

MINNESOTA ECONOMIC

TRENDS

TEST TUBE TECHNOLOGISTS

CAREERS IN MEDICAL AND
DIAGNOSTIC LABORATORIES

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m EMPLOYMENT AND
ECONOMIC DEVELOPMENT



Filling the Medical Lab Pipeline

Most people know what doctors, nurses and x-ray technicians do, but what about medical and diagnostic laboratory workers? Their roles in the medical field aren't nearly as well-understood because they work behind the scenes and rarely interact with the public.

Lack of awareness about medical lab professionals and what they do is one reason the industry has a shortage of workers, particularly in rural areas of the state, according to this issue's cover story by Cameron Macht and Anthony Schaffhauser. DEED projections indicate the industry will need to fill 850 new jobs in Minnesota in the next decade, along with replacing another 250 jobs annually because of retirements or people changing jobs.

Relatively low pay and high educational requirements are among other factors affecting the ability of medical labs to find new talent.

While industry professionals say the problem isn't serious yet, they will need to develop a recruitment strategy to compete in an era when many industries – from manufacturing to education – are struggling to fill positions. Ultimately, increasing awareness and changing perceptions about medical and diagnostic laboratory workers might be the field's best bet for meeting growing labor demands in coming years.

In other stories, Alessia Leibert looks at how minority students fared in the job market during and after the recession, Sanjukta Chaudhuri compares earnings for minority women to earnings for white women and men in Minnesota, and Luke Greiner examines perceptions among high school students about job opportunities in Greater Minnesota.

Two other stories dive into DEED data. Dave Senf writes about how LAUS (Local Area Unemployment Statistics) differs from CES (Current Employment Statistics). Meanwhile, Nick Dobbins compares CES data to QCEW (Quarterly Census of Employment and Wages). All of these data measure employment, but they do it in slightly different ways and get slightly different outcomes. Knowing the difference matters if you're a numbers geek who likes to follow the ups and downs of Minnesota's labor market.

Monte Hanson
Editor

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The Labor Force in the Laboratory

Medical and clinical lab technicians and technologists may not be as well known among health professions, but they also save lives – and in Minnesota job prospects are growing.



In taking a blood test, most people quickly get to know their phlebotomist, nurse and doctor, but they rarely get to meet the expert technicians and technologists who actually conduct the scientific analysis

to provide the test results. The behind-the-scenes nature of the work in medical and diagnostic laboratories conceals the opportunities of this essential and rapidly growing subsector of the health care industry as

well as the impending labor force needs, creating a unique challenge to growing the pipeline of future workers. This article highlights medical and clinical laboratory career fields and examines emerging trends and potential solutions to meet the workforce need. While we highlight factors that could increase the supply of workers or slow the demand growth in this field, it is clear that the industry will need proactive strategies to meet future workforce needs.

According to the official occupational description, medical and clinical laboratory technicians “perform routine medical laboratory tests for the diagnosis, treatment and prevention of disease,” and “may work under the supervision of a medical technologist.” Technicians typically require an associate degree for entry, and need knowledge of biology, chemistry, mathematics, and customer and personal service, in addition to technology skills in medical software and database management.¹

¹Summary Report for: 29-2012.00 - Medical and Clinical Laboratory Technicians. O*NET Online. Retrieved from www.onetonline.org/link/summary/29-2012.00.

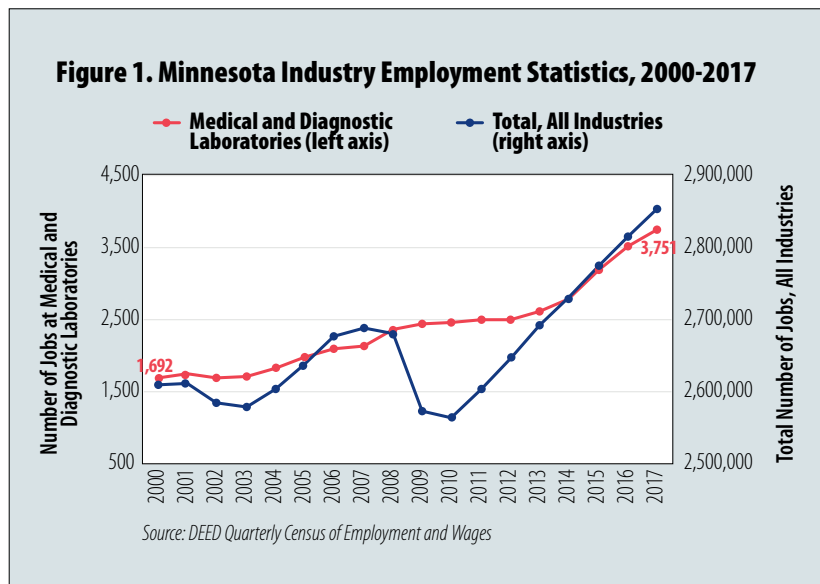
Table 1. Minnesota Industry Employment Statistics, 2017

NAICS Code	NAICS Industry Title	Number of Firms	Number of Jobs	Average Annual Wages	Change in Jobs, 2016-2017		Change in Jobs, 2012-2017	
					Numeric	Percent	Numeric	Percent
0	Total, All Industries	167,573	2,853,313	\$56,160	39,391	1.4%	208,378	7.9%
6215	Medical and Diagnostic Laboratories	125	3,751	\$66,976	237	6.7%	1,254	50.2%
621511	Medical Laboratories	90	3,371	\$66,508	233	7.4%	1,277	61.0%
621512	Diagnostic Imaging Centers	35	380	\$71,188	4	1.10%	-23	-5.70%

Source: DEED Quarterly Census of Employment & Wages

Likewise, technologists “perform complex medical laboratory tests for diagnosis, treatment and prevention of disease,” but may also “train or supervise staff.” These positions require a bachelor’s degree, as well as several years of work-related experience and on-the-job training. Technologists need many of the same skills and knowledge as technicians, but also need higher level skills in analysis, decision-making, critical reasoning and problem-solving.²

Despite operating behind the scenes, these are vital occupations in the health care system. As this article will demonstrate, medical laboratory technicians and technologists are in high demand due to rapid growth and are projected to stay that way in the future, and though they require higher education, they also earn higher wages. Put simply, laboratory work offers a great opportunity for growth.



Rapid Expansion

Most medical and diagnostic laboratory work is performed at hospitals and offices of physicians, but a distinct North American Industry Classification System (NAICS) code shows how quickly the subsector is expanding. Employment at medical and diagnostic laboratories in Minnesota more than doubled since 2000, expanding 121.7 percent.

Through 2017, there were 125 establishments providing an average of 3,751 jobs, with 3,371 of those jobs at medical laboratories and 380 jobs at diagnostic imaging centers (Table 1 and Figure 1).

In fact, medical and diagnostic laboratories were the second fastest growing health care and social assistance subsector in the state from 2012 to 2017, trailing

²Summary Report for: 29-2011.00 - Medical and Clinical Laboratory Technologists. O*NET Online. Retrieved from www.onetonline.org/link/summary/29-2011.00.

only other residential care facilities, but outpacing other fast growing areas like home health care services, offices of other health care practitioners, and continuing care retirement communities and assisted living facilities.

Critical Shortage?

With all of this growth, we asked an audience of medical and clinical laboratory professionals at their annual conference to assess how dire the workforce shortage is becoming. The overwhelming consensus (62 percent of respondents) was that it's moderate – they're going to need some help to fill their jobs – but not at a critical stage yet. Less than half as many respondents (26 percent) reported that it's serious. They don't know how they're going to fill their open jobs. The final 12 percent said that it wasn't bad at all. They feel like they should be able to find the people they need.

Participants agreed that the workforce shortage is much more challenging in rural areas and more difficult to manage for smaller operations. Providers in rural areas reported a smaller pool of potential candidates to choose from, and fewer educational opportunities to train new workers. Likewise, representatives from smaller laboratories mentioned that the smaller number of workers who

can train new employees makes it more complicated to bring entry-level technicians in and get them up to speed quickly.

There are also some differences in what technicians and technologists are asked to do based on the setting of the laboratory. Participants explained that technicians tend to handle a wider variety of tasks in rural settings; whereas technicians and technologists working at larger laboratories tend to be more specialized, focusing on very specific responsibilities. The larger laboratories in the Twin Cities metro area and Southeast Minnesota also tend to do more complex testing that requires technologists, rather than technicians, to perform.

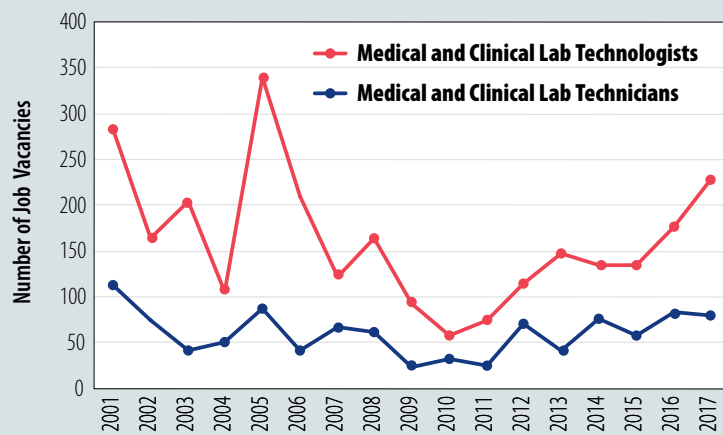
Higher Demand, Higher Education, Higher Wages

Over the past five years, employers have reported an average of over 230 vacancies for medical laboratory positions, with a notable increase in the past two years. There was a combined average of more than 300 vacancies in 2017, the highest number since a spike in demand was reported in 2005 (Figure 2).

Job Vacancies by Region, 2001-2017

As noted, while rural areas tend to rely more on technicians, the Twin Cities and Southeast regions show more demand for technologists. In sum, demand had been relatively evenly split across the state over the past

Figure 2. Average Number of Minnesota Job Vacancies for Selected Medical Laboratory Positions, 2001-2017



Source: DEED Job Vacancy Survey

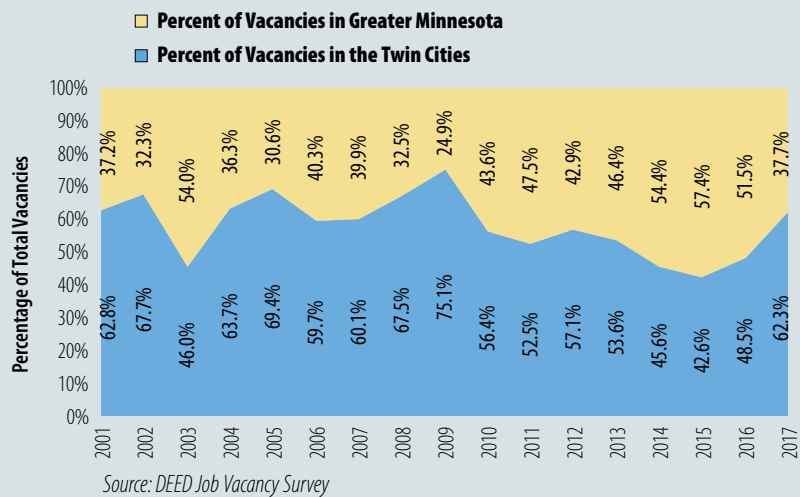
five years, until the majority of vacancies shifted back to the metro area in 2017 (Figure 3).

Wages for technicians and technologists range between \$40,000 and \$80,000 per year, and have also been increasing in recent years. Despite the relatively high wages, respondents at the conference felt like they haven't been keeping up with other similar health care positions, such as registered nurses or x-ray technicians. In the most recent Job Vacancy Survey, the median wage offer for medical laboratory technicians was \$17.56 per hour, compared to \$18.33 for radiologic (x-ray) technicians, \$19.21 for MRI technologists, \$19.27 for surgical technologists, \$19.56 for licensed practical nurses, and \$24.01 for dental hygienists, all of which also require an associate degree. The median hourly wage offer for medical laboratory technologists was \$23.23, compared to \$30.23 for registered nurses, and one can work as an RN with an associate degree, whereas a bachelor's degree is required for medical laboratory technologists.

Beyond that, the perception is that, long-term, wages also might not keep pace with other health care occupations, making laboratory positions less attractive in addition to being less visible. While technicians and technologists earn above



Figure 3. Medical and Clinical Laboratory Job Vacancies by Region, 2001-2017



average salaries, wage percentiles from DEED’s Occupational Employment Statistics program appear to verify that a gap exists – median wages for technicians were lower than many of the comparison occupations, and the top end 90th percentile wages were also lower (Table 2).

