

Understanding HRSA's 2012-2025 Supply/Demand Nursing Projections

George A. Zangaro PhD, RN, FAAN
**Director, National Center for Health Workforce
Analysis**
Health Resources and Services Administration
**U.S. Department of Health and Human
Services**

Background

- ▶ “Future of the Nursing Workforce: National- and State-Level Projections, 2012-2025”
 - ▶ In 2004, HRSA released projections of RN supply and demand
 - ▶ These projections provide an estimate or a forecast of the future RN and LPN nursing workforce.
 - Less emphasis should be placed on the projected supply and demand numbers, and instead focus more on the factors that have been identified as influencing the growth and reduction of the nursing workforce.
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Nursing Model

- ▶ **Microsimulation model assumptions**
 - Supply equals demand at baseline
 - Future production of nurses remains consistent with the current rate
 - Nurses practice in the state where they were trained
 - Current delivery systems
 - ▶ **Supply components**
 - New entrants
 - Attrition
 - Average work hours
 - ▶ **Demand components**
 - Changing demographics
 - ACA – number of insured
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*The Center for Health Workforce Studies
School of Public Health
University at Albany, State University of New York*

Tim Dall

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tim.dall@ihs.com

Historical Background on HRSA Workforce Modeling

- Silo models (separate models for each occupation group)
- Different contractors building different models; different platforms using different methods and assumptions
- Static models—parameters constant over time and across States
- Separate supply and demand models
- Models updated infrequently
- Both supply and demand models were population based
 - Limited capability an analyze policy or emerging care delivery models
 - Limited ability to capture geographic variation in population risk factors

Before

**Nursing Supply Model • Nursing Demand Model •
Physician Supply Model • Integrated Requirements
Model • Pharmacist Supply and Requirements
Model • Dental Requirements Model • General
Services Demand Model • other misc. models**



Now

**Health Workforce
Simulation Model**

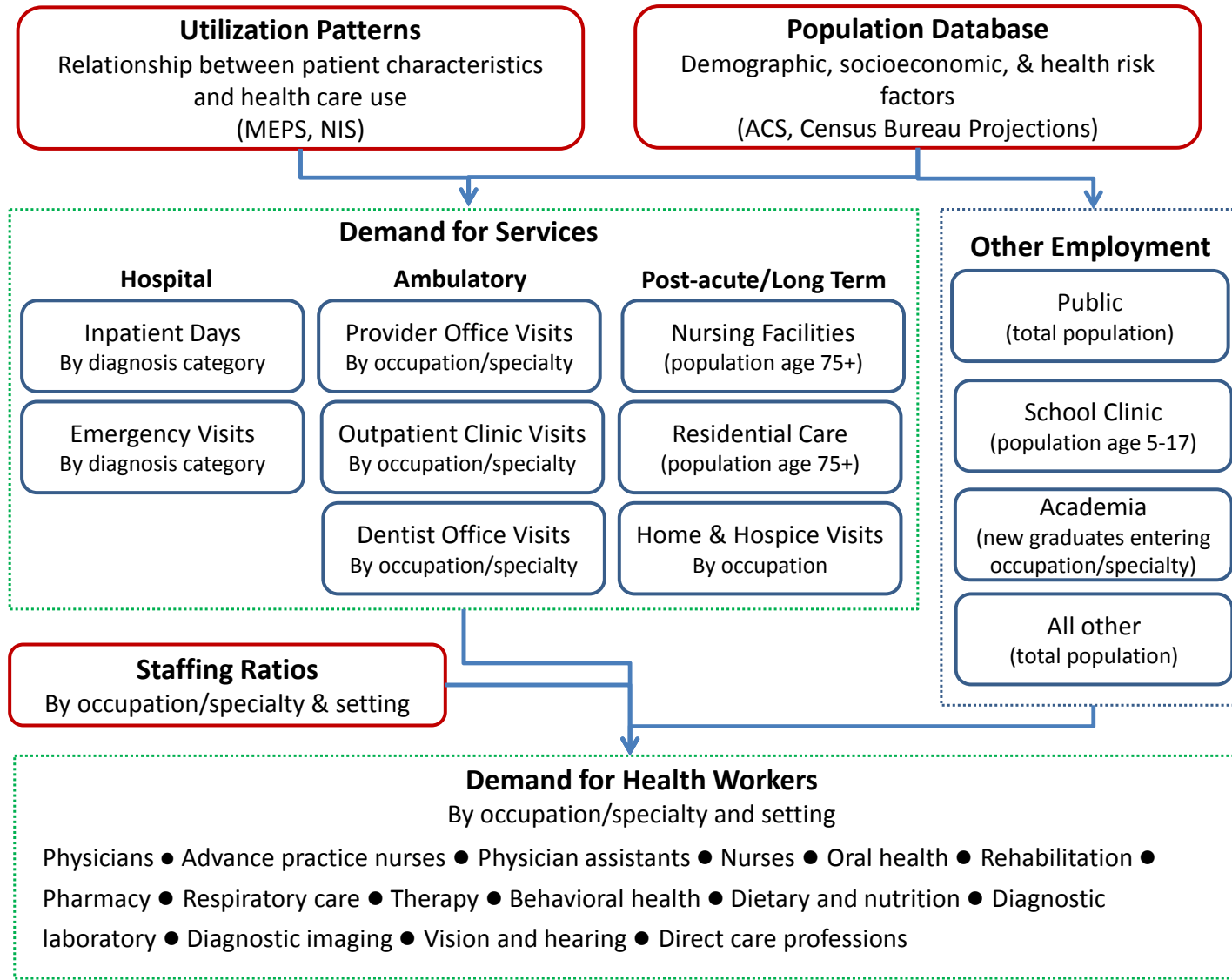
Health Workforce Simulation Model: Design Criteria

- Desired capabilities
 - Address key policy or research questions
 - Model wide range of scenarios—reflecting uncertainties in future trends
- Structure
 - Build on solid theoretical underpinnings
 - Build dynamic model
 - Integrate professions and specialties
 - Link supply and demand
 - Take into consideration both current and future availability of data
 - Be user friendly for adaptation at the state or local level
 - Be easy to maintain/update as new data becomes available
 - Provide platform for continued model improvement
- Transparency (through reports and presentations)

Conceptual Model, Methods and Data for Projecting Nursing Workforce Demand

HWSM version 1.0

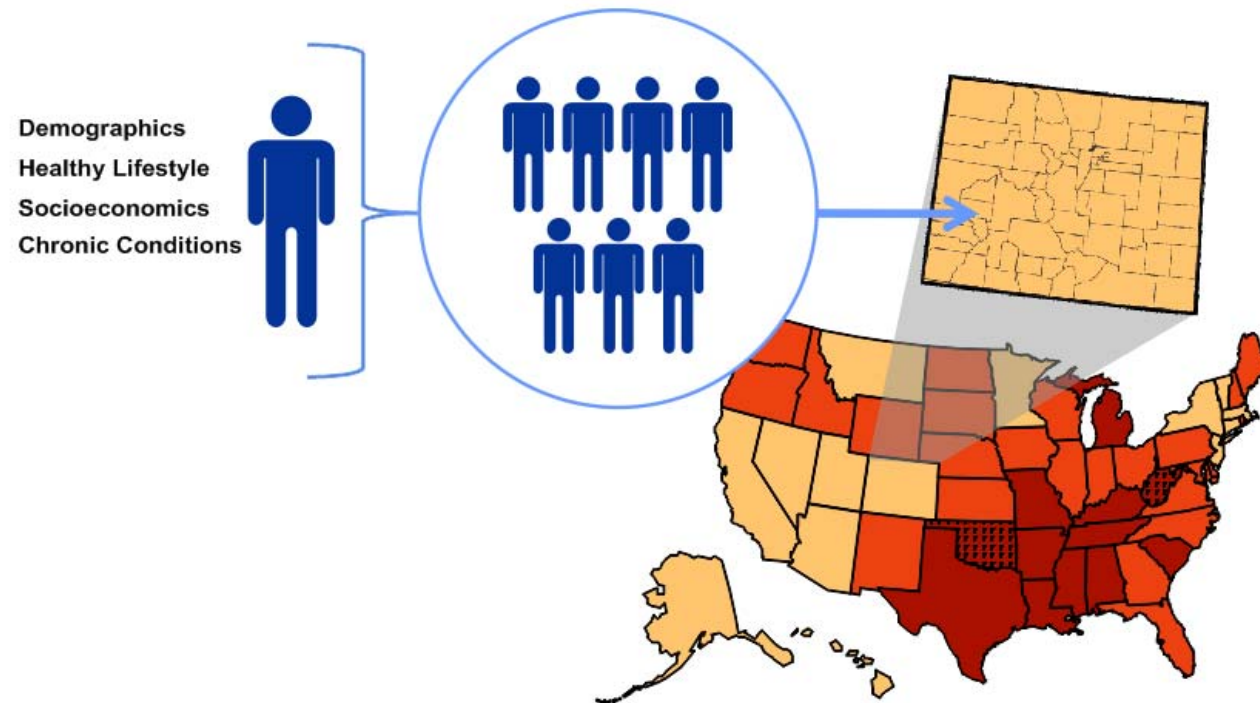
Conceptual Model for Projecting Workforce Demand



Microsimulation Approach for Modeling Workforce Demand

- Individual patients are the unit of observation
 - Predict use of health care services by individual
 - Determine how care will be provided to individuals
 - Sum across individuals to produce aggregate statistics
- Approach
 - Develop population health database with health profile for representative sample of the population
 - Develop predictive equations (using regression analysis) to model health care use
- Translate health care encounters into demand for physicians
 - Use data on how physicians divide their time between care delivery settings and patient encounters to create estimates of patient encounters per full time equivalent physician

