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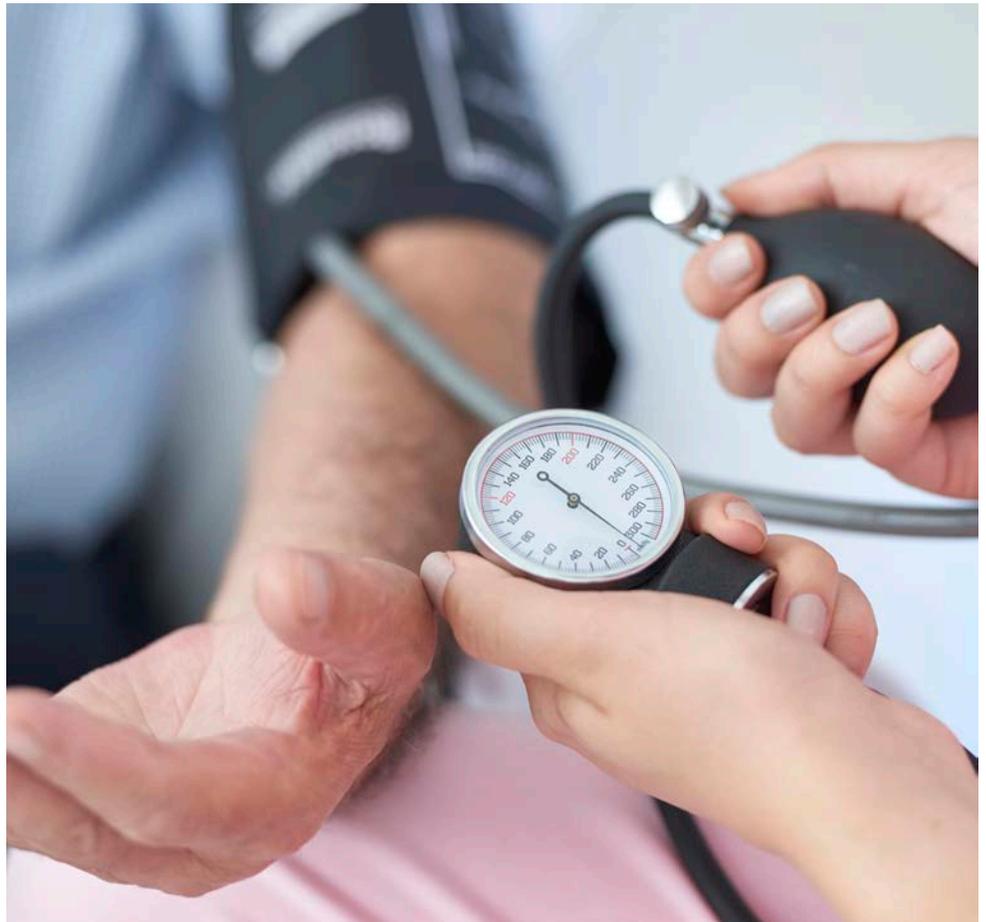
**Sarah Bohn,
Shannon McConville,
and Landon Gibson**

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Career Technical Education in Health

An Overview of Student Success at
California's Community Colleges



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Technical appendices to this paper are available on the PPIC website.

Career technical education (CTE) has received renewed focus from state and national policymakers interested in improving economic outcomes of students and addressing the state's workforce needs. California's community colleges are the state's primary provider of CTE, also known as vocational education. Career training in health care holds particular promise for students and the state's economy—health CTE programs attract a large and diverse set of students in California and are linked to growing job opportunities in health services, a generally well-paying industry for Californians with less than a bachelor's degree.

In this report, we examine outcomes for the 120,000 students who pursued health CTE degrees across California's community college system over the past decade.

- Health CTE students are predominantly female and tend to be slightly older than community college students overall, including those enrolled in other CTE programs. However, nearly 60 percent are identified as academically disadvantaged and 70 percent are economically disadvantaged.
- Health CTE credentials afford sizeable returns to students in California, who earn 50 percent more, on average, after they complete their schooling. Returns do not vary across socioeconomic groups but do vary across the type of credential. Associate degrees afford returns about 2 times larger than long-term certificates and about 10 times larger than short term-certificates. However, even within those categorizations, there is variation across programs, with short term certificates in Paramedic programs resulting in much higher returns than for Medical Assistants, for example.
- Overall completion rates for health CTE programs are relatively high: more than 70 percent of students who begin a program either obtain a degree or transfer to a four-year college within six years, while only about half of the overall CTE student population obtain a credential within six years. However, success varies substantially across health programs, ranging from 93 percent in dental hygienist programs to 44 percent in emergency medical services.
- Although a high share of health students do earn credentials, there are racial and ethnic achievement gaps across health programs. Program choice explains some of the gap, but academic preparation, financial aid, and course-taking behavior (in particular, full-time attendance and persistence) explain almost all of the observed achievement gap.

Policymaker efforts to improve completion rates and reduce achievement gaps could focus on increasing full-time enrollment and consecutive-term enrollment

for students after entering health programs. We find that students who enter health training but do *not* obtain programs may nonetheless be able to enter the health care industry and experience career growth over the long term. But obtaining credentials, particularly in high-reward programs will do the most to improve student and workforce outcomes.

Introduction

Rising economic inequality in the United States over the past few decades has led to wide-ranging conversations about how to improve economic mobility, especially for disadvantaged groups. Education, the single strongest correlate of economic success, is often regarded as the best way to promote upward mobility. Career technical education (CTE) has garnered particular interest, as perhaps the most proximate tie between postsecondary training and the labor market. Many CTE credentials can be earned over short time horizons, leading to relatively fast wage and labor market gains.

State and national policymakers have renewed their focus on CTE in recent years. The 2014 Workforce Innovation and Opportunity Act revised federal legislation on large-scale workforce training investment, better engaging community colleges and placing special emphasis on career technical education. In California, in addition to recent voter-approved increases in funding for K–14 education that have benefitted the state’s community college system, policymakers have directed resources to CTE in particular. The state piloted—and then renewed—the California Career Pathways Trust (CCPT) to invest in CTE pathways. The CCPT has allocated more than \$500 million since 2014 to school districts, county offices of education, community college districts, and other partners to support efforts to design and implement well-defined career pathways for CTE programs and support student success. California’s most recent budget also directed an additional \$200 million to the Strong Workforce Program, which aims to increase the availability of high-quality, in-demand CTE courses at the community colleges.

Career pathways in health-related fields hold particular promise for students and the state economy. California’s health care sector is large and growing; it provides key services to the state’s population as well as employment opportunities to a wide variety of workers. With a growing and aging population, the demand for health workers is projected to continue to grow substantially over the next decade. California’s health workforce is projected to require nearly half a million new workers over the next decade, with more than 40 percent of future health jobs likely to require either postsecondary certificates or associate degrees (McConville, Bohn, and Beck 2014).

In addition to satisfying workforce needs, many postsecondary health credentials yield greater labor market returns than other community college–level training (Stevens, Kurlaender, and Grosz 2015; Jepsen, Troske, and Coombs 2014; Dadgar and Weiss 2015). Furthermore, the need to diversify the health workforce to serve an increasingly diverse senior population provides an additional impetus to ensure that underrepresented minority students and other disadvantaged groups pursue health credentials. Community colleges are well-positioned to address this need, since they serve a higher percentage of underrepresented minority students than other public higher education institutions.

For-profit institutions also provide training in health CTE programs—and they represent the lion’s share of the growth in sub-baccalaureate health degrees over the past decade (McConville et al. 2014). However, increased scrutiny of for-profit colleges due to poor graduation rates, high levels of student debt, and questions about the value of degrees—along with several recent closures of for-profit institutions—has shifted even more attention to the state’s public two-year colleges.

While health CTE training has the potential to improve employment and economic outcomes, many issues and questions need to be addressed. Although labor market returns to health CTE awards are sizeable, it is not clear how labor market opportunities vary across health programs or how outcomes differ for students with wide-ranging socioeconomic backgrounds. To ensure the efficacy of recent investments—and future reforms—and ultimately to improve economic outcomes through vocational education, it is crucial to identify the student, institutional, and policy choices that lead to optimal outcomes.

In this report, we document the pathways to successful completion of health CTE programs in California’s Community College system. We also examine the employment outcomes of students—who complete health CTE degrees as well as those who begin a program but do not finish—to gauge the economic returns for students and the ability of the community college system to train workers for in-demand health jobs.

