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# Technical Difficulties: Meeting California's Workforce Needs in Science, Technology, Engineering, and Math (STEM) Fields



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## Overview

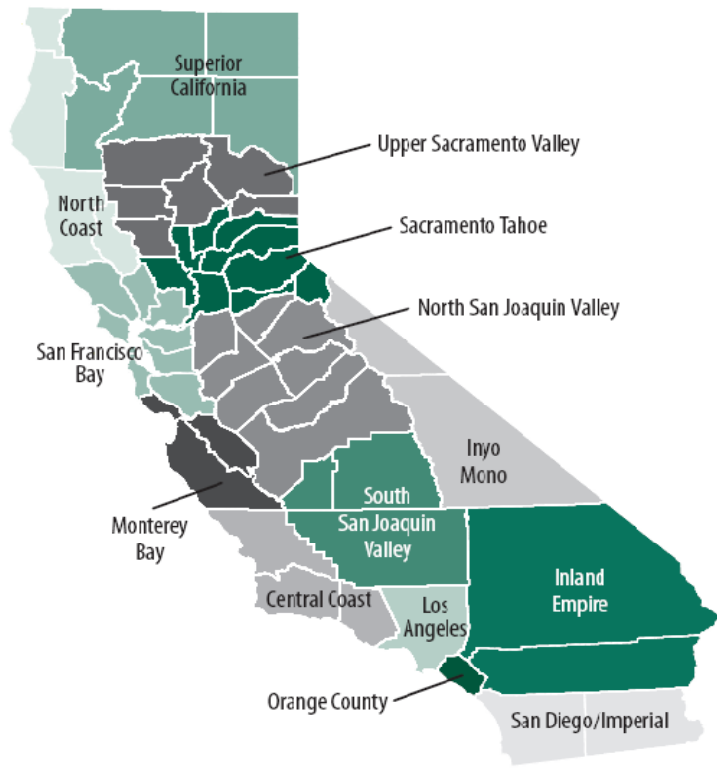


- STEM education and employment is vital to CA
- The context of STEM shortage- CA higher education performance
- Dimensions and Causes of STEM shortage
  - Growing demand
  - Constricting supply
- Recommendations for CA higher education

## *The Grades are In:*

California lags most other states in important aspects of higher education performance

- 45<sup>th</sup> in share of HS students taking advanced math/science
- 40<sup>th</sup> in rate of HS grads going directly to college
- 47<sup>th</sup> in number of degrees/certificates awarded in relation to enrollment



## Regional and Group Differences are Big Factors

- Large, urban areas perform significantly better on most measures

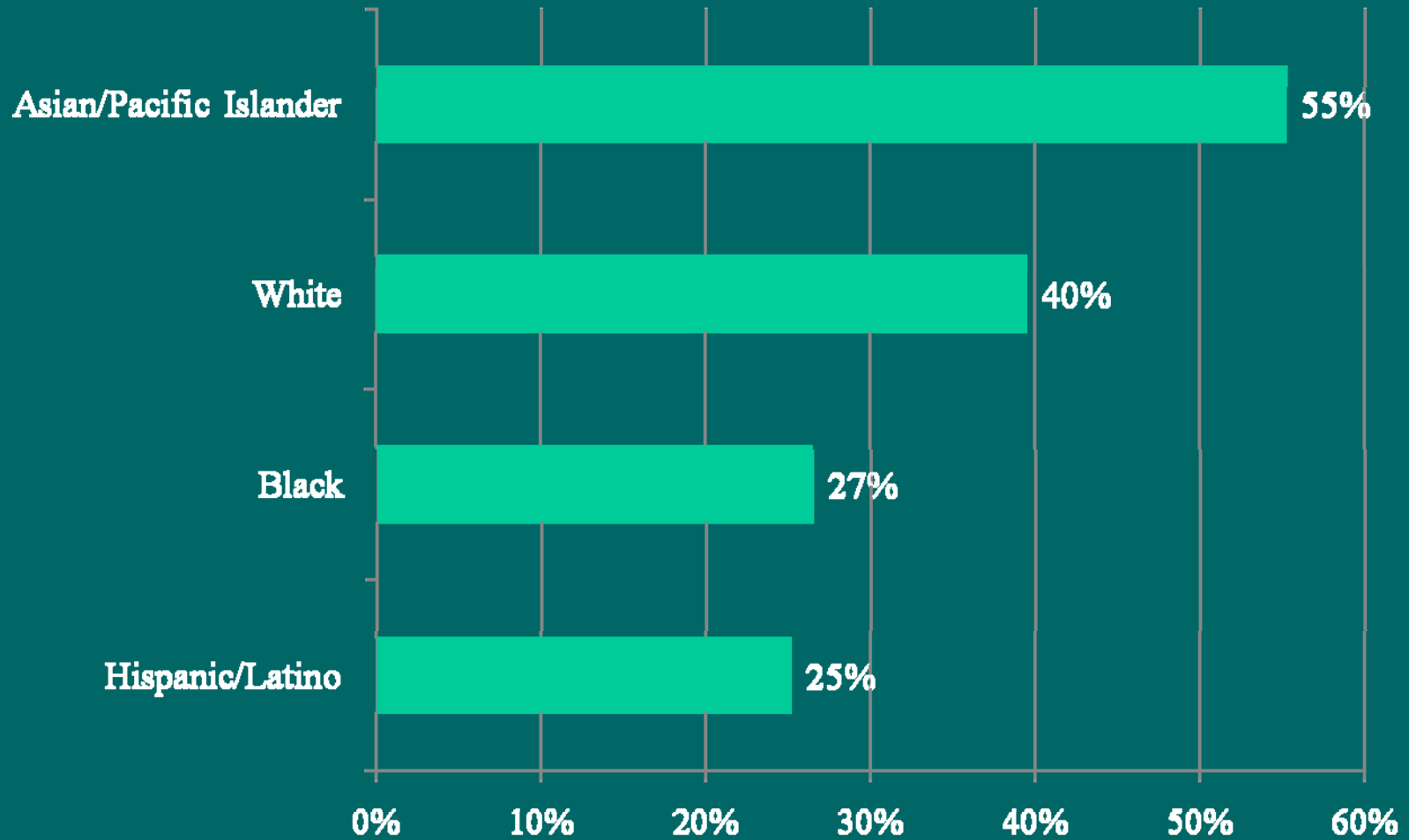
- Growing regions – San Joaquin Valley and Inland Empire – lag