Develop Representative Sample of Current and Future Population to Model Demand



Combines latest files of:
Behavioral Risk Factor Surveillance System (BRFSS)
American Community Survey (ACS)
National Nursing Home Survey (NNHS)
Census Bureau population projections
U.S. Census Bureau national projections
Individual state projections (methods/availability vary by state)

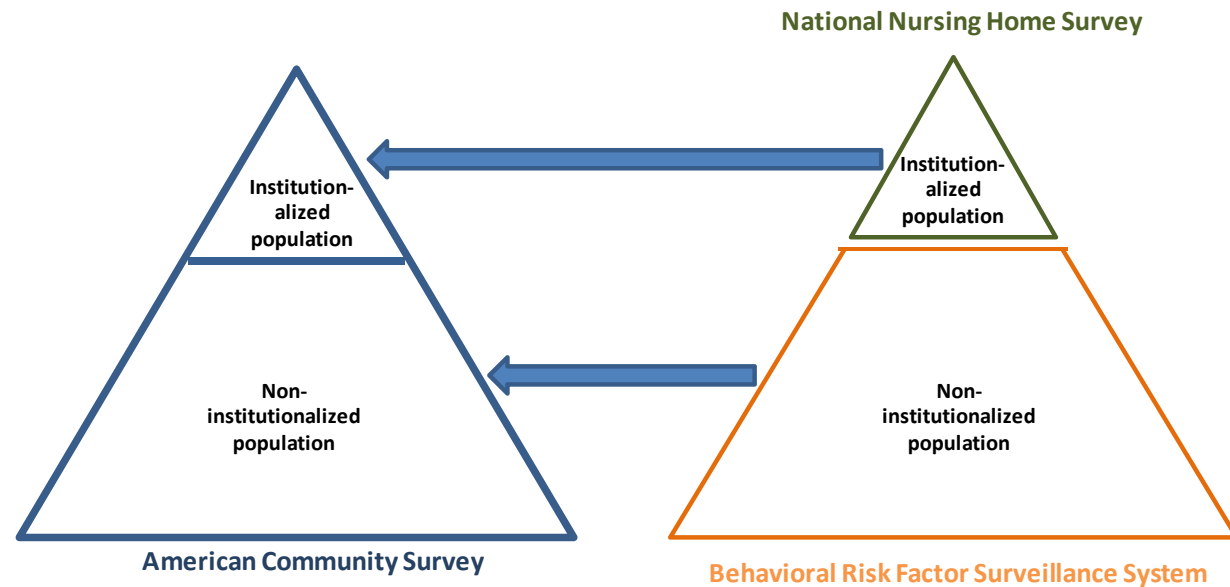
Obesity Rate Among U.S. Adults



Map Source: CDC (BRFSS, 2010)

Create State-Level Population Database for Demand Modeling

- ACS-BRFSS match based on same state, age group, gender, race/ethnicity, income level, insurance status
- ACS-NNHS match based on same age group, gender, race/ethnicity



Example: Healthcare Utilization for Cardiologist and Cardiology-Related Services

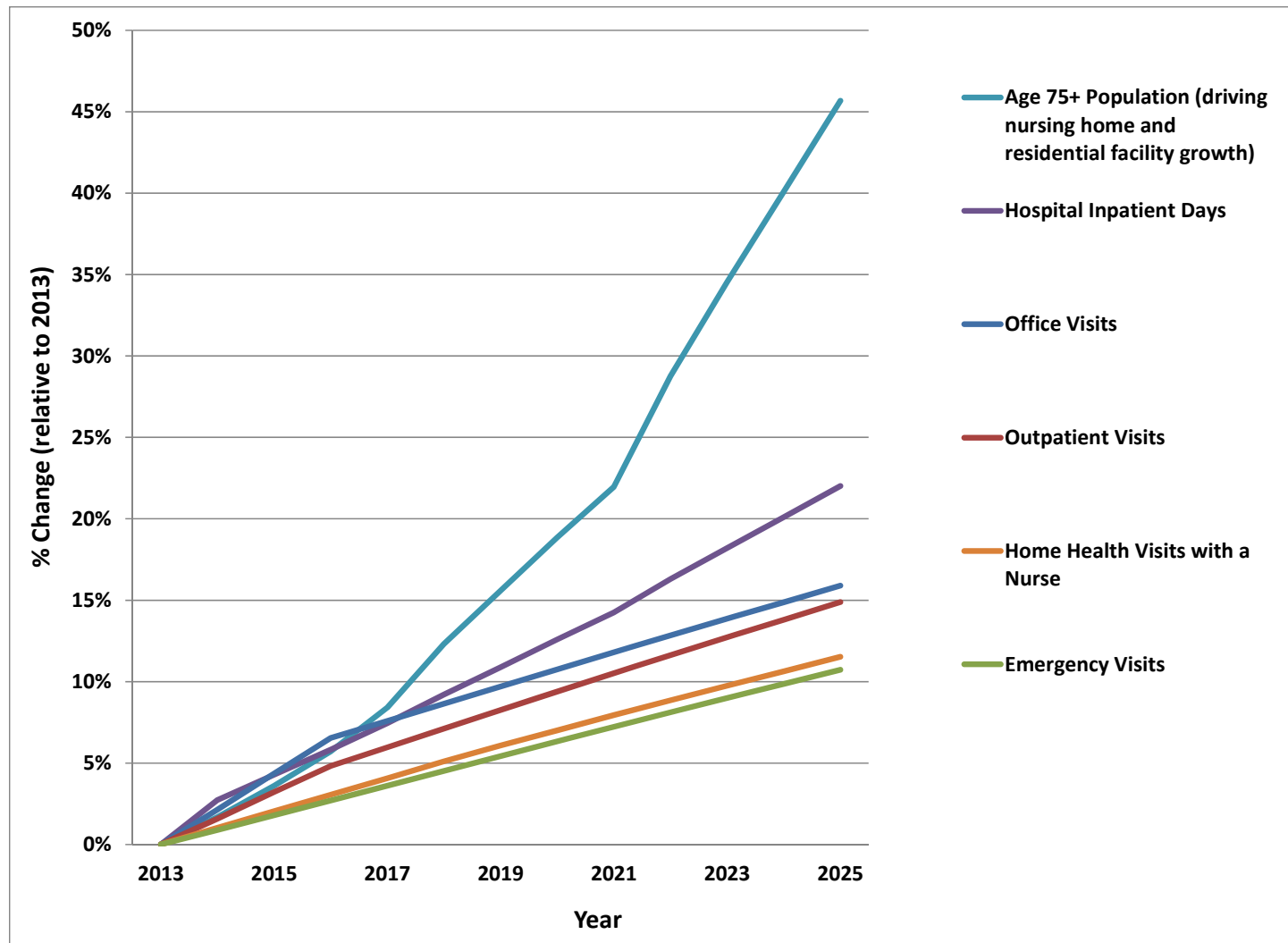
¹ Rate ratios from Poisson regression analysis using 2007-2011 MEPS.

² Odds ratios from logistic regression analysis using 2007-2011 MEPS. Statistically significant at the 0.05 (*) or 0.01 (**) level.

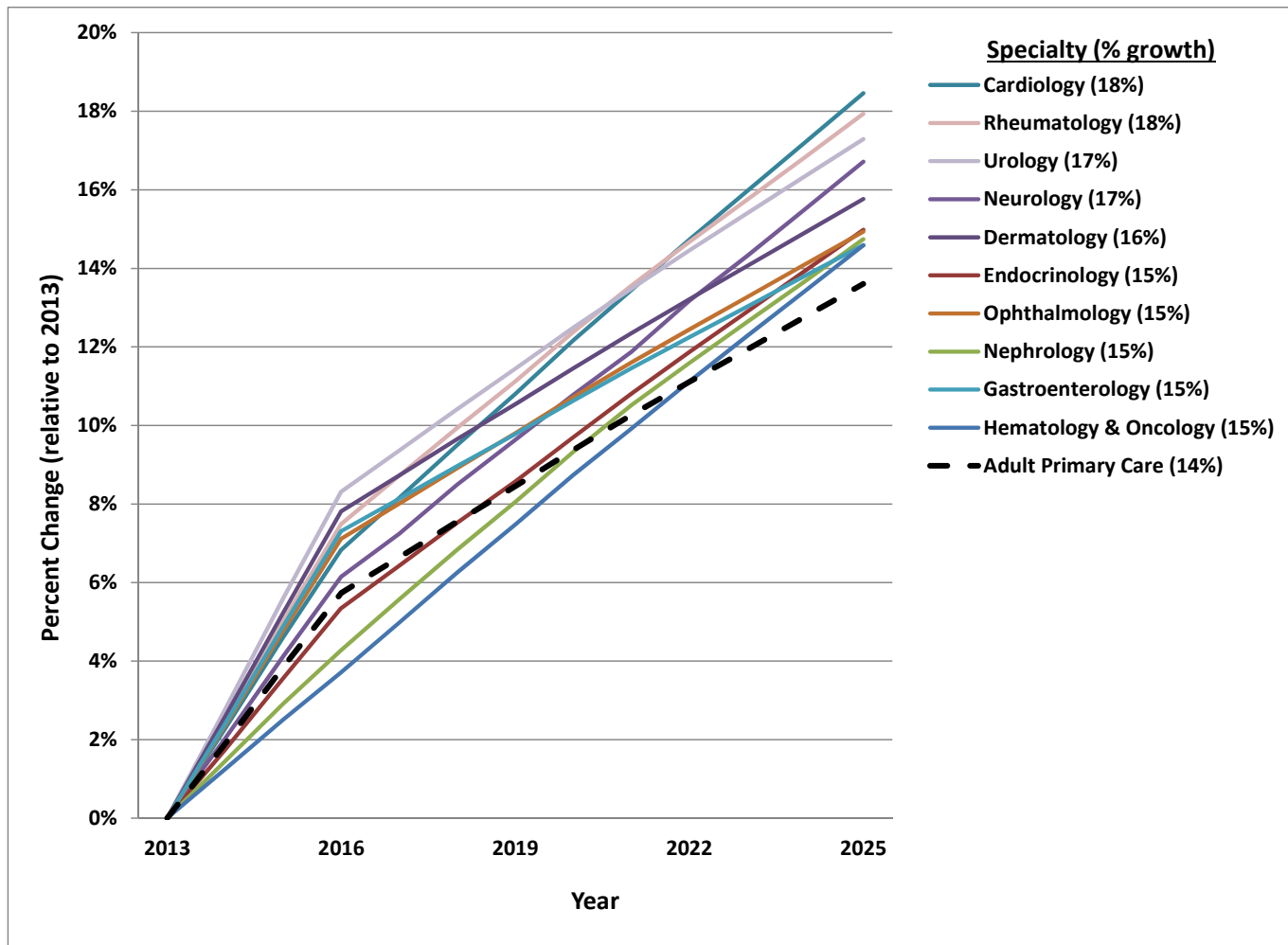
Regression analysis with Nationwide Inpatient Sample models length of stay per hospitalization