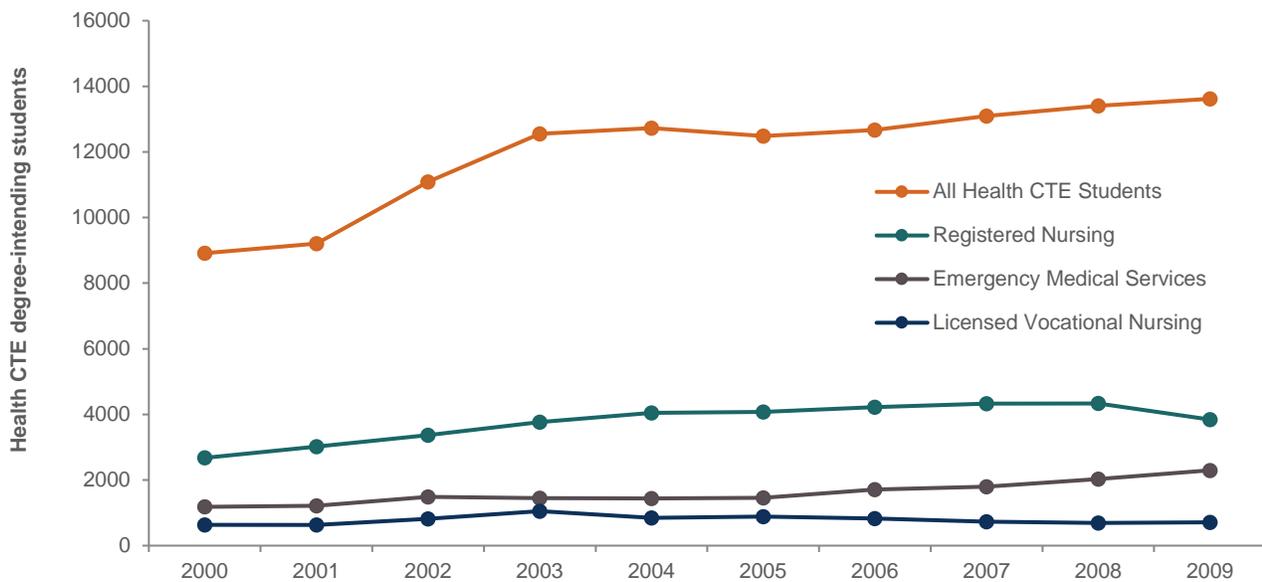
Data Used in This Study

To assess the experience of students in health programs in California’s community colleges, we use longitudinal student data maintained by the Chancellor’s Office. These records contain basic demographic information about the students as well as courses completed or attempted, grades, and credentials received. For most analyses, we use records for students who completed their first health CTE courses between 2000 and 2009. For these students, we also have records on earnings (at the quarter level) between 2000 and 2014, if they had jobs covered by the Unemployment Insurance system. See [Technical Appendix A](#) for full details.

Health CTE Enrollment at California Community Colleges

Over the past decade, about 120,000 students entered health CTE programs at California community colleges with the intention of obtaining degrees or credentials. From the early 2000s to the end of the decade, about 12,000 students on average each year completed at least eight units in a single health CTE program—a marker used by the Chancellor’s Office to signal the intent to pursue a CTE credential (Figure 1).¹ Registered nursing, emergency medical services (EMS), and licensed vocational nursing (LVN) had the largest student enrollment, although more than 20 different health programs had at least 1,000 CTE degree-bound students during our study period. Overall, we identified students pursuing CTE degrees across more than 40 different health programs.

FIGURE 1
Enrollment in health CTE programs has been increasing



SOURCE: Author’s calculations from CCCCCO data.

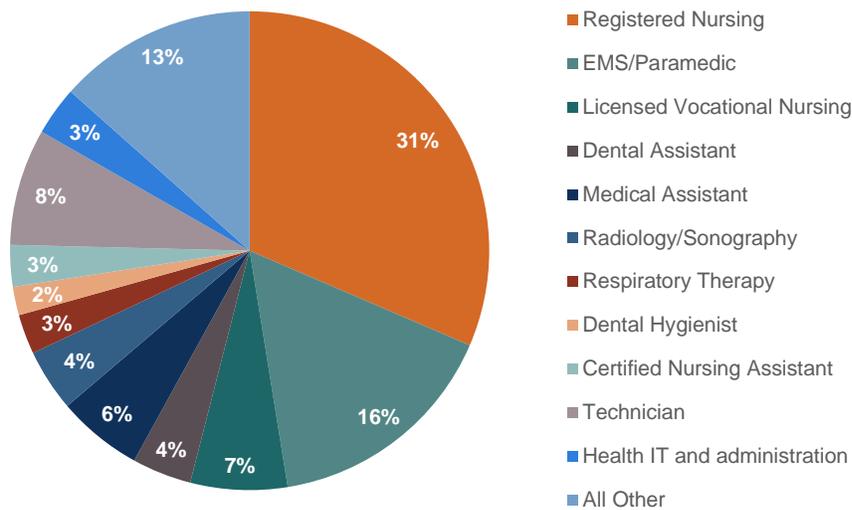
NOTE: See text box and Technical Appendix A for details on defining CTE degree-bound students.

Community colleges offer a range of credentials, from short-term and long-term certificates to associate degrees.² While the three largest programs accounted for about half of students pursuing health CTE degrees during our study period, other programs—including medical assistant, dental assistant, health IT and administration, respiratory therapy, and technician—had 3,000 to 5,000 students pursuing degrees (Figure 2).

¹ We define health CTE-intending students as those who complete at least eight units in a single health program within three years of starting a vocational health program (see Text Box). The student counts presented in this section represent individual students. It is possible that a student may have entered a health CTE program more than once over our 10-year study period, however, for our analysis we only include individual students once reflecting the first instance during our sample period that they met the criteria of taking 8 units in a single health program. See [Technical Appendix A](#) for more information.

² Short-term certificates are defined as those that take less than one year to complete and include certificates requiring less than 18 units, both those approved by the Chancellor’s office and local certificates, and certificates requiring between 18 and 29 units. Long-term certificates typically take between one and two years to complete and include certificates requiring between 30 and 59 units, and 60 or more units.

FIGURE 2
Distribution of health CTE students across programs



SOURCE: Author calculations from CCCC data.

NOTES: Includes all health CTE-intending students entering programs during the 2000 through 2009 school years. “Medical assistant” includes clinical and administrative; “technician” includes psychiatric, pharmacy, cardiovascular, surgical, occupational therapy, optical, and radiation therapy. For details on program enrollments by detailed program categories refer to [Technical Appendix A](#).

Identifying health CTE students

California’s community colleges are open-access institutions and generally do not require students to declare, apply for, or be accepted to a particular program of study—there are a few exceptions, such as registered nursing, and current reforms aim to encourage students to define their educational goals. Nonetheless, currently it is complicated to identify students who start a particular program but do not finish.

We use a strategy similar to that employed by the CCCC and recent work (Stevens et al. 2015) to identify health CTE students based on their enrollment in certain courses. First, we observe students who completed their first vocational health courses sometime between the 2000 and 2009 school years. If a student subsequently earned at least 8 units in a single health program within three years of completing their first vocational health course, we identify him or her as a “health CTE-intending student”. Health programs are defined by 6-digit TOP codes. We have tested this definition and found that lower cutoffs (6 units or 4 units, for example) or more restrictive cutoffs (achieving 8 units in a shorter time), does not materially impact our results. In addition, 84 percent of students who earn a health CTE credential meet this 8 unit criterion.

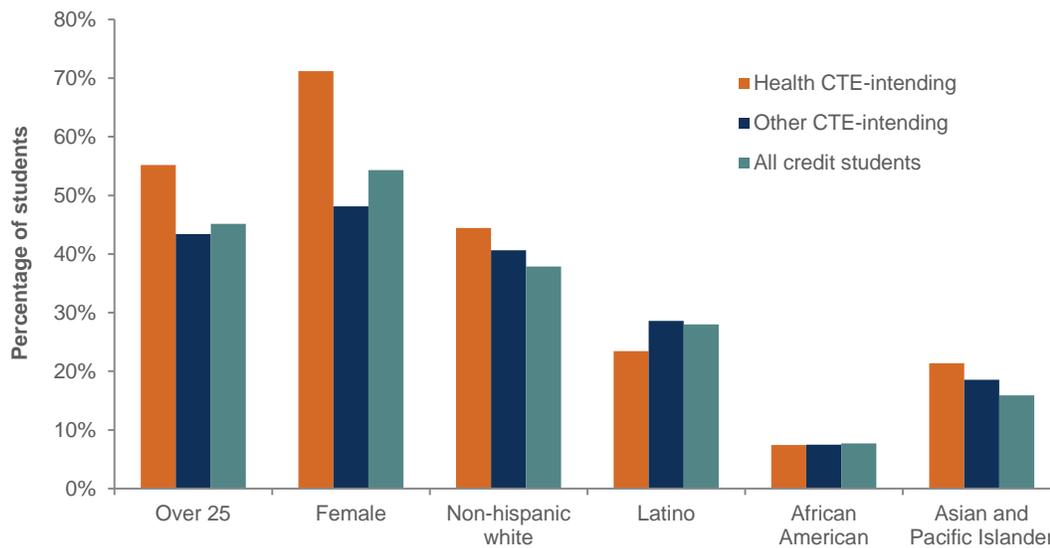
It could be that other students would like to pursue health credentials but never enroll in the initial health CTE courses we observe, either because they have not completed prerequisite courses or because the college they want to attend does not have enough capacity in certain programs. While these issues are discussed further in the text, we generally regard them as outside the scope of this report. See [Technical Appendix A](#) for full details.