- Latinos and blacks lag whites and Asians at every point along pipeline

## Regional Variation in College Preparation, Attendance, and in Working Adults with a Bachelor's Degree

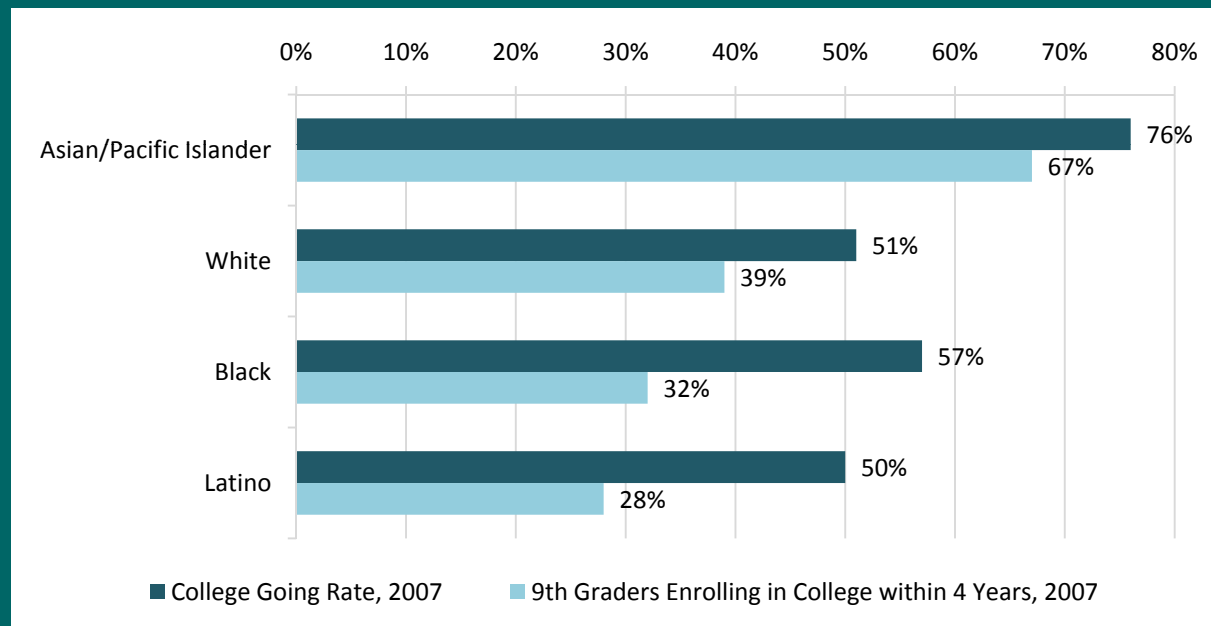
	Highest in CA	Lowest in CA	LA	OC
Share of HS Grads Completing a-g	45% (SF Bay)	17% (Superior CA & Inyo -Mono)	40%	39%
Percent of 18-24 Year Olds Enrolled in College	56% (Upper Sacramento Valley)	13% (Inyo-Mono)	43%	49%
Percent of Working-Age Adults with BA	43% (SF Bay)	14% (South San Joaquin)	29%	37%

## Racial/Ethnic Gaps in Share of HS Graduates Completing a-g



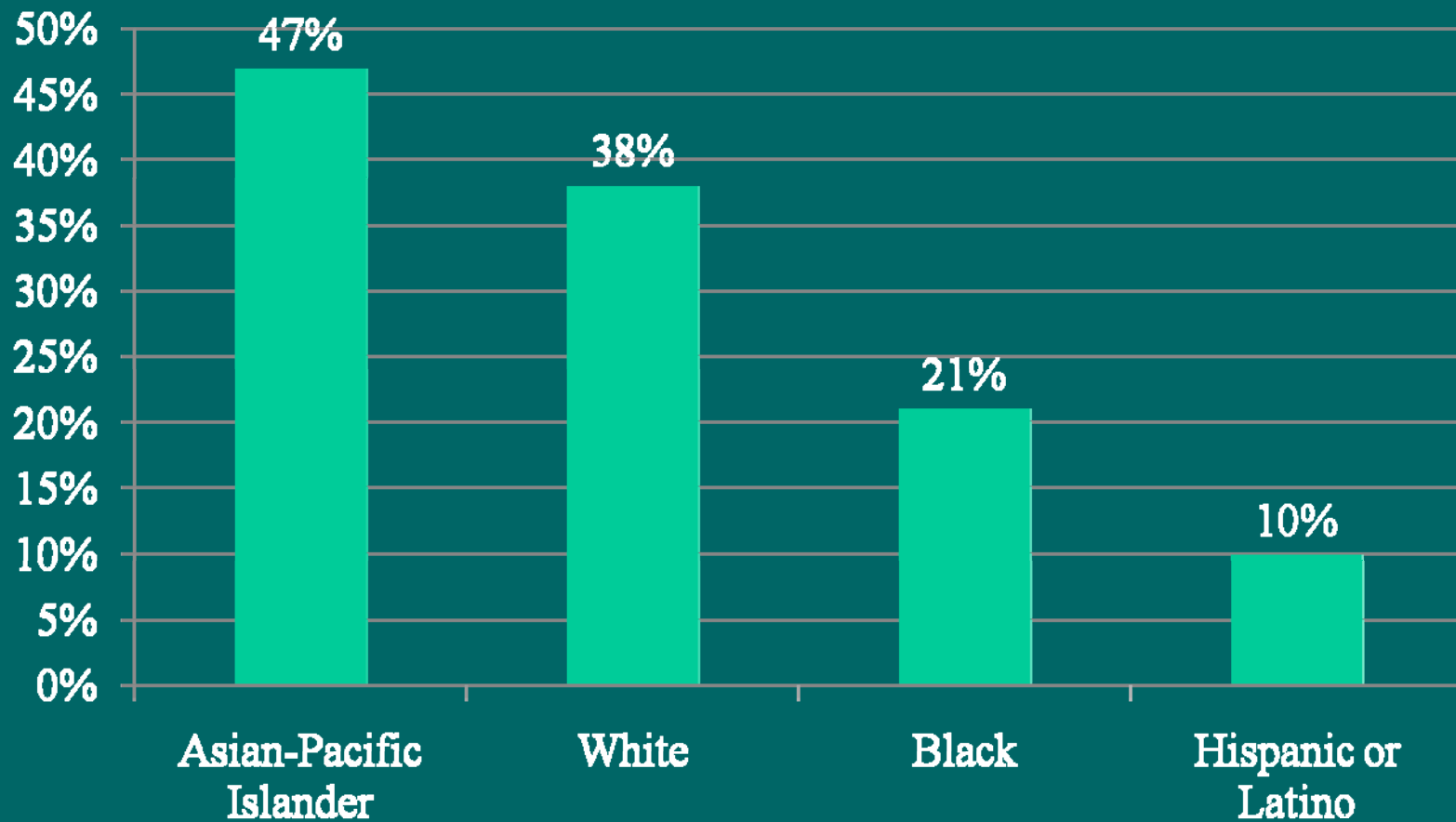
# Racial/Ethnic Gaps in College Enrollment