	Parameter	Office Visits ¹	Outpatient Visits ¹	Emergency Visits ²	Hospitalization ²
Race-Ethnicity	Hispanic	0.78**	0.67**	1.02**	0.86**
	Non-Hispanic black	0.73**	2.15**	1.41**	1.34**
	Non-Hispanic white	0.93**	1.31**	0.96**	0.97**
	Non-Hispanic other race	1.00	1.00	1.00	1.00
	Male	1.13**	1.62**	0.92**	0.99
Age	18-34 years	0.13**	0.12**	0.45**	0.25**
	35-44 years	0.32**	0.59**	0.84**	0.53**
	45-64 years	0.53**	0.72**	0.83**	0.69**
	65-74 years	0.88**	1.35**	0.91**	0.90**
	75+ years	1.00	1.00	1.00	1.00
	Smoker	0.77**	0.62**	0.97	0.95
Diagnosed With	Hypertension	1.34**	1.31**	2.50**	1.91**
	Coronary heart disease	7.03**	6.37**	2.60**	3.39**
	History of heart attack	1.61**	1.90**	2.59**	2.58**
	History of stroke	1.07**	0.80**	2.38**	2.53**
	Diabetes	1.18**	1.51**	1.08**	1.25**
	Arthritis	1.02**	1.32**	0.94**	0.89**
	Asthma	1.04**	1.06**	1.05*	1.09**
	History of cancer	1.15**	0.83**	0.93**	0.91**
	Insured	1.56**	1.14**	0.76**	0.99
	Medicaid	1.29**	1.59**	1.57**	1.42**
Household Income	< \$10,000	0.89**	0.64	1.66**	1.53**
	\$10,000 to < \$15,000	0.83**	0.64**	1.36**	1.51**
	\$15,000 to < \$20,000	0.85**	0.86**	1.10**	1.28
	\$20,000 to < \$25,000	0.93**	0.39**	1.35*	1.32
	\$25,000 to < \$35,000	0.88**	0.78**	1.56**	1.36**
	\$35,000 to < \$50,000	1.03**	0.69**	1.17**	1.16**
	\$50,000 to < \$75,000	0.99	0.80**	1.06**	1.09**
	\$75,000 or higher	1.00	1.00	1.00	1.00
Body Weight	Not available	0.89**	0.89**	2.26**	1.98
	Normal	0.97**	0.97	1.14**	1.02
	Overweight	1.00	1.00	1.00	1.00
	Obese	1.04**	0.69**	1.09**	1.12
	Metro area	1.35**	0.94**	1.04	0.93

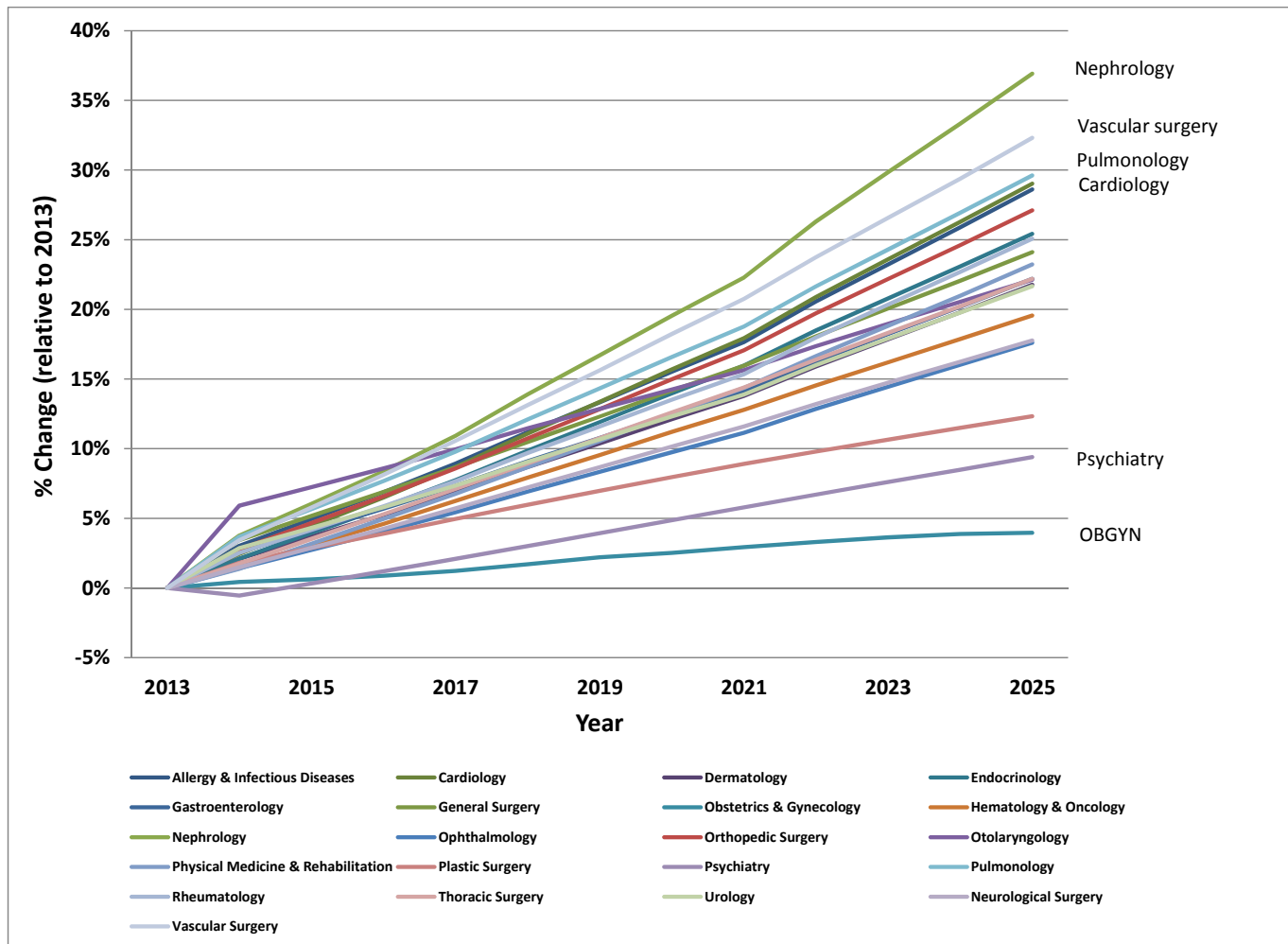
Projected Service Demand by Care Setting



Example: Projected Growth in Physician Office Visits, High Growth specialties



Example: Projected Growth in Inpatient Days by Primary Diagnosis



Care Delivery Patterns: Converting Service Demand to Health Profession FTEs

- Estimate current number of nurses by care delivery setting
- Estimate current national use of care by delivery setting
- Divide care use by number of nurses to estimate use-per-nurse ratios
- **Implicit assumption that supply & demand roughly in equilibrium nationally**

Nursing Workload Drivers by Work Setting

Work Setting	Workload Driver
Hospital inpatient	Inpatient days
Emergency	Emergency visits
Offices	Office visits
Outpatient	Outpatient visits
Home health	Home health visits by a nurse
Government	Overall population
Nursing care facilities (skilled/long term)	Population age 75 and older
Residential care facilities	Population age 75 and older
Nurse education	Nurses educated
School health	Population age 5 to 18
Other	Overall population

Distribution (%) of Nurses Across Employment Settings

Work Setting	RNs				LPNs
	OES ^a		2008-10 ACS ^b	2008 NSSRN ^c	2008-10 ACS ^b
	2012	2010			
Hospitals	62.0	60.4	63.2	62.2	29.3
Inpatient ^e	55.6	54.1	56.6	55.7	
Emergency ^e	6.4	6.3	6.6	6.5	
Offices	7.4	9.8	5.1	10.5	8.6
Outpatient	4.0	4.5	4.6		5.7
Home health	6.2	5.5	3.8	6.4	6.3
Government	5.6	5.8			
Nursing care facilities (skilled/long term)	5.3	5.1	7.4	5.3	30.7
Residential care facilities	1.7	1.6	0.4		1.3
Nurse education	3.1	1.2	0.6 ^d	3.8	0.3 ^d
School health	1.9				
Social work	0.7	0.7			
Public/community health				7.8	
Other	2.2	5.4	14.9	3.9	17.8
Total ^f	100	100	100	100	100

