From the Barrios of LA to UC-Davis: Latinas in STEM

Three Decades of DIMACS: The Journey Continues

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Overview

- Statistics of Women in STEM
- The missing women in STEM
- Some Solutions?
- My path and research
Bachelor’s Degree in STEM

Men

Women
### Doctoral Degrees, By Field and Gender, 2016-2017

<table>
<thead>
<tr>
<th>Field</th>
<th>Male</th>
<th>Female</th>
<th>Females per 100 Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts and Humanities</td>
<td>46.8%</td>
<td>53.2%</td>
<td>113.7</td>
</tr>
<tr>
<td>Biological, Agricultural Sciences</td>
<td>47.4%</td>
<td>52.6%</td>
<td>111.0</td>
</tr>
<tr>
<td>Business</td>
<td>51.1%</td>
<td>48.9%</td>
<td>95.7</td>
</tr>
<tr>
<td>Education</td>
<td>31.2%</td>
<td>68.8%</td>
<td>220.5</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td><strong>76.6%</strong></td>
<td><strong>23.4%</strong></td>
<td><strong>30.5</strong></td>
</tr>
<tr>
<td>Health and Medical Sciences</td>
<td>29.7%</td>
<td>70.3%</td>
<td>236.7</td>
</tr>
<tr>
<td><strong>Mathematics and Computer Sciences</strong></td>
<td><strong>74.9%</strong></td>
<td><strong>25.1%</strong></td>
<td><strong>33.5</strong></td>
</tr>
<tr>
<td>Physical and Earth Sciences</td>
<td>65.9%</td>
<td>34.1%</td>
<td>51.7</td>
</tr>
<tr>
<td>Public Administration</td>
<td>24.4%</td>
<td>75.6%</td>
<td>309.8</td>
</tr>
<tr>
<td>Social and Behavioral Sciences</td>
<td>38.9%</td>
<td>61.1%</td>
<td>157.1</td>
</tr>
<tr>
<td>Other Fields</td>
<td>47.6%</td>
<td>52.4%</td>
<td>110.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>47.0%</strong></td>
<td><strong>53.0%</strong></td>
<td><strong>112.8</strong></td>
</tr>
</tbody>
</table>
Gender share of total and STEM jobs in 2015

College educated workers with STEM degree by gender and field

Closeup: Hispanic women’s field of degree

Over a decade, Hispanic women’s share of bachelor's degrees rose in several fields.

<table>
<thead>
<tr>
<th>Degree field</th>
<th>Share in 2004</th>
<th>Share in 2009</th>
<th>Share in 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology</td>
<td>6.9%</td>
<td>8.0%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>4.9%</td>
<td>5.8%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>4.2%</td>
<td>4.3%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Mathematics &amp; Statistics</td>
<td>2.3%</td>
<td>2.6%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Engineering</td>
<td>1.7%</td>
<td>1.8%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Computer Sciences</td>
<td>1.8%</td>
<td>1.5%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Fields with highest shares of degrees

Fields where shares remained relatively flat

Source: National Center for Science and Engineering Statistics, National Science Foundation
Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017
https://nsf.gov/statistics/wmpd/
The missing women in **STEM** fields and jobs
Why are women underrepresented in STEM fields

5 key insights we can turn into action

- Provide Hands-on Experience
- Encourage a Growth Mindset
- Provide Mentors and Role Models
- Provide Encouragement
- Generate Excitement
Why are women underrepresented in STEM workforce

- Women and men differ in how they link college majors to occupational transitions and post-bachelor training; women are more likely to select biological sciences as a jump-off point for later career outside a narrowly defined STEM fields

- Gender differences in life goals and the relative importance assigned to careers

- Employer discrimination and implicit bias in evaluations that hinder initial jobs offers and/or subsequent promotions, segregation of job networks, material profiling

- Lack of support and influence of role models and mentors
Some solutions for improving representation women STEM fields and jobs

