

**The Economic Impact of Advanced Practice Nurses and Benefits of Expanding Their Scope of Practice in Tennessee: An Analysis of Local and State-Level Effects**

**An Economic Impact Report**

by

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**MAJOR POINTS**

* Advanced Practice Nurses, or APNs, are licensed Registered Nurses (RNs) who have received additional education in the form of a Master’s Degree or higher and enhanced clinical training in health assessment, physiology, pharmacology and counseling.
* The number of full-time, part-time and inactive APNs in Tennessee rose steadily from 9,276 in 2015 to 10,886 in 2017.
* In addition to providing direct patient care, APNs contribute significantly to the state and local economies by creating jobs, stimulating economic activities, and supporting public programs through tax revenues generated directly and indirectly by APNs’ practice activities.
* While most of APNs’ economic contributions stay within the local economy where they practice, they also contribute to the economies of neighboring cities and counties, and the state.
* Tennessee is one of the eleven “Restricted Practice” states that have restricted APNs’ practice authority. APNs can contribute more to the state and local economies of Tennessee if they are allowed to independently practice with greater authority within the limits of their education and training. This study was designed to estimate the economic consequences of expanding APN practice authority.
* APNs’ local county economic effects:
  + For the baseline year of 2017, active full-time and part-time APNs in Tennessee are estimated to have contributed more than $4.43 billion of total economic output (total expenditures), $566.5 million of total federal, state and local taxes levied, and 40,590 jobs to the economies of 95 Tennessee counties.
  + Between 2017 and 2025, expanding the practice role of APNs by changing the practice environment in Tennessee from the “Restricted Practice” status to the “Full Practice” status is likely to contribute $780 million of additional total output and 7,144 of additional jobs to the local economies in Tennessee.
  + When the effects of population growth and inflation and the ongoing influence of the Affordable Care Act are taken into account, the long-term economic contributions of APNs to Tennessee’s local economies are projected to be $7.02 billion of total output, 64,295 jobs, and $897.3 million of federal, state and local taxes by 2025.
* APNs’ Statewide Economic Effects:
  + When estimated for the statewide economy by taking into account the benefits that spill over beyond the boundaries of a county, the active full-time and part-time APNs in the 95 counties are projected to have contributed by the end of the baseline year of 2017 $5.45 billion of total output, 43,727 jobs, and $708.1 million of federal, state and local taxes to the statewide economy.
  + Between 2017 and 2025, greater practice authority of APNs will likely contribute $958.7 million of total output and 7,696 additional jobs to the statewide economy of Tennessee.
  + Expanded practice role of APNs, together with the long-term effects of population growth, inflation and the Affordable Care Act, will likely contribute $8.63 billion of total output, 69,263 jobs, and $1.12 billion of federal, state and local taxes by 2025.
* APNs are a critical component of Tennessee’s health care delivery system. Greater use of their services by, for example, expanding APNs’ scope of practice and thereby granting them greater practice authority, can potentially benefit the state and local economies with substantial increases in economic output and employment.

**EXECUTIVE SUMMARY**

Advanced Practice Nurses or APNs are a critical component of Tennessee’s health care delivery system. They are licensed Registered Nurses (RNs) who have received additional education in the form of a Master’s Degree or higher and enhanced clinical training in direct patient care and health assessment, physiology, pharmacology and counseling. In Tennessee, The Board of Nursing (BON) recognizes the professional status of APNs within one of four advanced-practice nursing roles: *nurse practitioners, nurse anesthetists, nurse-midwives, and clinical nurse specialists.*

Nurse practitioners (NPs), the largest group of the four, serve as primary and, in some cases, specialty-care providers, diagnosing and treating a variety of illnesses. Nurse anesthetists work primarily in health care institutions and provide care related to the delivery of anesthesia before, during, and after surgical, diagnostic, and therapeutic procedures. Nurse midwives provide care with a focus on women’s health services, labor and delivery, and newborn care. Clinical nurse specialists provide patient care and advice in one of several nursing practice specialties, such as critical care, pediatrics, women’s health, psychiatry, and oncology.

APNs’ primary role in a health care delivery system also makes another important but often neglected contribution, that is, they contribute significantly to the state and local economies by creating jobs, stimulating economic activities, and supporting public programs through generating tax revenues.

**Purpose of Report**

The purpose of this report is threefold: (1) to describe the current distribution of APNs in Tennessee, (2) to provide estimates of the current economic impact of APNs on the state and local economies in Tennessee, and (3) to project the economic benefits of expanded licensure of the APN workforce that allows them to deliver effective patient care with greater practice authority within the limits of their education and training.

The first two purposes will provide information to policy makers and other stakeholders on the economic contributions of this growing group of healthcare professionals. The primary contribution of APNs is the value of health services they provide to take care of the health care needs of their patients. As health care providers, APNs’ clinical roles in today’s health care delivery system and the quality of their services within their training and scope of practice (SOP) have been documented in the health care literature. This report focuses on a different aspect of their contribution – their contribution to local and state economies, important contributions that have received scant attention.

The third purpose of this report is to explore the economic benefits of more fully utilizing APNs as a critical and integral part of a comprehensive, effective, and efficient healthcare workforce for Tennessee. Currently, Tennessee is one of the eleven (11) “restricted practice states” in which practice and licensure laws and regulations restrict the ability of APNs to engage in at least one element of clinical practice that these highly trained professionals are trained to perform. These states require supervision, delegation, or team-management by an outside health discipline, typically physicians, in order for APNs to provide patient care.

**Methodology and Study Design**

We estimated the economic impact of APNs using the IMPLAN economic impact model initially developed by the U.S. Department of Interior and currently maintained by the Minnesota IMPLAN Group (MIG). The IMPLAN model has been used by more than 500 universities, government agencies and nonprofit organizations to estimate the economic and fiscal impacts of fresh investments and/or changes in economic activities. As an input-and-output economic model, the IMPLAN Model reports three types of economic effects:

* *Direct effects,* which are the initial changes in the industry in question (e.g., in the APN market itself);
* *Indirect effects,* changes in inter-industry transactions when supplying industries (e.g., impacts from additional nursing home or drug store sales) respond to increased demands from the directly affected industries(the APN market)); and
* *Induced effects,* which reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors (e.g., impacts from wage expenditures of drug store and nursing home employees).