What the Future Holds

Demand appears to be strong for medical and clinical laboratory positions in the future as well. DEED’s Employment Outlook program projects nearly 850 new jobs for technicians and technologists over the next decade, growing about twice as fast as the total of all occupations. In addition, there may be as many as 250 openings each year due to exits and transfers. Rather than new jobs being created, these are existing jobs that will become available as the workers who currently hold them retire out of the labor force or change jobs (Table 3).

Demographic data show that the average age of workers at medical and diagnostic laboratories has increased. Just 20 years ago, almost two-thirds (65.5 percent) of the workforce was between 25 and 44 years of age. Now just half (50.4 percent) is in that age group. Instead, 22 percent of the workforce is now 55 years and older, up from about 10 percent in 1997. The number of jobs in the 45 to 54 year old age group also increased rapidly, from 16.3 percent of the workforce in 1997 to 22.7 percent in 2017 (Figure 4).

And while the industry might like to hire more young people, the education and training requirements for laboratory workers make it difficult to hire inexperienced or untrained workers. The demographic data show that less than 1 percent of the workforce is 21 years or younger, and just 4.3 percent are between 22 and 24 years of age. That puts it at a disadvantage in comparison to all other

industries, especially the other rapidly growing health care subsectors that can hire high school students and get them into the pipeline quicker. For example, almost one-fourth (22.9 percent) of the workforce at continuing care retirement communities and assisted living facilities was 24 years and younger, indicating a much stronger feeder system.

While the data show that laboratories are relying more on older workers, the professionals in the field don’t believe that increased labor force participation rates for older workers are a great solution for the impending workforce shortage. Instead, human resources managers believe existing medical laboratory technicians and technologists are getting ready to retire, and will do so when they are able. Some of the older workers who said they would like to stay on the job stated that they would need their employers to be flexible, either

Table 2. Employment and Wages for Selected Health Care Occupations in Minnesota, 2018

Occupational Title	Employment	Hourly Wage Percentiles				
		10th	25th	Median	75th	90th
Medical Laboratory Technologists and Technicians	7,880	\$18.05	\$21.44	\$26.66	\$33.08	\$38.56
Registered Nurses	64,540	\$26.26	\$30.94	\$37.67	\$44.77	\$49.19
Magnetic Resonance Imaging (MRI) Technologists	600	\$31.75	\$33.60	\$36.63	\$39.74	\$45.80
Dental Hygienists	5,090	\$27.46	\$31.71	\$35.27	\$38.86	\$44.88
Radiologic Technicians and Technologists	4,750	\$22.72	\$26.56	\$31.11	\$36.50	\$40.08
Surgical Technologists	2,150	\$20.58	\$23.25	\$26.80	\$30.13	\$34.58
Licensed Practical and Licensed Vocational Nurses	16,840	\$17.06	\$19.65	\$22.04	\$24.40	\$27.96

Source: DEED Occupational Employment Statistics, 2018

in hours or responsibilities. And they also remarked that changes in the field are so great and so swift that it would be hard to jump back into the workforce after a period away without extensive training.

Developing Diversity

The medical and diagnostic laboratories workforce has also become more diverse over time, although diversity seems to have reached a peak in the early 2000s. As Figure 5 shows, the share of minority workers in the industry was highest during the 2003 to 2007 period and has decreased since then.

The demographic data show that the subsector has a slightly higher reliance on Asian or Other Pacific Islanders, but a lower concentration of black or African American workers and workers of Hispanic or Latino origin. Though workers of races other than white hold 12 percent of jobs, they accounted for almost 16 percent of the new jobs added in the subsector since 1997 (Figure 5).

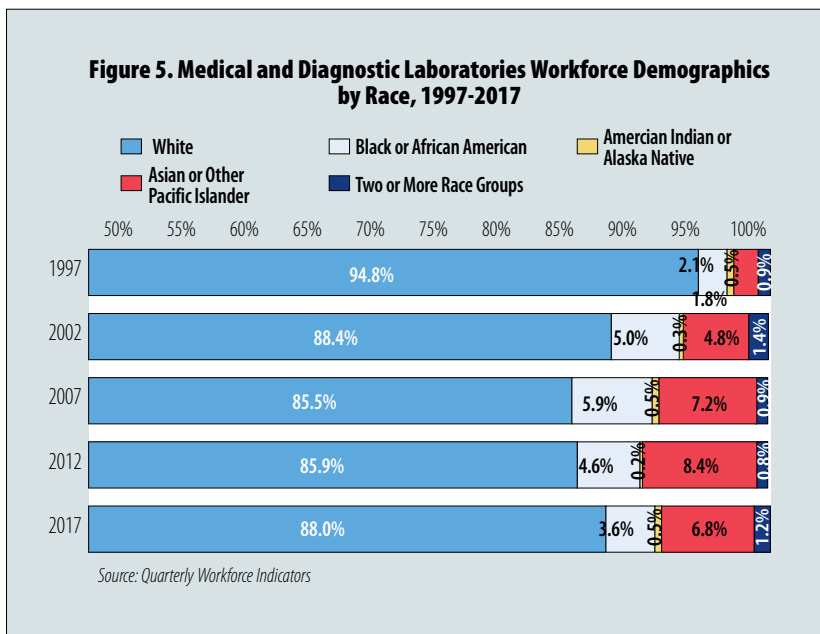
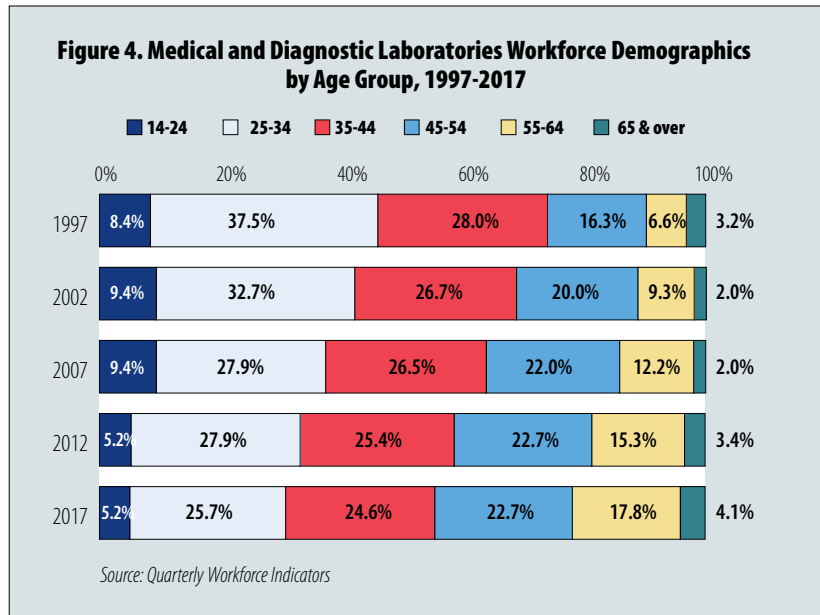


Table 3. Minnesota Employment Projections, 2016-2026

Occupational Title	2016 Employment Estimate	2026 Employment Projection	2016-2026 Numeric Change	2016-2026 Percent Change	2016-2026 Annual Exits	2016-2026 Annual Transfers	2016-2026 Annual Total Openings
Total, All Occupations	3,097,300	3,278,900	181,600	5.90%	148,028	195,076	361,264
Medical Laboratory Technologists	4,234	4,694	460	10.90%	135	135	316
Medical Laboratory Technicians	3,616	4,004	388	10.70%	115	115	269

Source: DEED 2016-2026 Employment Outlook

What Does it Take to Achieve a Medical Laboratory Career?

Both of the occupations featured require higher education and, usually, certification. Medical Laboratory technicians must complete a two-year Medical Laboratory Technology or Medical Laboratory Technician (MLT) degree, while medical laboratory technologists complete a Clinical Laboratory Science or Medical Laboratory Science (MLS) bachelor's degree. Given the scientific rigor of these higher education programs, prospective MLT and MLS students should take science and math courses in high school, including biology, chemistry and physics, plus at least three years of math. Find a list of helpful high school courses at careerwise.minnstate.edu/careers/

Those who enter these career paths should have an interest in science and mathematics. They should also possess a drive for accuracy, attention to detail, and the ability to multitask, as well as professional integrity and a desire to contribute to quality health care. Another characteristic of people in these professions is a preference to spend most of their time in a laboratory rather than in direct contact with patients and their families.

According to industry experts, an associate degree is required to work in medical clinical laboratories as an MLT. Eleven Minnesota colleges offer this degree. These programs are accredited and approved by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). The courses are heavy in science and include practical laboratory and clinical instruction. Like most health care programs, there are specific entry requirements, including background checks and immunizations, as well as academic requirements for courses and grades. Some have competitive admissions where the highest ranked applicants are accepted.

Program completers are eligible to take the Board of Certification exam of the American Society for Clinical Pathology (ASCP). Passing this exam bestows the Medical Laboratory Technician ASCP Board Certification. Hiring practices in Minnesota generally require this certification. Most MLT programs publicize their completers' ASCP Board pass rates, and many of these programs have agreements in place with four-year Medical Laboratory Science programs for students to continue their education.

The Medical and Clinical Laboratory Technologist occupation is commonly referred to as Medical Laboratory Scientist (MLS), also the title of the Board Certification. Seven Minnesota universities offer a bachelor's MLS program. These programs combine a strong foundation in science and math with the liberal arts required for bachelor's degrees, and clinical experience depending on the program. Be aware that even though this is a bachelor's degree, it may take more than four years to complete depending on what program you attend. Another option is a post-degree program: The Mayo Clinic College of Medicine, for example, offers a 10 month program for graduates of a university chemistry or human biological sciences bachelor's degree program.

What the additional two to three years of school gets you, besides higher pay, is more opportunity to use logic and science to analyze, troubleshoot and solve problems to enable doctors to diagnose and treat patients. In addition, an MLS will often gain staff training or supervisory responsibilities.

Go to www.mynextmove.org for career profiles and training programs in your area, and be sure to check www.naacls.org for program accreditation.

Industry professionals suggested that immigration is a small but potentially viable source of new workers. Anecdotally, hiring managers say there is very little overseas outsourcing currently being done, but they cited an example of a rural location in South Dakota that was bringing in workers from the Philippines for six-month stays to fill the laboratory roles. In that case, they stated that the foreign workers were already trained in their home country and were able to work in the U.S. once they arrived. To that end, the HR managers noted that there is a challenge in matching up the existing education of foreign workers with the requirements in the U.S., making it a less attractive solution.

Enhancing Efficiency

In response to tight labor markets, some employers are seeking ways to maximize the work that medical laboratory technicians and technologists are doing, either by modifying job responsibilities or creating new roles that take on a portion of the laboratory work. Professionals reported that there are already some lower-level tasks that have been taken on by CMAs, CNAs and phlebotomists, which have been received positively by those working in the field. Respondents were less enthusiastic about RNs being

asked to take on some of the laboratory work. To be clear, the idea isn't to replace medical laboratory technologists or technicians, but to see if there are areas or job responsibilities that could be handled by lower-skilled workers, which would free up time to meet demand. It is worth noting that some states are adopting this tactic even more than Minnesota. For example, in states that license medical laboratory professions, there is a lab assistant level of practice.

Currently practicing medical and clinical laboratory technicians and technologists at the conference agreed that the biggest change in the job moving forward is going to be automation, and many say that it is already happening. While technological advancements are making laboratory work more efficient, they also lead to an expanding array of new and more advanced medical tests. Even with automation, this increases the demand. Industry experts also believe that there are a lot of unnecessary tests that could potentially be scaled back, which would help free up time for the more important work that the laboratory does. The medical field has been working to reduce this so-called "inappropriate laboratory utilization," and that is good for patients,³ but it is unlikely to stifle the demand for medical laboratory professionals.



³McDonald, Emily et al. Mindfulness-Based Laboratory Reduction. *The American Journal of Medicine* (2017) 130, e241-e244.

Tapping into the Pipeline

Despite the challenge of hiring younger workers due to education and training requirements, almost 80 percent of survey respondents feel that the best workforce pipeline to tap into is high school – and even middle school – students. Of course, many other industries are also attempting to attract younger workers by increasing awareness and reaching out to high schools, so it may be more difficult for laboratories to stand out in such a crowded field. Respondents also saw a benefit in reaching out to a more diverse group of job seekers, though they believe that can also be accomplished by working more closely with schools where student populations are more diverse than their own workforce.