While black and Latino HS grads go directly to college at about the same rate as white grads...



...more high school drop-outs in those populations results in large gaps the share of 9<sup>th</sup> graders that attend college.

## Racial/Ethnic Gaps in Percent of Adults with a BA



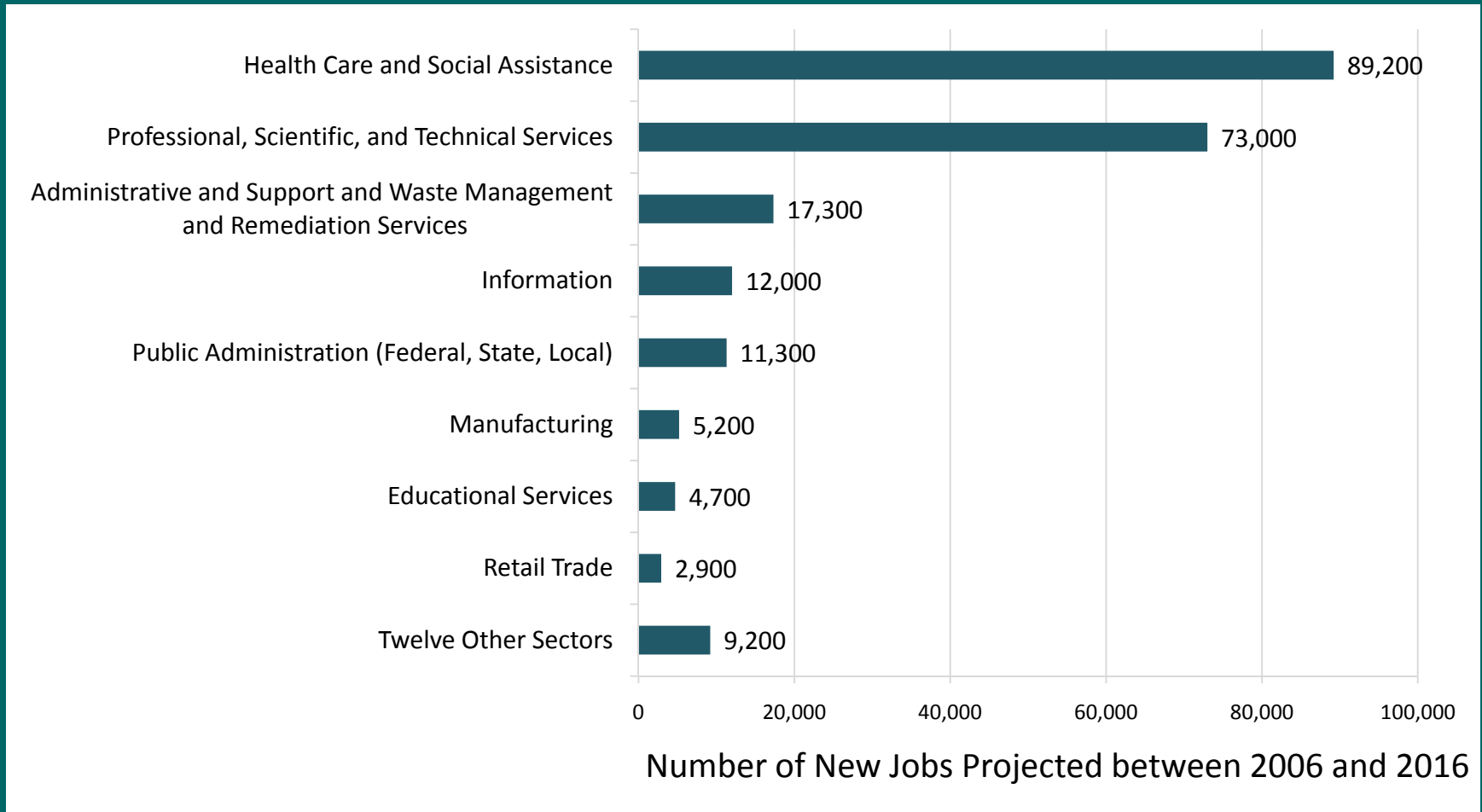


# STEM Shortages

*Technical Difficulties: Meeting California's  
Workforce Needs in STEM Fields*

- Growing demand is outstripping supply
- Half of STEM occupations that require college degree have projected shortages
- For those fields, need 90% annual increase in degrees/certificates

# Most Employment Growth in Occupations with Shortages will be in Health Care and Social Assistance and Professional, Scientific, and Technical Services Sectors