In this analysis, the indirect and induced effects add to or “multiply” the dirct economic impacts of a change. In addition, one result of the indirect and induced effects is to spread the overall economic consequences of an intervention in one sector of the economy across all sectors. For example, as in this study, the direct effect s of expanding APN workforce will impact other health care businesses as supplies are purchased as well as consumer product retailers as employees spend their wages on consumer products.

The unit of analysis of our report is an individual county, and we will present the economic contributions of APNs for each of the 95 Tennessee counties at two different levels. First, we will present the economic impact of APNs practicing in a county on the economy of that county. Second, we will present the state-level estimates by estimating the economic impact of APNs of one county on the economy of the whole state. This second approach recognizes the likelihood that the economic activities taking place in one county will generate spillover benefits for not only neighboring counties and the rest of the state as well as for the home county.

In this report, we used the following five vital economic barometers to measure the total economic impact of APNs:

1. **Jobs**– The number of original APN jobs plus additional jobs supported either directly by the patient care activities of APNs or indirectly through the multiplier effect of downstream benefits as a result of APNs’ initial contributions.
2. **Labor Income**- The dollars of labor income (wages and benefits) generated as a result of the patient care activities of APNs and the multiplier effect (increases in household income and total output) of downstream benefits of APNs’ initial contributions.
3. **Value Added** - The additional dollars contributed to a local economy over and beyond the original dollars generated by the patient care activities of APNs.
4. **Output**– Output is the most inclusive measure of the value of an economic activity such as the service provided by APNs. The total dollars of output in this report measure the market value of total contributions created directly by the patient care activities of APNs as well as the additional value added by the downstream economic activities as dollars change hand from one person to another over and over again.
5. **Federal, State and Local Tax Revenues –** These are dollars of federal, state and local taxes collected by taxing authorizes at the federal, state and local levels to support public programs as direct and indirect results of the patient care activities of APNs.

The design of this study is to first estimate the current economic impact of APNs on the state and local economies for the baseline year of 2017. We will then estimate four separate layers of future economic impacts of APNs and add each of these to the baseline estimates to derive the cumulative impacts for an eight-year period of 2017 to 2015.

The first layer captures the effects of expanding the SOP of APNs to allow Tennessee to become a “Full Practice Authority” state that would regulate APNs under the exclusive licensure of the state Board of Nursing. This estimation assumed a 2.2% per year increase in APN workforce resulting from expanded practice authority. Workforce and health care repercussions of public policy changes take time to take effect. The choice of an eight-year period allows sufficient lapse of time to produce realistic supply and demand impact estimates for the projected SOP changes that would allow APNs to practice independently at a level consistent with their education and training. The second layer of future impact is to estimate the long-term effects of population growth in Tennessee. A third layer is the effect of inflation, and the fourth layer is the continuing effects of the Affordable Care Act or ACA. The overall economic impact was then calculated by adding each of these layers to the baseline 2017 estimates.

**What is the Current Status of APN Workforce in Tennessee?**

In Tennessee, the Board of Nursing of the Tennessee Department of Health collects employment and licensure data on professional nurses of different levels of education and training and makes the statistics available on its official website (<https://tn.gov/health/article/nursing-reports>). We accessed the Geographic Information System (GIS) portion of the website and determined the numbers of full-time (FT) and part-time (PT) APNs and the count of those licensed but not currently practicing in Tennessee for 2015, 2016 and 2017. Data for each of the four subgroups of APNs were not available. The total numbers of FT, PT, and inactive APNs for the three consecutive years of the study sample, along with the calculated ratios of ANPs per 100,000 population, are summarized in Executive Summary Table 1.



For the three-year period of 2015-2017:

* the number of APNs rose steadily from 9,276 in 2015 to 10,886 in 2017, an increase of 17.4%, with most of the increases occurred among the full-time group. During the same period, the ratios of active full-time APNs per 100,000 population rose steadily by 17.3%, from 126.7 to 148.6. The part-time APN to population ratios, in contrast, fell slightly, by 1.0%, from 8.9 to 8.8;
* this rising trend in full-time APN to population ratio indicates that, proportionately, full-time APNs as a group grew faster than the general population in Tennessee;
* according to available physician supply data from the AMA Physician Master File (12/31/2014), Tennessee had 223.0 active patient care physicians per 100,000 population. In absolute terms, the supply of APNs appears to be slightly more than 50 percent as large as the supply of active physicians in Tennessee.

**Impact of APNs: Local (County-Level) and Statewide (State-Level) Effects**

*County-Level Effects*: Executive Summary Table 2 presents the state totals of economic impacts of each county’s APNs on their home county’s economy.



The major components of total economic impacts are reported in four separate columns for, respectively, employment, labor income, value-added, and total output, as defined above. We report the state totals of the individual county-level effects of APNs for the baseline year of 2017 at the top of Executive Summary Table 2 and these estimates of current impacts are followed by the following additional long-term economic impacts:

* the long-term economic impact of expanded practice authority for APNs and expanded APN Scope of Practice (SOP), 2017-2025;
* the long-term combined impacts of population growth, ACA, and inflation, 2017-2025; and
* the cumulative (baseline plus layers) economic impacts of APNs from 2017 to 2025.

For the baseline year of 2017, results showed that the active full-time and part-time APNs in Tennessee are estimated to have:

* contributed more than $4.43 billion of output (total sales), including $2.76 billion (62.3%) as direct economic effects (the initial contributions made directly by the practice activities of APNs), $455 million (10.3%) as indirect effects (increases in sales experienced by related industries such as drug stores and medical laboratories supported by the practice activities of APNs), and $1.22 billion (27.5%) as induced impacts (changes in local sales supported by the increases in wages and bonuses earned by workers in the industries and markets affected by the initial contributions of APNs and the subsequent indirect effects); and
* supported a total 40,590 jobs, including 28,012 jobs as direct effects, and 3,448 and 9,131 jobs as indirect and induced effects, respectively.