Which Students Pursue Health CTE Degrees?

Students who pursue degrees in health CTE programs are older and a higher proportion are women, white, and Asian (Figure 3). About 55 percent of health CTE students were age 25 or older, compared to about 45 percent of all community college students enrolled in credit courses over the same time period. More than seven in ten students enrolled in health CTE programs were women, compared to about 55 percent of all community college students and slightly fewer than half of students in other CTE programs. When we exclude students in nursing programs, the share of women and older students declines slightly but these groups remain overrepresented relative to the general student population.

FIGURE 3

Health CTE students are more likely to be over age 25 and female than other students



SOURCES: Author's analysis of CCCCO MIS data; CCCCO Datamart.

NOTE: Distributions of all credit students are calculated based on averages of student counts of term-level data available from Datamart and do not represent unique individual students over the time period. Health CTE and other CTE student characteristics are, however, based on unduplicated student counts and include students identified as CTE-intending in school years 2000–2009.

There are, however, some differences in student characteristics across programs. For example, while women make up more than 80 percent of students in registered nursing, licensed vocational nursing, and certified nursing assistant programs, fewer than 30 percent of students in EMS programs are women. EMS programs also stand out for their racial composition; white students are overrepresented (comprising 60% of EMS students) while African American students are underrepresented (comprising less than 4%) relative to their shares among all health CTE students ([technical appendix Table A4](#)).

So while health CTE students at California's community college are more diverse than the student population in California's other public higher education systems, they are somewhat less diverse than in other CTE programs or the community college system as a whole, particularly across certain programs. This suggests that there may be opportunities to improve the diversity of students enrolled in health programs.

Health CTE programs serve a wide range of economically disadvantaged students. Nearly 40 percent received a Pell Grant at some point in their community college career.³ And we estimate that 60 percent received a Board of Governors (BOG) fee waiver—which is awarded to low-income students and/or those who receive cash assistance through social safety net programs.⁴ Furthermore, health CTE appears to attract a relatively sizeable share of students identified as CalWORKs recipients.⁵ In fact, if we expand the definition of economic disadvantage to include students who received one or more of these types of aid or were designated as economically disadvantaged for the purposes of receiving Vocational Technical Education Act (VTEA) funds, nearly 70 percent of health CTE students are economically disadvantaged at some point in their community college enrollment.⁶

Academic Preparation among Health CTE Students

Academic preparation plays an important role in boosting program access for disadvantaged students—it also plays a key role in completion, which we examine below. In some respects, students in health programs appear to be better prepared than the overall community college student body, although a large share of students in health CTE programs nonetheless show markers of academic disadvantage.

On average, students pursuing health degrees were enrolled in the community college system for about three academic terms in the three years before they entered the health program. About 30 percent had completed at least 30 units. These students may have been taking preparatory work for health programs and/or had to wait for spaces to open up in their desired programs of study. About 10 percent of students had already earned at least one community college credential before enrolling in a health program, and 20 percent reported earning bachelor's or associate degrees before entering a health program.

Nearly 45 percent of health CTE students took at least one biological science course, such as biology or anatomy, in the three years before they began their health CTE program. And although we find little difference in the number of terms completed across socioeconomic groups of health CTE students, we do find some evidence that more students who are economically disadvantaged attempted and failed common prerequisite courses for health programs such as biology or anatomy compared to those not disadvantaged, which might have affected their choice of health programs. Furthermore, system-wide, students in underrepresented groups are less likely to complete certain coursework such as math and science courses, which could prevent them from entering some health CTE programs.

At the same time, more than three-quarters of students seeking degrees in health CTE programs enrolled in at least one basic skills or remedial education course and nearly 60 percent had been categorized as academically disadvantaged at some point in their community college history.⁷ And the shares of health CTE students with academic and economic disadvantage remain largely the same even when we exclude students in registered

³ While there is no single income guideline for determining Pell Grant eligibility, profiles of students who receive Pell Grants indicate that they have low family incomes. More than 70 percent of Pell Grant recipients nationwide have an annual family income below \$30,000 according to the US Department of Education Pell Grant Year End Report, 2013–14.

⁴ Other social safety net programs include Supplemental Security Income (SSI), General Assistance, or CalWORKs. Authors calculations based on information from CCCCO Datamart, accessed 6/17/16.

⁵ According to CCCCO, approximately 30,000 CalWORKs students were enrolled in each school year during the period 2006–07 and 2008–09, which falls in the middle of our study period. Our sample of health CTE students contains nearly 10,000 students who were identified as CalWORKs recipients at some point during their observed enrollment at California community colleges. Although we define our study period based on enrollments between school years 2000 and 2010, we have student information covering the period from 1993 through 2013. For the purposes of identifying economically disadvantaged students, including CalWORKs, GA, SSI, and other poverty-related makers, we use information across the entire time period to define measures indicating the student ever fell into one of these economically disadvantaged categories.

⁶ Carl Perkins Vocational Technical Education Act of 2006 provided funding for vocational education. Act was revised and reauthorized in 2012, now the Career Technical Education Act (CTEA).

⁷ Academic disadvantage is defined by the community college system and indicates that a student meets at least one of the following criteria: has been on academic probation or dismissal, had enrolled in remediation courses, or had received specialized services to support disadvantaged students.

nursing programs, which because of more stringent entrance requirements may be less accessible to disadvantaged students (see [Technical Appendix A](#)).

Overall we find that a diverse group of students are served by health CTE programs, even if there is room for improvement. We now turn to an analysis of the economic returns of these programs.

Health CTE Degrees Create Economic Opportunity

Many CTE programs, especially health CTE programs, are designed to prepare students for specific occupations—and to provide a route to increased earnings. Many health careers offer salaries well above the norm for community college credentials. Students who receive associate degrees in nursing (ADN) see sizable wage gains after obtaining their degrees, as do students earning other health CTE degrees—such as radiological technicians, dental hygienists, and physician assistants.⁸ In fact, according to the Chancellor’s Office, 18 of the top-25 wage-enhancing degrees are in health.⁹ These statistics point to the potential benefits of encouraging students to pursue high-reward health careers. However, there is a lot of variation across programs. Also, large wage gains for some students do not necessarily signal gains for all. And, of course, a fair share of students fail to complete a credential or transfer. To assess the success of health CTE programs, it is important to examine employment outcomes in detail.

The most important economic outcome for students, of course, is their earning capacity. Many factors affect earnings, and not all are related to completing a degree; that is why looking at average student earnings before and after college is not particularly informative. In particular, individual characteristics—such as ability or drive—are likely to lead to higher earnings regardless of completing a credential. If high-ability students tend to enter certain programs, looking at how much students in those programs earn before and after obtaining a degree tells you more about the students than the training. The ideal way to measure the economic value of a degree is to compare a student’s earnings trajectory with and without a degree. Of course, such a comparison has to be abstract. But the richness of the student information used in this study allows us to approximate it.

We use each student’s earnings trajectory before completing a health credential as a control for all of the characteristics that relate to the student’s underlying ability. At the same time, we compare the earnings trajectory for students who complete a program to those who enter a program but never finish. Both groups of students, in general, have an upward wage trajectory, but the difference between the two tells us how much completing a credential (beyond simply entering a program) increases earnings. Our approach closely follows that of Stevens, Kurlaender, and Grosz (2015), largely replicating their results on our specific sample. See [Technical Appendix C](#) for further detail.

A number of recent studies use similar methods to measure wage returns for vocational programs in various state contexts (Stevens et al. 2015 in California, Dadgar and Trimble 2015 in Washington, Jepsen et al. 2014 in Kentucky). All find that returns increase with length of study and vary substantially by program. This work also consistently finds that health CTE degrees are among the most valuable in terms of increasing employment and