One significant challenge that providers in rural locations face is the lack of post-secondary training options. It was noted that most rural areas have access to two-year community and technical colleges, which can train technicians, but they do not have access to the four-year universities that train technologists. Because of that, both awareness and the educational attainment of the regional workforce in rural areas are low.

Anecdotally, several respondents pointed out that many people

don't discover laboratory careers until they are older – often in their late 20s and early 30s, rather than their teenage years. The feeling was that this delay makes obtaining the necessary education more challenging, especially for people with families.

In addition, conference participants said medical laboratory college programs are very tough, causing many students to drop out during the process. Because of that, it was suggested that instead of scholarships, employers might get more bang for their buck by offering paid internships and loan payback plans. These options would be more attractive for potential candidates in these young to middle-age groups.

Raising Awareness

Industry professionals still felt that increasing awareness and changing perceptions would be the most helpful recruitment strategy. As noted above, one huge barrier is that most people know what nurses are and what x-ray technicians do, but many people don't know anything about laboratory workers because they don't see or interact with them. To overcome that, medical laboratory workers have been participating in Scrubs Camps and other outreach activities with schools.

Other rapidly growing health care subsectors are hiring lots of front-line workers like home health aides, personal care aides and certified nursing assistants that require little educational preparation, while nursing remains one of the most popular training programs in the state. Operating behind the scenes, medical and clinical laboratory technicians and technologists occupy a health care niche that requires significant educational preparation, but also provides great opportunities. More lab workers will be needed in the future to meet the growing demand, so awareness will be key in a tight labor market.

Trends and Countertrends

We have shown the rapid growth in the medical and diagnostic laboratory industry, as well as the strong demand for medical laboratory technicians and technologists recently and projected into the future. We also discuss measures or countertrends that might counteract or help meet future needs. Professionals in the industry inform us that automation, changing technician and technologist job roles to focus on the higher-level tasks, as well as elimination of unnecessary tests are all important to increase efficiency in their field. Furthermore, one can imagine that having

lower-level tasks performed by other workers might allow younger, less educated workers to enter the laboratory worker pipeline. The overall potential of increasing efficiency may be one reason why the majority of professionals we asked view the worker shortage as moderate rather than serious.

However, unlike for the broader labor market, these professionals do not believe retaining older workers past traditional retirement age will be a significant countertrend. Likewise, outsourcing, immigration and tapping into a high school-age pipeline will not have the same effect on the medical laboratory industry as other industries due to the higher education and certification requirements. Perhaps most significantly, the behind-the-scenes nature of medical laboratory work poses a challenge to raising awareness of these career opportunities. With the growth in diversity of the medical and diagnosing laboratories subsector showing signs of plateauing, the need to raise awareness and interest among a broader population emerges as an important focus for industry and education collaboration. ■



Racial Disparities Through Recession and Recovery

Race was a factor in the ability of students to find employment after leaving higher education during and after the Great Recession.

The Great Recession did not affect all Minnesotans equally. Racial minorities, specifically American Indians and African Americans, were hit particularly hard. To understand the impact of the recession and subsequent recovery by race, we looked at people who attended Minnesota post-secondary institutions from 2006 to 2015 and left school with or without a credential.

The economic climate when students leave higher education clearly affects their ability to find stable employment and enter a career. Figure 1 illustrates this point by tracking the changes in full-time, year-round employment from 2008 to 2016 among students of different racial backgrounds who left college.

Full-time, year-round employment is an indicator of the health of the job market because work hours tend to increase when the economy expands and decrease during

economic downturns as the demand for labor declines. It is also an indicator of job quality, because full-time jobs are more likely to provide important benefits like health care and retirement as well as career advancement opportunities.

Even before the recession, race was a factor in the ability of students to find a full-time job. Among white students who exited college in 2007 the incidence of full-time, year-round employment the year after (in 2008) was higher than most other race groups, at 45.8 percent. Then it sank to 41.4 percent in 2011-2012 before bouncing back to 43.4 percent by 2016. Black and American Indian former students were hit much harder, with full-time employment falling from 39.9 percent to 30.7 percent and from 35.4 percent to 27.4 percent, respectively, from 2008 to 2012.

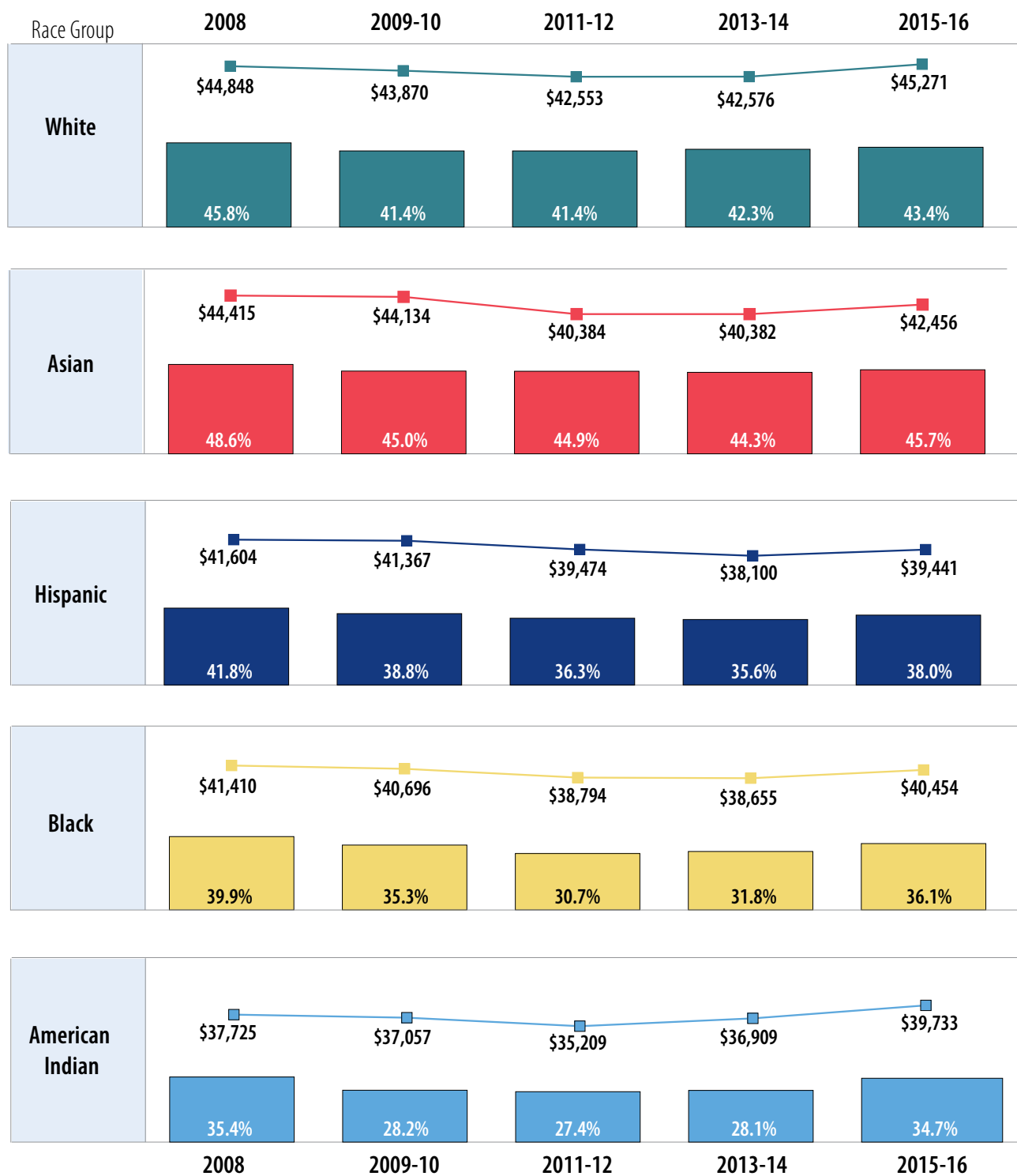
Racial disparities are also evident in wage differences. Wages declined in 2009-10 across all

racial groups, but full-time, year-round working white students consistently earned more than students of other races working similar hours. The decline in wages even among full-time workers stems from the fact that the jobs available to students right out of college paid less than those they would have qualified for before the downturn. As more experienced workers lost their jobs, they started crowding the entry-level job market that recent graduates relied upon. But the racial differences reported in Figure 1 suggest that, regardless of the ups and downs of the job market, as early as one year after college white students were more likely to be employed in jobs requiring a higher level of skills relative to students of other races who left in the same year.

Although black and American Indian students benefited greatly from the recovery, the last available data for 2015-16 show them lagging behind others on both indicators. Hispanic students consistently

Figure 1. Full-Time Year-Round Employment and Wages, Second Year After School Exit

Students Who Exited Higher Education From 2007 to 2015 With or Without Graduating



Source: Statewide Longitudinal Education Data System

ABOUT THE DATA

This research relies on post-secondary enrollment and graduation records from the Statewide Longitudinal Education Data System (SLEDS), which covers all for-credit public and private programs in Minnesota.

The dataset has 714,613 enrollees ages 19 to 50 at the time of exit who were either residents of Minnesota or had an employment record in the state after leaving college. These selection criteria mitigate the risk of treating as dropouts students who left the state and continued their educations elsewhere. Graduates who earned more than one degree in the same academic year were classified according to the highest degree obtained.

The wage analysis presented in this article does not capture people who went to work for the federal government, owned their own small unincorporated business or left the state. Wage records are unavailable for these workers because they are not covered by Minnesota's Unemployment Insurance Program.

Race/ethnicity is a self-reported category that includes the following options: Black or African American (black), American Indian or Alaska Native (American Indian); Asian; Hispanic/Latino (Hispanic); white. Asians include a broad spectrum of ethnic groups but the categories that students can select from do not provide any more detailed breakdown. This article does not distinguish between U.S. born and foreign born students.

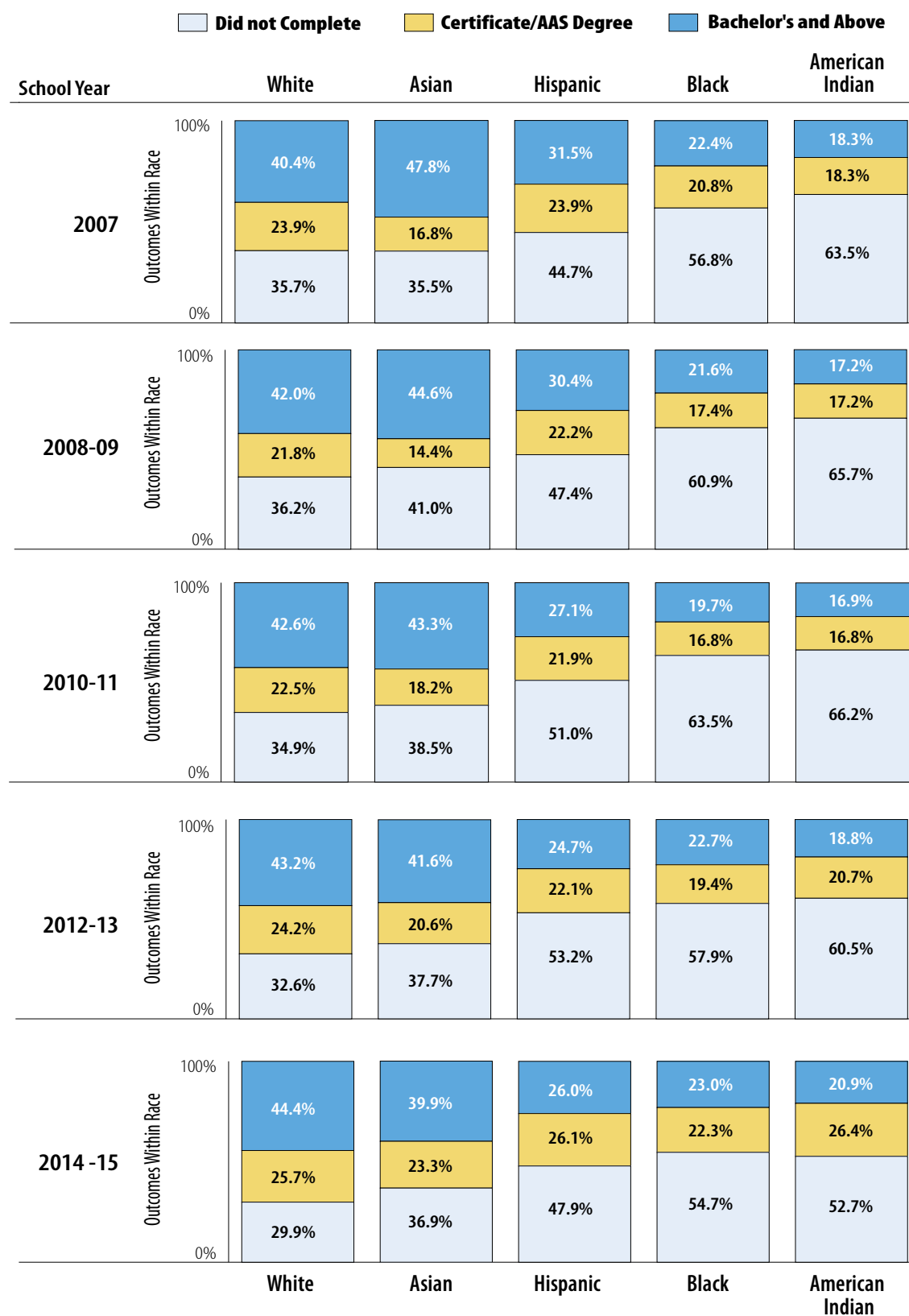


ranked in the middle between whites and Asians at one end of the spectrum and blacks and American Indians at the other end.