Between 2017 and 2025, moving Tennessee from a “Restricted Practice” status for APNs to a “Full Practice” status is estimated to contribute more than $780 million of additional total economic output and 7,144 additional jobs. The direct effects of the change in regulation are estimated to be $486 million of extra total output and 4,930 additional jobs.

The effects of population growth, inflation and the Afford Care Act are estimated to be 16,561 additional jobs and $1.81 billion of additional total output for Tennessee.

In summary, estimated at the county level, at the end of the eight-year period of 2017 to 2025 the total cumulative economic impacts of APNs are estimated to be:

* $7.02 billion of total output and 64,295 jobs;
* direct effects of APNs will be $4.37 billion of total output and 44,371 jobs;
* indirect effects of $721 million of total output and 1,407 jobs; and
* induced effects of $1.93 billion of total output and 14,463 jobs.

*State-Level Effects*: In addition to the county-level estimates summarized above, we also estimated the economic impacts of each county’s APNs on the state overall economy and derived statewide totals of these estimates. These are summarized in Executive Summary Table 3.



These data indicate that:

* at the state-level, the practicing APNs in Tennessee are estimated to have contributed $5.45 billion of total output and 43,727 jobs in the baseline year of 2017;
* the effects of expanded SOP are estimated to be close to $1.00 billion of total output and 7,696 jobs for the period of 2017 to 2025; and
* the effects of population growth, inflation and ACA are estimated to be $2.22 billion of total output and 17,840 Jobs.

Thus, the total economic impacts estimated at the state level of full-time and part-time APNs in Tennessee are likely to be about $8.63 billion and 69,263 jobs between 2017 and 2025. The estimates calculated at the state level are larger than those calculated at the county level because the former estimates include the additional impacts of APNs’ practice activities outside of the economy of a county in which the local APNs are located while the county-level estimates presented above (in the Executive Summary Table 1) do not.

In summary, APNs, in addition to being critical components of Tennessee’s health care delivery system, contribute significantly to the state and local economies. In the future, greater use of their services by, for example, granting APNs greater practice authority and expanding scope-of-practice for APNs, can potentially benefit the state and local economies with substantial increases in economic output and employment.

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**The Economic Impact of Advanced Practice Nurses and Benefits of Expanding Their Scope of Practice in Tennessee: An Analysis of Local and State-Level Effects**

1. **Introduction**

Advanced Practice Nurses or APNs are a critical component of Tennessee’s health care delivery system. They are licensed Registered Nurses (RNs) who have received both additional education in the form of a Master’s Degree or higher and enhanced clinical training in direct patient care, health assessment, physiology, pharmacology and counseling. In Tennessee, The Board of Nursing (BON) recognizes the professional status of APNs within one of four advanced-practice nursing roles: *nurse practitioners, nurse anesthetists, nurse-midwives, and clinical nurse specialists.*[[1]](#footnote-1)

Nurse practitioners (NPs), the largest group of the four, serve as primary and, in some cases, specialty-care providers, diagnosing and treating a variety of illnesses. They also engage in prevention and health education to benefit their patients. Nurse anesthetists work primarily in hospitals and health care institutions and provide care and advice related to the delivery of anesthesia before, during, and after surgical, diagnostic, and therapeutic procedures. Nurse midwives provide care with a focus on women’s health services, labor and delivery, and newborn care. Clinical nurse specialists provide patient care and expert advice in one of several nursing practice specialties, including critical care, pediatrics, women’s health, psychiatry, and oncology.

In addition to APNs’ primary role in a health care delivery system as health care providers, their work makes another important but often neglected contribution: they contribute significantly to the state and local economies by creating jobs, stimulating economic activities, and supporting public programs through tax revenues they directly and indirectly generate.

**Purpose of Report**

The purpose of this report is threefold:

1. to describe the current distribution of APNs in Tennessee;
2. to provide estimates of the current economic impact of APNs on the state and local economies in Tennessee; and
3. to analyze the economic benefits of expanded use of the APN workforce to allow them to deliver effective patient care with greater practice authority.

The results will provide information to policy makers and other stakeholders on the economic contributions of this growing group of health care professionals. The primary contribution of APNs is the value of health services they provide to their patients. As health care providers, APNs’ clinical roles in today’s health care delivery system and the quality of their services within their training and scope of practice (SOP) have been amply documented in the health care literature,[[2]](#footnote-2),[[3]](#footnote-3),[[4]](#footnote-4) and a full review of these functions is beyond the scope of this report. This report is limited to a different aspect of their contribution – their economic contributions, an important contribution that has received scant attention.

In addition, the report will explore the economic benefits of more permitting greater utilization of APNs as a critical and integral part of a comprehensive, effective, and efficient health care workforce for Tennessee. Currently, Tennessee is one of the eleven “restricted practice states” in which practice and licensure laws and regulation restrict the ability of APNs to engage in at least one element of practice that these highly trained professionals are trained to perform.[[5]](#footnote-5),[[6]](#footnote-6) These restricted practice states typically require supervision, delegation, or team-management by an outside health discipline, typically physicians, in order for APNs to provide patient care.[[7]](#footnote-7) Thus, this report provides detailed estimates and analyses of not only the current economic impacts of APNs on the state and the local economies in the baseline year of 2017 but also the long-term economic benefits of removing these SOP restrictions to allow them to practice with greater authority in Tennessee from the baseline year of 2017 to 2025.

1. **Methodology and Study Design**

This report provides estimates of the total economic impact of practicing APNs on the statewide economy of Tennessee and the economies of 95 counties. We excluded APNs who were not practicing from the analysis and included only those who are working either full time or part time. Since we had no information on actual hours of work for part time practitioners, we converted the numbers of part-time APNs into numbers of full time equivalent or FTE APNs by assuming that part-time APNs worked, on average, 50 percent as many hours as full-time APNs per time period.

**The IMPLAN Model**

We used the IMPLAN economic impact model developed initially by the U.S. Department of Interior and currently maintained by the Minnesota IMPLAN Group (MIG) to estimate the economic impact of APNs.[[8]](#footnote-8) The IMPLAN model has been used by more than 500 universities, government agencies and nonprofit organizations to estimate the economic and fiscal impacts of investments and/or changes in economic activities.

