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# Health Training Pathways at California's Community Colleges



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

California's Community Colleges train a substantial share of the state's health care workforce. They also provide pathways for students to demonstrably improve their economic outcomes. Recently, policymakers at the state and national levels have devoted attention to career pathways in vocational programs, also known as career technical education (CTE). Although these pathways are of great policy interest, and health training in particular holds much promise, they are not clearly defined and there is little information about their prevalence or success. To fill this informational gap, we assess the likelihood of health students in California's Community Colleges obtaining multiple credentials with a focus on those who earn successively more valuable credentials. Our aim is to identify health training pathways or stackable credentials that students are pursuing and isolate the economic gains to completing them.

- Most students (87%) who complete health CTE programs earn only one award. The rate of reenrollment does not vary substantially across demographic groups, though men and historically underrepresented minority groups are slightly less likely to reenroll than other students.
- Nearly half of health students earn a short- or long-term health certificate as their first award. Earning an additional credential could substantially improve these students' economic outcomes, but relatively few do go on to receive another credential—this share has risen from 18 percent to about 23 percent in the past decade.
- The most common pathways in health begin with either a long-term certificate in licensed vocational nursing or a short-term certificate in a certified nursing assistant, medical assistant, or emergency medical services program. The vast majority of completed pathways lead to an associate degree in nursing.
- The long-run wage returns to students with multiple credentials who start with relatively short-term ones that offer low economic returns are similar to those of students who initially earn high-return credentials. But multiple-award pathways take more time, and students forego earnings along the way or may fail to complete a pathway for various reasons.
- Among those who do reenroll to pursue a second credential, rates of completion are lowest among male, Latino, and African American students, as well as students identified as academically disadvantaged. Improving access to full-time course-taking and increasing use of financial aid are the most consequential levers for increasing completion of a health pathway.

These findings suggest that many of the ongoing efforts to boost student success and close achievement gaps in the community college system are likely

to improve completion for students in health pathways. However, targeted efforts could address the needs of students who set out on health pathways. These efforts may involve reaching out to students—and engaging their employers—once they have earned a credential, as well as addressing the challenge of balancing training and career-level employment. Our findings suggest that such outreach could have sizeable economic returns for students. Finally, given the small share of students who earn multiple credentials and the limited number of programs they are in, developing pathways in other valuable health programs could maximize the economic mobility of California’s CTE students.

## Introduction

In recent years, state and federal policymakers have renewed their focus on—and investment in—career technical education (CTE) and “career pathways” as policy levers for meeting workforce demands and also for providing opportunities for disadvantaged students to improve their economic outcomes. Health programs at community colleges—which have well-established progressions toward high-paying occupations—are an area in which such efforts could be highly effective. However, very little is known about whether or how the student population pursues the full set of potential pathways. In this study, we use longitudinal student data from the California Community Colleges to analyze credential progression in health fields. We provide information on the likelihood of health CTE students pursuing—and obtaining—multiple health credentials. We also examine how these students fare in the labor market, as a way of assessing the economic promise of health training pathways.

California’s 2016–17 state budget allocates an additional \$200 million in General Fund resources to support creating, expanding, and aligning pathways in career technical education at California’s community colleges.<sup>1</sup> Creating more effective career pathways was also a rationale for recent revisions to federal workforce legislation.<sup>2</sup> These efforts reflect a growing awareness that although higher education today provides opportunity for advancement, more students would benefit if career pathways were better defined and articulated. In general, the focus of career pathway development may be on training in high school, in community college, or both, but the end goal is to prepare students for technical or vocational careers. A career pathway could be relatively short (a year or less of training to acquire specific career-relevant skills) or it could entail multiple community college–level credentials in a long-term career trajectory. In this report, we focus on the latter, assessing the outcomes of students after they have earned at least one health CTE credential in California’s community college system.

In related research, we have identified strong returns to obtaining CTE credentials in health programs in California (Bohn, McConville, and Gibson 2016). The largest payoff comes from longer-term awards (40% to 60% wage increases for a year or longer credential), but short-term awards do have positive labor market returns (6% wage increases). We also found that the benefits to students obtaining credentials vary substantially across programs, and many students do not enter high-value programs. Furthermore, about one-quarter of students who enter a health CTE program fail to obtain any credential. Those who do not obtain credentials may still benefit from CTE training; even if their wages do not increase substantially, these students might be able to shift to the health care industry, which may open up a wider range of long-term career possibilities and motivate some to pursue additional training. These possibilities hinge on the ability of students to return to college and build upon their credentials.

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<sup>1</sup>Funding supports the Strong Workforce Program; additional resources support the Career Technical Education Pathways Program, administered by both the California Community Colleges and the California Department of Education.

<sup>2</sup> The *Workforce Innovation and Opportunity Act*, signed in 2014.

## Data and definitions

To assess the pathways of students in health programs in California’s community colleges, we use longitudinal student data maintained by the Chancellor’s Office. These student records contain basic demographic information about students as well as courses completed (or attempted), grades, and awards received and cover the period from 1993 through 2015. We focus on students who obtained their first health award between the school years 2000 and 2009 so that we can observe six year completion windows in which all students have the same length of time to complete a pathway.

We categorize health awards into categories based on the length of time it takes to complete them. Short-term certificates are obtainable in less than a year; the most common short-term health certificates are awarded by emergency medical services, certified nursing assistant, and medical assistant programs. Long-term certificates are typically obtained in 1 to 2 years; the most common long-term certificates are awarded by licensed vocational nursing, psychiatric technician, and dental assistant programs. See the [technical appendices](#) for full details.

In this report, we examine the prevalence of such educational trajectories. Because increasing opportunities—both educational and economic—for disadvantaged and underrepresented students is a key policy goal, we also examine the demographic composition of students pursuing various pathways. Although underrepresented students are relatively well represented in health programs, a high proportion enter short-term, low-return programs. If health CTE training is to provide an opportunity for upward economic mobility, it is particularly important for these students to earn multiple credentials.

## Profiling Health Pathways at California Community Colleges

One way of approaching CTE career pathway development is to look at the acquisition of multiple credentials that qualify workers for successively higher-skill jobs. These multiple credentials, often referred to as “stackable,” are defined by the US Department of Labor as “a sequence of credentials that can be accumulated over time to build up an individual’s qualifications and help them to move along a career pathway.”<sup>3</sup>

Many health careers are based on a clear progression of skills linked to successive credentials and certification. Nursing programs are the most common example: students can progress toward a registered nursing (RN) associate degree by completing programs such as certified nursing assistant (CNA) and licensed vocational nursing (LVN). However, only one-fifth of health students at California community colleges embark on these pathways. Instead, many students obtain credentials from a range of other programs—most commonly medical assistant (MA) and emergency medical services (EMS) programs. While these credentials may not offer the strictly defined pathways to higher-level degrees that nursing programs provide, they do offer training that can serve as a first step toward other health degrees.