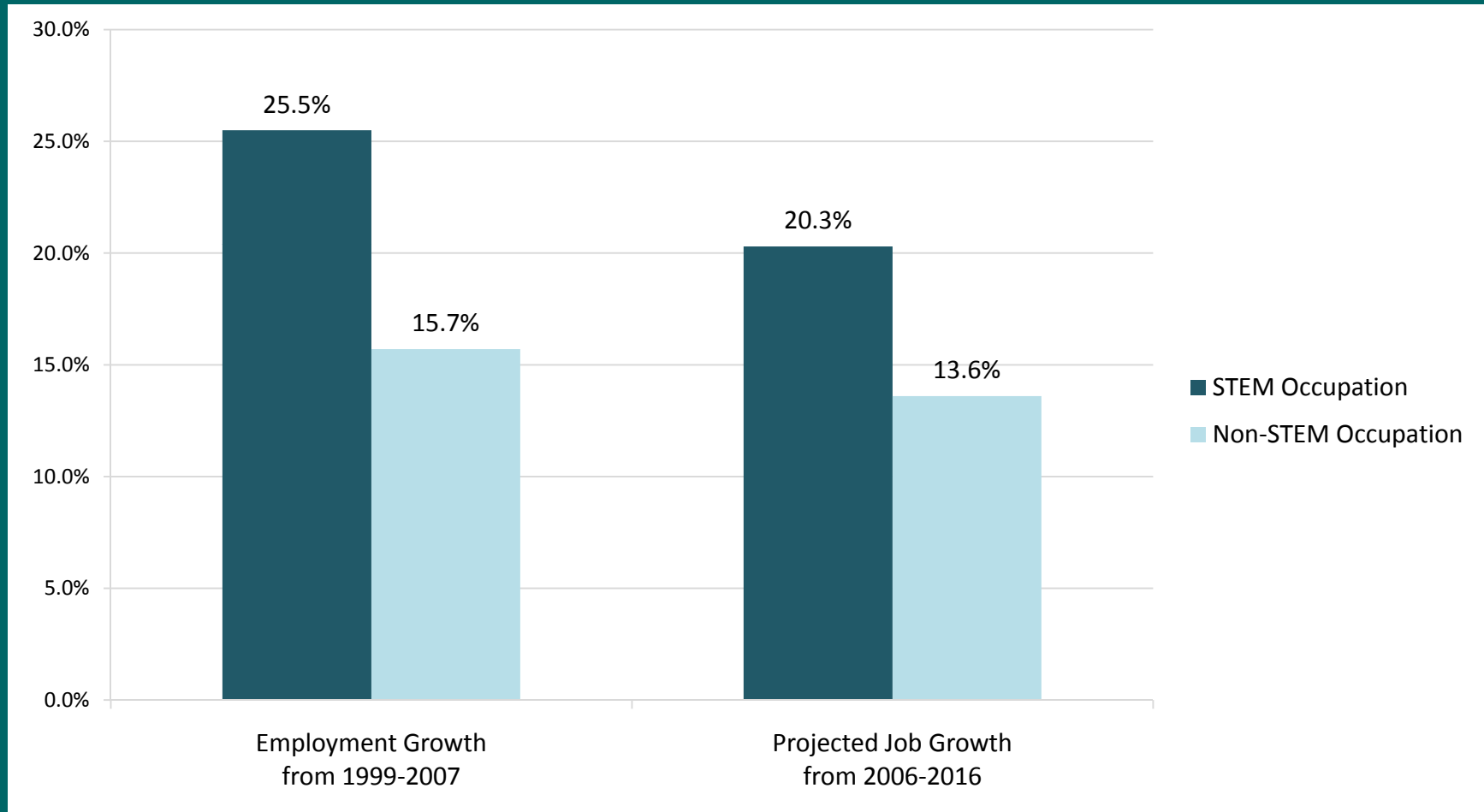


Source: Authors' calculations based on data from California Employment Development Department's Occupational Projections: 2006-2016 and Industry and Occupational Matrix; California Postsecondary Education Commission's Custom Data Reports

## Causes of Shortfall - Demand

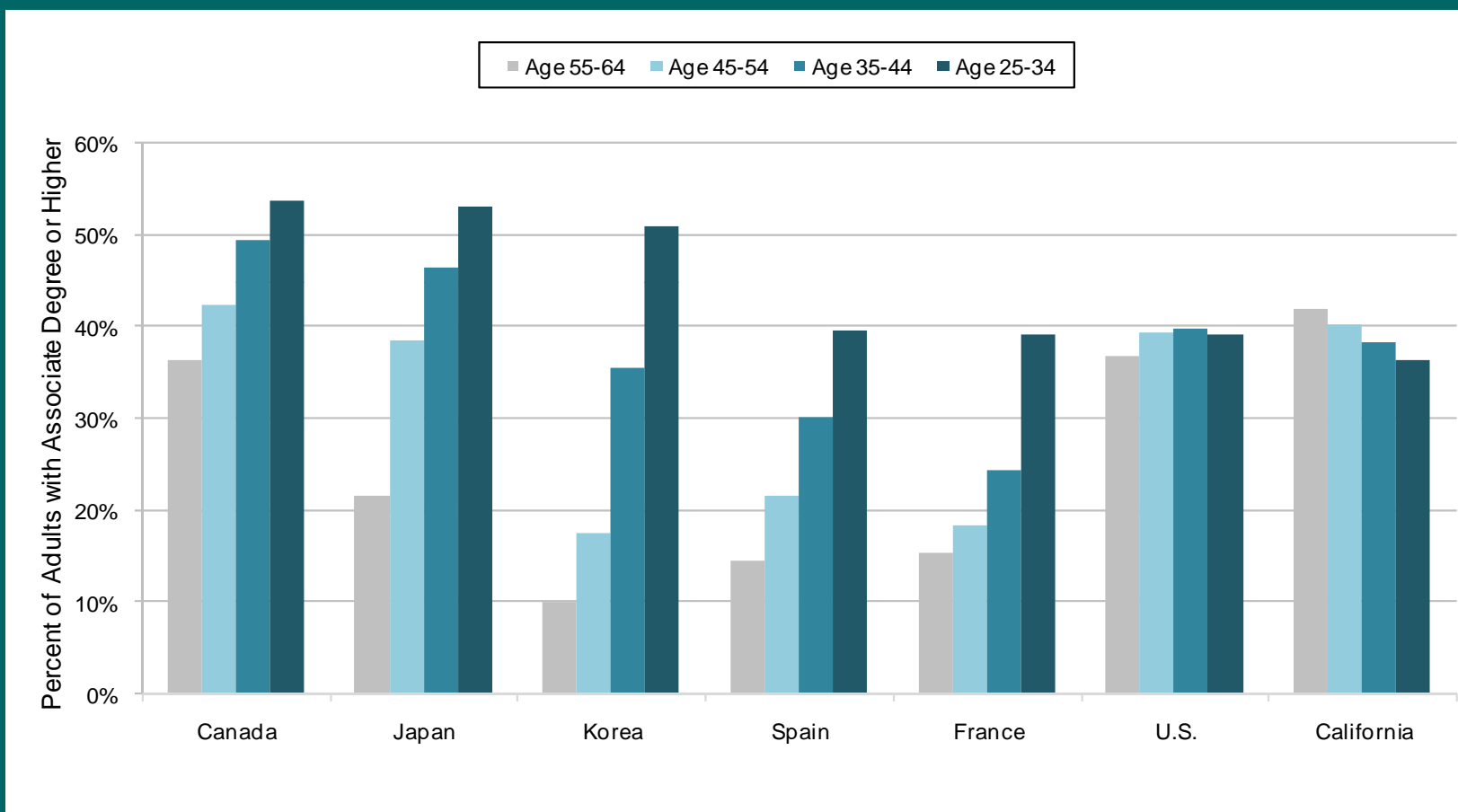
- High demand for STEM workers
  - STEM employment growing faster than non-STEM
  - Competition from other states and nations is rising
  - Aging population requires more healthcare workers
  - Retirees have high education levels