As an input-output model, the IMPLAN software program is designed to capture the “multiplier effect” of any change or shock in one part of a local economy that ripples across the whole economy.[[9]](#footnote-9) Specifically, the IMPLAN multipliers include the following three major parts:

* *Direct effects,* representing the initial changes in the industry in question (e.g., in the APN market itself);
* *Indirect effects,* measuring changes in inter-industry transactions when supplying industries (e.g., impacts from additional nursing home or drug store sales) respond to increased demands from the directly affected industries (the APN market); and
* *Induced effects,* reflecting changes in local spending that result from income changes in the directly and indirectly affected industry sectors (e.g., impacts of wage expenditures by drug store and nursing home employees).

**County-Level and State-Level Effects**

The unit of analysis of our report is an individual county and we will present the economic contributions for each of the 95 Tennessee counties at two different levels. First, we will present the county-level effects defined as the economic impact of APNs who practice in a county on the economy of only that county. Second, we will present the state-level effects of the same group of APNs by estimating their economic impact on the economy of the whole state. This analysis recognizes the likelihood that the economic activities taking place in one county will generate spillover benefits for neighboring counties and the rest of the state.

Central to the IMPLAN impact analysis is the initial market value of goods and services created by an economic activity such as the patient care services delivered by APNs. The market value of APNs’ practice activities can be determined by either (1) the sales revenues of the health services APNs deliver to their patients, or (2) the costs (salaries, bonuses, and fringe benefits) of their labor plus related equipment and operating costs. The former is usually referred to as the revenue approach while the latter the cost-of-labor approach. We chose the cost-of-labor approach because we had no access to the administrative (insurance claims) data for APNs’ sales output while the salary and fringe benefits data are readily available.

**Impact Measures**

As included in the IMPLAN Model, we will report the total economic impact of practicing APNs using five vital economic barometers:

1. **Jobs**– The number of actual APN jobs plus the additional jobs supported either directly by the patient care activities of APNs or indirectly through the multiplier effect (increases in household income and total output) of downstream benefits as a result of APNs’ initial contributions.
2. **Labor Income**- The dollar value of labor income (wages and benefits) generated as a result of the patient care activities of APNs and the multiplier effect of downstream benefits originated from APNs’ initial contributions.
3. **Value Added** - The difference between total receipts (revenues from sales) and costs of inputs from delivering the output sold.
4. **Output**– Output is the most inclusive measure of the dollar value of an economic activity such as the service provided by APNs. The total dollars of output (i.e., revenues from sales) reported in this report measure the market value of medical care created directly by the patient care activities of APNs as well as the value added by the downstream economic activities as the initial patient-care dollars change hand from one person to another over and over again.
5. **Federal, State and Local Tax Revenues –** These are the federal, state and local taxes collected by taxing authorizes at the federal, state and local levels to support public programs as a result of the patient care activities of APNs.

**Study Design**

Consistent with the threefold purpose of this report, we will first describe the current distribution of APNs in Tennessee. We will then estimate the current economic contributions of APNs to the state and local economies for the baseline year of 2017. Finally, we will add four “layers” of economic impacts to the baseline estimates to forecast the long-term economic impacts of APNs in Tennessee over the eight-year period of 2017 to 2015.

The first layer captures the effects of expanding SOP and move Tennessee to become a “Full Practice Authority” state for APNs. Workforce and health care repercussions of public policy and legislative changes take many years to implement and produce results. The choice of an eight-year period allows enough passage of time to produce realistic supply and demand impact estimates for the proposed scope of practice changes that would allow APNs to practice with more practice authorities consistent with their education and training.

The second layer of future impact of APNs is to estimate the long-term effects of population growth independent of the Full Practice Authority status. In health care, population is a major driver of demand. As population grows, the demand for health care workforce, including APNs, will also grow.

A third layer reflects the effect of inflation that will expand the nominal (current dollar) direct, indirect and induced values of health care , while the fourth layer captures the effects of Affordable Care Act or ACA passed by Congress and signed into law by former President Barak Obama in 2010. The future of ACA is admittedly uncertain as many attempts are being made to repeal and replace it in Congress and by the Administrative Branch of the federal government. Some of the features of ACA (i.e., greater awareness of the need for health insurance coverage and eligibility rules) will survive the repeal efforts and continue to affect the Tennessee’s health care system in the foreseeable future, albeit in a gradually diminishing manner.

Finally, we report the additive impacts of APNs on the county and statewide economies projected for 2025 by adding the long-term effects of the different layers of economic impact to the baseline estimates for 2017.

**Data Sources**

In Tennessee, the Board of Nursing (BON) of the Tennessee Department of Health collects and maintains employment and licensure statistics on professional nurses of different levels of education and training.[[10]](#footnote-10) We accessed the Geographic Information System (GIS) of the Board of Nursing website and collected data on the numbers of full-time (FT) and part-time (PT) APNs, as well as those licensed but not currently practicing in Tennessee, for 2015, 2016, and 2017. Data for each of the four subgroups of APNs were not available.

To determine the initial market value created by practicing APNs in a county, we collected compensation information on salaries and fringe benefits to derive a realistic estimate of the labor cost of APNs. Our salary and fringe benefit data came from two primary sources: the Occupational Employment and Wage Estimates maintained by the US Department of Labor,[[11]](#footnote-11) and the private data provider, salary.com.[[12]](#footnote-12) We included a third component in the value of APNs’ output– the practice expenses of the offices where APNs meet their patients and deliver care. We consulted two recent and widely referenced studies of APNs’ economic contributions for North Carolina[[13]](#footnote-13) and for Florida,[[14]](#footnote-14) and we followed their examples of estimating the office practice expenses based on the established ratios of office expenses to total labor costs for Advanced Practice Nurses in North Carolina and Florida. Thus, the initial value of total output of APNs in a Tennessee County is the sum of (1) total annual salaries, (2) total fringe benefits, and (3) estimated office expenses of FTE APNs in each of Tennessee’s 95 counties.