To better understand how health pathways work in California, we need to examine the number of students who complete multiple health credentials as well as those who complete successive longer-term credentials in different

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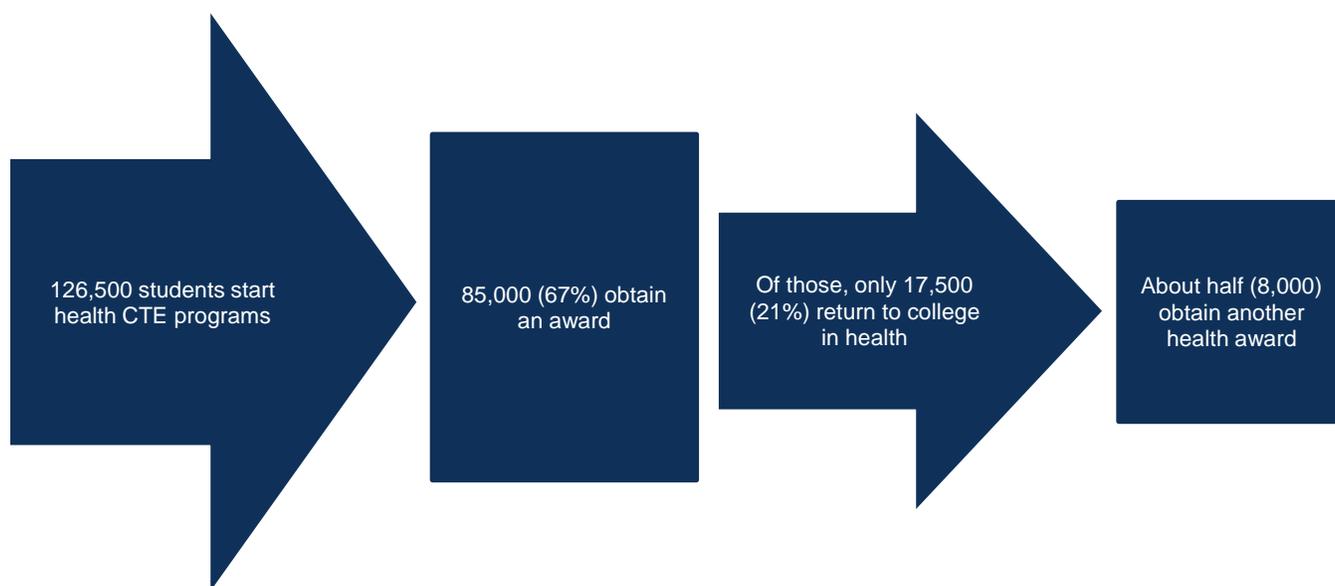
<sup>3</sup> US Department of Labor [Training and Employment Guidance Letter 15-10](#).

health subfields. In practice, students do not follow linear career ladders; they may obtain credentials (or accumulate course credits) in fields as disparate as nursing and engineering, or they may obtain multiple credentials in the same sub-field. Our aim is not to examine outcomes for students who change course but to better understand both successful navigation and stalled progress along health training pathways.

We consider four consequential steps along a potential career pathway in health: (1) beginning a health program;<sup>4</sup> (2) completing an initial health CTE award; (3) enrolling in additional health CTE courses after the initial award; and (4) earning a second (or third, fourth, etc.) health CTE award. These steps are summarized in Figure 1, which also estimates the scale of progression along health pathways using detailed student information covering the period from 2000 to 2015 (see text box above).

**FIGURE 1**

Only a small share of health CTE students obtain more than one credential



SOURCE: Author calculations from CCCCO MIS database.

NOTE: All estimates pertain to students who could have earned a health award between 2000 and 2009 and do not subsequently transfer to a four-year college. We define starting a health program as obtaining at least 8 credits in a single program within 3 years. The estimate of the count of students who start health CTE programs shown here is obtained by applying the completion rate of health-intending students (see Bohn et al. 2016) to the base estimate of health awards over the study period. To count a student as returning to a California community college after obtaining his/her first health award, we must observe that student completing additional health CTE units within three years. We allow a six-year window for completing a subsequent health credential. The final estimate includes roughly 2,500 students who complete multiple health awards but no observable course-taking between the first and second award.

To better understand why some students do not proceed along pathways, we delve into the details of steps two, three, and four. Step one is the focus of a related report (Bohn, McConville, and Gibson 2016), which examines the number of students who obtain initial health awards and the factors that are most likely to improve completion rates.

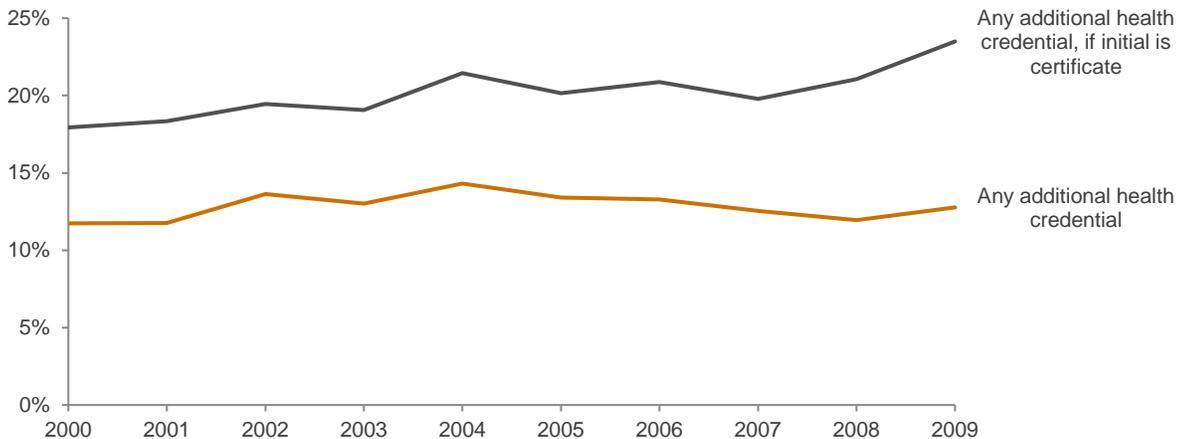
<sup>4</sup> Note that community colleges are open-entry and most programs do not require students to matriculate. Therefore, we use student course-taking behavior and credit accumulation within narrowly defined programs to signal intention. See our related report (Bohn, McConville, and Gibson 2016) for more detail.

## Few Obtain Multiple Health Credentials

Of the nearly 85,000 students who completed a first health CTE credential between 2000 and 2009, only about 13 percent earned a second degree within six years.<sup>5</sup> Figure 2 shows that this share has remained relatively flat over time (orange line).

**FIGURE 2**

Few health students obtain multiple credentials, but the share is higher and increasing among students who start with short-term certificates



SOURCE: Author calculations from CCCCO MIS database.

NOTE: The year denotes the date of the student's first health award, but we observe students for six years after that date to obtain completion rates for additional health credentials.