# Growth in STEM Employment is Greater than Growth in Non-STEM Employment in California



Source: Authors' calculations based on Bureau of Labor Statistics, U.S. Dept. of Labor, Occupational Employment and Wage Estimates

# Educational Attainment is Lower for Younger Cohorts of Californians than for Older Cohorts

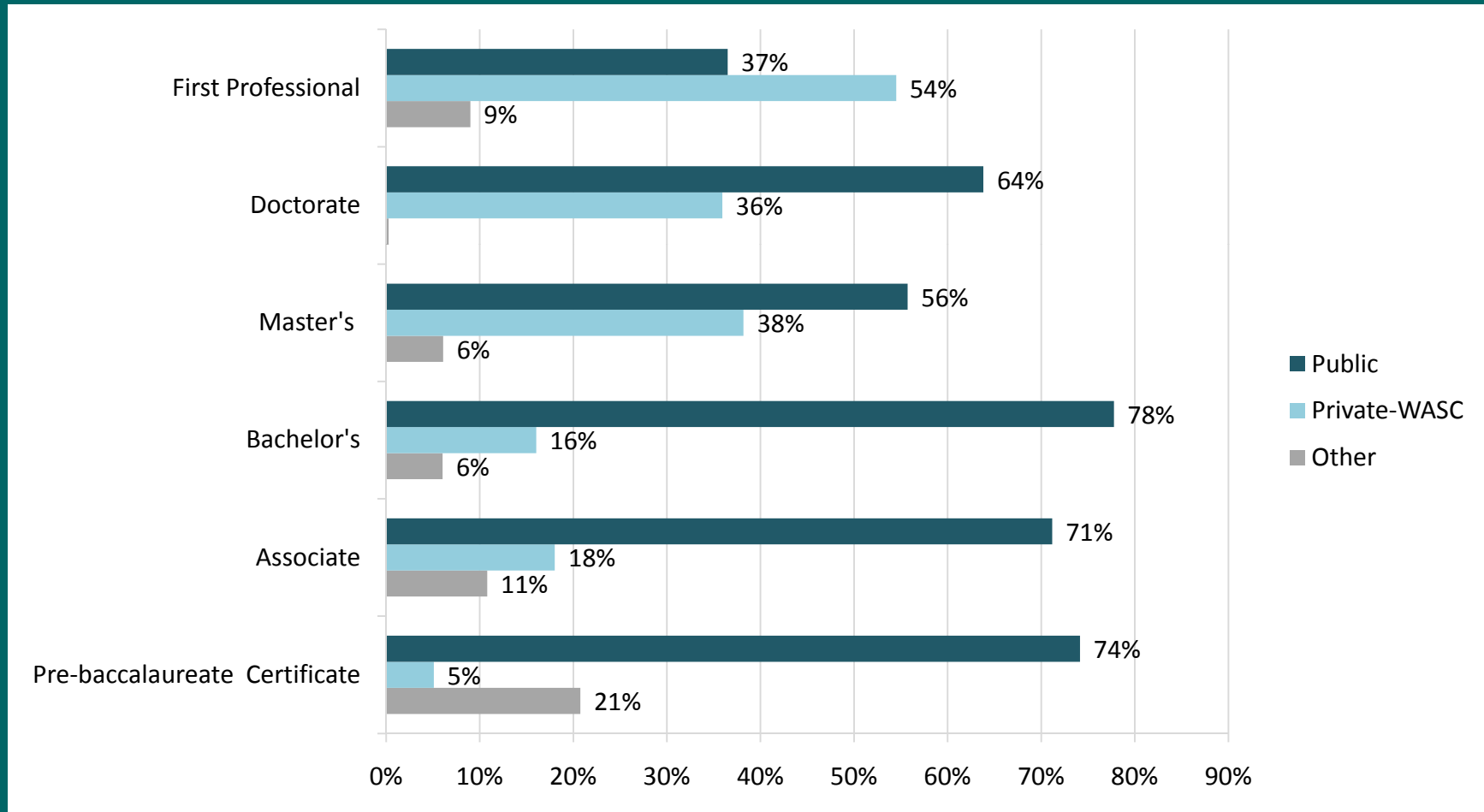


Source: Organisation for Economic Cooperation and Development, *Education at a Glance 2007*; Not shown on the graph are Belgium, Norway, Ireland and Denmark, which also rank ahead of the U.S. on attainment among young adults (attainment is increasing for younger populations as in the other countries)