Tennessee’s 95 counties are located in three different Grand Divisions of East, Middle, and West and we followed the definition of the three Grand Division recommended by the Tennessee Office of the Secretary of State.[[15]](#footnote-15) To analyze geographic variations based on population density, we used the definitions of Metropolitan (Metro) Area, Micropolitan (Micro) Area and Non-Metropolitan (Rural) Area used by the US Office of Management and Budget (OMB).[[16]](#footnote-16)

1. **What is the Current Status of APN Workforce in Tennessee?**

We analyzed county-by-county labor force data of full-time (FT), part-time (PT) and inactive (not practicing) Advanced Practice Nurses provided by the Tennessee Board of Nursing. The data for three consecutive years of 2015, 2016, and 2017 are summarized for the state, as well as for its major Grand Divisions and the major population areas of Metro, Micro and Non-Metro Areas, in Table 1.[[17]](#footnote-17)



The data summarized in Table 1 suggest that:

* The APN workforce experienced steady increases from 2015 to 2017 in all three of the Grand Divisions of Tennessee, averaging more than a 17.0% increase over the 3-year period;
* the most populous Middle Grand Division has the most APNs while the West the least; and
* among the three federally designated Statistical Areas, close to 93.0% of APNs are located in the Metro or Micro Areas while only about 7.0% of APNs are located in Non-Metro (Rural) Areas.[[18]](#footnote-18)

To gauge the density of APN distribution in Tennessee, we converted the numbers of APNs presented in Table 1 into APN-to-population ratios (Table 2). These ratios are useful in assessing the community distribution of APN workforce by measuring the relative sizes of APNs as a ratio of the number of APNs per 100,000 population across different Grand Divisions or Statistical Areas of the state.



The APN-to-population ratio data summarized in Table 2 suggest:

* the Middle Grand Division consistently had the highest APN density while the West Grand Division had the lowest, with the Middle Grand Division having an APN density of more than 20% higher than that of the West Grand Division; and
* the disparity of APN density is more marked among the different Statistical Areas, with the greatest APNs density in the Metro Areas (with 180 APNs per 100,000 population in 2017), the Micro Areas having 100.4 APNs per 100,000 population, and the rural areas having only 99.3 APNs per 100,000 population.

The results for individual counties varied widely, as shown in table A1 in the Appendix document. The toal number of APNs varied from zero ino ne county (Van Buren couty) to 1,753 in Davidson county. Similarly, density of APNs (in counties that had one or more APNs) varied from 12.3 per 100,000 population (Houston county) to 292.4 APNs per 100,000 populaton (Washington county).

1. **Economic Impact of APNs in Tennessee**

As discussed in the Methodology and Study Design Section, we will first present estimates of “county-level effects” of APNs’ economic impact. These are the sums of estimates of economic contributions of APNs to the county in which they practice. These county-level estimates will be followed by the estimated impacts of the same group of APNs in each county on the statewide economy; these will be referred to as “state-level effects.” In both instances, we will only report the state totals of economic impacts aggregated from the economic impacts estimated for each of the 95 individual counties. The detailed county-by-county estimates of the impacts on the county economies and on the state economy will be presented in detail as Appendix Tables in a separate companion document.

**County-Level Estimates of Economic Impact**

The state totals of economic impacts of APNs on their respective home counties’ economies for the baseline year of 2017 are summarized in Tables 3 and 4. Table 3 focuses on the observed geographic variations of economic impacts across the three Grand Divisions in Tennessee, and Table 4 reports urban and rural differences in economic impact using the definitions of urban and rural areas developed by the U.S. Office of Management and Budget (OMB). In both Tables, the major components of total economic impacts are reported in four separate columns for, respectively, employment (number of jobs), labor income (wages and benefits earned), value-added (differences between total sales and costs of inputs of production), and total output (dollar value of total sales). Rows in each section represent the breakdown results for each of the three Tennessee Grand Divisions or the three different federally designated Statistical Areas.



The county-level estimates for Tennessee and its three Grand Divisions summarized in Table 3 suggest:

* APNs in Tennessee contributed more than $4.43 billion of total output to the local economies in the baseline year of 2017;
* of this total, $2.76 billion (62.3% of total) were the direct impact while $455 million (10.3% of total) and $1.12 billion (27.5% of total) were indirect and induced impacts, respectively;
* among the three Grand Divisions in Tennessee, APNs in the Middle Division contributed the most ($1.99 billion or 44.9% of total), while the East and West Divisions contributed $1.49 billion (33.5% of total) and $957 million (21.6% of total), respectively;
* APNs in Tennessee supported 40,590 jobs in the baseline year of 2017, with 28,012 jobs (or 69.0% of the total) representing the direct employment effect while 3,448 jobs (or 8.5%) and 9,131 jobs (or 22.5%) of the total representing, respectively, the indirect and induced effects; and
* the distribution of jobs among the three Grand Divisions follow the patterns of the distribution of total output, with the Middle Division contributing 37,0% (15,023 jobs) of the total number of jobs while the East and West contributed 35.7% (14,500 jobs) and 27.3% (11.067 jobs), respectively.

Table 4 presents baseline estimates of ANPs’ economic impact on the local economies in the three different federally designated Statistical Areas.



The county-level estimates for Tennessee and its Statistical Areas summarized in Table 4 suggest:

* among the three Statistical Areas in Tennessee, APNs in the Metro Areas contributed the most ($3.88 billion or 87.4% of total output) to the local economies while the smaller Micro Areas contributed another $259 million or 5.8% of total output in the baseline year of 2017, and Rural or Non-Metro Areas, contributed $298 million or 6.7% of total output;
* Metro Areas supported 33,721 jobs in 2017 while the Micro and Non-Metro (Rural) Areas contributed, respectively, 2,934 and 3,935 jobs; and
* As described earlier, the economic impact varied widely among the 95 counties (Table A2 in the appendix document), from total outputs of $0.33 million in Houston county to $792 million in Davidson county.