It is important to account for the fact that California's community colleges offer a wide range of health programs that confer various types of credentials, and some students enter and complete high-value credentials from the outset. Slightly more than half of students earned an associate degree as their first award – with roughly one-third completing an associate degree in nursing (ADN), one of the highest-value credentials that can be obtained in the community college system. These students are unlikely to take the next step along a career pathway at a community college.<sup>6</sup>

If we focus on students who earn other credentials, the likelihood of completing multiple awards is slightly higher (Figure 2, grey line). Specifically, we identify students whose first health award is either a short-term or long-term certificate (which can be obtained in less than a year or more than a year, respectively).<sup>7</sup> Twenty percent of these students return to obtain additional health credentials, a still small, but larger, share than among health students overall. Over time, the multiple credential rate has increased slightly, from 18 percent in 2000 to 23 percent in 2009. This modest improvement may reflect increasing efforts at the community colleges to direct students along multiple-credential pathways.

The low rate of multiple award completion, even among students who first earn less than an associate degree, arises from, first, a relatively small share returning to college after their first award, and second, a small share of

<sup>5</sup> We exclude students who transferred to a four year college after their first health degree because we are interested in their subsequent enrollment and degree completion and we do not have access to that information for those students who transfer.

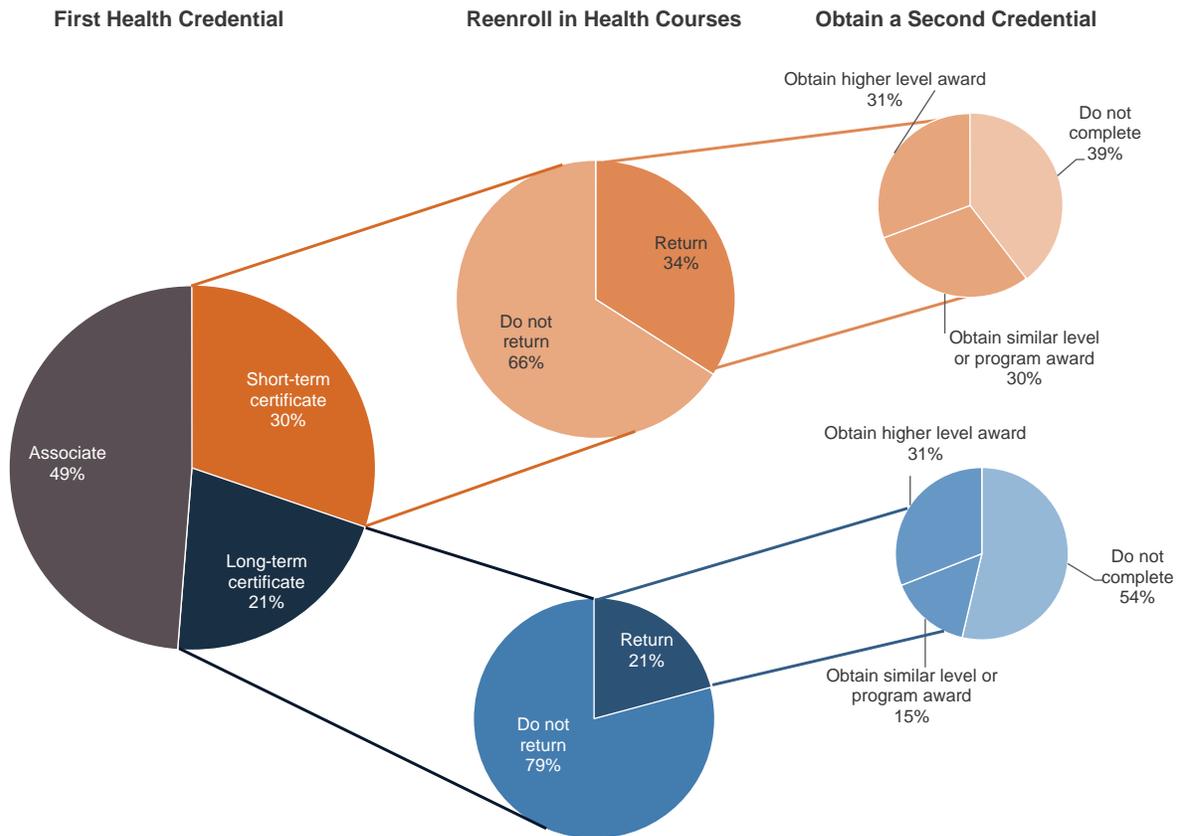
<sup>6</sup> Nonetheless, even students who first earn an associate degree in health sometimes return for additional training. We estimate that 5 percent of students whose first health award is an associate degree obtain additional health credentials within six years; for those who first earn an associate degree in nursing, that percentage is 2.

<sup>7</sup> Short-term certificates are those completed in less than a year and include degrees completed that require less than 18 units, and certificates of 18–29 units. Long-term certificates include those that require 30–59 units and 60+ units.

those who do return obtaining a second credential (Figure 3). Fifty-one percent of initial health awards are short-term or long-term credentials. Only 34 percent of students who first earn a short-term credential return to a community college and reenroll in health courses, and only 21 percent of students with a long-term credential reenroll. Furthermore, of those who do return, 39 to 54 percent fail to complete a second health program.

**FIGURE 3**

Most health students do not return to college—and many who do return do not obtain additional credentials



SOURCE: Author calculations from CCCCO MIS database.

NOTE: All estimates pertain to students who earned a first health award between 2000 and 2009 and do not subsequently transfer to a four-year college. To count a student as returning to a California community college after the first health award, we must observe that student completing additional health CTE units within three years after completing a first health award. We allow a full six-year window for the subsequent credential. The final breakdown of students who obtain a second credential excludes roughly 2,500 students who earn multiple health awards with no discernable course-taking between the first and second award. The second award is counted as higher level if it requires more units and is in a different program than a student’s initial award.

These estimates clarify the kind of interventions that might result in more students completing pathways: increasing the share of students who return to college after an initial short-term degree, and increasing the share of students who successfully complete a subsequent, higher-level award. As Figure 3 illustrates, there may be important differences across programs, given that rates of return to college and completion vary according to program length. Some of these differences may be attributable to the labor market value of certificates, the characteristics of students who obtain them, or program trends. We now attempt to disentangle these factors so that colleges might have better information for targeting ongoing reform efforts.