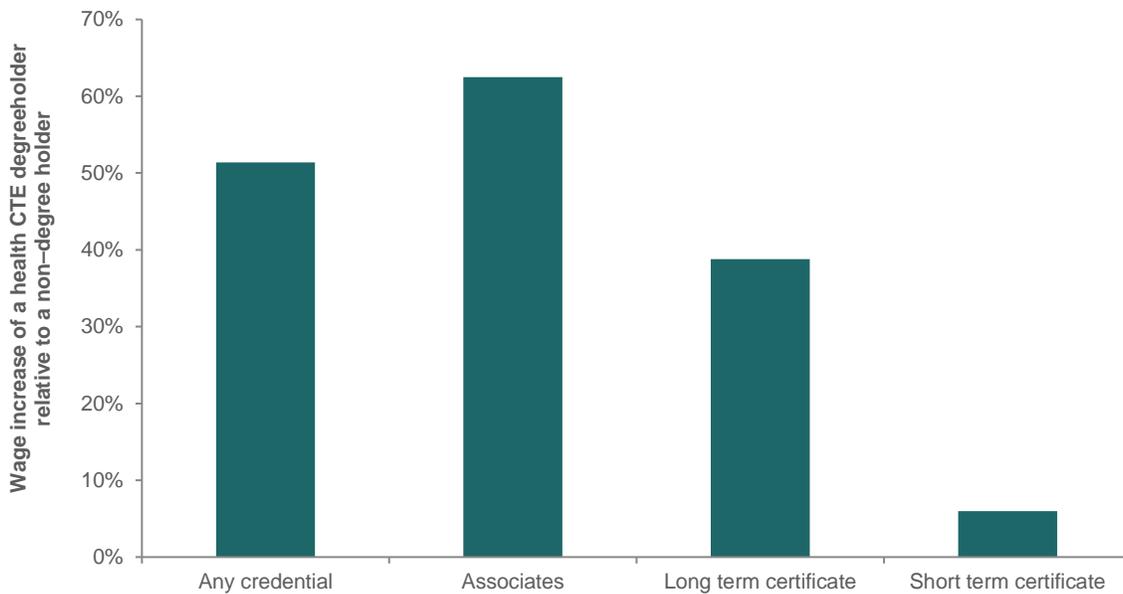
⁸ This is according to wage information made available by the Community College Chancellor’s Office on their Salary Surfer website, which provides information on median wages for students before and after completing awards in specific programs of study. See <http://salarysurfer.cccco.edu/SalarySurfer.aspx>; we accessed these statistics 7/5/16, and they pertain to the cohort of students earning an award between 2004–05 and 2008–09.

⁹ The other top earning certificates are in engineering programs, where, for example, the median student who earns an electrical systems certificate goes from \$69,000 before the award to \$124,000 afterwards. Note, of course, that the higher earnings before this award probably signal a very different student than among the health programs cited. Other top earning engineering awards are similar, with the exception of programs in heavy equipment maintenance.

wage outcomes. While these studies examine wage returns to health degrees based on differing award levels—short-term certificates, long-term certificates, and associate degrees—they typically focus on nursing and do not delve into the differences across other health programs. And while nursing is the largest single health CTE program, 70 percent of health CTE students in California’s community colleges are enrolled in programs other than registered nursing.

On average, health CTE students who obtain credentials increase their earnings 51 percent above both their own earnings before entering CTE training and the wage increase experienced by non-completers (Figure 4). The returns are larger for students who earn associate degrees (63%) than for those who earn long-term certificates (39%). Compared to all health CTE students, those who earn only a short term certificate see a smaller, but positive 6 percent increase in earnings.¹⁰

FIGURE 4
Obtaining a health CTE credential substantially increases earnings



SOURCES: Author’s calculations of CCCCO MIS data.

NOTES: Chart shows the wage increase an individual experiences after completing a health credential, net of the wage increase the average non-completer earned over the same time frame. Specifically, each bar is the coefficient from a fixed effect regression model of the log quarterly wage on year-quarter, age, enrollment, award completion, and student identifier. The universe includes health-CTE intending students who took a first health CTE course between 2003 and 2009 and either completed a credential or did not (transfer students are omitted), and were between age 18 and 54 at start. For students that earned more than one award during the sample period, we measure the effect of the highest award level only. Students are observed (in course taking and wages) from 2000 to 2014, to allow for credential attainment and wage trajectory both before and after. All estimates are statistically significant at the 1% level except for the short term credential return compared to all health CTE-intending students, which is significant at the 5% level. See [Technical Appendix C](#) for more details.

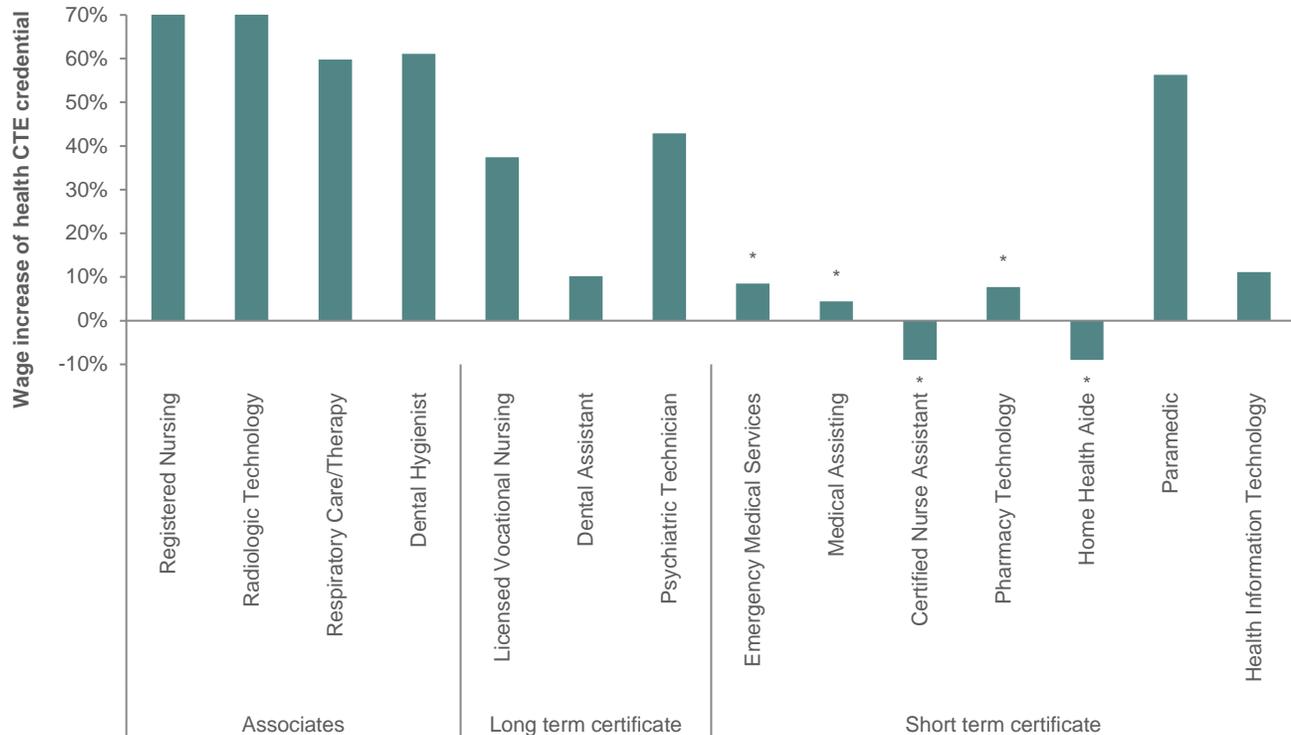
Although the average wage return of a health credential is large and positive, and generally increases along with program length, some long-term and short-term certificate programs equal or outperform associate degree programs. For example, students who complete paramedic certificates typically see wage gains similar to some associate programs (about 56%). The sizeable earnings gain for health CTE programs overall is driven by a

¹⁰ We also compare the earnings gain for students who earn health awards compared to students who enter similar length programs; the results are similar. See [Technical Appendix C](#) for these results as well as numerous additional robustness checks.

handful of programs: registered nursing, radiologic tech, paramedics, respiratory therapy, and dental hygienist. Higher wages in these areas are attributable not just to credential attainment but also industry certification. It is true that educational credentials typically prepare students for certification tests, but we cannot measure the two separately.

Other major short-term credential programs have smaller wage returns than those for most longer-term health CTE programs. In fact, except for health IT credentials, we cannot statistically distinguish the returns from zero.¹¹

FIGURE 5
Earnings gains vary substantially across programs



SOURCES: Author's calculations of CCCCO MIS data.

NOTES: Chart shows the wage increase an individual experiences after completing a health credential, net of the wage increase the average non-completer earned over the same time frame. Specifically, each bar is the coefficient from a fixed effect regression model of the log quarterly wage on year-quarter, age, enrollment, award completion, and student fixed effects. The universe includes health-CTE intending students who took a first health CTE course between 2003 and 2009 and either completed a credential or did not (transfer students are omitted), and were between the ages of 18 and 54 at the start. For students that earned more than one award during the sample period, we measure the effect of the highest award level only. Students are observed (in course taking and wages) from 2000 to 2014, to allow for credential attainment and wage trajectory both before and after. All estimates are statistically significant at the 1% level unless noted. See [Technical Appendix C](#) for more details.

*Note: Results are not statistically significantly different from zero.

Our estimates control for individual characteristics by measuring the growth in earnings *for each student* after he or she earns a health credential. It is possible that certain student groups figure more prominently in the overall positive return—just as certain programs do. But that does not seem to be the case. We find that wage returns are remarkably similar across a wide range of socioeconomic characteristics. Gender, race and ethnicity, signals of

¹¹ These findings hold even when we attempt to grow the sample in various ways. Using more years of data, we still detect only small, insignificant returns to these short term credentials, with the exception of EMS. We estimate an 8 to 10 percent return in earnings for EMS, sometimes statistically significant, depending on the sample.

economic disadvantage (such as receiving Pell Grants or participating in CalWORKs), and the region of the state where the credentials were earned do not appear to affect the return to community college health CTE credentials (see [Technical Appendix C](#) for detailed estimates). This suggests that efforts to increase completion of these programs—for average and for historically underrepresented students—are likely to pay off.