**County-Level Estimates of Taxes Collected**

Another way to explore the contributions of APNs is to examine the federal, state, and local taxes collected as a result of APNs’ patient care activities. Each year, the direct and multiplier economic activities of APNs enable taxing authorities at the federal, state and local levels to collect a wide range of taxes on, for example, employee compensation, business earnings, and corporate sales. The county-level estimates of taxes collected that can be attributed to APNs’ patient care activities are summarized for the state and for each of the major geographic regions and population areas in Tables 5 and 6 for the baseline year of 2017. Data for each county are provided in Appendix Table A3. 

The tax collection data summarized in Table 5 suggest:

* in 2017, the patient care activities of APNs in Tennessee led to a total of $566.5 million of federal, state and local taxes collected;
* of this total, $422.8 million were federal taxes (74.6%) and $143.6 million were state and local taxes (25.4%); and
* following the patterns of geographic variations of total output, tax collection was the highest in the Middle Grand Division ($256.9 million or 45.3% of total taxes) and lowest in the West Grand Division ($118.5 million or 20.9% of tax taxes).

Table 6 presents the same results summarized for the state and for the three different Statistical Areas in Tennessee.



The tax collection data summarized in Table 6 suggest:

* consistent with the concentration of APNs in the Metro Areas in Tennessee, taxing authorities collected $496.8 million or 87.7% of total federal, state and local taxes in these urban population centers in Tennessee in 2017.
* the smaller Micropolitan Areas added another $32.9 million or 5.8% of total tax collection; and
* the sparsely populated rural or Non-Metro areas contributed a relatively modest amount of $36.7 million (or 6.5% of total) of federal, state and local taxes in the baseline year of 2017.

**State-Level Estimates of Economic Impact**

The state totals of economic impacts of APNs on the statewide economy aggregated from the 95 individual counties are summarized in Tables 7 and 8 for the baseline year of 2017. Table 7 focuses on the observed geographic variations of economic impacts across the three Grand Divisions in Tennessee and Table 8 reports urban and rural economic impacts. These impact estimates will be followed by the results of state-level estimates of federal, state, and local taxes collected that can be attributed to the practice activities of APNs in Tennessee for the baseline year of 2017. County-specific data are presented in Appendix Tables A4 and A5.



The economic impact summarized in Table 7 suggests:

* APNs in Tennessee contributed more than $5.45 billion of total output to the statewide economy in the baseline year of 2017;
* this state-wide impact estimate is 23.0 percent larger than the $4.43 billion of total impact of APNs estimated at the county level and reported in Table 3, reflecting the inter-county spillover in impacts included in the state-level estimates;
* $2.92 billion (53.6% of total) were the direct impact while $550.0 million (10.1% of total) and $1.98 billion (36.3% of total) were indirect and induced impacts, respectively;
* APNs in the Middle Grand Division contributed the most ($2.33 billion or 42.7% of total) while the East and West Divisions contributed $2.04 billion (37.4% of total) and $1.08 billion (19.9% of total), respectively;
* APNs in Tennessee supported 43,727 jobs in the baseline year of 2017, with 25,503 jobs (or 58.3% of the total) representing the direct employment effect while 3,814 jobs (or 8.7%) and 14,410 jobs (or 33.0%) of the total representing the indirect and induced effects, respectively; and
* the distribution of jobs among the three Grand Divisions follow the patterns of the distribution of total output, with the Middle Grand Division contributing 42.7,0% of the total number of jobs while the East and West contributed 37.4% and 19.9%, respectively.



The state-level estimates for Tennessee and its Statistical Areas summarized in Table 8 suggest:

* APNs in the Metro Areas contributed the most ($4.72 billion or 86.6% of total output) to the statewide economy while the smaller Micro Areas contributed another $333.6 million or 6.1% of total in the baseline year of 2017.
* Rural or Non-Metro Areas, in comparison, contributed $397.2 million or 7.3% of total output; and
* Metro Areas supported 37,860 jobs in 2017 while the Micro and Non-Metro (Rural) Areas contributed, respectively, 2,678 and 3,189 jobs.

**State-Level Estimates of Taxes Collected**

Table 9 presents state-level estimates of federal, state and local taxes collected for the baseline year of 2017 that could be attributed to APNs practice activities.



The data summarized in Table 9 suggest:

* the patient care activities of APNs in Tennessee led to a total of $708.1 million of federal, state and local taxes collected in 2017;
* of this total, $527.3 million were federal taxes and $180.8 million were state and local taxes; and
* following the patterns of geographic variations of total output, tax collection was the highest in the Middle Grand Division ($302.5 million or 42.7% of total taxes collected) and lowest in the West Grand Division ($140.9 million or 19.9% of tax taxes collected) in the baseline year of 2017.

Table 10 presents the same results for tax collection summarized for the state and for the three different Statistical Areas in Tennessee.



The state-level estimates summarized in Table 10 suggest:

* consistent with the concentration of APNs in the Metropolitan Areas in Tennessee, tax authorities collected $613.1 million or 87.7% of total federal, state and local taxes in the Metro Areas in 2017;
* Micropolitan Areas added another $43.4 million of tax collections; and
* Non-Metro (Rural) areas contributed a relative modest amount of $51.6 million (or 7.3% of total) of federal, state and local taxes in the baseline year of 2017.

**Effects of Expanded SOP, Population, Inflation and Affordable Care Act (ACA)**

Beyond the base year and for the foreseeable future, what are the likely effects of less restrictive regulation of APNs in Tennessee? How will other major drivers of economic impact affect the future contributions of APNs? We will present the findings of our analysis of the long-term impacts of APNs in the following sections.

**Effects of Expanded SOP**

As discussed in the Study Design Section of this Report, we built our analysis on the basis of a “baseline and layers” research strategy. We began the analysis with a comprehensive exploration and estimation of the current economic contributions of APNs. We then added “layers” of economic impact to the baseline estimates to complete our analysis of the long-term impacts of APNs for an eight-year period of 2017 to 2025.