## The First Step in Most Health Pathways Is a Short-Term Credential

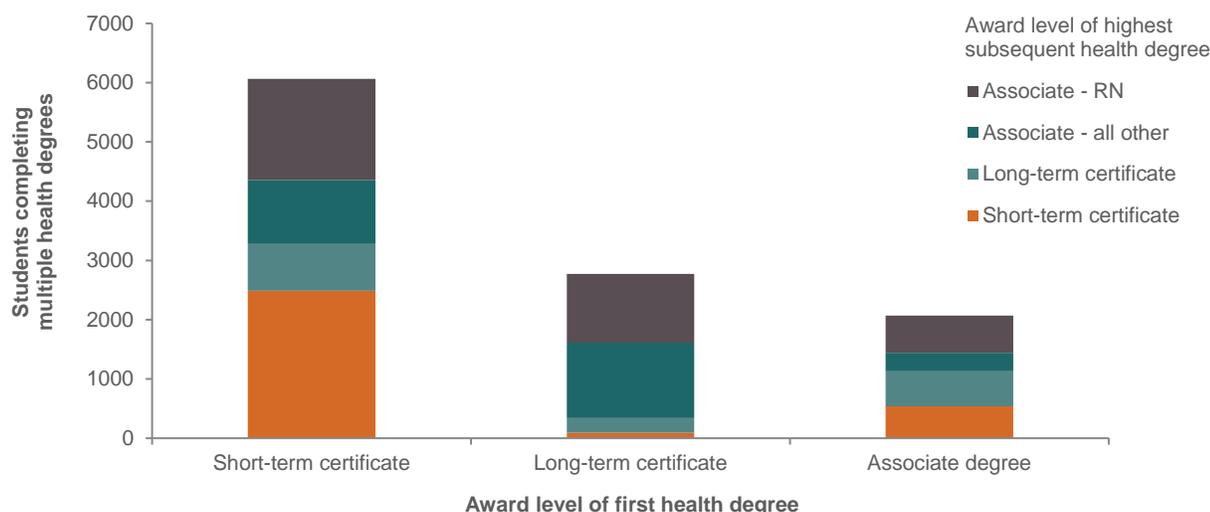
In order to increase the small share of health CTE students who earn multiple credentials, we need a better understanding of the most commonly completed pathways and their career value. Of the 10,900 students who earned multiple health awards during our study period, the majority (6,100) started by obtaining a short-term certificate. One-quarter (2,700) and one-fifth (2,100) started with a long-term certificate or associate degree, respectively (Figure 4). It is encouraging that larger shares of those who begin with shorter-term awards are obtaining multiple credentials, since shorter-term degrees generally have lower labor market returns, as shown in [Bohn, McConville, and Gibson \(2016\)](#).

One potential benefit to short-term credentials is that students can obtain them relatively quickly as a first step along a training pathway. Indeed, the majority of students who earn multiple health awards after starting with a short-term credential do receive higher-level awards—the majority go on to get associate degrees (2,800), most often in registered nursing. However, 40 percent (2,500) of students who start with a short-term health certificate go on to obtain another short-term certificate. Completing multiple short-term programs could signal progression on a career pathway in the context of a modular approach to building skills in various tasks or areas of the broader health field; and there are examples of this approach in use at other state community college systems.<sup>8</sup> This does not seem to be the case in California, however—more than two-thirds of students in our sample who earn two short-term certificates do so in emergency medical services, which suggests some type of continuing education or other requirement.

Fewer students who obtain multiple health awards initially earn long-term certificates, but nearly all of these students earn a subsequent associate degree. There are also students who earn an associate degree as their first award and go on to obtain additional health degrees—some of which are short-term and long-term certificates.

**FIGURE 4**

Most students who complete multiple health awards start off with short-term credentials



SOURCE: Author calculations from CCCCO MIS database.

NOTE: Includes students whose first health credential was awarded between school years 2000 and 2010 and earned at least two awards through 2013. For students who obtain more than two awards, the highest-level second, third, fourth (etc.) award is recorded.

<sup>8</sup> This approach is being adopted, for example, by the Kentucky Community and Technical College System, which is creating modules that are short courses that focus on a specific job skill. They are designed to be completed in three to eight weeks and combined to establish proficiency in a set of job skills needed for a particular occupation.

As we home in on health CTE pathways, we focus on students who obtain additional credentials at higher levels than their initial degrees. This means that we exclude students whose first health credential is an associate degree, and assume that obtaining a sequence of awards at the same level (multiple long-term or multiple short-term certificates) does not indicate career progression, as discussed above. In some analyses, we further narrow our focus to students who obtain each award from a different health program. This slightly more restrictive condition assumes that multiple awards in the same narrowly defined health program do not confer additional career benefits.<sup>9</sup> We consider the students who complete multiple awards at higher levels in different programs to be “completing a health pathway.” In practice, this definition covers the vast majority of students who obtain multiple health credentials. Table 1 shows that about 70 percent of students who earn multiple awards complete subsequent higher level credentials (6,006 compared to 8,834). Similarly, about 70 percent of those complete a health pathway based on our definition, by not only earning a higher level credential but doing so in a different health program.

As discussed earlier, health CTE programs train students in a wide variety of fields, from nursing to emergency medicine to technical support. And California’s health students combine credentials in ways that sometimes seem surprising to an outside observer. There are, however, a handful of common program combinations. Eighty percent of students who complete health pathways start with a long-term certificate in licensed vocational nursing (LVN) or a short-term certificate in one of three programs: medical assistant (MA), certified nurse’s assistant (CNA), and emergency medical services (EMS).<sup>10</sup> Although these programs represent only a subset of available short-term and long-term certificate programs within the CCCCCO, they attract the majority of students who earn multiple credentials. Furthermore, they are the most popular non–associate degree programs for students who begin their community college enrollment in health programs (55%, per the numbers in column 1).

**TABLE 1**

LVN and MA degrees are most common starting points for students completing health pathways

Initial health award	Number of initial health awards	Multiple health awards	Higher-level health award	Health pathway (higher-level award in a different program)	Subsequent associate degree in nursing
Long-term certificate	17,793	2,771	2,431	1,426	1,156
Licensed vocational nurse (LVN)	5,256	1,398	1,304	1,057	1,046
Short-term certificate	25,655	6,063	3,575	2,972	1,708
Certified nurse’s assistant (CNA)	4,246	1,121	928	928	531
Medical assistant (MA)	2,853	1,190	1,012	875	725
Emergency medical services (EMS)	11,581	2,452	666	629	235
<b>Total long- and short-term certificates</b>	<b>43,448</b>	<b>8,834</b>	<b>6,006</b>	<b>4,398</b>	<b>2,864</b>

SOURCE: Author calculations from CCCCCO MIS database.