Nonetheless, the choice of which credential to pursue is clearly a huge factor in how much a student’s economic opportunity might grow as a result of pursuing postsecondary education. As we showed earlier, program choice does vary across socioeconomic characteristics, and it turns out that the choice of program has a significant bearing on whether students obtain a credential at all. In order to improve outcomes across all student groups, we need to know more about this and other factors in the completion of health programs.

Improving Completion Rates

Given the dual goal of preparing students for rewarding health careers and meeting the state’s workforce needs, it is crucial to identify factors related to successful outcomes across the health CTE programs throughout the community college system. Registered nursing programs are the largest and most selective—and therefore have high completion rates. But only three in ten health CTE students are in registered nursing programs.

Community colleges are being challenged to improve student outcomes, particularly by increasing the number who earn credentials or transfer to four-year colleges (CCC Student Success Task Force 2012; Metzker and Heiman 2016; Sengupta and Jensen 2006; Shulock, Moore, and Offenstien 2011). The overall completion rate across California’s community college system is only 47 percent. Completion across all CTE programs is slightly higher, at 51 percent—probably because CTE programs are more likely to set shorter-term completion goals, such as certificates, than more general programs.¹²

Recent efforts to improve completion rates culminated in the Student Success Act of 2012, which required changes to enrollment practices, curriculum, and supports that have the potential to help more students complete community college programs across all areas of study. These efforts, along with new initiatives targeted specifically at developing CTE programs, may prove effective in improving completion in health programs. In particular, insufficient course offerings in high-demand programs are especially problematic for CTE programs because courses are more costly to offer (Shulock et al. 2012). This is why nursing programs at community colleges have long received supplementary funding to ensure adequate course offerings, faculty, and other resources needed to meet the state’s nursing workforce needs.

Given the importance of degree completion for students, colleges, and the economy, we now turn to a detailed analysis of completion within health CTE programs. We highlight differences in completion across programs and student groups and measure how student choices might improve the odds of success.

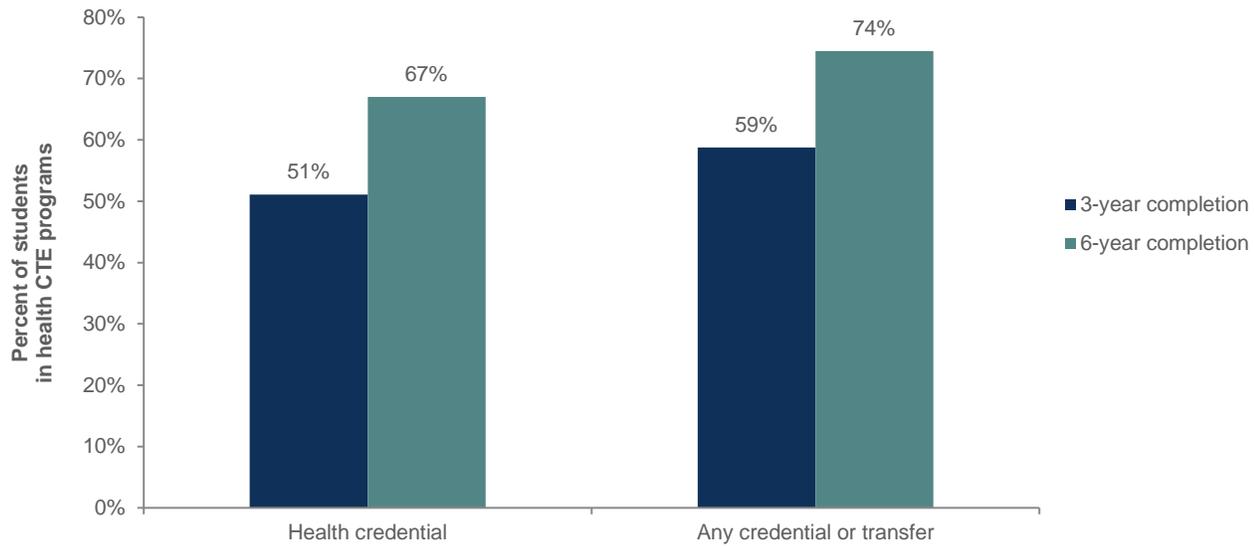
Overall Health CTE Completion Is Relatively High

Among the sample of students seeking degrees in health CTE programs, 59 percent either obtain some type of credential or transfer to a four-year college within three years and slightly more than half earn a credit award in a health program (Figure 6). When we extend the time window to six years after program entrance, completion rates increase—nearly three-quarters (74%) obtain a certificate or degree and/or transfer to a four-year college and

¹² CCCCO Scorecard, accessed 6/17/16. Based on six-year completion for first-time students in 2009–10.

two-thirds (67%) obtain a health credential. While these completion rates are high compared to other CTE programs, the fact that only half of students complete a health degree within three years suggest there may be opportunities to shorten the time to degree, particularly when we consider health students have been enrolled for three terms, on average, prior to beginning their health programs.

FIGURE 6
Most health CTE students get degrees or transfer to four-year schools



SOURCE: Author’s calculations of CCCC MIS data.

NOTE: Completion is measured for all health CTE students who entered programs between school years 2000 and 2009. Both the three-year and six-year completion rates also adjust for colleges not reporting local certificates for certain short-term health programs. See [Technical Appendix A](#) for more details.

Perhaps not surprisingly, the difference between three- and six-year completion rates is driven almost entirely by more students earning an associate degree or transferring to a four year college. Nearly one-third of students who enter a health CTE program obtain associate degrees in a health field or transfer within three years; that share increases to about half of students when we look out six years. The vast majority of students who do complete programs receive associate degrees. Only about 10 percent of health CTE students earn short-term certificates (requiring less than 30 units) as their highest degree and about 13 percent earn a long-term certificate (which requires more than 30 units). These rates remain largely the same regardless of the time window for completion.¹³

Completion Varies across Health Programs

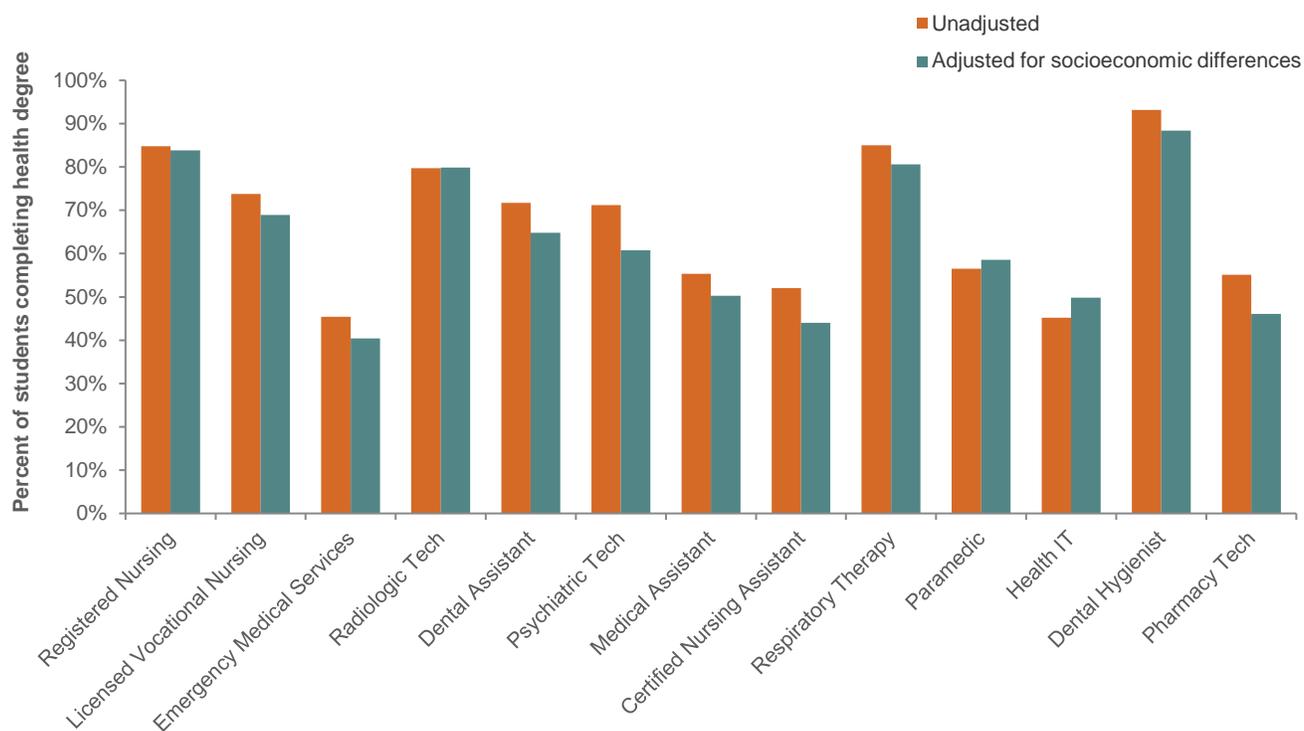
Given the sizable variation in economic returns across health credentials, we now turn to a more detailed look at completion of health degrees across different programs. Figure 7 presents six-year completion rates of health degrees for the largest health CTE programs. The actual or unadjusted completion rates are simply the percentage of students who begin the health CTE program and earn a certificate or an associate degree in a