Sources and notes: ^a Occupational Employment Statistics. ^b 2008-2010 pooled files of the American Community Survey, reported in HRSA 2013 nursing report. ^c 2008 National Sample Survey of Registered Nurses. ^d Nurses in teaching positions might be recorded in the ACS under teaching rather than under nursing. ^e Estimated based on estimate that 89.6% of hospital nurses are working in inpatient settings and 10.4% are working in emergency settings, with nurses in administration allocated proportionately across settings (from the 2008 NSSRN). ^f Numbers might not sum to 100% because of rounding

Annual Health Care Use per RN and LPN

- Example: every 4,469 visits to a physicians office translates to 1 full time equivalent RN
 - Notes: Estimate reflects that not all physician offices employ RNs
 - Estimate does not reflect that care provided by nurses differs within settings (e.g., in a cardiologist office versus a primary care provider office)

	Registered Nurse	Licensed Practical Nurse
Office visits	4,469	15,258
Outpatient visits	382	1,065
Inpatient days	106	802
Emergency visits	612	
Home Health Visits	63	246
Nursing Home Residents	125	86
School Health	900	
Residential	389	2,021

Conceptual Model and Characteristics of Nursing Supply

HWSM version 1.0

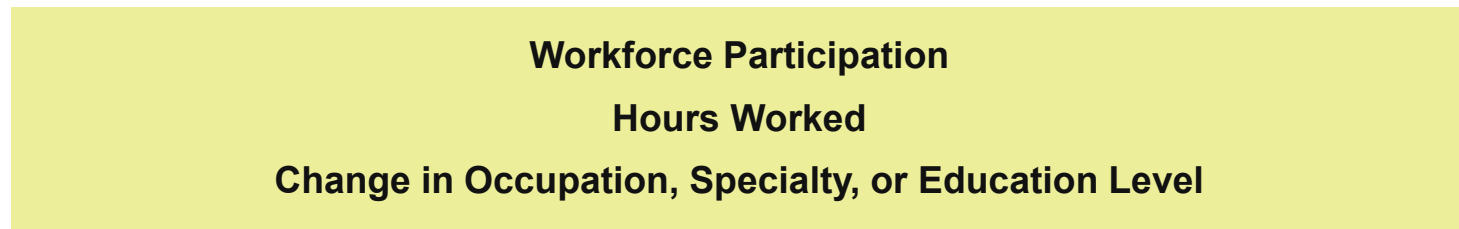
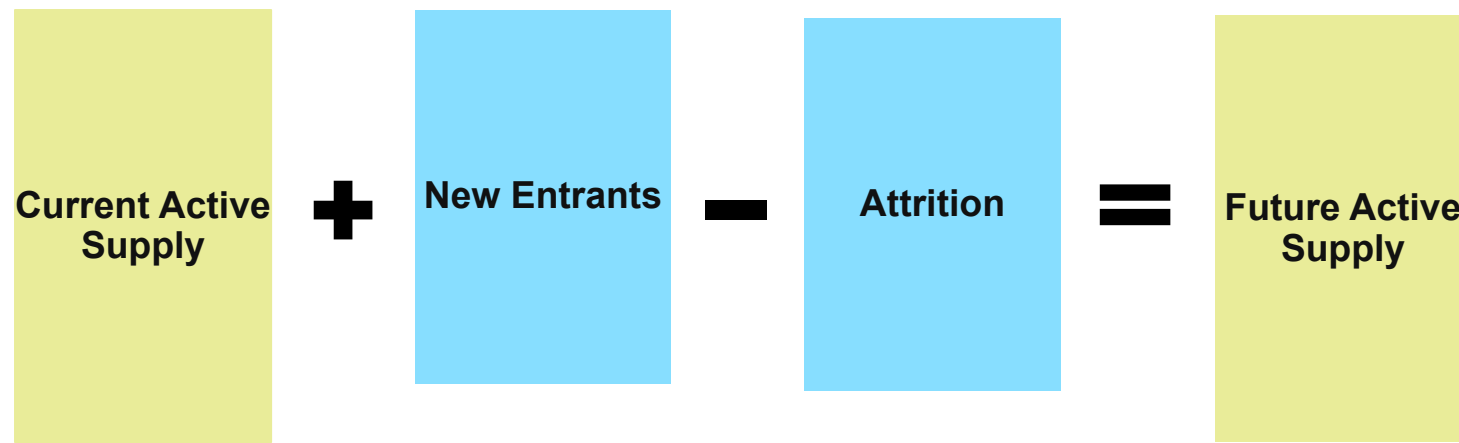
Nursing Workforce Simulation Model: Supply Component

- Simulate likely career choices of individual clinicians
 - Microsimulation—modeling workforce decisions of individual clinicians, rather than stock-and-flow models that simulate groups of clinicians
- Dynamic modeling
 - Environmental and market factors—clinicians respond to changes in the economy, healthcare operating environment, and policy
 - Shortages/surpluses affect clinician workforce decisions
- Workforce activities: what, where, how, when
 - What type of work will I do?
 - Where will I work (e.g., state of practice)?
 - How many hours will I work?
 - When will I retire?

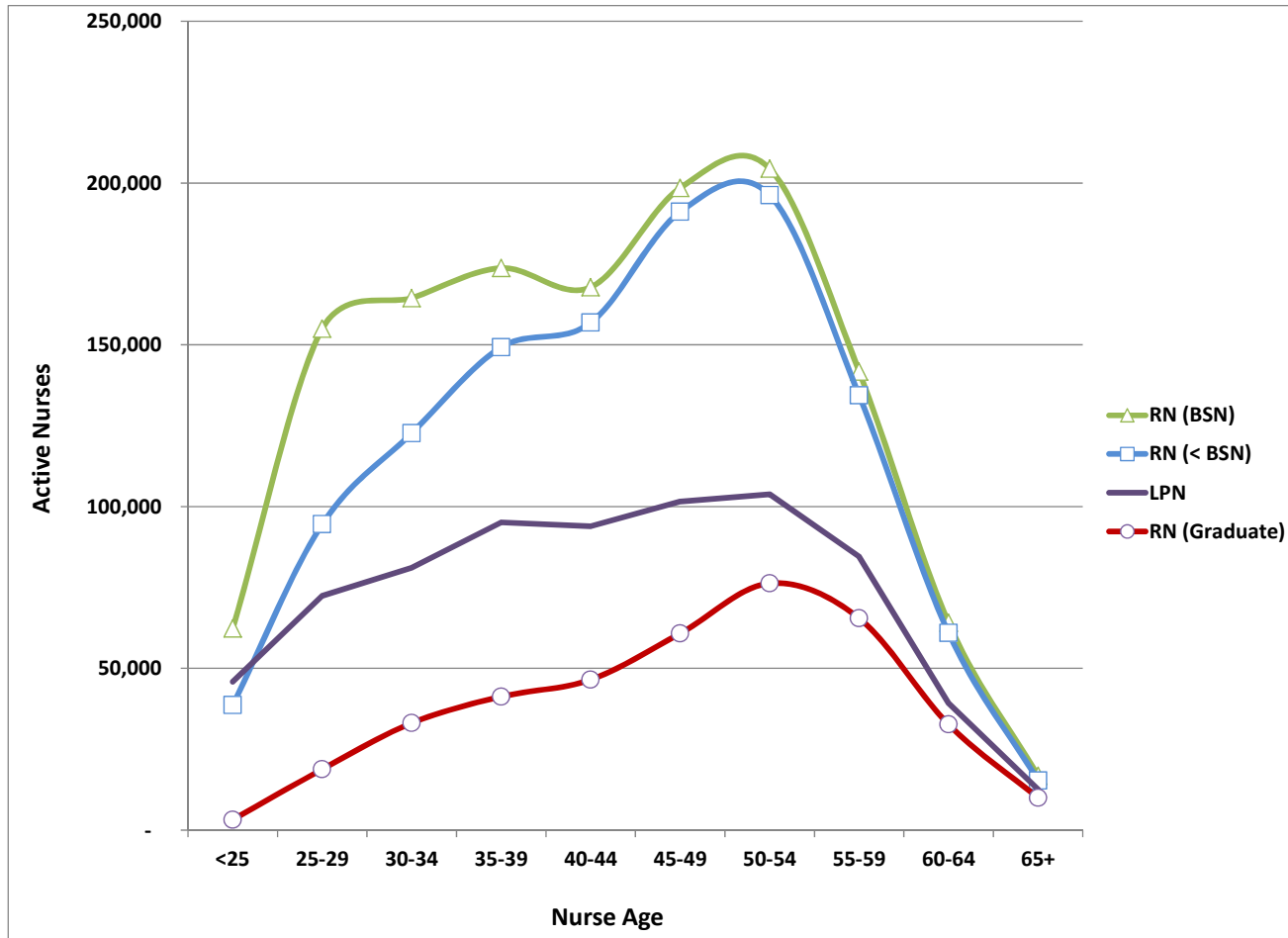
Nursing Workforce Simulation Model: Supply (cont.)