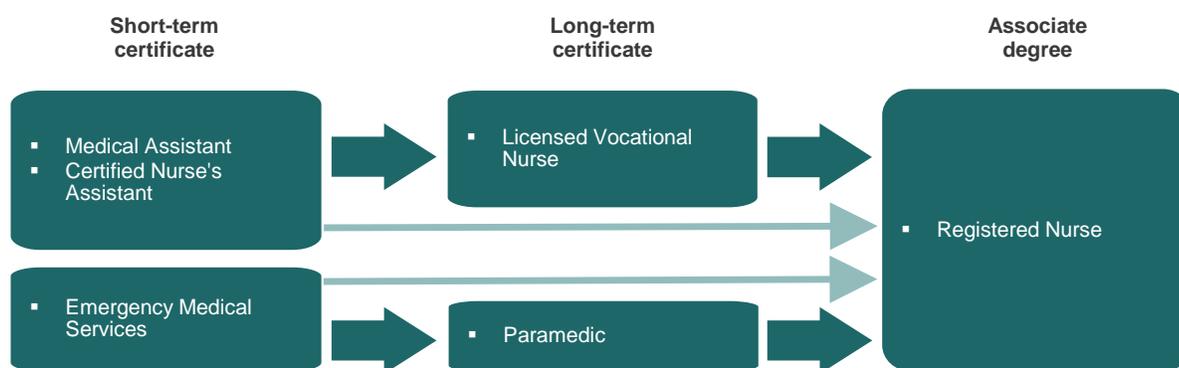
NOTES: First award in the pathway is the first observed health award completed by the student. The next award on the pathway can be completed anytime within six years of their first award although not necessarily sequentially; although in 92 percent of cases the higher-level subsequent award is the student’s second and final health award.

<sup>9</sup> We also observe a fairly large share of students who seem to earn multiple awards at different levels within the same program; that is they obtain a subsequent higher-level health award, but do so from the same program that awarded them their first health degree. For example, about 5 percent of students who earn multiple health awards start with a long-term LVN certificate and go on to complete an LVN associate degree as their highest health award. Other examples of students combining awards of different levels in the same program include medical assisting, psychiatric technicians, and dental assisting degrees. It is not clear whether this should be considered an advance along a career pathway or as evidence of credential auditing or credit accumulation among students intending to earn credentials in other programs. In any case, we see little evidence that these combinations result in higher wages.

<sup>10</sup> The share of students who combine these programs is slightly smaller if we count students who get multiple degrees in the same program.

From these four starting points, students pursue additional credentials along many tracks, but again, there are a few common combinations. Students who first earn a short-term medical assistant or certified nurse’s assistant credential typically then proceed to an LVN long-term certificate or registered nursing associate degree (Figure 5). Those who start with an LVN typically go on to earn a registered nursing associate degree. In fact, 98 percent of LVN students who complete a health pathway take this route (Table 1, final column). EMS short-term certificates, the single most common starting point, typically lead to long-term paramedic certificates or an associate degree in nursing. An associate degree in nursing (ADN) is the most prevalent final degree (Table 1, final column). Students may take three steps in their pathway to an ADN—from short-term MA or CNA to long-term LVN to ADN—but because this pathway was taken relatively rarely during the period we observed, we focus on students who take two steps.<sup>11</sup>

**FIGURE 5**  
The most common health pathways students complete in California



SOURCE: Author analysis based on CCCCO MIS database.

NOTE: Most common pathways among students who obtain multiple health credentials between 2000 and 2015, with the first award occurring before 2010, and additional awards of longer level and in different programs.

## Who Starts—and Who Completes—Health Pathways?

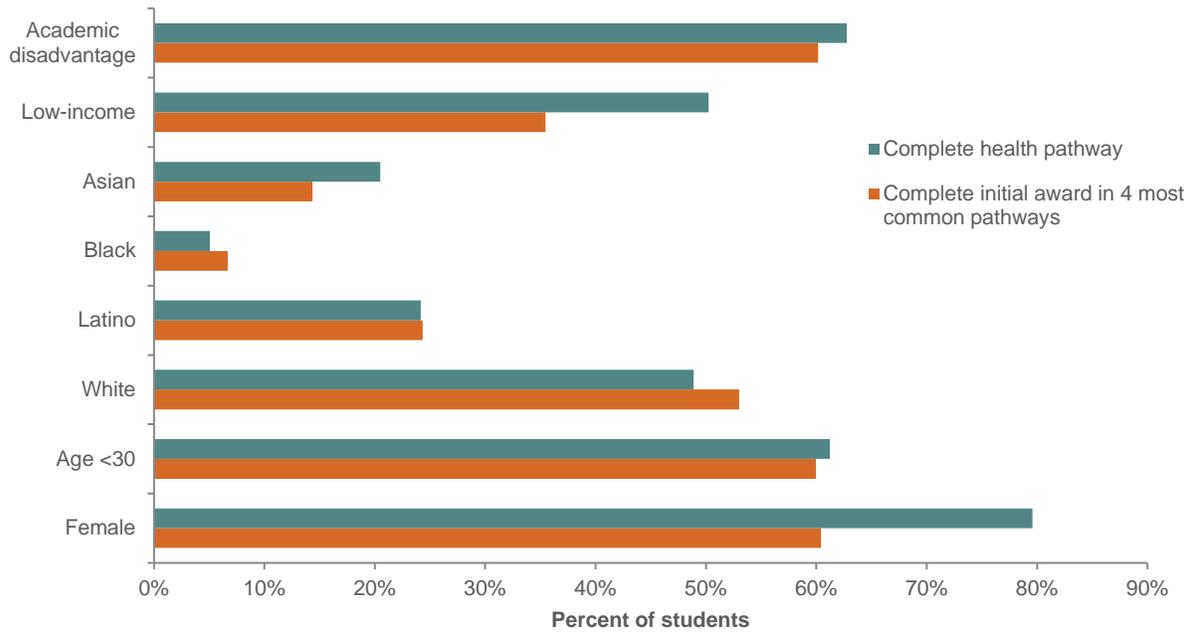
Among students who complete an initial award along the most common health pathways (LVN, CNA, MA, and EMS), higher shares are women, younger than 30 years of age, and academically disadvantaged (Figure 6, orange bars). Just over half of students are white and about 35 percent are low income.<sup>12</sup> What are the demographic characteristics of the students who complete higher-level credentials along these health pathway? An even stronger majority of the students who complete health pathways are women (80%), and a majority are young (61%). The racial mix of students who complete pathways is not substantially different from the racial composition of the students who start them, except that Asian students have higher shares of students who complete pathways. Importantly, disadvantaged students—including low-income students and those identified as academically disadvantaged—also comprise a larger share of the students who complete health pathways.

<sup>11</sup> We observe three steps occurring relatively rarely in the window of our analysis. The three-step pathway occurs most commonly for students who begin with a CNA short-term credential. About 5 percent complete CNA-LVN-RN and 7 percent each complete CNA-LVN or CNA-RN.

<sup>12</sup> Low-income is defined as students who received either CalWORKS cash assistance or a Pell Grant at some point during their community college attendance.

**FIGURE 6**

The majority of students who complete health pathways are women, younger adults, and economically disadvantaged students



SOURCE: Author calculations from CCCC MIS database.

NOTE: “Complete initial health award” includes all students who earned a short-term or long-term health CTE certificate between 2000 and 2009 in the four most common programs identified in the text. “Complete health pathway” includes the subset of those students who also completed a subsequent health award of longer length and in a different program. Low-income is defined as students who received Pell Grants or CalWORKs at some point during their community college attendance. 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.