## Causes of Shortfall – Supply

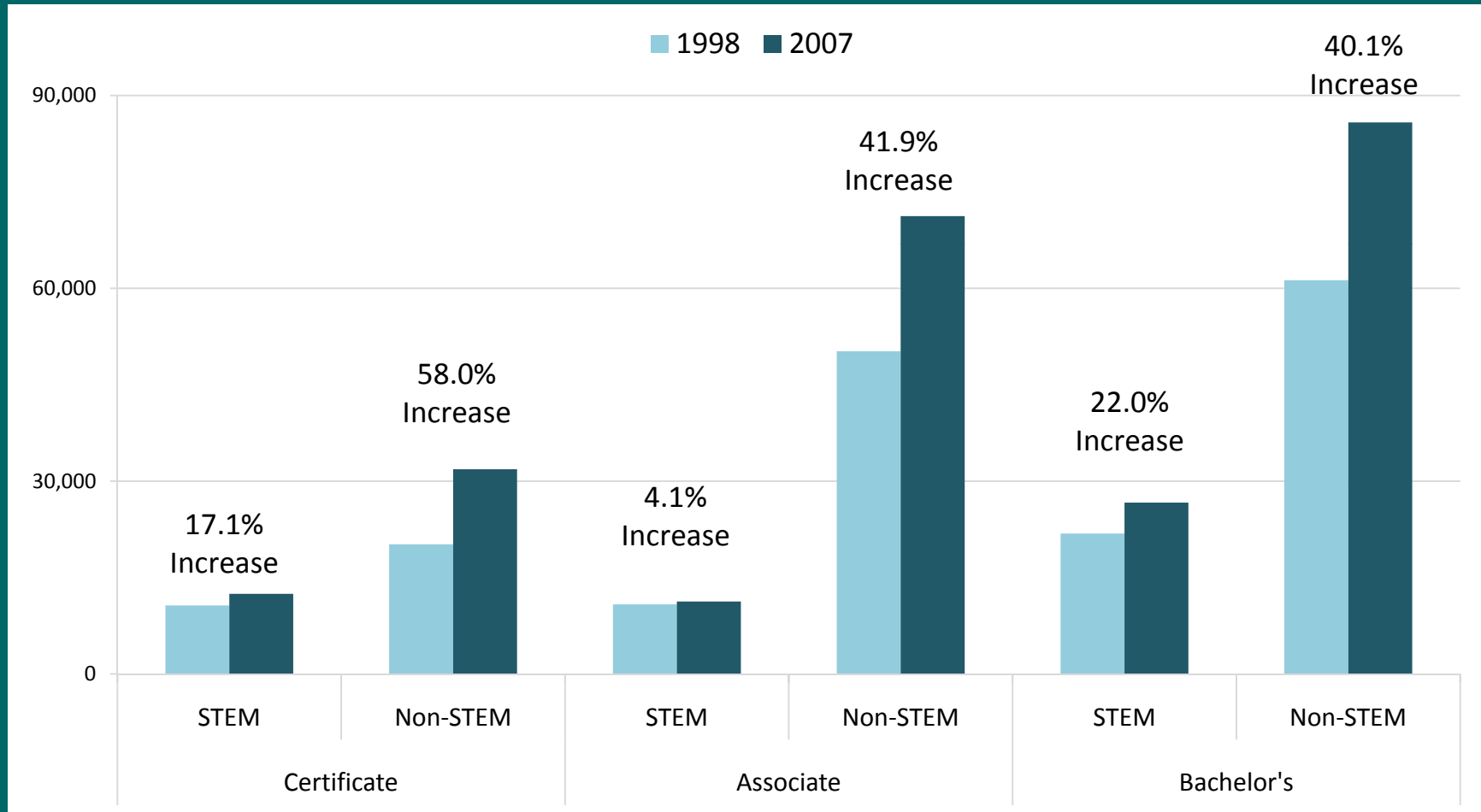
- Shortage of STEM workers
  - CA is 9<sup>th</sup> of 10 “new economy” states in producing bachelor’s degrees in science and engineering
  - STEM degree production increasing more slowly
  - Race/ethnicity and gender disparities worsen shortfall
  - State budget cuts may especially hurt STEM (high cost)

# The Public Sector Awards Most STEM Degrees



Source: Authors' calculations based on 2007 data from the California Postsecondary Education Commission's Custom Data Reports

# The Number of Degrees and Certificates Awarded in STEM Fields has Increased Less than in Non-STEM Fields in the CCC, CSU, and UC



Source: Authors' calculations based on 2007 data from the California Postsecondary Education Commission's Custom Data Reports