Documenting Racial Disparities

Why were some racial groups disproportionately hurt by the recession? A partial explanation can be found in the educational achievement gap. Racial differences in educational achievement were already strong before the recession hit. As shown in Figure 2, in academic year 2007 the overwhelming majority of white and Asian students completed a credential. Only one out of three – or 35 percent – did not graduate. In contrast, more than half of black and American Indian students – 56.8 and 63.5 percent, respectively – did not graduate. Whites and Asians were also much more likely than other races to complete a bachelor's degree or higher. In 2007, 40.4 percent of whites and 47.8 percent of Asian students graduated with a bachelor's degree or higher.

Another alarming finding is that completion rates of Hispanics, blacks and American Indians declined during the recession at the same time as those of whites and Asians increased. In 2010-11, 63.5 percent of black and 66.2 percent of American Indian students dropped out of school,

Figure 2. Trends in Educational Outcomes from 2007 to 2015 by Race

Source: Statewide Longitudinal Education Data System

while only 34.9 percent of whites did. What factors contributed to these opposing trends by race?

Structural differences in income level between race groups are a contributing factor. Looking at post-secondary students who attended a Minnesota public high school over the last 10 years we find that racial minorities were more likely to attend a low-income school defined as having 50 percent or more students eligible to receive free or reduced-priced lunches. Among students for whom this information is available, 49.7 percent of blacks, 42.6 percent

of American Indians, and 25.5 percent of Latinos attended a low-income school versus 9.2 percent of whites. Asians are the most socio-economically diverse group, with high concentrations at the extremes of the spectrum: 42 percent attended a low-income school and 35 percent attended a high-income school (defined as having less than one third of students eligible for free/reduced price lunch). Low-income students must remain employed to afford college tuition, while those from wealthier families have enough resources to continue in college despite the lack of job

opportunities. Since black and American Indian students are more likely to live in low-income households, they probably were more likely to be forced to drop out of school after losing a job. Educational outcomes for minority students improved in 2015-16 when tighter labor markets made it easier for them to get and keep jobs that helped them cover college costs.

The higher likelihood of dropping out during the recession could have set back the employment and earnings potential of blacks and American Indians by years. Evidence shows

Table 1. Educational and Employment Outcomes Among Students Who Exited School From July 2009 to June 2011 Before Age 27 With No Credentials or With a Sub-baccalaureate Credential

Race Group	Graduation Status	Percent Employed First Year After School Exit*	First Year Annual Wages	Percent Employed Fourth Year After School Exit	Fourth Year Annual Wages
White (38,512)	Did not Complete (22,728)	76.5%	\$14,672	69.8%	\$25,192
	Completed a Certificate or Associate Degree (15,784)	85.8%	\$18,109	80.3%	\$32,221
Asian (2,466)	Did not Complete (1,642)	76.2%	\$15,247	76.2%	\$27,755
	Completed a Certificate or Associate Degree (824)	85.6%	\$18,115	85.3%	\$31,622
Hispanic (1,810)	Did not Complete (1,272)	71.1%	\$13,701	69.4%	\$24,442
	Completed a Certificate or Associate Degree (538)	83.3%	\$18,039	77.9%	\$29,387
Black (4,081)	Did not Complete (3,379)	62.5%	\$11,661	60.9%	\$18,349
	Completed a Certificate or Associate Degree (701)	77.8%	\$14,927	73.4%	\$25,737
American Indian (797)	Did not Complete (660)	58.0%	\$11,452	56.8%	\$16,971
	Completed a Certificate or Associate Degree (137)	75.9%	\$14,218	72.3%	\$23,540

*This analysis excludes students who were not resident in Minnesota because they are more likely to leave the state after school and bias the employment rates downwards. Even with this exclusion we see declines in the employment rates four years after school exit, probably because some residents left the state.

Source: Statewide Longitudinal Education Data System

that a post-secondary credential increased the odds of finding a job during the recession. Table 1 looks at students who left college between July 2009 and June 2011 – when the unemployment rate in Minnesota peaked at 8 percent – and compares the outcomes of those who earned a sub-baccalaureate credential with those who dropped out without any credential. This analysis is limited to young students and looks at earnings from jobs held at any time during the year, which are lower than full-time, year-round earnings because they include people who worked part-time or in seasonal jobs.

Completers fared much better than non-completers on all measures. First, they were more successful in their job search, as shown by higher employment rates relative to non-completers both in the first and fourth year after graduation. Second, employed completers earned higher wages after exiting school than employed non-completers.

Racial disparities, however, are also evident in these measures. Whites, Asians and Hispanics had much better outcomes than their black and American Indian counterparts even if they did not complete a credential: 76.5 percent of white non-completers were employed after graduation versus 62.5 percent and 58 percent of black and American Indian non-



completers, respectively. These disparities affected many people, considering that non-completers made up the overwhelming majority of the black and American Indian 2010-11 cohorts.

While young white students could choose to weather the crisis by spending additional

time in school, young minority students were more likely not to complete higher education. This put them at a disadvantage for years to come, as shown by wage differentials four years after school exit. Black students who completed a credential in 2010-11 earned median annual wages of \$25,737 while those who did not complete earned \$18,349.

Figure 3 wraps up our discussion by tracking trends in the earnings ratio between whites and other race groups from before to after the recession. In 2008 white students earned median wages of \$34,919. Blacks earned 88 percent and American Indians earned 72 percent of each dollar earned by whites. Asians are the only race group whose earnings surpassed those of whites, at 102 percent.

One reason for the high performance of Asians as a group is the presence of international students who enroll in graduate school after having already earned a college degree in their home countries. And one factor contributing to the low performance of American Indians is their high concentration in Greater Minnesota, where wages are lower than the Twin Cities metro. If we could redistribute students equally across regions, the earnings ratio to whites – though still low – would be almost the same for blacks and American Indians.

Initial gaps further worsened between 2009 and 2012. While the wages of whites fell from \$31,661 to \$30,493, the wages of students of color fell even more, causing a decrease in the earnings ratio relative to whites. By 2012, American Indians

earned two-thirds (65 percent) of whites, and blacks earned 75 percent of whites. Gaps started to narrow in 2014 thanks to the economic recovery, but they did not return to pre-recession levels except in the case of American Indians. Still, in the years 2015-16 American Indians earned 75 percent of whites, a major difference. It will take more years of economic growth to alleviate the inequitable impact of the recession on racial wage gaps.

Finally, it is important to mention that the inequalities relative to whites vary by age and education level. They are least pronounced among bachelor's degree completers younger than 30 and most pronounced among non-completers older than 30, suggesting that policies aimed at increasing educational attainment can mitigate racial disparities especially when students finish before age 30.¹

Conclusions and Policy Implications

This study documented racial differences in labor market outcomes before, during and after the Great Recession using a variety of metrics. Students who left post-secondary school between 2010 and 2012 faced the toughest labor market in decades, but some race groups suffered significantly more than

others, leading to wider racial disparities between 2010 and 2012. Gaps started to narrow again in 2014 thanks to the economic recovery.

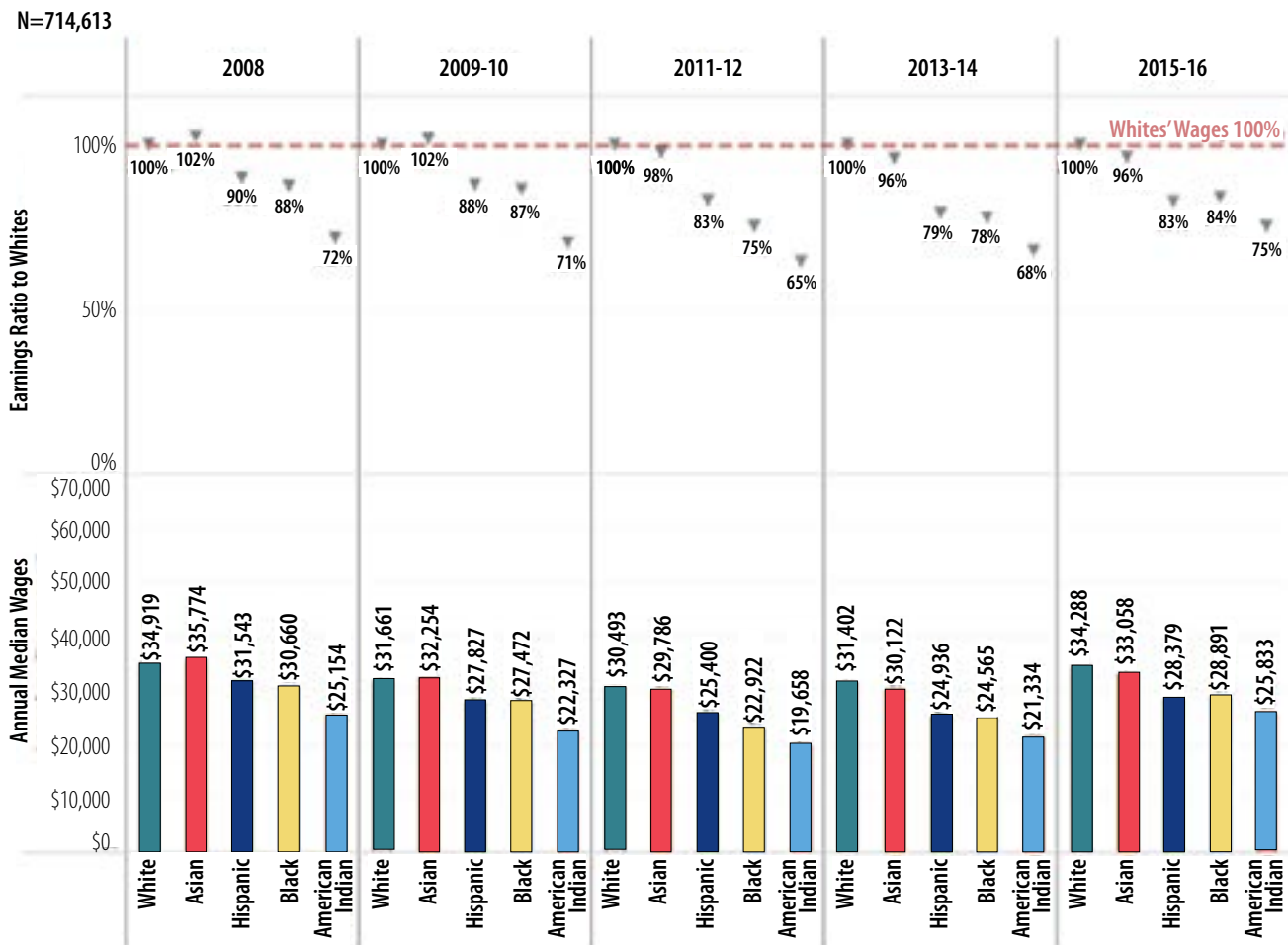
By far the most extreme inequalities affected black and American Indian students, especially non-completers (see Table 1). This result is partially driven by differences in socio-economic status and college attendance behavior. White non-completers tend to leave when they are further ahead in coursework and have already accumulated marketable skills, while their counterparts (excluding Asians) are more likely to interrupt their studies when a weak job market increases the financial strain of paying for college.