## Economic Returns of Multiple Credentials

The intent of pathways with multiple credentials is to achieve better long-term career outcomes. Do we observe such gains for California’s health students? As we saw above, most students who obtain multiple credentials begin with short-term awards and, as our related report (Bohn, McConville and Gibson 2016) shows, these awards have the lowest wage returns. Nonetheless, if students who earn multiple awards are doing much better than they would be doing if they had stopped at one credential, they would be making meaningful progress—especially disadvantaged students, who—as we have seen—comprise a large share of the pathway population.

In previous work we detailed the labor market returns to obtaining a health CTE award. We found that while all awards on average yield positive payoffs for students, these payoffs vary greatly, depending on which awards are pursued. Students who earn short-term certificates net a 6 percent increase in wages, those with long-term awards see a 39 percent increase, and those with associate’s degrees earn 63 percent more. Wage returns also vary across programs—for example, registered nurses and radiologic technicians see at least five times more in wage returns than medical assistants and two times more than LVNs.

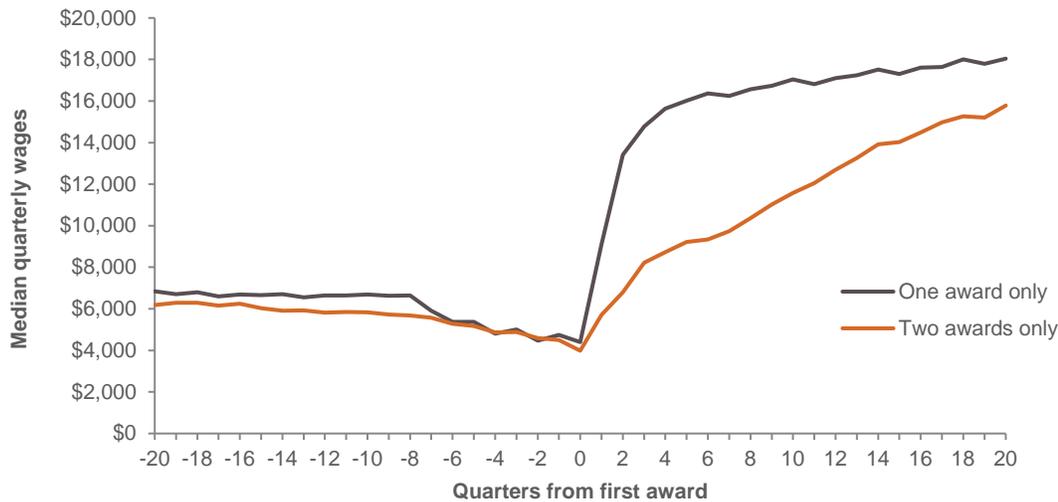
Because not all community college students start out intending to earn one of the highest-return credentials, pathways that involve earning multiple awards and stepping up the ladder from lower- to higher-paying positions

are key to enhancing economic mobility. In fact, we find that despite differences in the socioeconomic status or academic preparedness of students in these alternate trajectories, long-run wage payoffs are remarkably similar.

On the whole, students who earn a single award experience a large and immediate earnings boost (Figure 7). Median wages jump from \$4,800 in the quarter before a degree to \$9,100 in the quarter after (adjusted for inflation). It should be noted that all wage differences are partly explained by the fact that students typically work fewer hours or do not work at all while they are in school. As Figure 7 shows, pre-degree wages are low for those who end up with two credentials, and similar to those of single award earners. Rather than experiencing a large initial boost in earnings, students who earn two awards make a slower, but nonetheless steady, climb. Increases are driven by subsequent degree attainment (which could occur in any quarter after “0”) as well as experience which does not depend on credentials. What is remarkable is that both sets of students reach similar wage levels within five years of obtaining a first award.<sup>13</sup> This is the first piece of evidence that health pathways can indeed enhance economic mobility. However, the costs of additional schooling and foregone earnings for students who earn multiple awards must also be taken into consideration.

**FIGURE 7**

Wage trajectories for students who complete one or two health CTE credentials



SOURCE: Author calculations from CCCC MIS database.

NOTE: Sample includes students who earned a first health CTE award between 2003 and 2009. We adjust the time window for observing awards here, as compared to previous figures, since the objective is to observe a long trajectory of wages prior to earning credentials, and we only have wage information from 2000 forward. Wages are adjusted for inflation. The number of students in each quarter for the series based on one award only ranges from 21,000 to 40,000. The student count for the second series ranges from 2,000 to 4,500. A similar figure based on earnings in quarters from the final award received is provided in the [technical appendices](#).

To further determine the relative importance of individual factors, specific credentials earned, and timing of award completion, we need to do a detailed statistical analysis of the wage trajectories shown in Figure 7. We isolate the increase in wages attributable *solely* to completion of one or more credential at California’s community colleges. Many factors aside from earning a credential affect earnings. In particular, individual characteristics—such as ability and academic preparation—would probably lead to higher earnings with or without a credential.

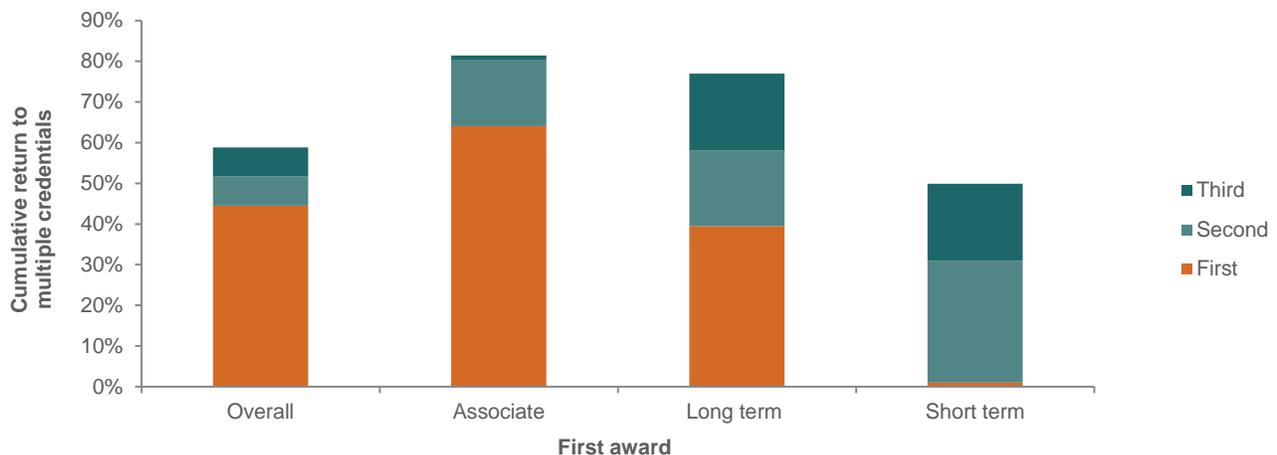
<sup>13</sup> In the appendix, we also show the wage trajectory for the same groups of students but measured as the median wages before and after their final award (that is, the final award we observe during the study period). For the one award only students, the trajectory is identical; for the two award students the trajectory shows a much larger initial jump, to a level about \$2,000 lower than one award earners, which narrows slightly over time.