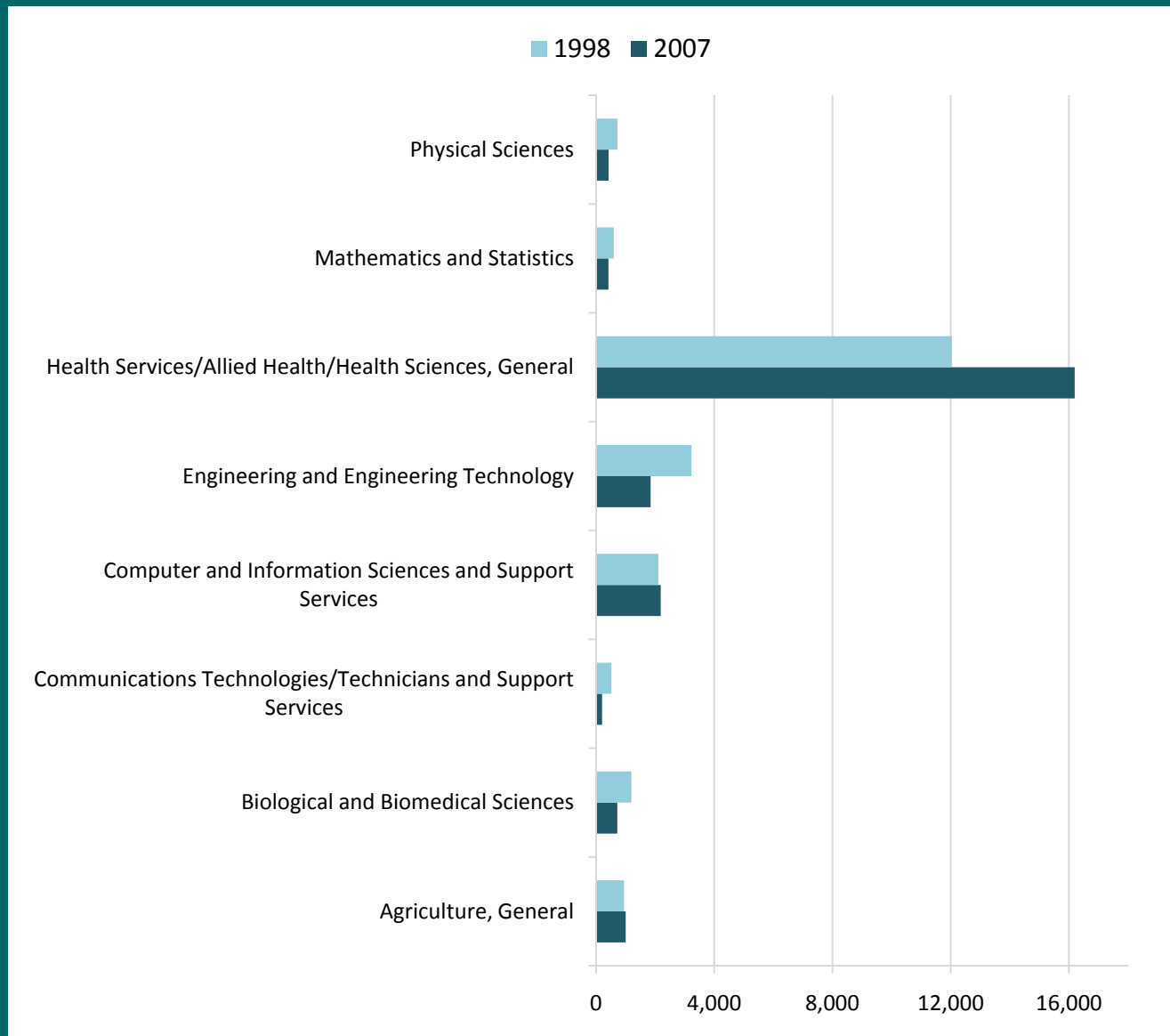


## STEM Degree Production 1998-2007: Even Increases Not Showing Strong Pattern

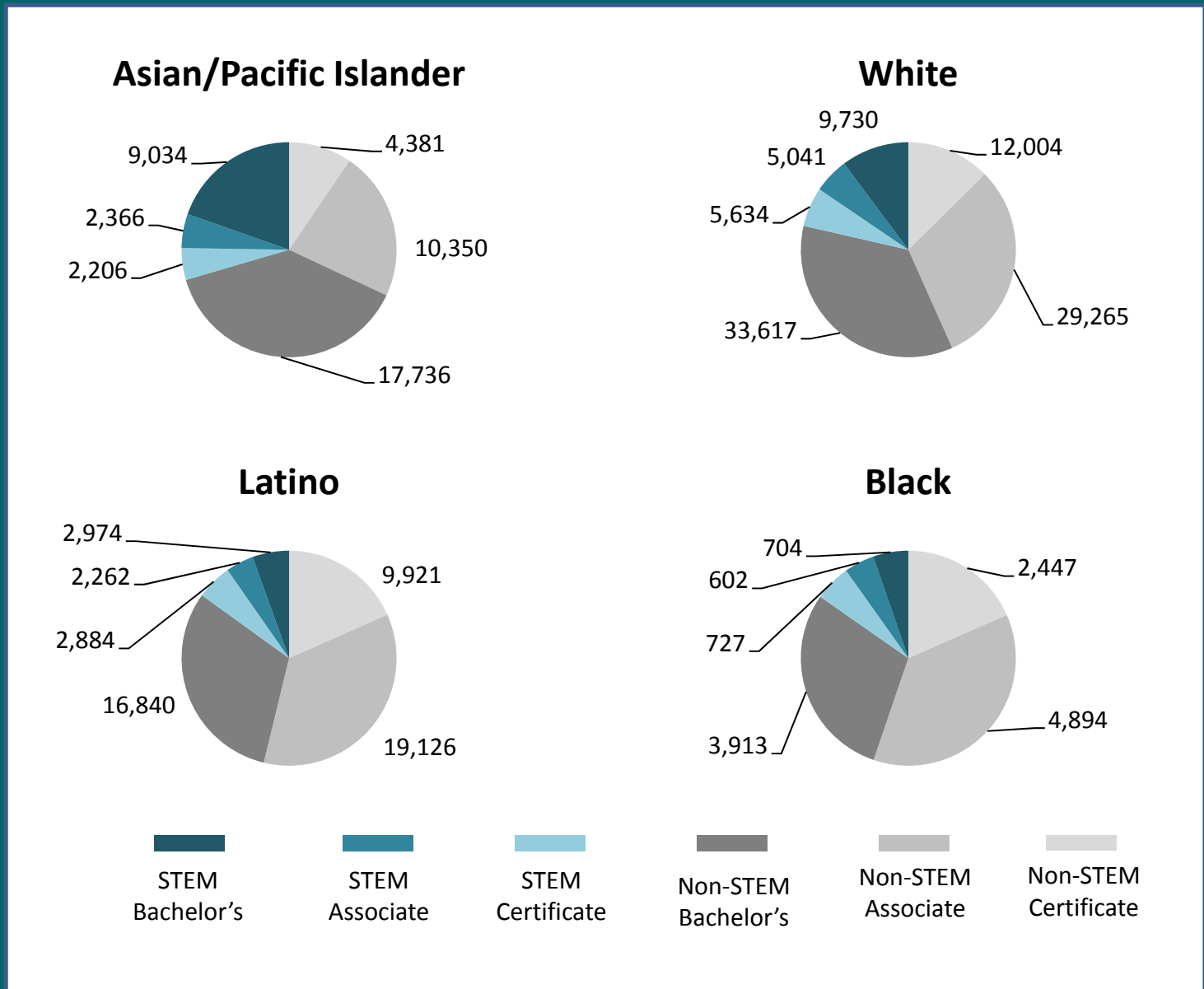
Largest increase in bachelors degree:

- Engineering
- Health (mixed growth/decline)
- Biological sciences (mixed growth/decline)
- Computer and info. sciences (annual declines since 2003)

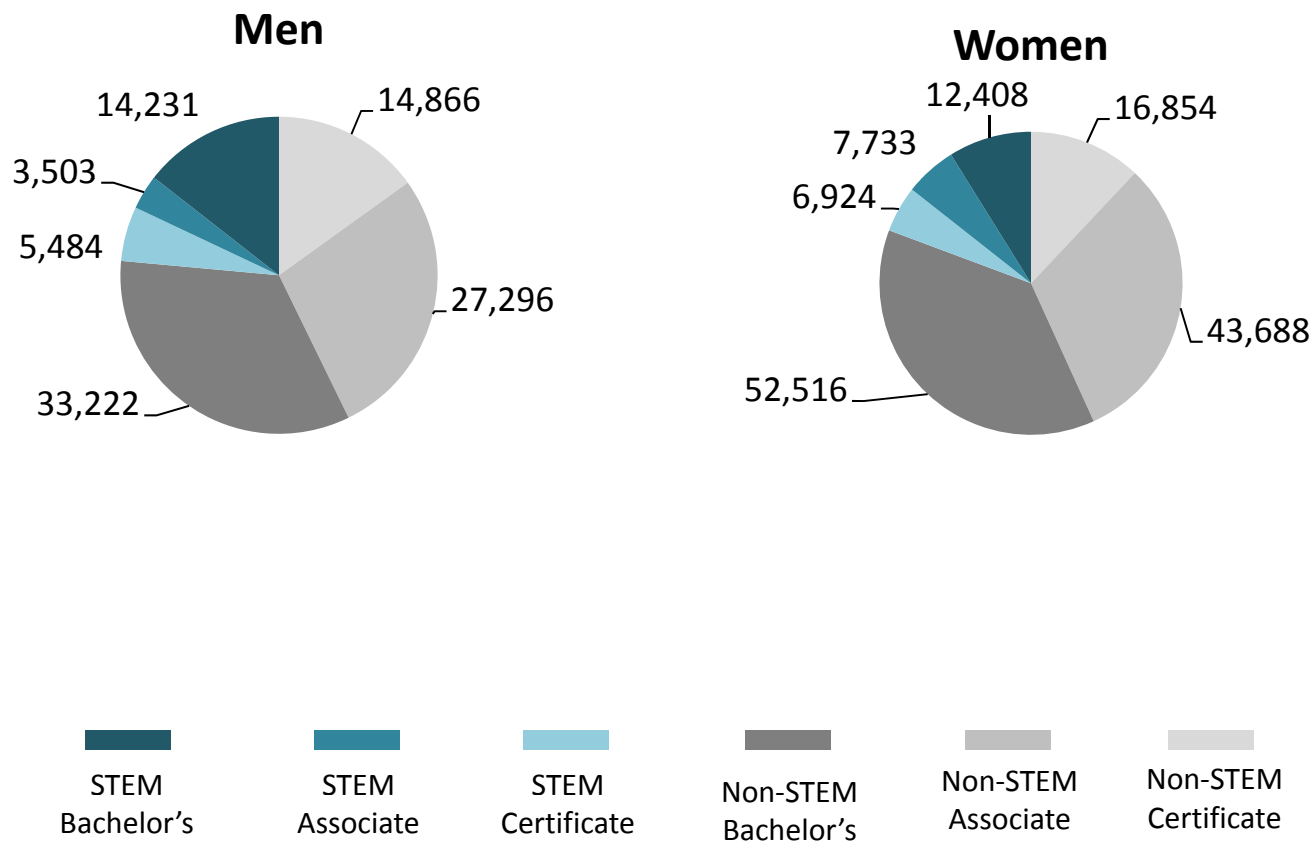
# Certificates and Associate Degrees: Health Dominates



# Blacks and Latinos Earn Smaller Share of STEM Bachelor's Degrees



# Women Earn a Smaller Share of STEM Bachelor's Degrees





## Recommendations

### General points:

- State leaders need to develop a “public agenda”
  - Acknowledge seriousness of problem
  - Goals for higher education
  - Plan/policies for meeting goals
- Strategic investment within budget constraints
  - Protect core investments in higher education
  - Target funding to best meet workforce needs

## Example of Public Agenda: Illinois

### *Process (Year-long planning):*

- Legislature, Board of Higher Education, Public Agenda Task Force (appointed by Governor)
- Study challenges & opportunities facing postsecondary education in IL, workforce needs, demographic trends, funding, financial aid

### *Principles:*

- Higher ed is public good and public responsibility
- Priorities and policies should align with state goals
- Unique missions of institutions should be supported
- Adequate and equitable funding for P-20
- Comprehensive P-20 data system is vital

## Example: Illinois - continued

### ***Result:***

- A public agenda for college and career success - to make Illinois “ready to face the future”
- “Call to arms” for students, parents, educators, unions, business executives, civic leaders, elected officials...

### ***Goals:***

1. Increase educational attainment to match best-performing states and countries
2. Ensure affordability for students and taxpayers
3. Increase credentials to meet needs of economy
4. Better integrate educational, research, and innovation assets to meet economic needs of state and regions

## Recommendations: Some Specific Points

- Improve K-12 preparation in math and science
  - Improve teacher development programs
- Improve career pathways and information about them
  - Support programs like MESA
- Create financial incentives for students and institutions
  - Create incentives for students to enter high demand fields
- Increase STEM achievement in under-represented groups
  - Improve guidance counseling
- Better coordinate STEM programs with industry
- Maximize STEM employment among STEM degree-holders



The full report is available at:

[www.csus.edu/ihelp](http://www.csus.edu/ihelp)