- Model process
 - Start with database containing starting supply of RNs and LPNs
 - Each year, model:
 - New entrants to the workforce
 - Attrition (retirement, mortality)
 - Other activities (labor force participation, hours worked, education, geographic mobility)
 - End of year supply = starting supply for subsequent year
- Scenarios: vary number of new graduates, retirement patterns, hours worked

Conceptual Model for Nurse Workforce Supply



Current Supply, Based on Analysis of the American Community Survey

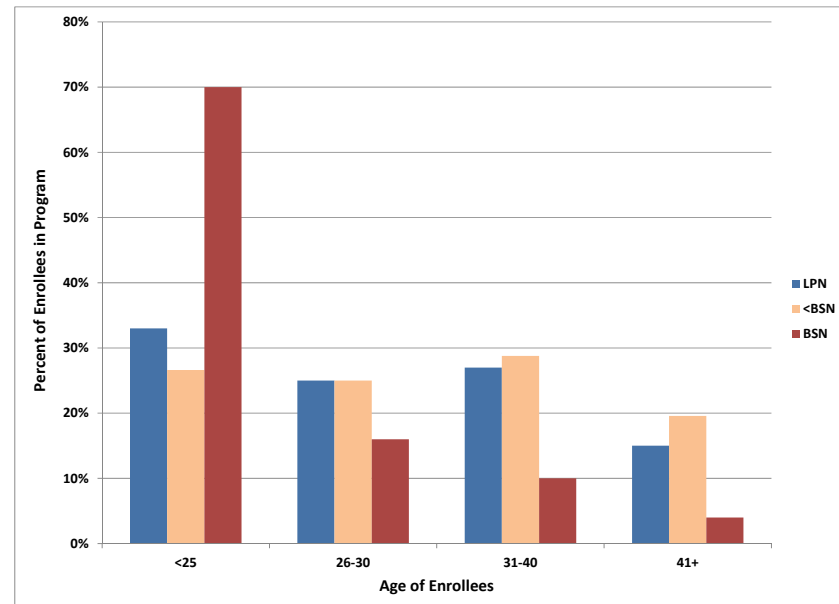


Pooled 2006-2012 files of the U.S. Census Bureau's American Community Survey (ACS) to increase sample size for individual states; calibrated to 2012 levels

New Entrants

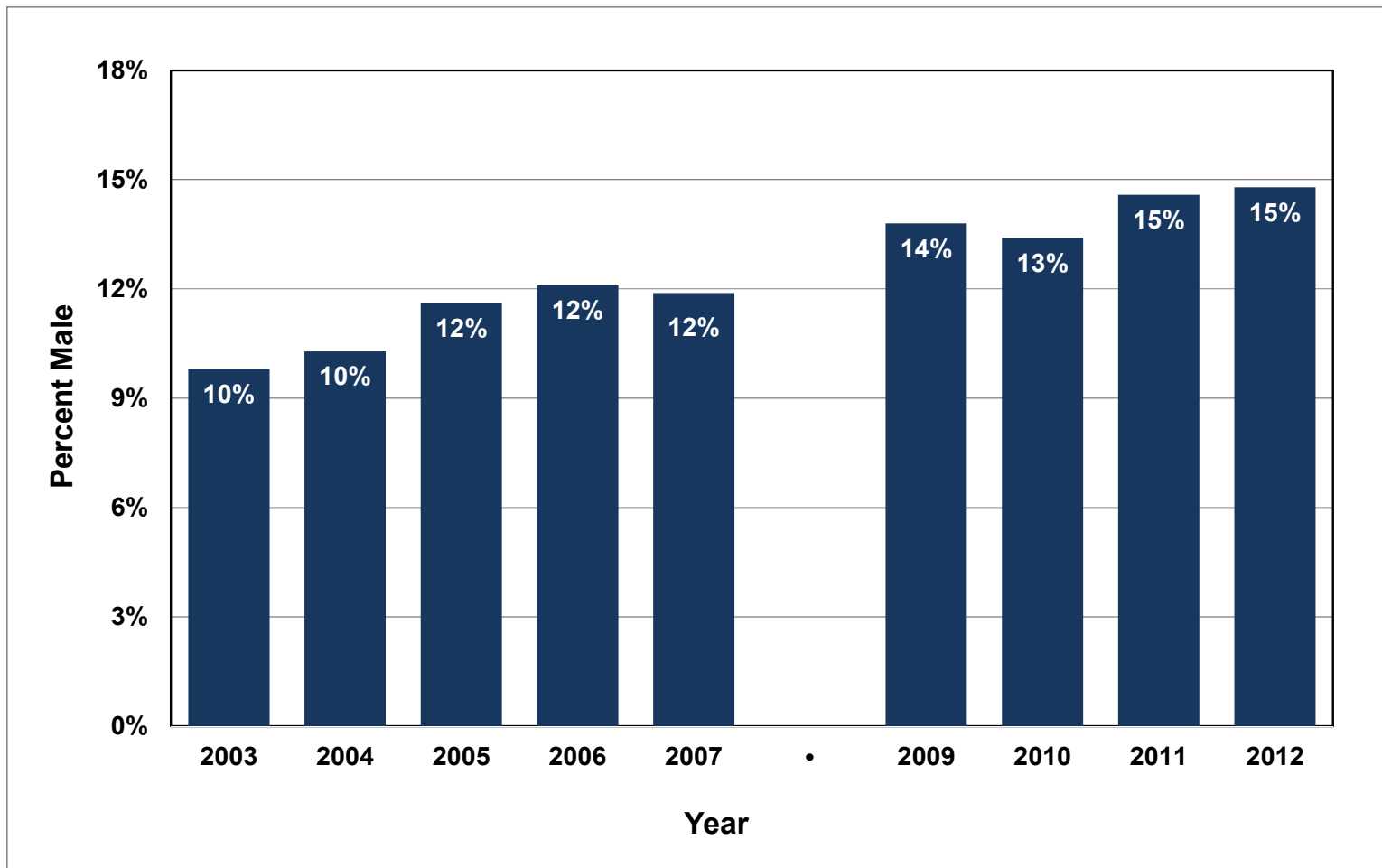
- Uses first time U.S.-educated candidates taking the NCLEX exam as a proxy for the number of new entrants to the workforce (2012 data)
 - 150,266 first-time takers of the NCLEX-RN
 - 62,535 who completed a baccalaureate degree
 - 87,731 who completed a diploma or associate degree
 - 64,061 first-time takers of the NCLEX-PN
- Status quo scenario assumes, annually:
 - 62,500 new RNs educated at the baccalaureate level
 - 87,700 new RNs educated at less than the baccalaureate level
 - 64,100 new LPNs

Age Distribution of Enrollees in LPN and Entry RN Programs



Source: National League for Nursing. 2013. Annual Survey of Schools of Nursing, Fall 2012.

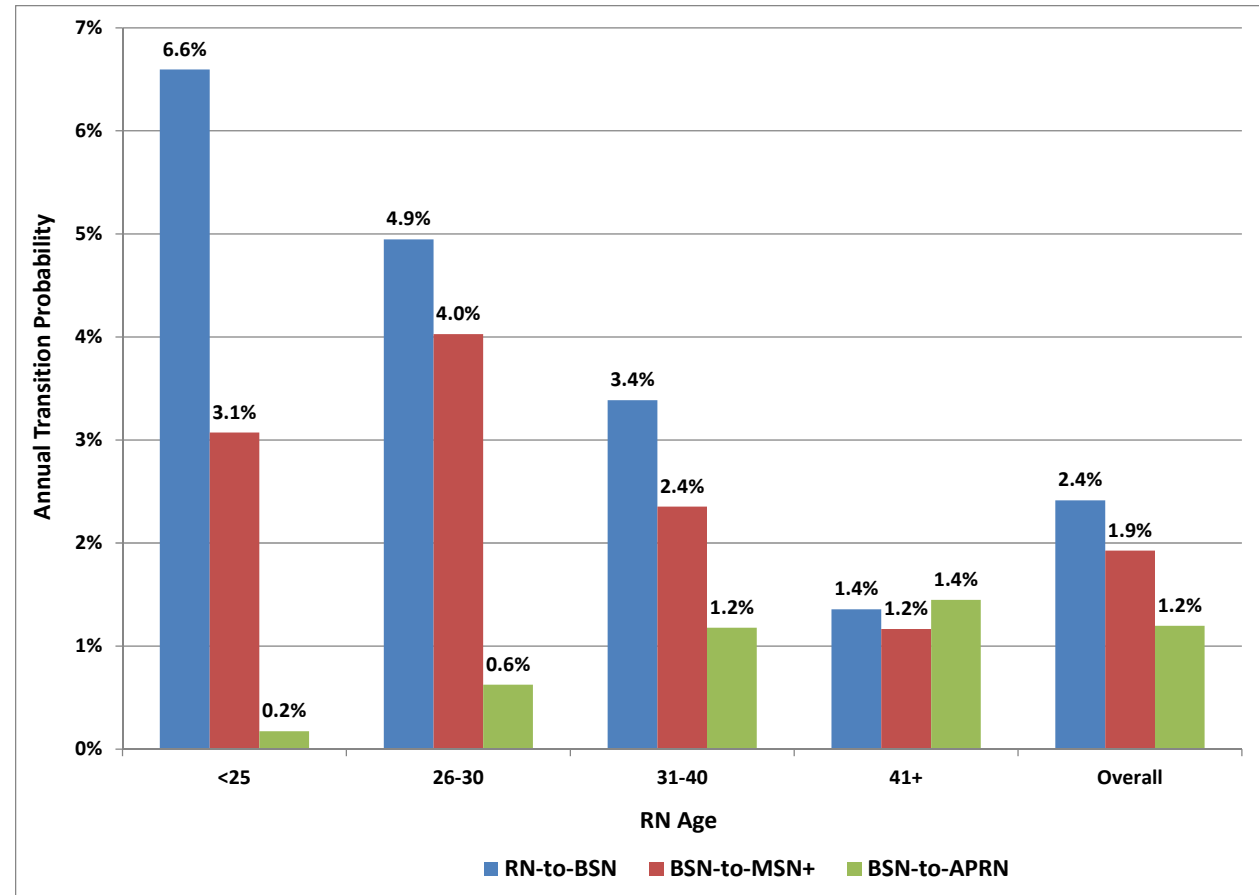
Percent Male for RN Entry Level Program Enrollment 2003-2012