Policies aimed at increasing retention and college affordability among students of color could alleviate these disparities. Ending disparities in higher education, however, is not enough to address those originating in the workplace. The barriers that prevent certain racial minorities from securing a full-time, stable job after exiting higher education are not fully explained by differences in educational characteristics.

A possible explanation to the observed large disparities

¹ For more detailed results and interpretation, see Graduate Outcomes Dashboard by Race mn.gov/deed/data/data-tools/graduate-employment-outcomes/race-geo.jsp.

Figure 3. Earnings Ratio to Whites by Race From 2008 to 2016, Based on Median Wages Earned in the Second Year After School Exit



Source: Statewide Longitudinal Education Data System

among non-completers during the recession is that racial discrimination by employers is more prevalent in the low-skilled labor market during economic downturns. In contrast, in a tight labor market employers' perceptions — including racial bias — tend to have less

influence on hiring decisions.

This evidence represents a warning and a lesson for the future. Since racial minorities are the fastest-growing segments of Minnesota's workforce, their greater vulnerability to the ebbs and flows of the business cycle is

concerning. Addressing existing racial inequalities in educational achievement and access to full-time employment is critically important not only for the economic security of families and communities but for the economy as a whole. ■

Tapping Homegrown Talent

Many Greater Minnesota students say they would prefer to remain in their hometowns after graduation, but perceptions about employment opportunities sometimes get in the way.

Perceptions matter when it comes to what rural youth think about their communities and local economic opportunities. Perhaps surprisingly, students appear to favor staying in their communities after graduating if they can secure a “good paying job.” Seventy-five percent of students surveyed in southwestern Minnesota indicated they would stay in their area if they had an acceptable job prospect (see Figure 1).

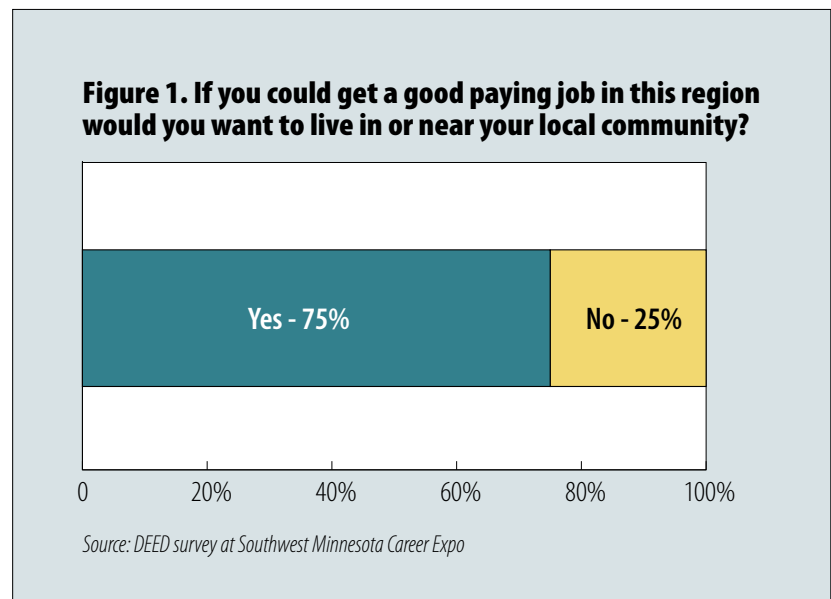
This is excellent news for rural communities and companies. The challenge is educating students and parents about the real opportunities that exist locally. What happens when a student goes off to college and returns to find that relatively few jobs require college? Does the wage they are willing to work for change after investing in higher education?

With few people moving to the region, Greater Minnesota is largely dependent on high school graduates flowing into the workforce.

Using survey data from DEED’s participation in the Southwest Minnesota Career Expo in October 2017, we can gain valuable insight into the perceptions of the next generation of workers. It’s likely the views and influences of the students in southwestern Minnesota are the same for students across Minnesota. Roughly 2,000 10th-grade students in the southwestern region took the survey.

When 10th-grade students were asked about their plans after high school, they responded as follows:

1. 61 percent indicated they plan to go to a university.
2. Almost one in 12 said they plan to go into the military, but statistically only about one out of 100 actually do.
3. Only 4 percent planned to join the workforce right after



high school, yet SLEDS data show that 26 percent actually do.

Figure 2 illustrates 10th-grade students' plans for post-graduation.

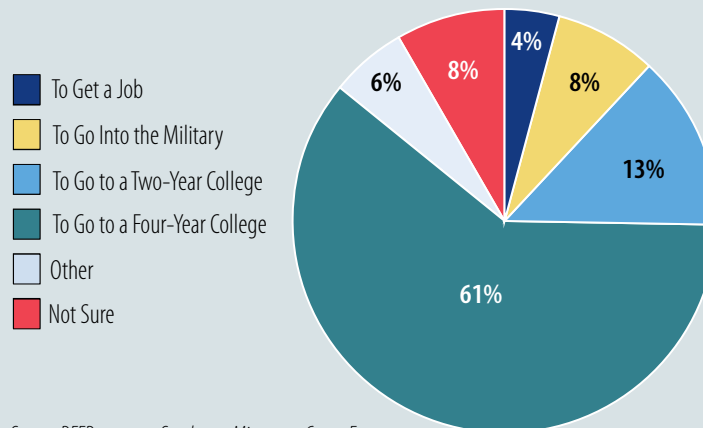
There are many factors that students consider when deciding on their educational or career paths, but one influencer stands out: parents.

Figure 3 shows that nearly two-thirds of students rely on family to help inform educational and career decisions. This strong correlation between family (parents) guidance and student plans highlight a possible disconnect between actual opportunities that exist in Greater Minnesota and what parents think is the best way for their student to achieve success.

Enrolling in college can be an excellent way to achieve a successful career. Clearly students (by way of parents) also strongly perceive college as a way to get a higher paying job (see Figure 4).

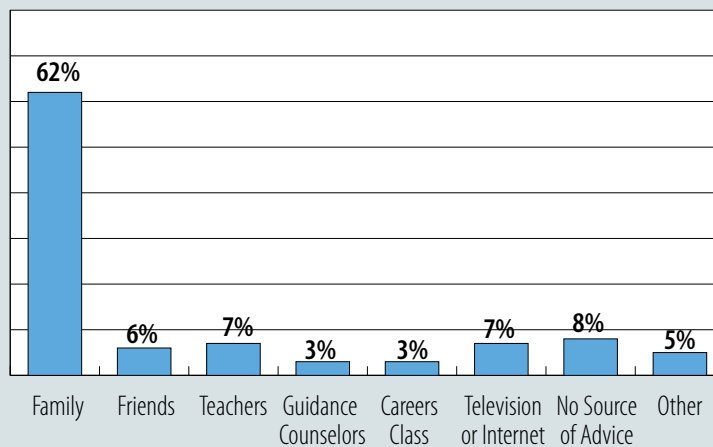
Two-thirds of students who responded are primarily interested in college to boost their earnings potential. It's likely this response is a reflection of their parents' views on the benefits or necessity of college to get a good job.

Figure 2. What are your plans for after high school?



Source: DEED survey at Southwest Minnesota Career Expo

Figure 3. What is your primary source of advice about your future education and career?



Source: DEED survey at Southwest Minnesota Career Expo

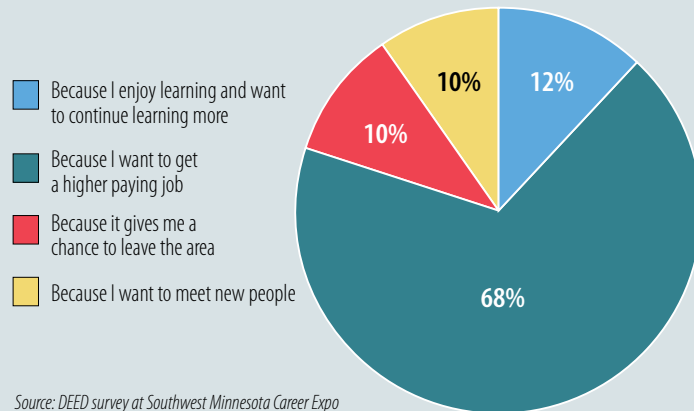
Make no mistake about a college degree: The data clearly support numerous benefits enjoyed by many college graduates. But enrolling in college, particularly a four-year institution, is not the only or even best option for every student.

Roughly 69 percent of jobs in Greater Minnesota do not require education beyond a high school diploma. Employment projections indicate that trend is unlikely to change over at least the next decade. A significant number of these jobs are in entry-level occupations with low pay and low or no educational requirements, but for many new workers they represent the first step in gaining valuable skills that lead to better, higher-paying jobs. Furthermore, Minnesota has roughly 230,000 jobs with a median annual wage greater than \$50,000 per year that do not require college.

Low education, however, is not always synonymous with low skill. Many of the good-paying jobs in Greater Minnesota that typically do not require any type of higher education do require a specific skillset gained through apprenticeships or on-the-job training.

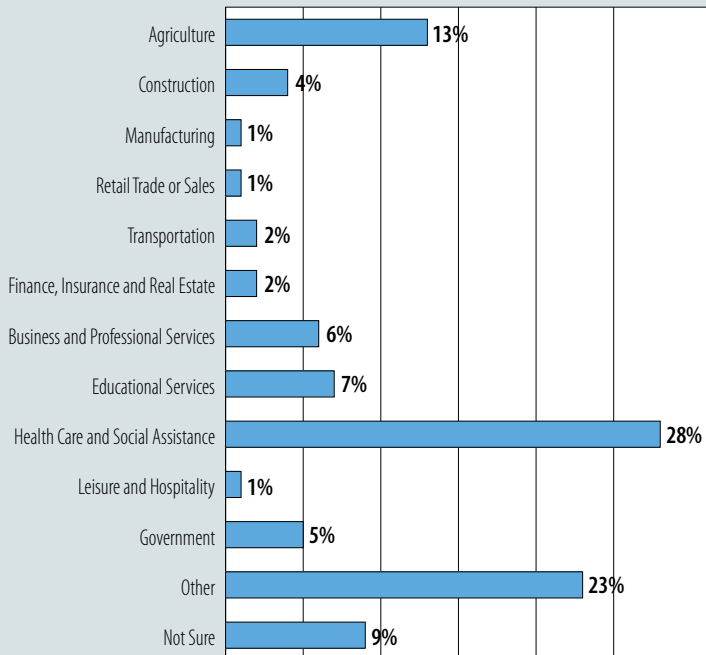
With so many students planning to attend college and relatively few jobs in Greater Minnesota requiring that level of education, it's reasonable to suspect that well-intentioned

Figure 4. If you are considering going to college, why?



Source: DEED survey at Southwest Minnesota Career Expo

Figure 5. What career field are you most interested in?



Source: DEED survey at Southwest Minnesota Career Expo

parents might be overlooking excellent opportunities in their own backyards that could lead to successful careers for students. Rural Minnesota has excellent jobs for workers of every educational background, but communities miss out when the perception is that only a sliver of the jobs in the area are deemed “good.”

Greater Minnesota is well-positioned to provide students with the jobs they are interested in and passionate about. Over one-quarter of students indicated they were interested in health care and social assistance (see Figure 5). This also happens to be the largest-employing industry in Greater Minnesota, representing 19 percent of all jobs.

There is also an abundance of agricultural jobs that have high wages and low educational requirements in many rural areas of Minnesota. Providing Greater Minnesota youth and their parents with better information about what types of jobs are available in their areas and what the educational requirements are for those jobs can help students plan for their futures and help businesses find the workers they need.

So how well do the plans of 10th-grade students represent what they actually do after high school in Greater Minnesota?

With a full two and one-half years left of high school at the time of the survey, it’s no surprise that many students ended up changing their minds and pursuing other paths. Looking back at higher education enrollment in the fall among the class of 2016:

1. 27 percent enrolled at a university.
2. 23 percent enrolled at a two-year school.
3. 17 percent enrolled in higher education outside of Minnesota.
4. 26 percent started working without enrolling in higher education (class of 2015).

We know that over one-fourth of high school graduates join the workforce right after high school. This is problematic not because they aren’t going to college, but rather because they might not have been preparing for the vast majority of jobs that require nothing more than a high school diploma but still require skills. Since only 4 percent of 10th-grade students indicated they plan to join the labor force after completing high school, how well do they know the labor market or skills employers are looking for?

Again, just because a particular job doesn’t require college doesn’t mean that everyone is qualified or has the necessary



skills to perform the tasks. Being successful without college in Greater Minnesota takes careful and intentional planning, just like going to college does.