The first layer reflects the long-term effects of expanded scope of practice (SOP) regulation of APNs on the economy of Tennessee and its 95 counties and we followed the methodology original developed by authors of the North Carolina study and refined by authors of the Florida study referenced earlier.[[19]](#footnote-19) In brief, both the North Carolina and Florida studies assumed that expanded use of APNs by less restrictive SOP regulations would result in increases in the future supply of APNs over a period of years and these increases would be met in the local health care markets by increases in realized demand for the patient care delivered by APNs. In this study, we assumed an average increase in the supply of APNs of 2.2 percent per year for 2017 – 2025 and this is more conservative than the 3.05 percent annual growth rate used by the North Carolina study but more robust than the 0.92 percent of annual growth rate used by the Florida study. The results of this estimation summarized to the Grand Division level and for the state as a whole are presented in Tables 11 and 12. Specifically, Table 11 presents the state totals of economic impacts of expanded SOP on county economies and Table 12 presents the same impacts on state economy.



The long-term results summarized in Table 11 suggest:

* an expansion of APNs’ scope of practice and the resulting increases in the supply of and demand for APN labor force will likely add $780.3 million if economic impact between 2017 and 2025 to the baseline impact of $4.43 billion, a 17.6% increase;
* of this total, $485.7 million will be the direct effects (62.3%) and $80.2 million (10.3%) and $214.4 million (27.4%) will be the indirect and induced effects, respectively; and
* the expanded use of APNs by expanding APNs’ SOP is projected to add a total of 7,144 jobs between 2017 and 2025 in Tennessee, including 2,644 jobs in the Middle Grand Division, 2,552 jobs in the East and 1,948 jobs in West Grand Division.



The results summarized in Table 12 suggest:

* at the state level, the expanded SOP for APNs will add a total of $958.7 million of total economic impact for the eight-year period from 2017 to 2025;
* this is more than 22.0 percent greater than the total economic impact of $780.3 million on county economies presented earlier in Table 9; and
* an additional 7,696 additional jobs will be added to the statewide economy, and 4,489 of the total will be the direct effect while 671 and 2,536 jobs will be the indirect and induced effects, respectively.

The range of impacts across Tennessee’s 95 counties are presented in Appendix Tables A6 through A9. For example, the projected increase in total economic output related to expanded SOP (Appendix Table A6) ranged from $58,000 for Houston county to over $139 million for Davidson county.

**Effects of Population Growth, Inflation, and ACA**

To complete the analysis of the long-term economic impacts of APNs, we will incorporate three other key factors that are also likely to drive the growth in the demand for APNs’ services and their economic contributions to the state and local economies. Following the examples of the North Carolina and Florida studies cited earlier, we estimated the effects of three specific drivers of population growth, economy-wide inflation, and the Affordable Care Act of 2010 for the eight-year period of 2017 to 2025. The county-level and state-level estimation results are reported in Tables 13 and 14, respectively.



The county-level results summarized in Table 13 suggest:

* from 2017 to 2025, the combined effects of population growth, inflation, and the remaining effects of ACA are projected to add $1.81 billion of total economic benefits to local economies in Tennessee or a 40.8% of increase from the baseline estimate of $4.43 billion of total impact reported in Table 3;
* the Middle Grand Division will gain $812.2 million of total output while the East and West Grand Divisions will gain, respectively, $606.3 million and $390.3 million; and
* an increase of 16,561 jobs for the eight-year period, with the Middle Grand Division gaining 6,129 jobs and the East and West Grand Divisions gaining, respectively, 5916 and 4,516 jobs.

Table 14 presents state total estimates of the effects of population, inflation and ACA estimated at the state level.



The state-level results summarized in Table 14 suggest:

* at the state level, the effects of population growth, inflation and ACA are projected to add $2.22 billion of total output for 2017 to 2025; and
* the statewide economy in Tennessee is projected to gain a total of 17,840 additional jobs during the eight-year period of 2017 to 2025.

**Cumulative Impacts of APNs from Baseline to 2025**

Finally, we aggregated the estimates of each of the impact layers and added them to the baseline estimates reported in Tables 4 – 10 to produce cumulative impacts of APNs from the baseline year of 2017 to 2025 (i.e., the total economic impacts practicing APNs are projected to contribute to Tennessee’s state and local economies in 2025). Cumulative impacts estimated for the three Grand Divisions are presented in Tables 15 and 16 for, respectively, the local economies of the 95 individual counties and for the statewide economy. In Tables 17 and 18, we present cumulative impacts of APNs, along with the statistical area breakdowns, on the local economies of individual counties and the statewide economy, respectively.



Results presented in Tables 15 suggest:

* when given full authority to practice at a level consistent with their education and training, active APNs are projected to contribute $7.02 billion of total output to the county economies in Tennessee in 2025, an increase of 58.5% from the baseline estimate of total economic impact of $4.43 billion in 2017 reported in Table 4;
* of this total cumulative impact, $4.37 billion will be the direct effect while $721.3 million and $1.93 billion will be the indirect and induced effects, respectively;
* APNs in the Middle Division will contribute more than $3.15 billion while the East and West Grand Divisions will contribute $2.35 billion and $1.52 billion, respectively; and
* APNs in Tennessee will support a total of 64,295 jobs including include both their own jobs as well as jobs created by the multiplier effects as APNs practice activities stimulate sales of related businesses and as these indirect impacts generate still additional incomes, spending, and employment through induced effects of the initial contributions of APNs.

We consider these county-level estimates that capture the economic benefits received within the boundaries of each of the Tennessee counties lower-bound estimates of the total long-term economic impact of APNs in Tennessee.



Results summarized in Table 16 suggest:

* at the state level, when the spillover benefits of APNs’ work beyond the economy of APNs’ home county are taken into account, the total economic impact is likely to be $8.63 billion in 2025, an increase of $3.2 billion from the baseline estimate of total economic impact of $5.44 billion in 2017 reported in Table 7.
* the long-term employment effect is a total of 69,263 jobs supported by APNs in Tennessee; and
* the Middle Grand Division will gain 29,584 jobs from 2017 to 2025 while the East and West Grand Divisions will gain, respectively, 25,896 and 13,783 jobs.

Tables 17 and 18 present the same cumulative estimates for the three Statistical Areas in Tennessee.