Source: National League for Nursing. 2013. Percentage of Men Enrolled in Basic RN Programs by Program Type: 1992 to 2012 (Selected Years)

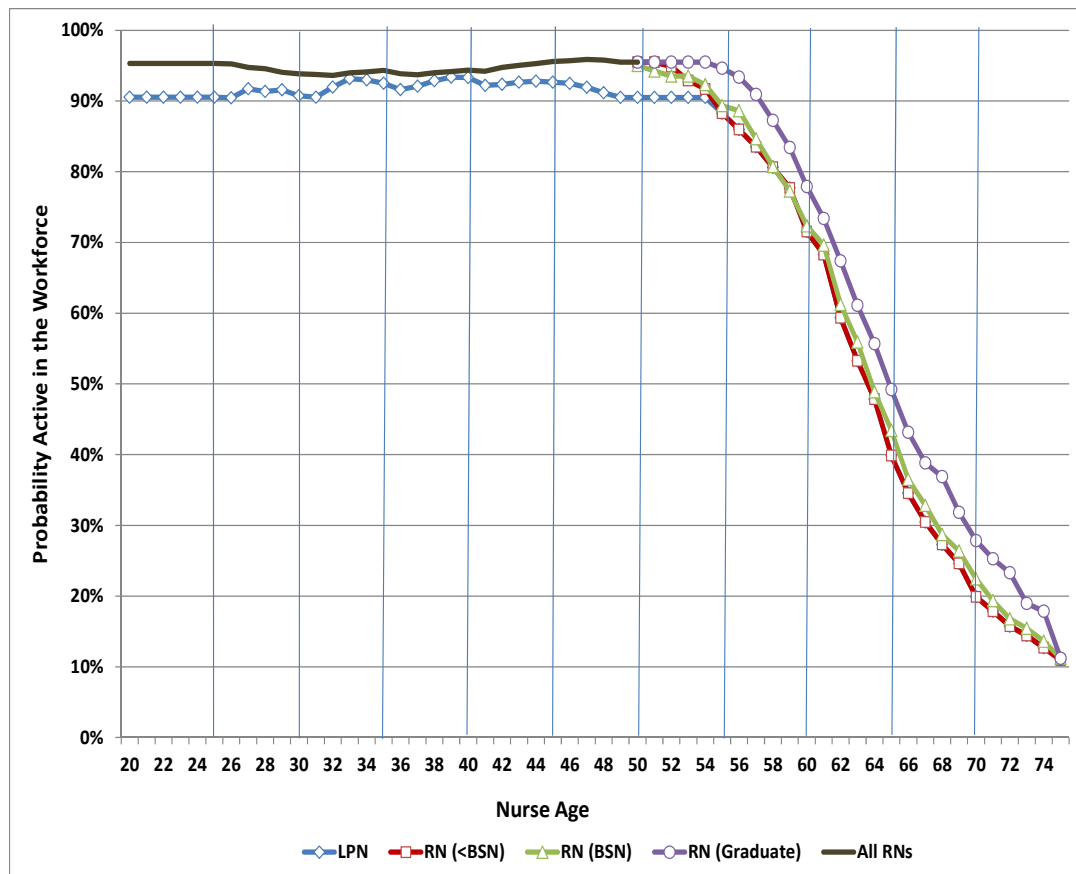
Annual RN Transition Probability to Change Education Level

- Supply projections include
 - ~16,200/yr. RN-to-APRN (about 1.2% of BSN-educated workforce)
 - ~16,000/yr. LPN-to-RN (about 2.5% of LPN workforce)

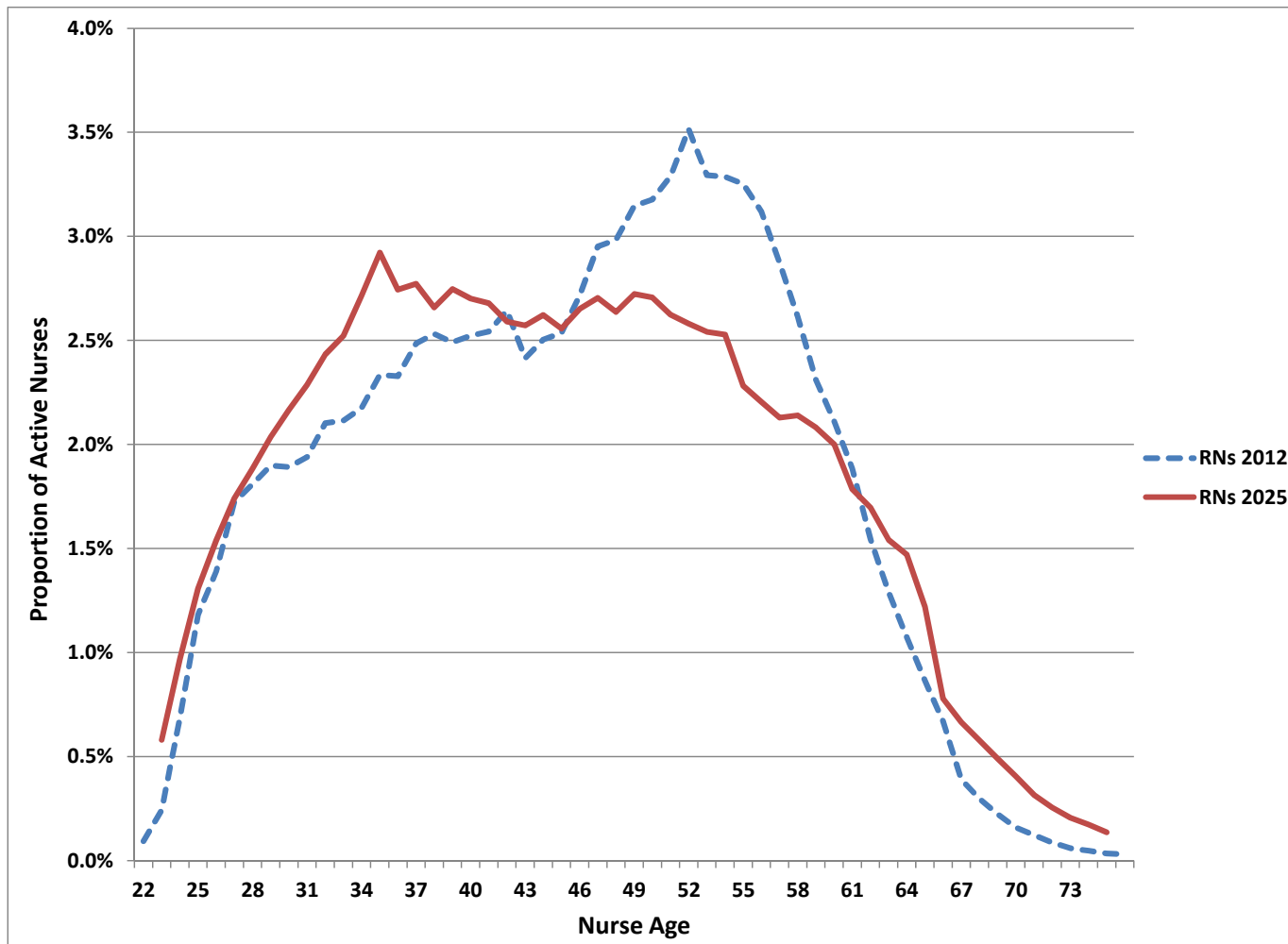


Percent of Nurses Remaining Active in the Nursing Workforce by Age and Education Level

- Labor force participation and retirement rates calculated using the ACS
 - < age 50: use participation rates for RNs and LPNs
 - \geq age 50: use labor force participation rates based on highest educational attainment (i.e., less than baccalaureate, baccalaureate, or graduate degree) for individuals employed at some time during their adult life