- Increase the pool of women majoring in STEM fields (gender disparity in transition into STEM jobs is mostly related to women’s underrepresentation in engineering and computer science fields; Sassler, et al., 2017)

- Elevate the odds of transitioning into first occupations and reduce transitions out of STEM fields

- Reduce the *leaking pipeline*: most career oriented women, who expected to marry late and limit fertility, were no more likely to enter STEM jobs than were women who anticipated marrying young and having two or more children.
Exemplary Latinas in STEM

Science
Technology
Engineering
Mathematics
About Me

- Born in Guadalajara, México
- One of six siblings
- Immigrated to US at age 14

LOVE
- Mathematics
- Statistics
- Public Health
My Path in STEM
My Mentors

Overview

The Problem: Though prescription rates have fallen, the opioid epidemic continues to grow. Rates of neonatal abstinence syndrome (NAS) and maternal opioid use disorder (OUD) are continually on the rise.

What we did: A serial cross-sectional study on demographic differences in the incidence of neonatal abstinence syndrome, contextualized within the growth of maternal opioid use disorder and the larger opioid crisis.

What we found: American Indian/Alaskan Native and White mothers and infants who are on public insurance or pay out of pocket bear the highest burden. An intersectional, equitable approach is needed for effective intervention.
NAS a drug withdrawal syndrome in newborn infants due to abrupt cessation of in utero exposure to opioids and other substances.

NAS symptoms manifest 12-72 hours of birth and include central nervous system and autonomic nervous system irritability, gastrointestinal dysfunction, and occasional seizures.

Long-term effects of NAS include poor neurodevelopmental, mental, and psychomotor developmental outcomes.

NAS incidence in the United States increased by 433% between 2004 and 2014 (1.5 to 8.0 per 1,000 births); by 2014, a baby was born every 15 minutes with NAS symptoms.

Between 1999-2014 the national prevalence of maternal opioid use increased by 333% (from 1.5 to 6.5 cases per 1,000 delivery hospitalizations).

NAS is associated with more than $315 million in healthcare utilization and expenditures (2012 estimates).
Results

NEONATAL ABSTINENCE SYNDROME NATIONAL ESTIMATES

Rate of Neonatal Abstinence Syndrome and Maternal Opiate Use per 1,000 Births
- NAS
- OUD

2000: 1.0, 1.2
2016: 22.1

Regional NAS Incidence per 1,000 Hospital Births
- < 2.5
- 2.5 - 5.0
- 5.1 - 7.5
- > 7.5

State NAS Incidence per 1,000 Hospital Births
- No Data
- < 2.5
- 2.5 - 5.0
- 5.1 - 10.0
- > 10.0

2000:
- Regional: 3,980
- State: 3,980

2003:
- Regional: 4,888
- State: 4,888

2006:
- Regional: 6,645
- State: 6,645

2009:
- Regional: 11,062
- State: 11,062

2012:
- Regional: 17,104
- State: 17,104

2016:
- Regional: 25,675
- State: 25,675
Incidence Stratified by Race and Primary Payer 2009-2016
Key Findings

- Maternal OUD showed drastic nationwide increases, and NAS followed suit.

- American Indian/Alaskan Natives had the highest incidence of NAS, followed by Whites.
  - AIAN rates overtook White rates after 2012; both groups represented a higher % of cases than the general population.

- Public insurance and the Northeast region suffered the highest incidence rates in their respective strata, consistent with previous studies.
  - The Midwest had the highest fold-increase in rate.
Key Findings

- Rates of NAS showed a more than 6-fold increase and rates of maternal OUD showed greater than an 18-fold increase since 2000.

- All races/ethnicities reported by HCUP showed at least a small increase in incidence rate but AIAN and White infants with NAS are both highly overrepresented.

- White infants still suffered the highest rates of NAS in 2009, but had been overtaken by AIAN infants by a large margin in 2016.

- Rates of maternal OUD growing far faster than NAS, indicating a complicated relationship.
THANK YOU