The success of these students and the regional economies across rural Minnesota can improve by aligning educational programming to labor market demand. How students perceive their own local labor market is critical to retaining and attracting qualified workers. With record numbers of job openings and a declining labor force in many rural counties, Greater Minnesota can’t afford to have students misunderstand their economic opportunities within it. **■**

Economic Status of Minority Women in Minnesota

Minority women earn less than white women and men in Minnesota, even when they have the same level of education.



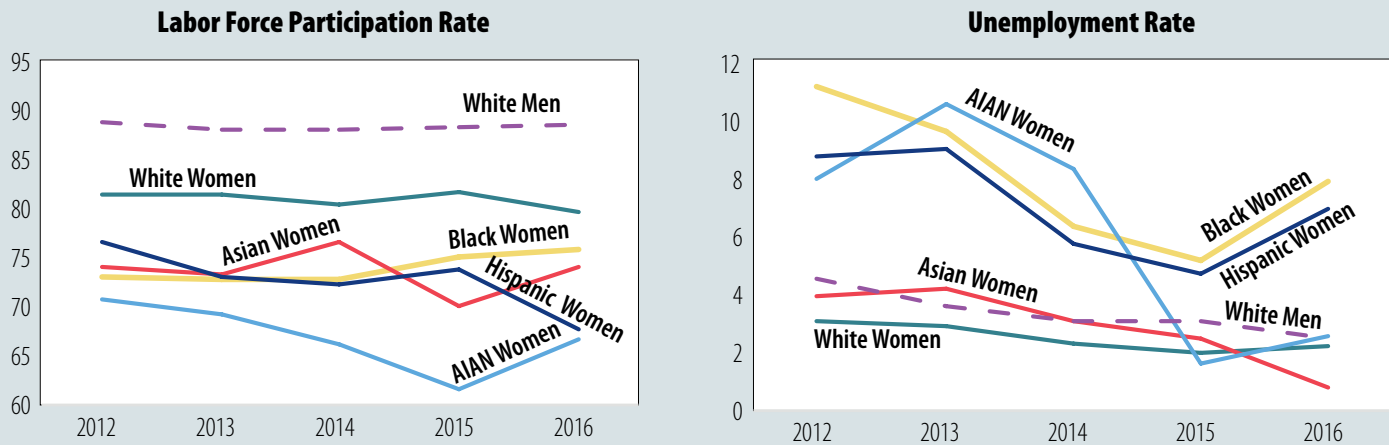
This article examines the economic status of racial and ethnic minority women in Minnesota, focusing on educational attainment and labor market outcomes. The minority communities examined are African American (black), Asian, American Indian or Alaska Native (AIAN), and women of Hispanic origin. This analysis compares the economic status

of minority women with white women and men.

The data were drawn from the 2012-2016 one-year American Community Survey (ACS) microdata unless otherwise indicated.¹ Full-time workers ages 25 to 64 were used for the analysis, with full time defined as at least 40 hours per week.

The race/ethnicity categories analyzed in this article are highly aggregated categories and are by no means representative of the wide diversity of people who identify with sub-categories based on their ethnic origins. For example, the category “Asian” can include persons with a wide range of origins, including but not limited to Cambodian, Chinese, Indian, Japanese, Korean, Hmong and Filipino. Combining all these ethnicities as “Asian” naturally hides the wide diversity of immigration, education and economic experiences that are often associated with a person’s specific ethnic origin. Unfortunately, the ACS has limited data availability on race/ethnicity and hence the data source itself limits our ability to delve deeper into each of these summary race categories. Also, given the small minority population of Minnesota, fragmenting race groups into sub-categories leads to large margins of error and renders results unreliable. With these considerations, we focus only on the aggregated race categories with the acknowledgment that

Figure 1. Labor Force Participation Rates and Unemployment Rates for Women by Race/Ethnicity and for White Men, Ages 25 to 64, Minnesota, 2012 to 2016



Source: American Community Survey microdata, 2012–2016

this way of analyzing the data falls short of representing the true nature of experiences of Minnesota's diverse population.

Demographics

Minnesota is not one of the nation's more diverse states. The white population is 84.4 percent of the state's total population compared with 73 percent nationwide. Blacks account for 5.6 percent of Minnesota's population compared with 12.7 percent nationwide. Asians are 4.6 percent of the state population compared with 5.3 percent nationwide, and AIAN are 1.1 percent of the population compared with 0.8 percent nationwide. Another 4.3 percent of Minnesota's population is

minority racial/ethnic groups compared with 7.8 percent nationwide. Hispanics are 5 percent of the state's population compared with 17.3 percent nationwide.

In Minnesota the average female is 39.1 years old, with white females at 40.5 years and minority females typically younger. Hispanic females are on average the youngest at 26.2 years old. Sixty-four percent of Minnesota women are in the working-age population (ages 16 to 64). Asians have the highest proportion of working-age women (66 percent) followed by whites at 63.6 percent. For other minority groups, the share is around 60 percent.

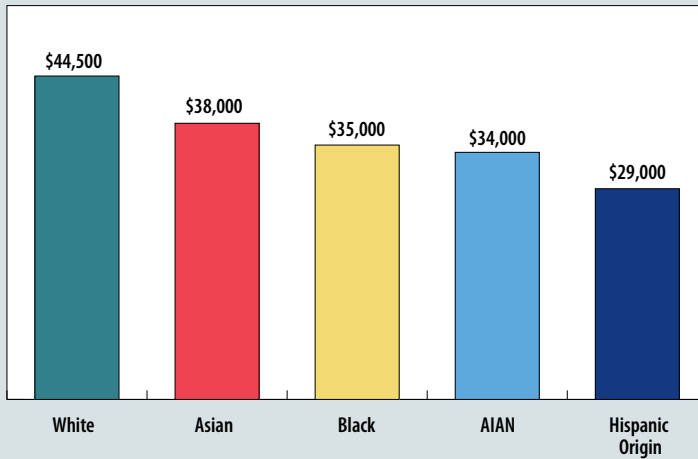
Labor Force Demographics

Overall, women have lower rates of labor force participation than white men. White women have the highest rates of participation among women, while AIAN women have the lowest. As for unemployment rates, white and Asian women have the lowest unemployment rates, while black and Hispanic women have the highest (see Figure 1).

Earnings

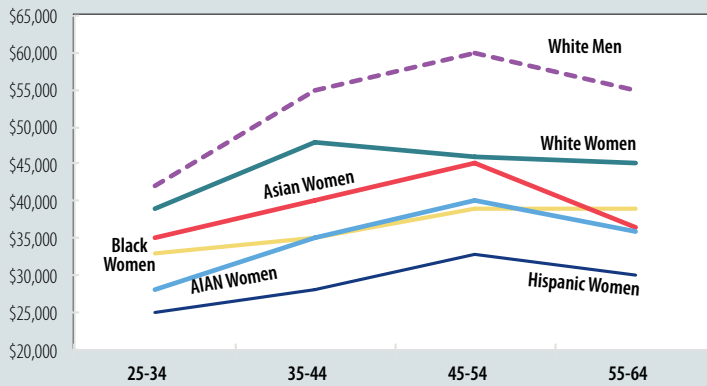
Women in Minnesota earn less than men at the median. Limiting the analysis to full-time employed workers ages 25 to 64, women earn \$43,000 annually, while men earn \$50,000 – a

Figure 2. Median Earnings by Age and Race for Women; Full-time Workers Ages 25 to 64, Minnesota, 2012 to 2016



Source: American Community Survey microdata, 2012-2016

Figure 3. Median Annual Earnings by Age for Women and White Men Ages 25 to 64, Minnesota, 2012 to 2016



Source: American Community Survey microdata, 2012-2016

With the highest-earning demographic – white men – as the benchmark, the earnings gap by gender and ethnicity is as follows: 14.4 percent for white women, 26.9 percent for Asian women, 32.7 percent for black women, 34.6 percent for American Indian women and 44.2 percent for Hispanic women.

Age

Figure 3 shows that earnings gaps by gender and ethnicity are consistent across age. Over time, women never catch up with the earnings of their male counterparts, and minority women generally do not catch up with their higher earning counterparts of other ethnicities. Black women are one exception to this trend, possibly because they are likely to continue working well into typical retirement years.

An even clearer picture of earning gaps among women by ethnicity emerges when we convert annual earnings into hourly wage rates by adjusting for hours of work. Figure 4 shows that minority women earn less on an hourly basis than white women and men. Asian women earn 11.1 percent less per hour than white women, while black women earn 20 percent less, AIAN earn 25 percent less and Hispanic women earn 34 percent less.

gender earnings gap of 14 percent.

Median earnings vary widely by gender and race. Figure 2 shows that among women, white women have the highest annual median earnings at \$44,500, followed by Asians at \$38,000,

blacks at \$35,000, AIAN at \$34,000 and Hispanic women at \$29,000.

Men of all ethnicities earn more than their female counterparts, with white men at the top at \$52,000 and Hispanic men at the bottom at \$32,700.

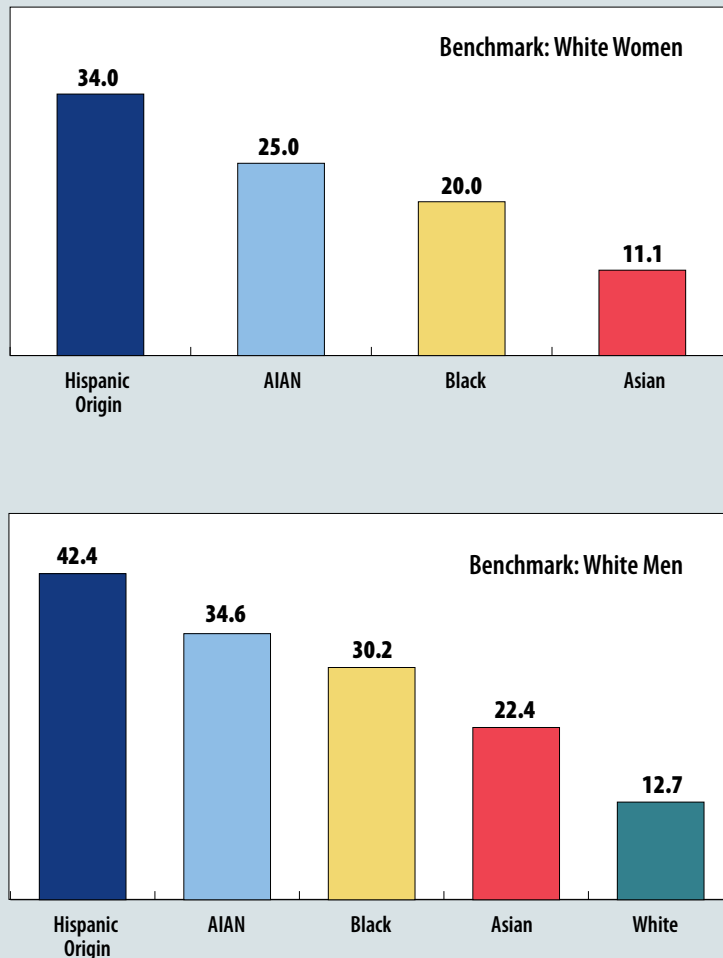
A similar story emerges when compared with white men, although the hourly wage gap is much higher. White women earn 12.7 percent less than white men, while Asian women earn 22.4 percent less, black women earn 30.2 percent less, AIAN women earn 34.6 percent less and Hispanic women earn 42.4 percent less.

Educational Attainment

Minnesota women in their prime working years (ages 25 to 64) are relatively more educated than their counterparts in other states: 39.3 percent have bachelor's or advanced degrees. By ethnicity, however, there is wide variation in educational attainment. Almost one quarter of Hispanic, 19 percent of black, 18 percent of white, 16 percent of AIAN and 13 percent of Asian women have only a high school diploma.

Asian and white women are more likely to have a postsecondary credential, with 31.1 percent of Asian and 27.6 percent of white women holding a bachelor's degree. This percentage drops drastically to 15.6 percent for Hispanic women, 13.5 percent for AIAN women and 11.5 percent for black women. Asian women are most likely to have an advanced degree (21 percent), while AIAN women are least likely (5.3 percent).