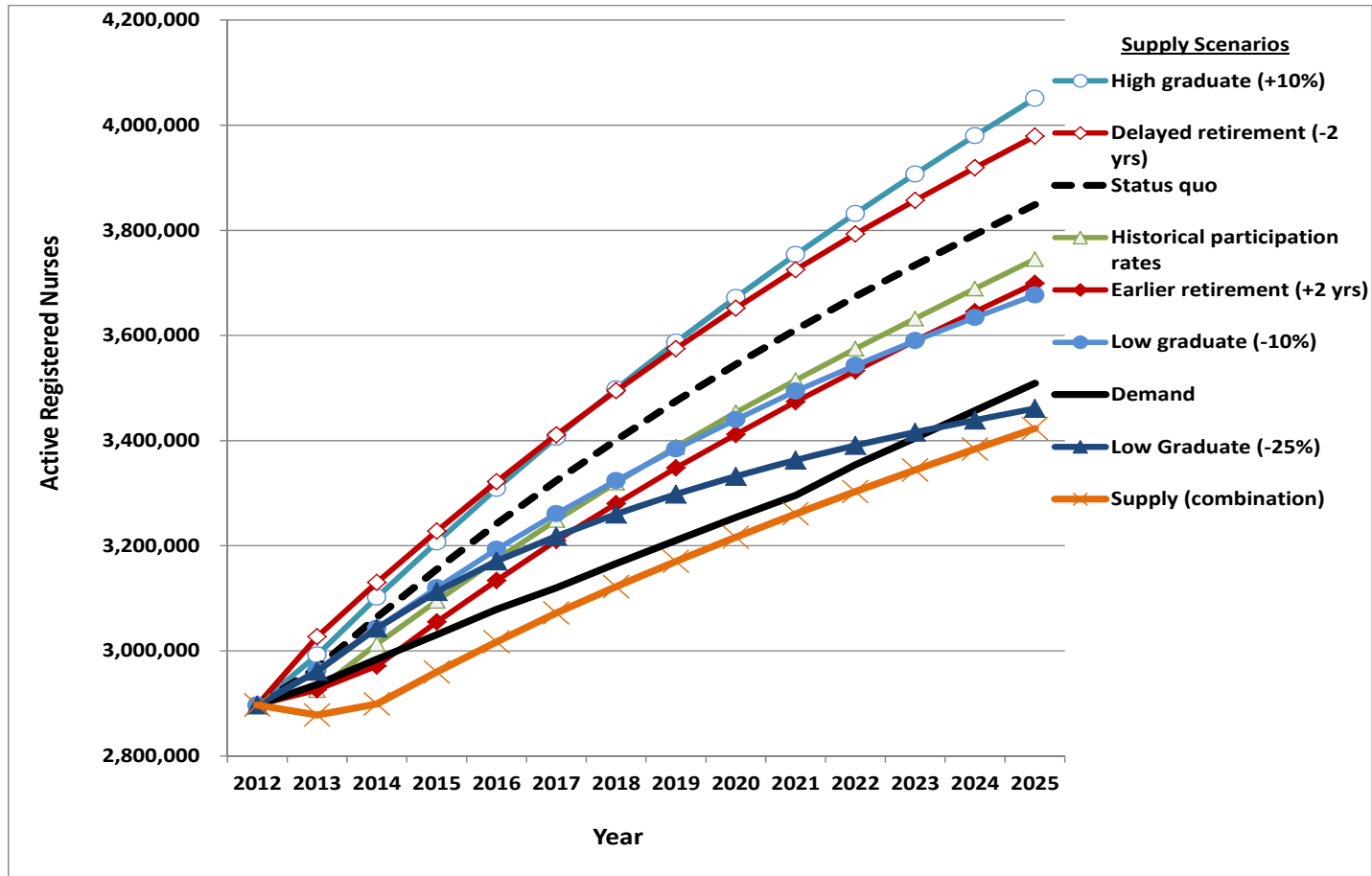


RN Age Distribution: 2012 & 2025 (Status Quo Scenario)



Supply and Demand Projections for RNs by Scenario

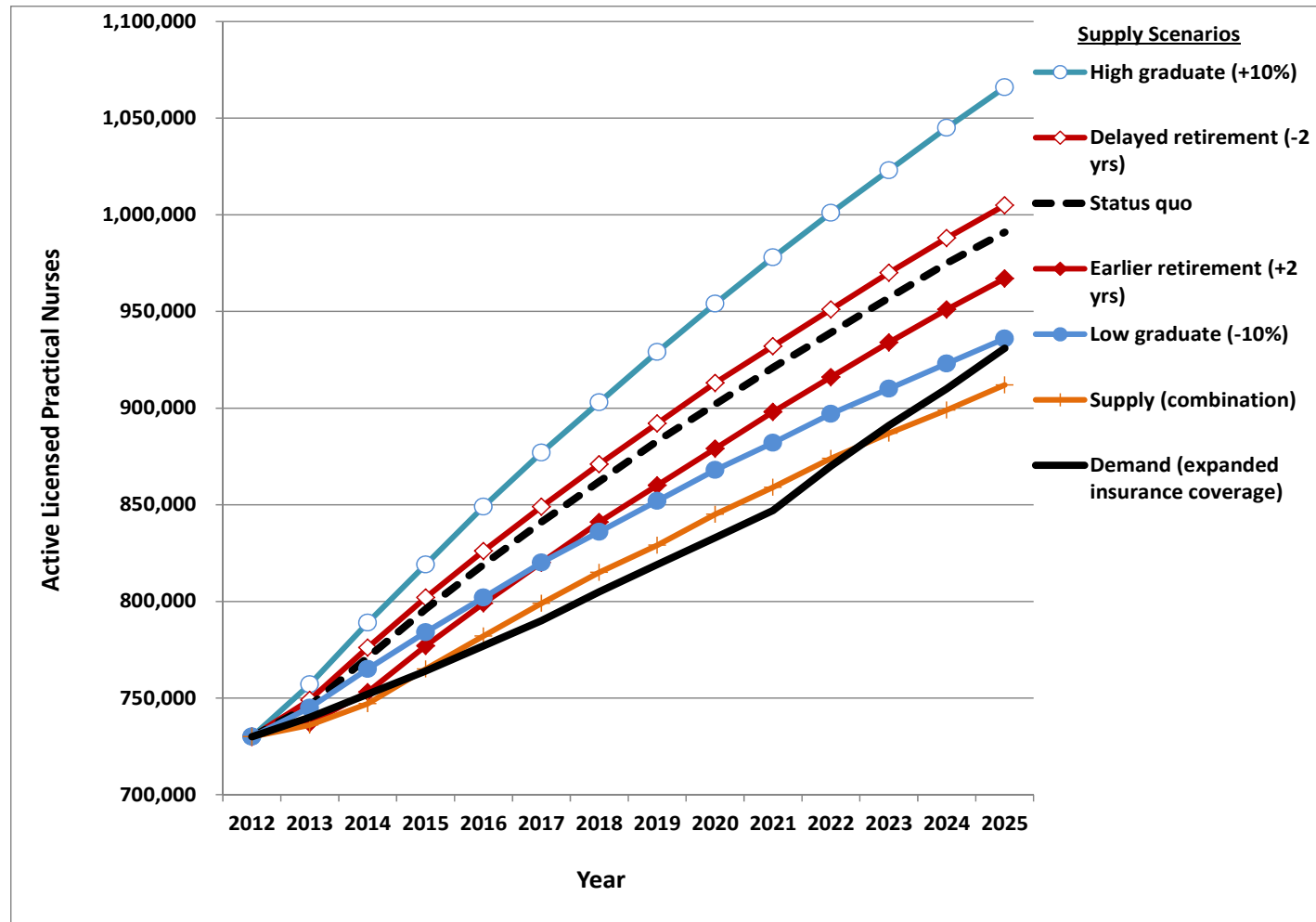
- By 2025 RN supply nationally is projected to exceed demand under most high and low growth scenarios modeled



Note: Combination supply scenario assumes 10% decrease in new graduates relative to status quo, and RNs retire two years earlier, on average, relative to pre-recession labor force participation patterns.

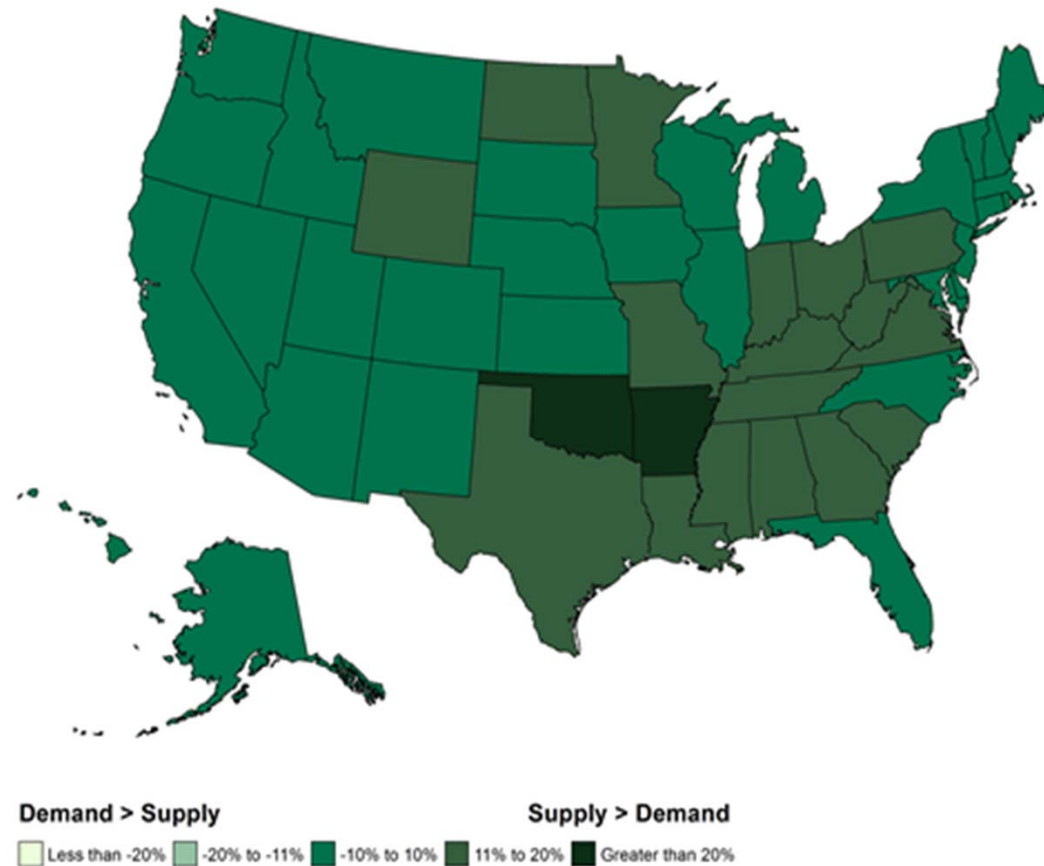
Supply and Demand Projections for LPNs by Scenario