¹³ An unknown share of short-term certificates (6-18 units) are awarded locally by colleges and are not reported in the CCCC student-level data. For this reason, short term certificate completion may be understated. We examine programs and colleges that have potentially artificially low completion rates due to non-reporting. Excluding these does not substantively affect overall completion rates, however. See [Technical Appendix A and B](#) for more details.

health program within six years.¹⁴ Registered nursing and dental hygienist students have the highest completion rates—85 and 93 percent, respectively—followed by respiratory therapy and radiological technology students. At the other extreme, emergency medical services and health IT programs have completion rates below 50 percent.¹⁵

The composition of students does vary across some health programs in terms of age, gender, ethnicity, as discussed above—and some of these student characteristics are associated with higher or lower completion rates. So to isolate the impact of the choice of health program from the composition of the students enrolled in a program, we hold constant several student characteristics—including age and education level at program entrance, race, citizenship, language ability, as well as economic and academic disadvantage. We also account for the colleges that health CTE students attended. The second set of bars in Figure 7 shows that the relatively large differences in completion rates across programs persist even after adjusting for individual demographic and socioeconomic characteristics and for the college attended.¹⁶

FIGURE 7
Completion rates vary considerably across health programs



SOURCE: Author’s calculations of CCCC MIS data.

NOTE: Unadjusted rates are actual 6-year completion rates for students in our sample of CTE-intending students, according to the program in which they earned the most credits. Adjusted completion rates control for student gender, race/ethnicity, citizenship status, age, education level at program entrance, year of entry, disability status, limited English proficiency, academic disadvantage (as defined by CCCC), economic disadvantage, and the college of attendance. The adjusted rates use the following reference group: White, female, citizen, high school diploma, academically disadvantaged, non-disabled, and not limited English proficient. Students completing only non-health awards or transferring to four year colleges are excluded from this analysis. See [Technical Appendix B](#) for full regression results.

¹⁴ We focus on completion of health awards to examine differences across health CTE programs. The unadjusted and adjusted completion rates presented below do not include students who completed only non-health awards or transferred to a four year college.

¹⁵ Once again, even controlling for potentially locally awarded certificates at select colleges does not alter these conclusions.

¹⁶ See [Technical Appendix B](#) for details on our statistical analysis of completion. Briefly, we estimate linear probability models predicting whether health CTE students complete a health credential within 6 years of entering a program. We control for demographic characteristics and college fixed effects in this first model. Research on California’s Community Colleges suggests that the college students attend affects the likelihood of degree completion above and beyond controlling for individual student factors (Kurlaender, Carrell, and Jackson 2016).

Although there does not seem to be a direct correlation between student socioeconomic characteristics and differential completion rates across programs, there may be an indirect link by way of program admission requirements. Community college courses are generally open access, except in special cases where admission requirements are put in place to allocate resources effectively and maximize returns on investment in certain programs, particularly those that are more expensive to offer. Students need to be prepared for program coursework and have a high likelihood of completing a degree, especially if capacity is limited and many students seek admission. Registered nursing is a prime example—most if not all colleges have strict admission criteria—such as prerequisite courses, minimum GPA, and assessment tests—for these programs.

Because there is no comprehensive accounting of entrance requirements across programs and colleges over time, we cannot systematically assess the impact of program admission criteria on student success. We did, however, analyze qualitative information on several large health CTE programs from community college course catalogs for the 2012–13 school year. Not surprisingly, programs with the highest completion rates—upwards of 80 percent of students who begin programs for registered nursing, respiratory therapy, and dental hygiene earn degrees—do have more rigorous admission criteria than programs such as medical assisting and certified nursing assisting. While this makes sense in terms of ensuring that students are prepared for a program’s coursework, these criteria can prevent many students from accessing certain programs. Because underrepresented students are less likely to be prepared for college, they may be less likely to gain access to high-demand and highly rewarded programs, and this in turn may make it harder to close achievement gaps and diversify the health workforce.¹⁷

To assess the role of academic preparation in differential completion rates across programs, we examine how completion of specific prerequisite coursework before entering a health program and course-taking during a health program predict success. Completing a biology, anatomy, or chemistry class in advance increases the odds of finishing a health CTE credential by 4 to 6 percentage points (Figure 8). This correlation persists regardless of whether a student enters a program with strong prerequisite requirements. We also examine student GPA, another indicator of academic preparation. We find that for each 0.5 grade points higher the GPA, student completion rates increase by 6 percentage points. These findings suggest, not surprisingly, that ability and preparation lead to more successful outcomes.

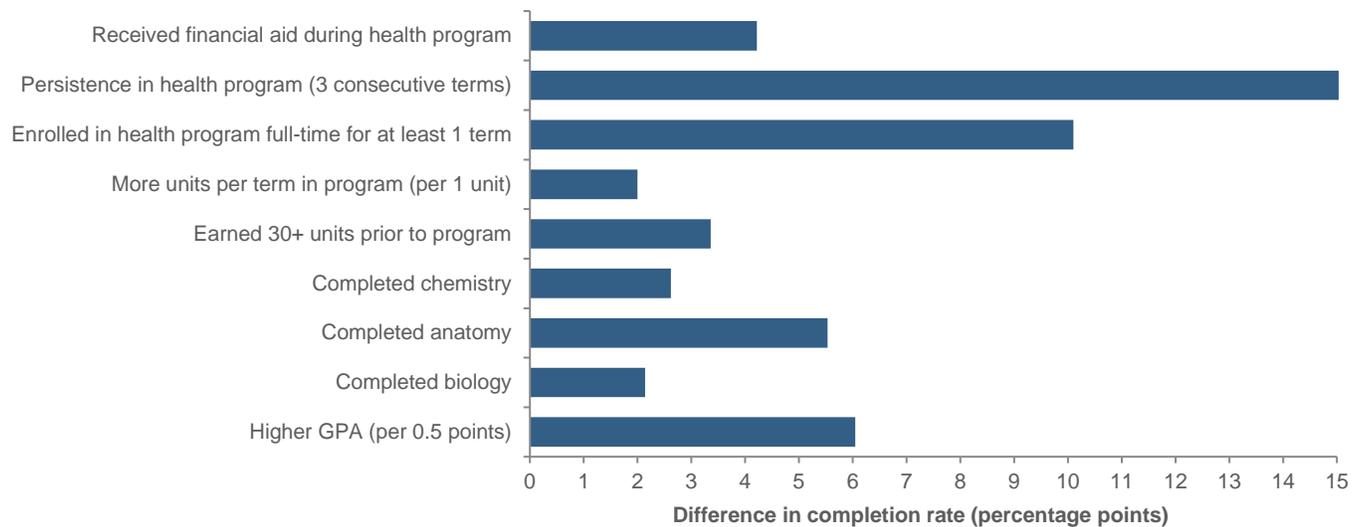
While not all students will maintain high GPAs or complete difficult prerequisite coursework, other student course-taking behavior also has the potential to increase successful completion of health credentials. We examine a student’s credit accumulation (30+ units) and whether he or she took at least one full-time course load or enrolled continuously in at least three terms. These markers are treated by the community college system as intermediate milestones toward earning a credential. We find that earning 30 or more units (often referred to as an indicator of “momentum”) prior to health program entry is correlated with higher completion rates.¹⁸ Similarly, once students enter a health program, the faster they accumulate credits, the more likely they are to complete a health credential. For each additional unit per term, completion rates are 2 points higher. Students who attend full time for at least one term are much more likely to complete as well. Last, those who enroll in at least three consecutive fall/spring terms once they enter a health program are substantially more likely—on the order of 15 points—to obtain an award. These students are often referred to as showing “persistence.” These relationships between student course-taking behavior and completion suggest that efforts to improve persistence and momentum could yield sizeable gains.

¹⁷ Indeed the community college system has been assessing the impact of admission criteria and assessment tests on the racial/ethnic composition of students in nursing programs: see, for example, California Community Colleges Chancellor’s Office, *Nursing Education Programs* (2010).

¹⁸ Because many health programs we evaluate require less than 30 units to complete, we do not measure momentum for students *during* the program, but rather focus on the prior enrollment period.

A student’s ability to attend full time or to quickly accumulate credits toward a degree may very well depend on whether he or she needs to work while attending school. Financial aid programs that serve health CTE students may boost student success. Indeed we find that health CTE students who receive aid during their studies are more likely to finish. Specifically, completion rates are 5 points higher for those who received some financial aid during their health CTE program compared to those who do not.

FIGURE 8
Prerequisite courses, momentum, and financial aid predict successful completion



SOURCE: Author’s calculations of CCCC MIS data.