Figure 4. Hourly Wage Gap between Minority Women and White Women/White Men Ages 25 to 64, Minnesota, 2012 to 2016



Source: American Community Survey microdata, 2012-2016



Table 1 shows that wage gaps by gender and race remain consistent even when broken out by educational attainment. Minority women with bachelor's degrees earn between 12 and 22 percent less than white women, with bachelor's degrees. The earnings gaps by race and ethnicity at similar levels of educational attainment are even starker when using white men as the benchmark. Women earn between 23.9 percent and 40.3 percent less than white men with

the same educational attainment. Similar earnings gaps by gender and ethnicity are seen at other levels of educational attainment.

Occupation

Occupational choice makes a big difference in earnings. An examination of occupations most frequently chosen by women of various ethnicity sheds some light on the earnings gaps discussed here. Overall, Hispanic women take up low-

paying occupations, while white and Asian women track into medium- or high-paying occupations. Black and AIAN women tend to be in a mix of medium- and lower-paying occupations.

Table 2 shows that white women are found in medium- to higher-paying jobs such as registered nurses and accountants (both medium-income occupations), as well as high-paying management occupations. Asian women are found in a wider range of occupations, including software developers (high income), accountants (medium income) and personal appearance workers and production assemblers, both low-income occupations.

Black women are also found in a range of occupations, including customer service, health aide and personal care aide occupations (all low-income occupations), as well as registered nurses and social workers (both medium-income occupations). AIAN women tend to be social workers,

Table 1. Median Annual Income by Education and Race for Women in Minnesota

Race/Ethnicity	Highest Degree Earned			
	HS	AA	BA	Advanced Degree
White Women	\$32,700	\$40,000	\$51,000	\$67,000
Black Women	\$26,000	\$38,000	\$45,000	\$67,000
Asian Women	\$28,000	\$36,000	\$44,400	\$66,000
AIAN Women	\$28,000	\$33,000	\$40,000	\$67,000
Hispanic Women	\$22,000	\$28,000	\$40,000	\$60,000
White Men	\$40,000	\$52,000	\$67,000	\$85,000

Source: American Community Survey microdata, 2012–2016

Table 2. Top Five Occupations for Women by Race/Ethnicity, Full-Time Workers Ages 25 to 64, Minnesota

White	Black	Asian	AIAN	Hispanic
Elementary and Middle School Teachers (\$52,000; medium)	Nursing, Psychiatric and Home Health Aides (\$30,000; low)	Miscellaneous Assemblers and Fabricators (\$30,000; low)	Elementary and Middle School Teachers (\$52,000; medium)	Maids and Housekeeping Cleaners (\$21,000; very low)
Secretaries and Administrative Assistants (\$54,000; medium)	Personal Care Aides (\$22,900; very low)	Software Developers, Applications and Systems Software (\$86,000; high)	Social Workers (\$48,000; medium)	Janitors and Building Cleaners (\$32,000; low)
Registered Nurses (\$65,000; high-medium)	Customer Service Representatives (\$39,000; low)	Miscellaneous Personal Appearance Workers (\$22,000; very low)	Nursing, Psychiatric, and Home Health Aides (\$30,000; low)	Packers and Packagers, Hand (\$24,000; very low)
Miscellaneous Managers, Including Funeral Service Managers and Postmasters and Mail Superintendents (\$72,000; high)	Social Workers (\$48,000; medium)	Miscellaneous Managers, Including Funeral Service Managers and Postmasters and Mail Superintendents (\$72,000; high)	Accountants and Auditors (\$58,000; medium)	Customer Service Representatives (\$39,000; low)
Accountants and Auditors (\$58,000; medium)	Registered Nurses (\$65,000; high-medium)	Accountants and Auditors (\$58,000; medium)	Secretaries and Administrative Assistants (\$54,000; medium)	Cooks (\$24,000; very low)
% Full Time in Top 5 Occupations				
19.4%	27.4%	21.4%	18.8%	20.2%

Source: American Community Survey microdata, 2012-2016

teachers, accountants and secretaries (all medium-income occupations). Lastly, Hispanic women are found in low- or very low-paying occupations, including maids, janitors, packers and cooks.

Minority women in Minnesota have lower educational attainment, higher unemployment rates, lower

earnings, lower wage rates and track into lower-paying occupations. The earnings gaps remain fairly stable over different age groups.

Earnings gaps do not disappear when women of different races have the same educational attainment. This is especially true of black, Hispanic and AIAN women. Asian women have

lower unemployment rates and higher educational attainment, but they still have earnings and wage rates below white women and men. Look for future Trends articles on this topic, with particular focus on education, fields of study and occupational choices. **T**

Variations in Employment in the CES and QCEW Programs

While CES and QCEW track related employment data, they measure slightly different universes.

Current Employment Statistics (CES) and Quarterly Census of Employment and Wages (QCEW) employment data are closely related. Both data sets are known primarily for their wage and salary employment counts, and both are useful in that regard.

Each one covers about 97 percent of wage and salary jobs in Minnesota and about 90 percent of all employment. Neither covers the self-employed, unpaid family workers or certain agricultural workers.

The CES is built on the back of the QCEW, pulling its survey sample from the QCEW universe, and benchmarking to QCEW every year. The primary difference between the two is that the survey-based estimates of CES allow for more timely data releases, with estimates published less than a month after the reference period, while QCEW's population data

allow for much more granular geographic and industry data.

Despite their similarities and shared origins, comparing the total employment counts in these two data sets shows that CES reports around 75,000 more jobs in a given month. The disparity comes from the fact that these two tools are actually measuring slightly different universes, with certain types of jobs excluded from each. In fact, because each data set includes some jobs the other doesn't, the difference you see dramatically understates the true divide. In a given month there may be more than 120,000 jobs that are covered by one program but omitted from the other.

The reasons for this divergence are somewhat varied. The QCEW program relies on unemployment insurance (UI) reports for its data. This leads to gaps when jobs or industries are not covered by laws that govern UI. The lion's share of

the difference between the two data sets comes from those jobs that are included in the purview of CES but are not covered, and are therefore not present, in QCEW data. As such, CES refers to these as "non-covered employment."

A diverse and otherwise unrelated array of jobs and industries comprises the non-covered employment that is included in CES estimates. Examples include railroad workers, private religious organizations, and students employed via work study at colleges and universities. A detailed breakdown of non-UI covered employment in CES is included in Table 1. In 2017, employees in religious organizations accounted for more than 30 percent of all non-covered employment in CES estimates.

A smaller but not insignificant number of job classes are included in QCEW data but

Table 1: Major Areas of Non-Covered Employment in Current Employment Statistics

Industry Group (Private Ownership Unless Otherwise Noted)	Relevant Non-Covered Jobs* (Presumed Excluded From QCEW but in CES)	CES Employment	QCEW Employment	Difference (Presumed Non-covered Employment)
Religious, Grantmaking, Civic and Professional Organizations	Employees of Religious Organizations and Some Small Nonprofits	64,961	34,173	30,788
State Government Education	Students Employed by a School Through Work Study Program	59,282	40,207	19,075
Local Government Excluding Education	Elected Officials, Judges and Others	147,930	131,800	16,130
Colleges, Universities and Professional Schools	Students Employed by a School Through Work Study Program	26,004	18,045	7,959
Elementary and Secondary Schools	Employees of Private Religious Schools	21,674	14,399	7,275
Local Government Education	CES is Adjusted for Staff With Summers Off	144,775	138,182	6,593
Transportation and Warehousing	Railroad Employees	93,866	88,363	5,503
Insurance Carriers and Related Activities	Commissioned Non-office Sales Agents	61,736	57,530	4,206
Hospitals and Offices of Physicians	Interns and Trainees	185,287	182,256	3,031

*Not all jobs within the described class are necessarily non-covered

Source: DEED Current Employment Statistics and Quarterly Census of Employment and Wages data

excluded from the scope of the CES. Most notable are agricultural jobs, some but certainly not all of which are covered by UI. Agriculture is not present in CES because the many exemptions to UI coverage

cause a poor sample frame for calculating quality estimates. Other out-of-scope employment for CES includes private households and the incorporated self-employed (many of which are also in agriculture).

It should be noted that QCEW originates as quarterly administrative reports by employers to UI and, as a result, not every report is completely accurate. While many of the mistakes are caught and cleaned



very quickly, not all are caught in every report.

The (In)credible Shrinking Divergence

The employment difference between the two programs, while a permanent fixture, does fluctuate in size. In recent years, it has been steadily declining. As illustrated in Figure 1, 2017 annual averages displayed the narrowest gap between the two, going all the way back to at least 2000, the earliest year for which

we have published data. The reasons for this, like the reasons for the employment differences themselves, are varied. There are, however, a couple of especially noteworthy forces driving the two counts together.

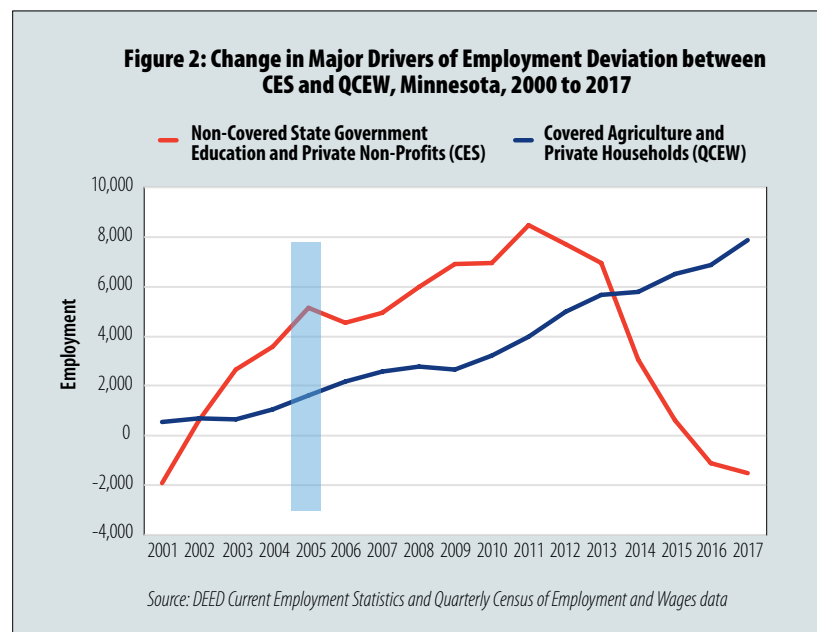
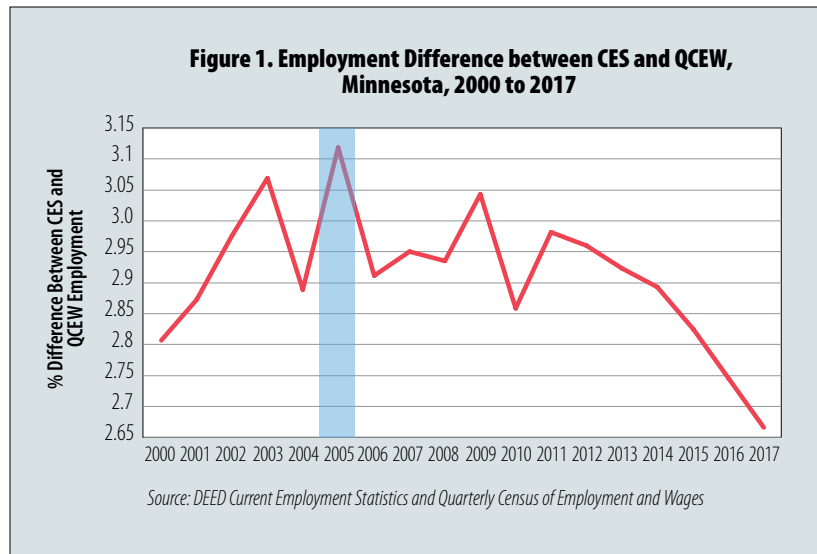
As noted in Table 1, employees of religious organizations and small nonprofits are the single largest group of non-covered employment in QCEW, and state government education is the second.

Since 2005, when the difference between CES and QCEW was the largest on record (83,563 jobs, or 3.12 percent), employment in both of these groups has shrunk. The non-covered employment gap in state government education has shrunk from 22,999 to 19,075, while the employment gap in religious, grantmaking, civic, professional and similar organizations (where religious organizations are situated) has dropped from 33,541 to 30,788 jobs. All told, the tightening in

the two series accounts for 6,677 fewer non-covered jobs included in CES estimates over the given period (see Figure 2).

While employment included in the QCEW universe but excluded from CES represents a smaller subset of jobs than its inverse, it is big enough to make a noticeable difference. The bulk are agricultural jobs, with the next largest group in private households. Both of those classifications have been growing in recent years, in real numbers and as a proportion of total QCEW employment (see Figure 2).