- Future national supply of LPNs is also projected to exceed demand under most scenarios modeled



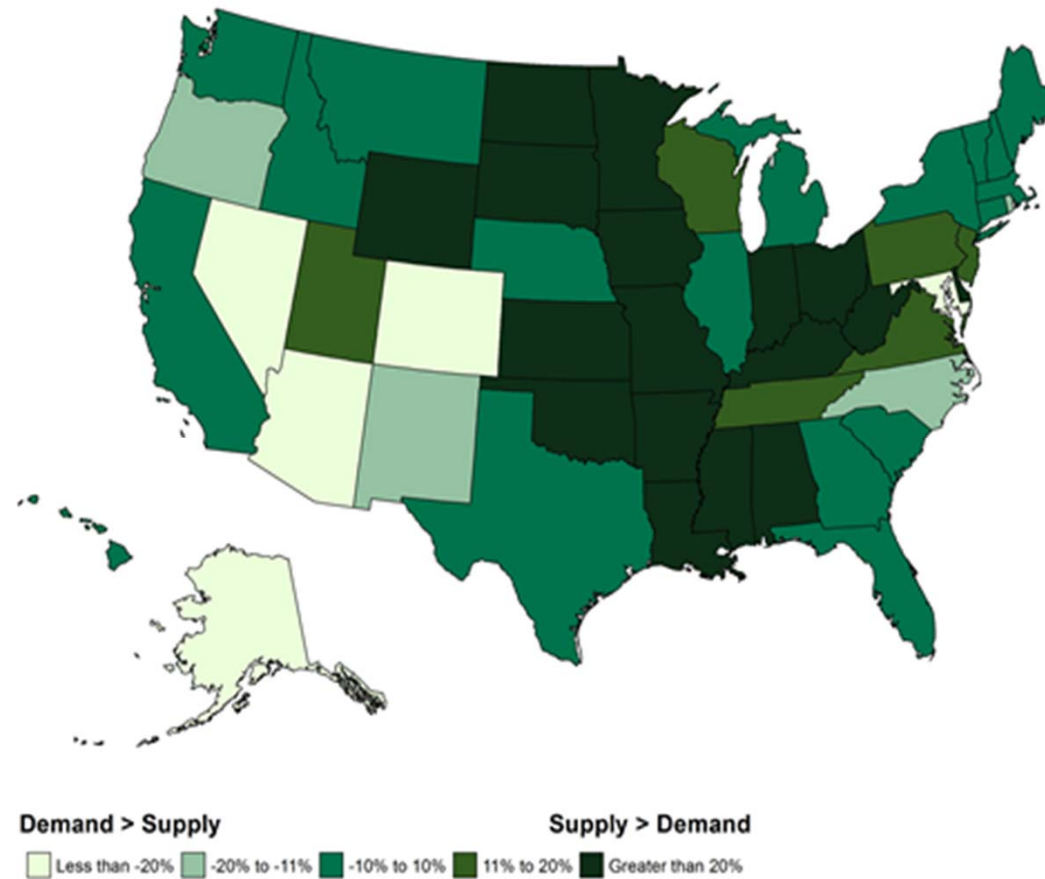
Adequacy of RN Supply under Migration Scenario (2025)

- Assuming employment seeking migration, many States with high supply are likely to experience a net outflow of RNs by 2025



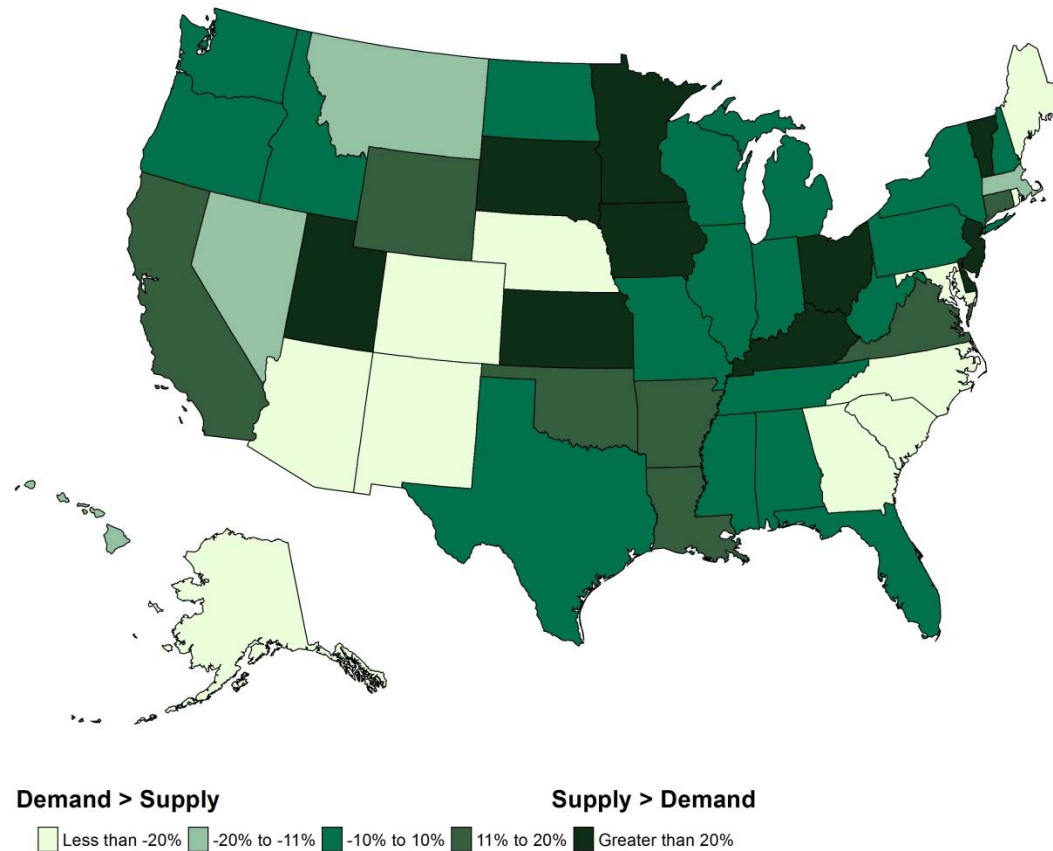
Adequacy of RN Supply under No-migration Scenario (2025)

- By 2025, assuming no out-migration many States are projected to train more RNs than required to meet future demand



Adequacy of LPN Supply, 2025, under No-migration Scenario

- Assuming no out-migration, projected adequacy of LPN supply varies by State based on training capacity and service demand



Health Workforce Simulation Model versions 1.0, 2.0, +

- HWSM was designed to be easily updated
 - Annual updates to key data from the American Community Survey, Behavioral Risk Factor Surveillance System, Medical Expenditure Panel Survey, Nationwide Inpatient Sample, Census Bureau/state population projections, etc.
- Incorporate the latest research
 - Nurse migration patterns
 - Care delivery models (e.g., Accountable Care Organizations, team-based care)
 - Evolving scope of practice, changing technology, changes in “economics of health care delivery” such as labor costs and supply availability
 - Economic conditions that might affect labor force participation rates
- Recognition that individual states have more complete supply data than available at the national level
 - HRSA decision to create web-based (but simplified) version of the HWSM that allows states to run their own supply numbers/scenarios
 - Underscores importance of minimum database for nursing

Key Findings and Implications

Key Findings

▶ National Findings

- Supply of both RNs and LPNs will exceed demand in 2025.
- RN and LPN supply is expected to grow by 952,000 FTEs and 260,900 FTEs respectively.
- RN and LPN demand is expected to grow by 612,000 FTEs and 201,000 FTEs respectively.

▶ State Level Findings

- Distributional imbalances exist
 - State shortages / surpluses
-

Alternative Scenarios

- ▶ Combination of 10% decrease in graduation rates and early retirement (2 years)
 - ▶ Shortfall of 86,000 RNs
- ▶ Adjusting number of new graduates to approximately 126,000 to 133,000 per year
 - ▶ Supply and demand balanced

Implications

- ▶ Adequate supply of nurses to meet the increased numbers of individuals receiving care due to the ACA.
 - ▶ Greater flexibility to fill expanding roles.
 - ▶ Greater need to focus on distribution and diversity of the RN and LPN workforce.
 - ▶ HRSA's investments in Nursing programs.
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Conclusions

- ▶ Projections are a planning tool for nursing leaders.
 - ▶ Supply and demand will continue to be affected by numerous factors including population growth and the aging of the nation's population, overall economic conditions, aging of the nursing workforce, and changes in health care delivery and reimbursement.
 - ▶ HRSA will refine the health workforce projection models on a regular basis to continue to assess the impacts on the nursing workforce.
 - ▶ Next set of projections is expected to be released in 2016.
 - ▶ Nursing web-based model is expected to be live in summer 2015.
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Contact Information

George A. Zangaro PhD, RN, FAAN

Director, National Center for Health Workforce
Analysis

301-443-9256

gzangaro@hrsa.gov