NOTE: Results from a regression model of completion that controls for the socioeconomic factors (age, race, prior education, entry year, language, disability, citizenship status, economic disadvantage and academic disadvantage), college, program, and these variables. All coefficients shown are statistically significant at the 1% level. See [Technical Appendix B](#) for full model specification and results.

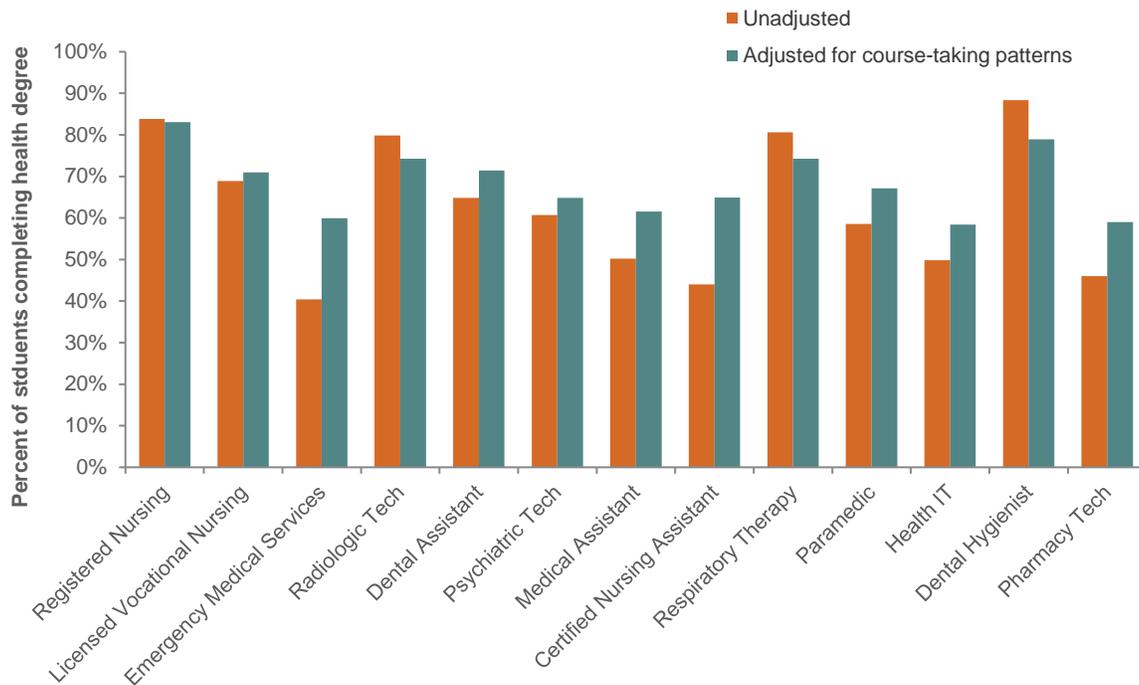
Given the strong relationships between student preparation and course-taking behavior, we next examine how these factors contribute to differential completion rates across programs. For example, do differences in student GPA or full-time attendance across programs explain the variation in completion rates? Figure 9 compares actual completion rates by program to rates that are adjusted for preparation and course-taking behavior.

For programs with relatively high completion rates, adjusting for student course-taking or academic achievement does not substantially shift attainment rates. This suggests that most students in these programs are already exhibiting course-taking behavior that is likely to lead to completion. Nonetheless, a small fraction of students in these programs do not obtain degrees. While certain student services like counseling and tutoring might explain some of the remaining non-completion, personal circumstances and choices also likely factor in for these students.

When we make these adjustments for programs with relatively low completion rates, the likelihood of students completing a health degree increases substantially. This reflects differences in the odds that students attend full time, maintain higher GPAs, persist across terms, and the like. If course-taking patterns across all programs were more similar, completion rates would be much less variable than they actually are. These rates would range from a difference of nearly 50 points (the gap between EMS programs and dental hygiene programs) to less than 20 points.

FIGURE 9

Differences in completion rates across programs are mitigated once we account for course-taking behavior



SOURCE: Author’s calculations of CCCC MIS data.

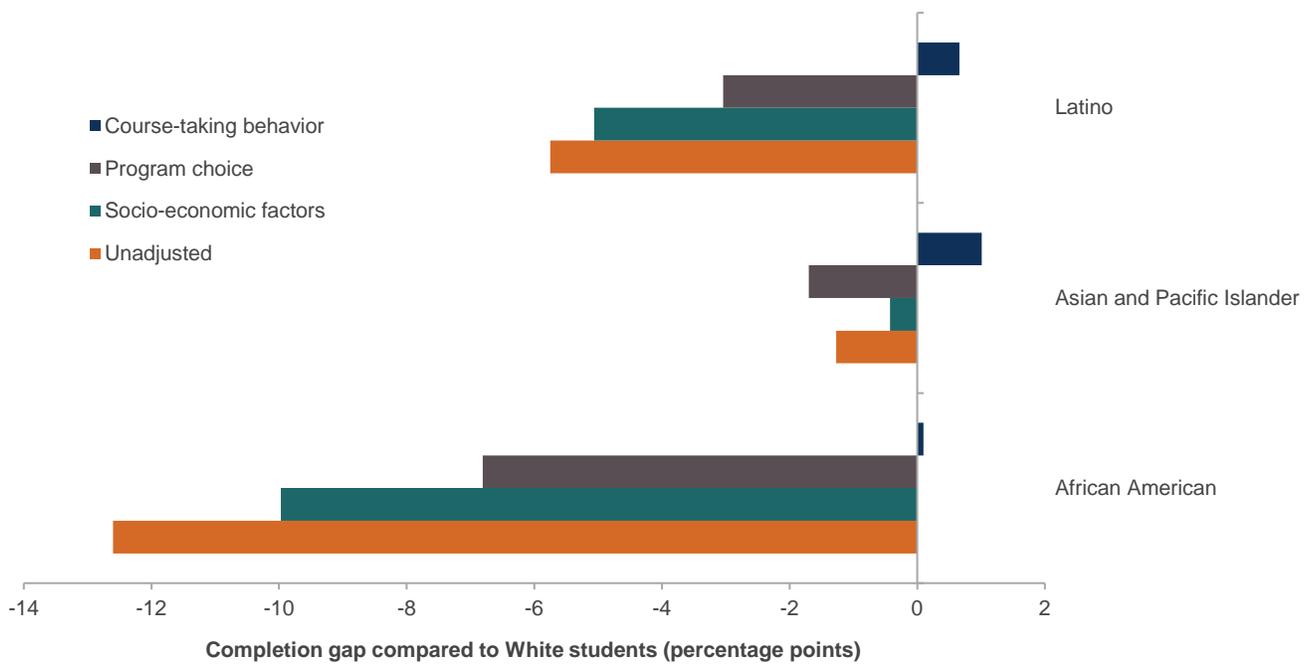
NOTE: Unadjusted completion rate is the 6 year completion of a health credential for our health CTE student sample; students completing only non-health awards or transferring to four year colleges are excluded. The second set of bars adjust for student characteristics and course-taking before and after entering a health CTE program using regression models. All models include the socioeconomic factors shown in previous chart (age, race, prior education, entry year, language, disability, citizenship status, economic disadvantage and academic disadvantage). Completion rates are shown for the reference categories as above and achieving academic markers including enrollment in three consecutive primary terms (persistence), full-time enrollment in at least one term, and sample averages for GPA and average number of units per term. See [Technical Appendix B](#) for full model specification and results.

Examining the Racial Achievement Gap in Health Programs

Improving completion among underrepresented minority students is of particular interest, both as an important aspect of increasing degree attainment overall and as a way of diversifying the health workforce so that it better reflects and serves an increasingly diverse population. While we do find sizable achievement gaps between white and African American—and, to a lesser degree, Latino—students before adjusting for other student characteristics, we are able to explain these gaps once we control for socioeconomic factors, program choice, and course-taking behavior (Figure 10).

FIGURE 10

Achievement gaps across racial/ethnic groups are explained by health program choice and student course-taking



SOURCE: Author calculations using CCCCO MIS data.

NOTES: Chart shows difference in completion rates across race/ethnic groups (relative to white students) controlling for various independent variables, as described in text. Each bar plots the coefficient from a regression model adding successively more independent variables. See [Technical Appendix B](#) for more details. All models also control for college attended.

After controlling for socioeconomic factors (age, citizenship status, educational level, and economic disadvantage), the completion gap between white and African American students is reduced by about 2.5 percentage points and the gap between white and Latino students by nearly 1 point. The fact that students of different racial groups tend to choose programs with varying completion rates also explains a portion of these achievement gaps. Program choice explains more than 3 points of the completion gap between whites and African Americans, and 2 points of the white-Latino gap. Course-taking and achievement seem to account for the remaining completion gaps across racial/ethnic groups. In fact, the completion gap is eliminated when we adjust for momentum and persistence, full-time enrollment and higher average units per term, and receiving financial aid.