Covered agriculture and private households combined added 16,772 jobs to QCEW's total employment in 2005. By 2017, that number was 23,039, with the proportion of total employment up from 0.65 percent to 0.81 percent over the period. As Figure 2 shows, this portion of employment has been steadily climbing for quite some time, which suggests that at least one force will continue pushing these two job counts closer together. **T**



Measuring Employment in Minnesota

Changes in the employment mix in Minnesota have narrowed the gap in LAUS and CES employment counts in recent decades.

DEED publishes two employment estimates each month based on two separate surveys.¹ One is the household survey (also called the Current Population Survey) and the other is the payroll survey (also known as the Current Employment Statistics or CES survey). The household survey asks households about their employment status, while the payroll survey asks Minnesota employers how many workers they have on their payrolls.²

Minnesota payroll employment estimates are available back to 1950, while consistent household employment estimates (more commonly referred to as LAUS employment) start in 1976. Annual average LAUS employment in 1976 was 217,000 higher than annual average CES employment – a difference of about 14 percent. By last year, however, LAUS employment was only 27,000 higher than CES employment – a difference of 1 percent (see Figure 1).

While we like to think that our survey methods are producing better results today than four decades ago, LAUS and CES employment estimates have narrowed over the last four decades because of long-term changes in certain types of employment in Minnesota.

LAUS and CES numbers are designed to produce slightly different employment counts. LAUS estimates the total number of Minnesotans who are employed, while CES estimates the total number of nonfarm wage and salary jobs in the state. Table 1 lists the major differences between the two employment estimates.

LAUS numbers include agricultural jobs and self-employment jobs, while CES numbers exclude both of these employment types. People who hold multiple jobs are counted only once in LAUS, while CES includes all nonfarm wage and salary jobs held by a worker. For example, a Minnesota worker

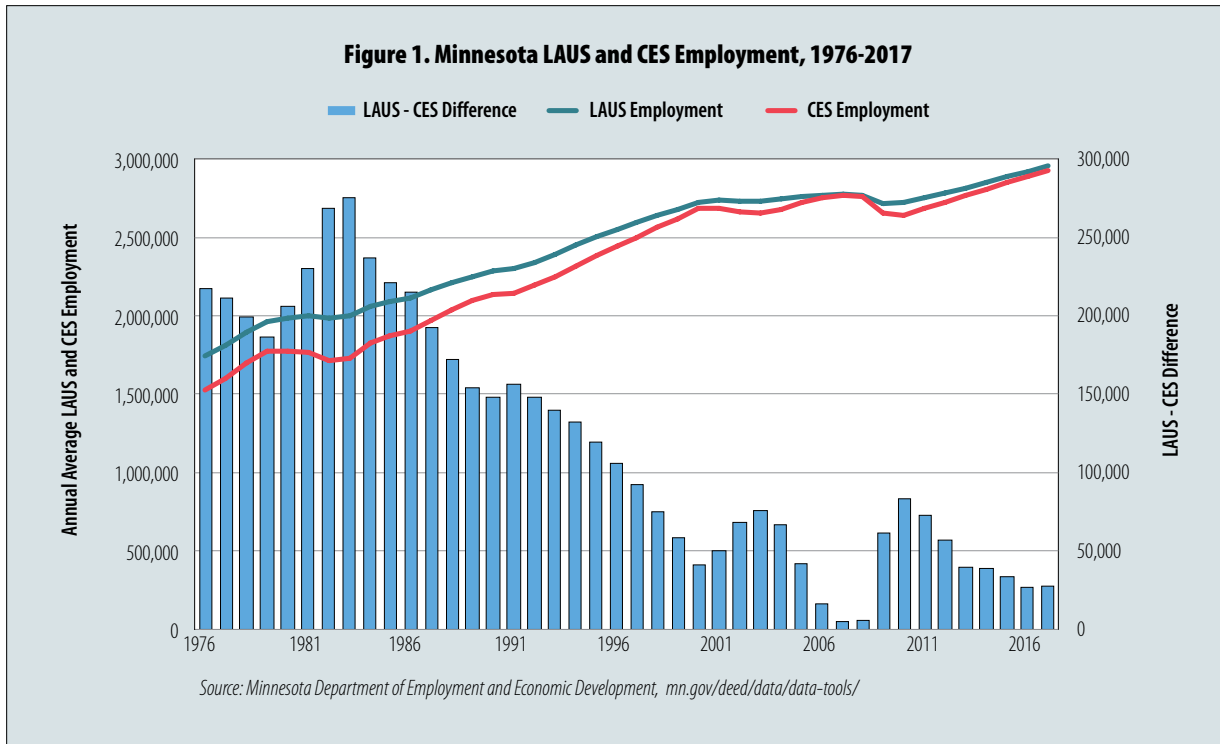
who answers the household survey by saying her primary job is being a self-employed farmer while also working weekends as a bartender and one day a week as a substitute teacher would be counted differently in the two surveys. She would be counted once in the LAUS estimate (farm work) and twice in the CES estimate (bartender and substitute teaching work).

Another key difference is the place of work versus place of residence. Let's say the farmer above lives and farms in Minnesota just north of the Iowa border. Thus her farm job is counted in Minnesota's LAUS total. But her bartending and teaching jobs, if they were in Iowa, would not be counted in Minnesota's CES numbers. They would be tallied instead in Iowa's CES total.

The nonfarm wage and salary jobs held by people from Iowa, South Dakota, North Dakota or Wisconsin who commute to Minnesota for work are

¹The monthly release schedule can be found here: mn.gov/deed/data/lmi-help/release-schedule/.

²More information on the two employment estimates can be found at www.bls.gov/lau/laumthd.htm and www.bls.gov/sae/790over.htm#intro.



counted in Minnesota’s CES but not in Minnesota’s LAUS. Nonfarm payroll jobs held by Minnesotans who commute out of the state for work are included in Minnesota LAUS numbers but not in Minnesota’s CES numbers.

The four-decade trend of the two employment measures converging at the state level is the result of self-employment, people holding multiple jobs and agricultural jobs shrinking as a percent of employment. A slight uptick in the net flow of interstate commuting (more workers commuting into Minnesota than out of Minnesota than in the past) also is a factor.

Table 1. Major Differences Between CES and LAUS Employment

CES Employment	LAUS Employment
Based on payroll survey	Based on household survey
Count of jobs	Count of Minnesotans employed
Place of work	Place of residence
Excludes self-employed workers	Includes self-employed workers
Excludes agricultural jobs	Includes agricultural workers
Counts multiple-job holding	Ignores multiple-job holding

A higher percentage of working Minnesotans are employed in nonfarm wage and salary positions (CES employment), a lower percentage of Minnesotans hold multiple jobs, and a lower percentage are working in agricultural and self-employed jobs (LAUS employment)

than four decades ago. The net effect is that LAUS and CES estimates have nearly converged even though there are important differences between the two estimates.

Minnesota’s LAUS estimate is closer to its CES estimate

than most states (see Figure 2). Nationally LAUS employment is nearly 7 million more (5 percent higher) than CES employment because agricultural employment and self-employment is included in LAUS but not in CES. National LAUS employment was 30 percent higher than CES employment in 1948. Declining farm employment and self-employment rates over the last 70 years account for the declining difference in the two employment measures.

Commuting has almost no role at the national level but plays a significant role in explaining the LAUS-CES difference in many states. LAUS employment for Washington, D.C., in 2017 was more than 50 percent smaller than CES employment. Most of the difference was Marylanders and Virginians commuting into D.C. for work. Maryland's LAUS number, on the other hand, was 13.4 percent higher than its CES number in part because of commuting into work in Washington, D.C. Maryland commuters are counted in that state's LAUS total but not its CES total.

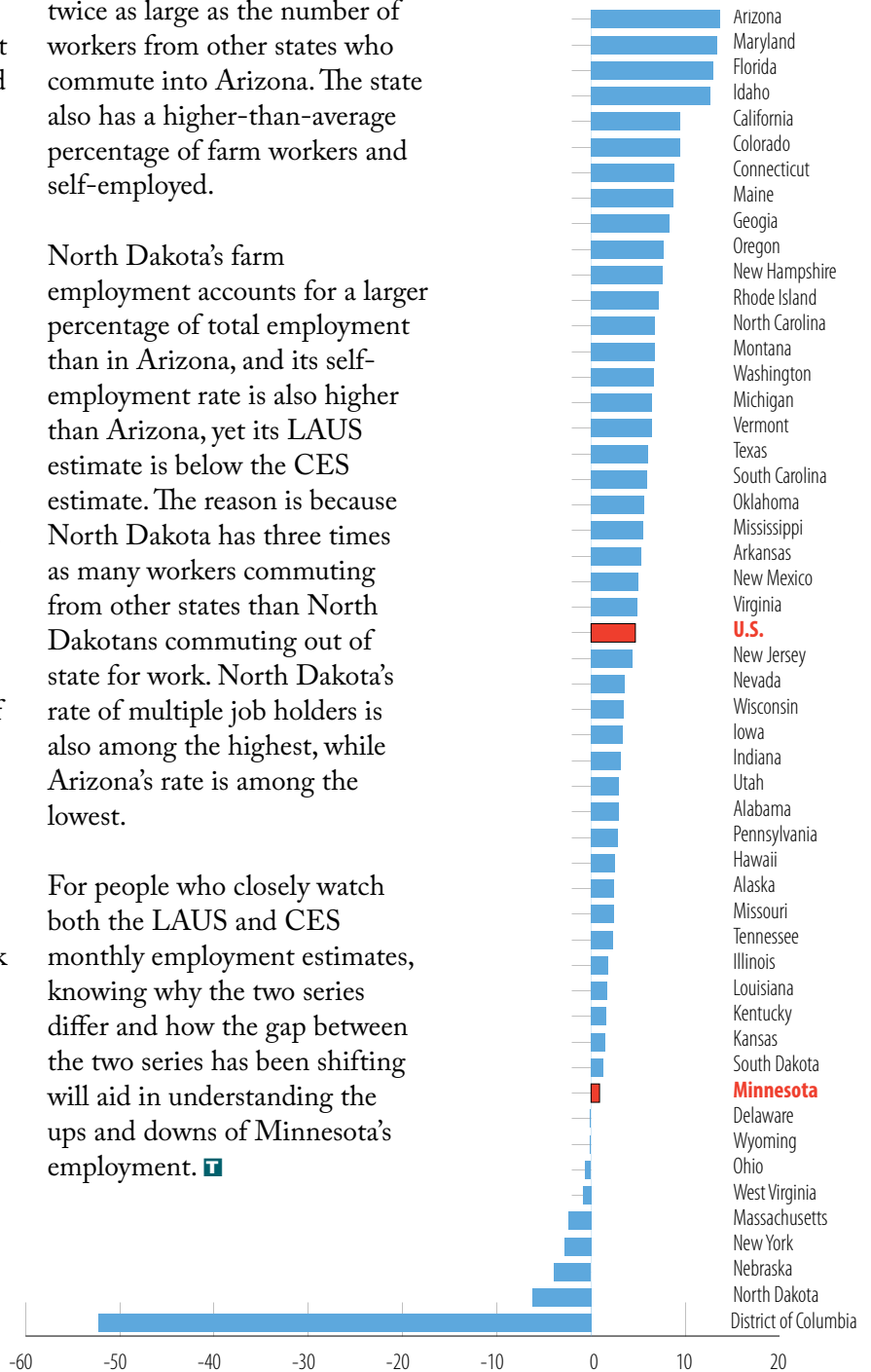
Arizona had the largest gap between LAUS and CES estimates in 2017, with its LAUS employment 13.7 percent larger than CES

employment. The number of Arizonians who commute to neighboring states for work is twice as large as the number of workers from other states who commute into Arizona. The state also has a higher-than-average percentage of farm workers and self-employed.

North Dakota's farm employment accounts for a larger percentage of total employment than in Arizona, and its self-employment rate is also higher than Arizona, yet its LAUS estimate is below the CES estimate. The reason is because North Dakota has three times as many workers commuting from other states than North Dakotans commuting out of state for work. North Dakota's rate of multiple job holders is also among the highest, while Arizona's rate is among the lowest.

For people who closely watch both the LAUS and CES monthly employment estimates, knowing why the two series differ and how the gap between the two series has been shifting will aid in understanding the ups and downs of Minnesota's employment. ■

Figure 2. LAUS Employed Percentage Higher or Lower than CES Employment, 2017



Source: Bureau of Labor Statistics, LAUS, 2017

Meet

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