Also, over time, wages tend to increase as workers acquire experience. Thus, the ideal way to measure the economic value of a degree is to compare a student’s earnings trajectory having received a degree (or two) to his or her trajectory had they not earned a credential (or two). Of course, one cannot create these two trajectories in a laboratory. But the detailed student information used in this study allows us to approximate it. First, we use each student’s pre-degree wage trajectory as a control for all of the characteristics linked to underlying ability. Second, we compare the earnings trajectory for students who obtain a single award to the trajectory for those who earn multiple awards. Both groups of students, in general, experience an upward trajectory of wages, but the difference between the two tells us how much completing an additional credential increases earnings. Our approach closely follows that of Stevens, Kurlaender, and Grosz (2015) and our previous analysis (Bohn, McConville, and Gibson 2016).<sup>14</sup> See [Technical Appendix C](#) for further detail.

After completing a first health CTE credential, student wages increase 45 percent above and beyond their earnings trajectory prior to entering CTE training (Figure 8). A second and/or third award return an additional 7 percent increase in wages, each.<sup>15</sup> These wage returns vary according to the length and type of program. Students whose initial award is an associate degree have the largest earnings return (64%); a second credential provides an additional boost (16%), while a third has no discernible impact. Students who start with a long-term credential earn a smaller initial return (40%). But those who earn additional credentials experience additional returns that bring them close to the large, outsized returns of associate degree holders. Those who start with a short-term credential see very little return from their first award, but a second award yields a 30 percent increase in wages and a third yields an additional 20 percent return.

**FIGURE 8**

Wage returns increase for students who earn more than one health CTE credential



SOURCES: Author calculations from CCCCO MIS database.

NOTES: Sample includes students who earned a first health CTE award between 2003 and 2009. Wage returns shown are estimates from a fixed effects regression model of the logarithm of quarterly wages on indicator variables for whether the student was enrolled, earned an award (first, second, and/or third) by type and fixed effects for age, year-quarter, and student. These results should be interpreted as the increase in wages relative to a student’s own prior earnings and, in the case of those who earn a second or third award, relative to those who completed only one. The results are based on a sample of roughly 54,000 students. All coefficients shown are significant at the 1 or 5 percent level, with the exception of the third award for associates and the first award for short term certificates (which for display purposes are shown as .01%). See the [technical appendices](#) for more on our methodology and detailed results.

<sup>14</sup> It is also preferable to control for changes in earnings that might induce a student to enroll (a pre-enrollment dip). In Bohn et al. (2016) we use a group of students who entered the same programs but did not complete a credential to control for these pre-enrollment factors (a “health CTE intending” student). We find that the results are not sensitive to the use of such a control group, however. For the purpose of the present study, the control group would complicate the analysis since it requires all students to enter CTE programs within a set time window, limiting the sample size. Because a small proportion of students stack health credentials, we find it preferable to avoid any reduction in sample size. Given the Bohn et al (2016) results, we argue the choice is unlikely to substantively affect the estimates.

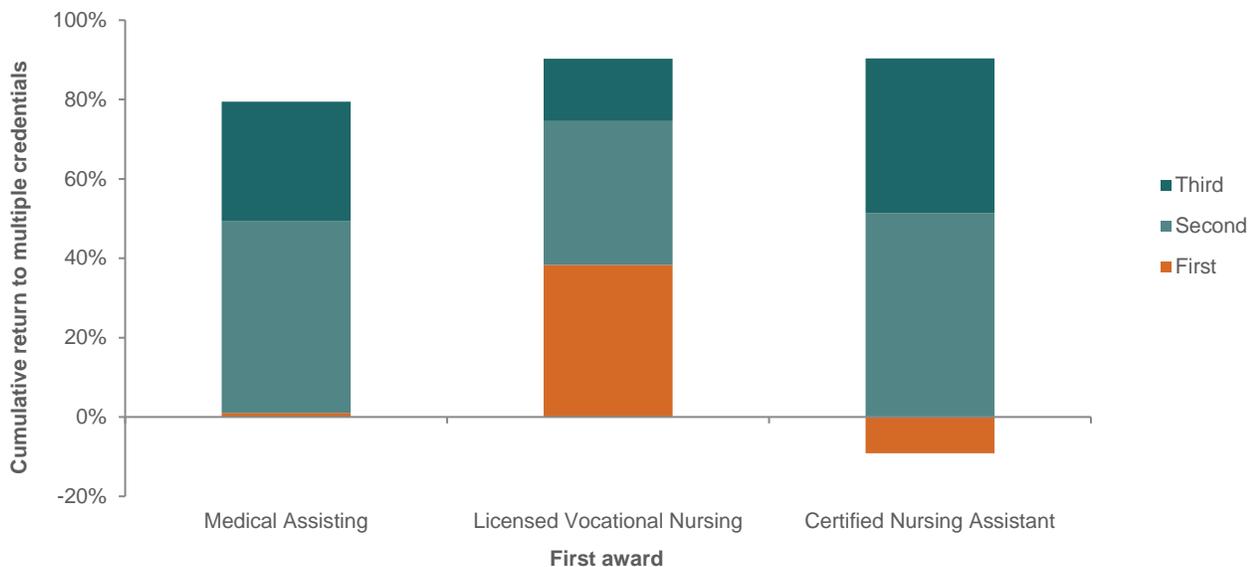
<sup>15</sup> See technical appendix Table C5 full details on these results.

These results make clear that the pathways students pursue—and, in particular, their starting points—matter for their economic outcomes. Even though students who earn multiple degrees may eventually catch up with those who earn a single high-value degree, it may take a significant amount of time and investment to get them there.

Students who begin with medical assistant, licensed vocational nursing, or certified nursing assistant credentials initially earn relatively small returns. MA and CNA students do about the same (or slightly worse) in wages before and after earning the credential, after accounting for inflation and their natural wage trajectory. LVN students experience a 38 percent increase in wages following credential attainment, accounting for these same factors. However, all three groups of students, if they attain additional awards, do significantly better than their counterparts who do not (Figure 9). These students earn between 38 and 51 percent more than their former peers, if they complete a second credential. And an additional 16 to 40 percent more upon earning a third credential.

**FIGURE 9**

Multiple health credentials can increase earnings for those who start out with degrees in low-return fields



SOURCES: Author calculations from CCCCO MIS database.

NOTES: Sample includes students who earned a first health CTE award between 2003 and 2009. Wage returns shown are estimates from a fixed effects regression model of the logarithm of quarterly wages on indicator variables for whether the student was enrolled, earned an award (first, second, and/or third) by type and fixed effects for age, year-quarter, and student. These results should be interpreted as the increase in wages relative to a student’s own prior earnings and, in the case of those who earn a second or third award, relative to those who completed only one. The results are based on a sample of 2,500 medical assisting students, 4,400 LVN students, and 2,400 CNA students. We estimated similar models for EMS students but found no statistically significant results. All coefficients shown are significant at the 1 or 5 percent level, with the exception of the first award for MA (which for display purposes is shown as .01%). See the [technical appendices](#) for more on the methodology and detailed results.