These results suggest that efforts to improve completion outcomes for all students, but particularly for underrepresented students, will be most effective if they can enable students to devote more time to their courses of study and performance after they have entered a health program. Such efforts can and do take many forms, from increased financial aid, to more course sections, to advising and other types of student support. Identifying programs of study and degree goals in order to support completion pathways once a course of study is initiated could prove particularly beneficial.

Opportunities for Students without High-Value CTE Credentials

Although some programs are more likely to lead to higher wages than others—and there are systematic differences in completion across programs—students who choose a low-return program or fail to obtain a credential do not necessarily lack economic opportunity. One potential benefit to pursuing health CTE training is the chance to move into the health care industry, as an entry point to career ladders that—with additional training or experience—might pay off in the long run.

Are students who pursue health CTE training at California’s community colleges able to migrate into the health care industry? Slightly more than 25 percent of students were employed in the health care industry before they enrolled in a health CTE program. A similar share were employed in either the food services or retail industries. Within the three-year period after enrollment in a health CTE program, about 60 percent of students in our study sample were working in the health care industry. While employment in the industry is not necessarily tied directly to specific training (e.g., hospitals hire janitors and nursing homes employ cooks), the substantial shift in industry indicates a real change in employment situation regardless of whether students obtained credentials.

TABLE 1
Industry of employment for health CTE students, pre- and post-enrollment

Industry of employment	Pre (3-yr period before health CTE enrollment)	Post (3-yr period after health CTE enrollment)
Health care and social assistance	26.0%	60.7%
Hospitals	9.2%	31.7%
Ambulatory health services	9.4%	18.9%
Nursing and residential care	4.4%	6.9%
Accommodation and food service	13.6%	3.7%
Food services and drinking places	12.3%	3.1%
Retail trade	18.7%	5.5%
General merchandise stores	4.4%	1.3%
Food and beverage stores	3.4%	1.0%
Administrative and support services	6.2%	4.2%
All other industries	35.5%	25.9%
Total	100%	100%

SOURCE: Author calculations using CCCCO MIS data.

NOTES: The industry analysis is restricted to students who entered a health CTE program in years 2003 through 2009. We create three distinct 3-year periods for all students entering in these years. The first period includes the 3 years prior to entrance (Pre-period), the second period includes 3 years from the time of program entrance (during) which is not shown in the table, and the third period captures the 3 years following the second period (Post). Students may have enrollments during all of these periods and students may not complete a degree within 3 years of program entrance, if ever. Student employment is categorized by the industry in which they earned the highest aggregate wages in each 3 year period. Industry definitions are based on NAICS code at the 2-digit and 3-digit levels.

Furthermore, students who shifted into the health care industry show more improvement in earnings than those who did not—regardless of whether they completed a program (Table 2). Among all health CTE students, average quarterly earnings in the three year period prior to entering a health training program were \$2,607, and quarterly earnings increased to \$8,433 in the three years after the program for an average total earnings increase of \$5,826.

The median increase in earnings was \$7,063 for CTE students who made this shift, and higher for those who completed a degree (\$8,661) compared to non-completers (\$4,435). Even among non-completers who moved into the health care industry, earnings increases were larger (\$4,435) compared to other non-completers who did not shift into health care (\$2,694). Unlike our previous analysis of wages, these comparisons do not factor in individual factors.

TABLE 2

Wage gains are greater for students who shift into the health industry after enrolling in a health CTE program

Employed in the health industry? (pre/post-enrollment)	Change in quarterly student wages		
	All employed health CTE students	Degree or certificate (3-year)	No degree or certificate
Health industry / Health industry	\$7,969	\$9,550	\$4,303
Health industry / Non-health industry	\$4,431	\$8,149	\$3,261
Non-health industry / Health industry	\$7,063	\$8,661	\$4,435
Non-health industry / Non-health industry	\$2,712	\$3,516	\$2,694

SOURCE: Author calculations using CCCC MIS data.

NOTES: Only students who entered health CTE programs in school years 2003 through 2009 are included so that all students can be observed for a period of 3 years prior to program enrollment, 3 years during program enrollment, and 3 years after program enrollment. The sample of health CTE students included in the industry analysis is 78,417 with 52,626 students earning a degree and 25,791 who did not earn a degree. Degree completion refers to 3 year completion; students may still be enrolled in the program in both the 3 year pre and post enrollment periods. Industries defined based on 3 digit NAICS code for the industry with the highest aggregate wages during the 3 year period defined prior to entering the program and the 3 year period after program enrollment. Changes in wages are calculated based on the change in median quarterly wages between the pre and post periods. All dollar amounts are adjusted for inflation.

Our analysis shows that pursuing health CTE credentials pays off for students generally but is especially beneficial to those who obtain awards in longer-term programs and those who enroll in certain technical subfields. Nonetheless, even for students who do not complete a program or who obtain a lower-value credential, health CTE programs may afford opportunities to move into the in-demand health care industry. Whether that pays off in the long run depends on subsequent choices—an understudied issue that we plan to explore in future work.

Conclusion

Health CTE programs at California’s community colleges hold promise for students in the state. Many fields—even those outside registered nursing—offer students the opportunity to substantively improve their economic standing. The odds that students will obtain credentials in health programs are often much higher than in other community college programs. However, there is room for improvement—especially given the dual goal of meeting workforce needs and setting more students on a path to upward mobility.

Students who enter health programs are not substantially different from the overall student population—except that they are more likely to be older, female, and not in underrepresented minority groups. Large shares of both health CTE students and the overall student population are economically or academically disadvantaged. These socioeconomic markers are correlated with completion rates, but their effects are largely explained by academic preparation (in terms of specific coursework), intermediate milestones that indicate momentum and persistence, and access to financial aid.

The largest predictor of program completion is whether students attend full time once they enter a health program or attend consecutive terms. This is particularly true for Latino and African American students, which suggests that current and proposed reforms to encourage student progress are well targeted and may help the state create more diversity in the health workforce. State efforts to cover the full cost of schooling so that students can attend full time could help more students complete high-value health credentials.

Considering that students who complete health CTE credentials increase their earnings 51 percent, on average, the economic return for policymaker and practitioner efforts to improve completion is quite large. The roughly 31,000 health CTE students who started a program during our study period but did not complete or transfer within six years would have earned an additional \$10,200 per year (on average) had they obtained credentials. In total, the net additional earnings would have amounted to nearly \$320 million per year.¹⁹ In addition to improving the economic standing of individual students, these gains would have had economic value to the state in terms of meeting health workforce needs.

It is important to note that these earnings gains are not spread evenly across programs. Lower wage returns for many short-term credentials may call into question the value of offering these programs, particularly those that enroll large numbers of students. However, the sizable growth in short-term health degrees conferred by for-profit colleges—which tend to cost more than similar programs at community colleges—indicates that there is significant demand for some lower-return programs.

Given this demand for training, providing lower-cost options for students wishing to pursue shorter-term degrees could be an important way for community colleges to help more Californians embark on career pathways in the health care industry. In fact, this is the subject of our [companion report](#). Regardless, earning a credential is the first step to increasing earnings and/or moving along a career pathway, and more students could be taking this important step. By combining information on which programs offer better completion rates and increased earnings, students as well as colleges can make more informed choices. At the same time, there appear to be many policy levers—some of which we have outlined here—that could improve student outcomes in CTE programs.

¹⁹ These calculations are rough estimates based on our calculated 6-year completion (or transfer) rate, the number of students who begin programs between 2000-2009, the average wage return for health credentials, and assume \$20,000 in median annual earnings prior to obtaining a health credential (estimate based on Salary Surfer statistics accessed 10/22/16).

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ABOUT THE AUTHORS

Sarah Bohn is a research fellow at the Public Policy Institute of California. A labor economist, her work focuses on how policy affects individual and family economic well-being, with particular attention to low-income and vulnerable populations. Her current work addresses poverty and inequality in California, the role of safety net policy, and the workforce skills gap. Sarah's work has been covered by major media outlets including the New York Times, The Economist, and the Washington Post and has been published in academic journals including the American Economic Review, Demography, and the Review of Economics and Statistics. She holds a PhD in economics from the University of Maryland, College Park.

Shannon McConville is a research associate at the Public Policy Institute of California. Her research interests include health care access, utilization, and outcomes among vulnerable populations. Her current work focuses on examining safety net programs, health workforce training needs and capacity, and the effects of the Affordable Care Act in California, including the opportunities for and impact of health insurance coverage for the jail population. Before joining PPIC, she was a research training fellow in the Health Services and Policy Analysis doctoral program at the University of California, Berkeley; a senior research associate at the Department of Health Research and Policy at Stanford University; and a project manager at the Lewis Center for Regional Policy Studies at the University of California, Los Angeles. She holds an MPP degree from the University of California, Los Angeles.

Landon Gibson is a former research associate at the Public Policy Institute of California, where he focused on health policy and safety net programs. Before joining PPIC, he was a research assistant at the University of California, Irvine, where he studied the mechanisms of cigarette addiction, and he was a quality assurance data analyst at a community health clinic. He is pursuing his master's degree in public health at the University of California, Los Angeles, and holds a BS in biological sciences from the University of California, Irvine.

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