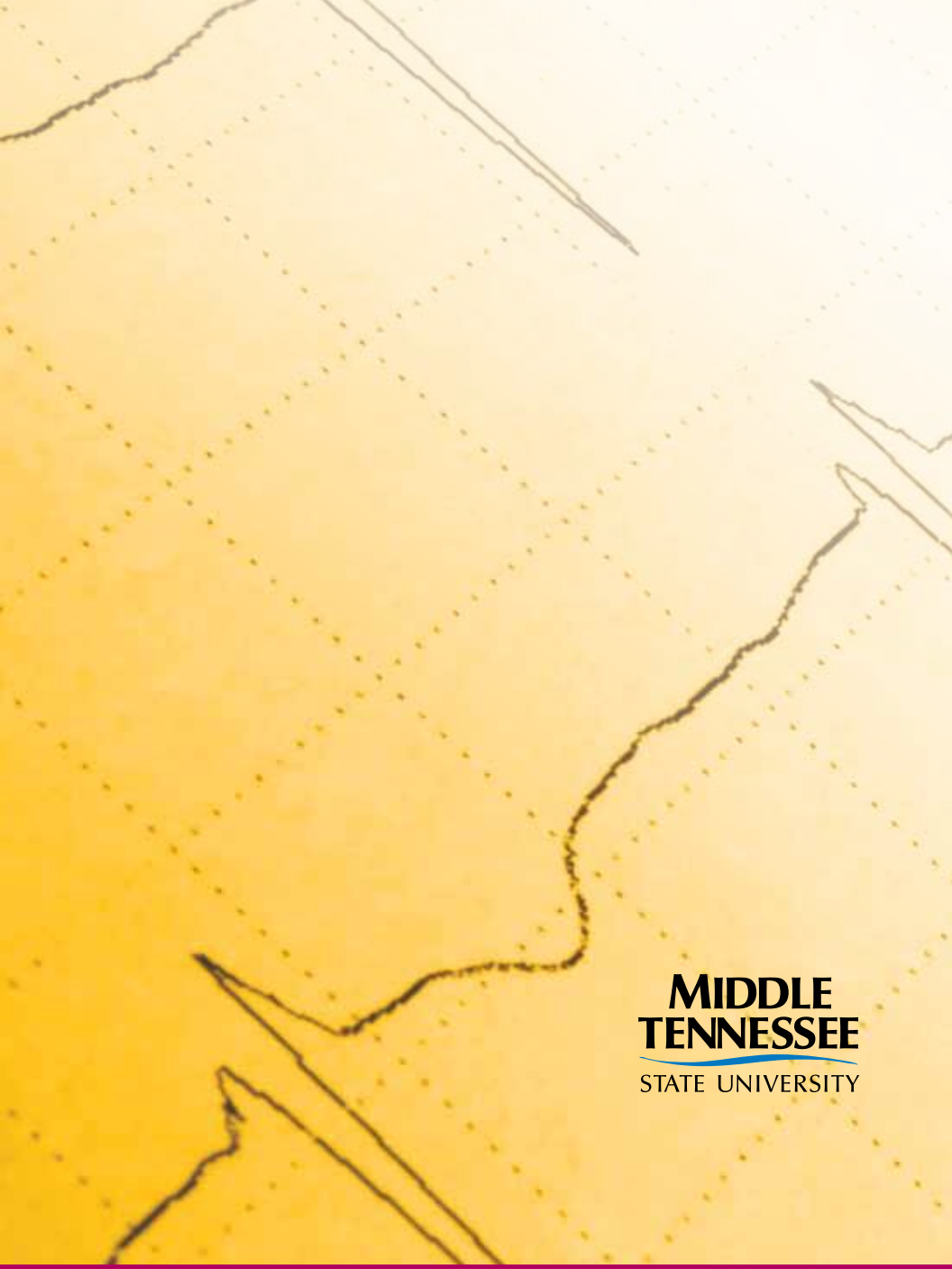
Randy White
Rutherford County EMS

Contributors for the 1993, 2000, and 2004 editions of this study, each from the MTSU Center for Health and Human Services:

Melissa Bess
Evelyn Farr
Beth Fuller
Carol Smith

We also wish to thank Jean Harrington and Martha Wettemann, Tennessee Division of Employment Security, for employment and license data, and Betty Dandridge Johnson from the Tennessee Higher Education Commission (THEC).

Funded in part by the Tennessee Department of Labor and Workforce Development, the Nashville Career Advancement Center is an equal opportunity employer/program. Auxiliary aids and services will be provided upon request to persons with disabilities. Coni Caudle, 862-8890, TTY 1-800-848-0298.


MIDDLE
TENNESSEE
STATE UNIVERSITY