Tables 17 and 18 together suggest:

* APNs in the populous Metro Areas will contribute $6.14 billion (Table 17) and $7.47 billion (Table 18), respectively, to the local economies of the 95 counties and the statewide economy in Tennessee from 2017 to 2025.
* APNs in the smaller urban Micro Areas in Tennessee will contribute $410.5 million and $528.4 million to the county economies and the statewide economy, respectively;
* the distribution of jobs to be supported by APNs’ practice activities follow the same patterns, with the Metro Areas gaining 53,414 (a lower bound estimate) and 59,971(a higher-bound estimate) jobs in the county economies and in the statewide economy, respectively, and the smaller Micro Areas will gain 4,647 and 4,241 jobs, respectively; and
* the rural Non-Metro Areas in Tennessee will gain between 5,051(a lower bound estimate) and 6,234 (a higher-bound estimate) jobs from 2017 to 2025 because of low population density and relatively low presence of practicing APNs.

As in the examples above, the projected cumulative, total economic output is expected to vary amongthe counties (Appendix Tables A10 through A13). The lowest value of $524,000 is projected for Houston county while the highest of $1.3 million is projected for Davidson county (Appendix Table A10).

Finally, the cumulative amounts of total federal, state and local taxes to be collected as a result of APNs’ practice activities are presented in Tables 19 and 20.





The results presented in Tables 19 and 20 together suggest:

* APNs’ economic impact in Tennessee will include large amounts of federal, state, local taxes, ranging from $897.3 million to $1.23 billion; and
* of these totals, about 75 percent of the collection will be federal taxes while state and local taxes will be about 25 percent of the total taxes.

1. **Conclusion and Discussion**

This study analyzes the supply of APNs in Tennessee and estimates the current economic impact of this group of health care providers. In addition, this study projects the economic contributions of APNs to the state and local economies if Tennessee expands the scope of practice of APNs from a restricted practice status to a full-practice status.

Our assessment of the supply of APN in Tennessee found that the number of APNs rose steadily from 9,276 in 2015 to 10,886 in 2017, with most of the increases occurred among those working full-time. During the same period, the ratios of active full-time APNs per 100,000 population rose steadily by 17.3%, from 126.7 to 148.6. The part-time APN to population ratio, in contrast, fell slightly, by 1.0%, from 8.9 to 8.8. This rising trend of the proportion of full-time APN to population indicates that full-time APNs as a group grew faster than the general population in Tennessee.

We then conducted an in-depth analysis of the current economic contributions of practicing APNs to the state and local economies. The overall impacts, including the impacts on jobs and taxes, were substantial (Tables 3-10). We also found, as expected, the total impact on the statewide economy to be larger than that on the local economies. For the baseline year of 2017, for example, our lower-bound estimates of the total active full-time and part-time APNs in Tennessee are estimated to have contributed more than $4.43 billion of total output (dollar value of total sales), $566.5 million of total federal, state and local taxes collected, and 40,590 jobs to the economies of 95 Tennessee counties. Our state-level estimates for the baseline year of 2017 are estimated to be $5.45 billion of total output, 43,727 jobs, and $708.1 million of federal, state and local taxes collected.

Our analysis of the economic effects of expanded role of APNs suggested that a change of the practice environment in Tennessee from the “Restricted Practice” status to the “Full Practice” status is likely to contribute $780 million of additional total output and 7,144 of additional jobs to the local economies in Tennessee from 2017 to 2025 (Tables 11 and 12). When the effects of population growth and inflation and the ongoing influence of the Affordable Care Act are taken into account, the long-term economic contributions of APNs to Tennessee’s local economies are projected to be $7.02 billion of total output, 64,295 jobs, and $897.3 million of federal, state and local taxes by year 2025 (Tables 15-20). State-level estimates of the effects of expanded role of APNs are even more impressive: greater use of APNs will likely contribute $958.7 million of total output and 7,696 additional jobs to the statewide economy of Tennessee from 2017 to 2025. When the long-term effects of population growth, inflation and the Affordable Care Act are added, practicing APNs in Tennessee will likely contribute $8.63 billion of total output, 69,263 jobs, and $1.12 billion of federal, state and local taxes by the year 2025.

While this report documents that Advanced Practice Nurses, as critical components of Tennessee’s health care delivery system, contribute significantly to the state and local economies of Tennessee, it is not without limitations. First, the study did not consider the costs of increasing the supply of ANPs (e.g., education costs) because the study is not a cost-and-benefit analysis. In the future, a larger scale and more comprehensive economic analysis of the economics of greater use of APNs should take into account both the benefits and costs of increased demand for and supply of the APN labor force. Another limitation of the study is that there were numerous assumptions made throughout the analysis. For example, we only considered the effects on the demand for and supply of APNs of population growth, inflation, and ACA implementation in the analysis. Many other health system and technological changes that can potentially affect the results were excluded from the analysis. One such factor is the improvement in access to primary care through expanded use of APNs that can potentially reduce the need for the more expensive inpatient care. The ongoing national health care reform that can potentially increase the number of the uninsured and decrease the demand for health care and, as a consequence, the demand for the APN labor force. In addition, the economic value of expanded APN functions may be increased by reducing the migration of health care and the associated dollars out of counties with inadequate provider networks as well the downstream increase in worker productivity resulting from the improved population health expected from greater access to primary care.

Despite these limitations, the results presented in this report are consistent with those reported in other similar APN impact studies. We also believe that the report should be viewed as the starting point for additional and deeper analyses for Tennessee that include such additional impact-influencing factors as the costs and benefits of greater use of Advanced Practice Nurses and the dynamic and interlocking effects of many additional health system and technological changes that can affect the results of the economic contributions of Advanced Practice Nurses.

~~ End of Report ~~

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17. Detailed, county-by-county employment data are reported in a companion document as Appendix Table A1. [↑](#footnote-ref-17)
18. Most of the residents in Tennessee live in major population centers that are described by the U.S. Office of Management and Budget (OMB) as Metropolitan (Metro) Areas. OMB describes smaller urban areas with a population core of at least 10,000 but less than 50,000, population as Micropolitan (Micro) Areas. Finally, Non-Metro areas outside of Metro and Micro Areas in a state are defined by OMB as rural areas. [↑](#footnote-ref-18)
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