These results reflect, to a large degree, the fact that students often stack up to registered nursing credentials. We find no convincing evidence that a second or third award pays off—unless it is in registered nursing. This does not mean that pathways outside nursing cannot have strong economic returns, but few exist today that we can measure (see [Technical Appendix C](#) for more details).

Clearly many health CTE programs provide a substantial boost in earnings potential for students. The choice of program matters—associate degrees in a handful of programs yield the largest return. But for students who do not or cannot enter these highest-return programs initially, this evidence suggests that pathways to stack additional health credentials can also be extremely fruitful investments for students and colleges.

## What Factors Contribute to Pathway Completion?

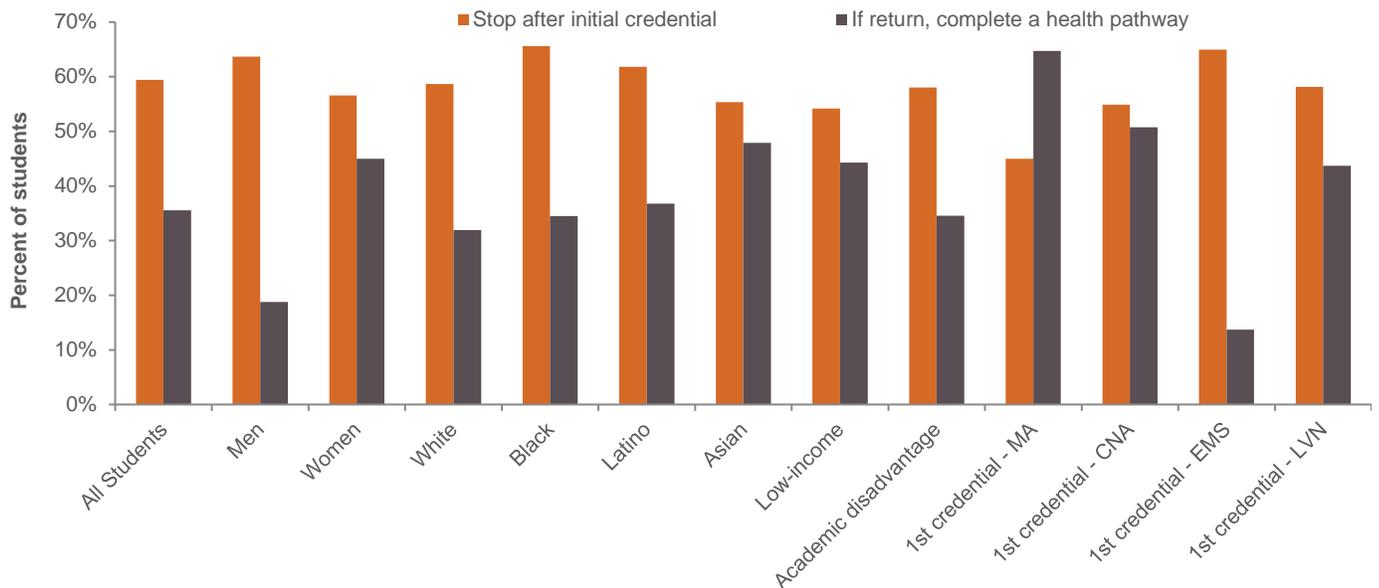
Given the wage returns of stacking higher-level credentials, particularly for students who initially complete a short- or long-term certificate, increasing the share of students who obtain a second credential could be an important way to improve economic mobility. The first step would be for these students to enroll in additional health courses. The majority of students—even those with short-term credentials—do not return for additional health coursework. But even among those that do return, the odds of completion of a secondary credential are quite low. In this section, we examine the factors that could increase completion among students who do return, and assess how it varies on multiple dimensions.

Six in ten students who start by earning one of the four most common initial credentials—CNA, MA, EMS, or LVN—do not reenroll at a community college to complete additional health training. (Figure 10). This rate of reenrollment varies slightly across student groups and programs, but in all except one case (those who start with an MA), the majority do not return to college. Clearly, improving the rate of return to college for students that earn short term credentials is a key part of ensuring that more students complete career pathways.

The most effective single way to improve overall pathway completion, however, would be to increase the odds that students who do return are able to obtain a second credential. We find that 35 percent of students who earn one of the initial awards and reenroll go on to complete a more valuable credential (Figure 10, grey bars). The other 65 percent either fail to complete a subsequent program or earn another award of the same length or in the same program. The odds of earning a second credential vary substantially across students and programs. Women are much more likely than men to complete a pathway, and Asian students are more likely to do so than other racial/ethnic groups. Low-income students are more likely than other socioeconomic groups to complete a pathway.

**FIGURE 10**

The odds of completing a second credential vary across student demographics and health programs



SOURCE: Author calculations from CCCCO MIS database.

NOTE: Includes students who completed a short-term MA, CNA, or EMS certificate or a long-term LVN certificate as their first health degree between 2000 and 2009. Students categorized as stopping after their first award did not complete any subsequent units in health courses in the three years following their first health award. If they are observed completing subsequent units, they are counted in the denominator of the calculation for the second set of bars. The numerator consists of students who complete a health pathway by earning a subsequent higher level health award in a different program than their first.

Students who first earn a short-term medical assistant certificate are least likely to stop after earning that first credential; among those who reenroll, 65 percent complete a pathway. EMS students are the opposite—they are most likely to stop after the first credential, and those who do reenroll are least likely to obtain a higher-level credential in another program.

Student characteristics and program choices actually work in tandem. For example, men are most likely to earn EMS credentials, and men have lower completion rates overall, potentially driving the seemingly low pathway completion among EMS students. To sort out the isolated influence of student and program characteristics, we use regression analysis. We also examine the experience of students when they return to college to better understand what factors policy and practice could leverage to improve health pathway completion.

In Figure 11, we present the difference in completion rates for a health pathway that can be linked to specific characteristics and factors.<sup>16</sup> We control simultaneously for demographic characteristics (age, gender, race, language proficiency, disability, economic disadvantage), academic preparation (high school completion, prior GPA, remediation), initial credential (EMS, MA, LVN, CNA) and year of completion, college attended, and whether the student reenrolls full time and/or receives financial aid. Each vertical line represents the difference in completion rates linked to an individual factor of interest, and the length of the bar signifies the extent of that difference.

What we see is a 10 percentage point difference between women and men—even when we account for other factors like race and program choice. Looking at race alone, we find a difference of roughly 3 percentage points between Asian, white, Latino, and African American students, in that order. After we account for other factors, the seemingly higher rate of completion among low-income students disappears. Specifically, we observe that low-income students are predominantly female.<sup>17</sup> Academically disadvantaged students are about 5 points less likely to complete when we consider that characteristic alone.

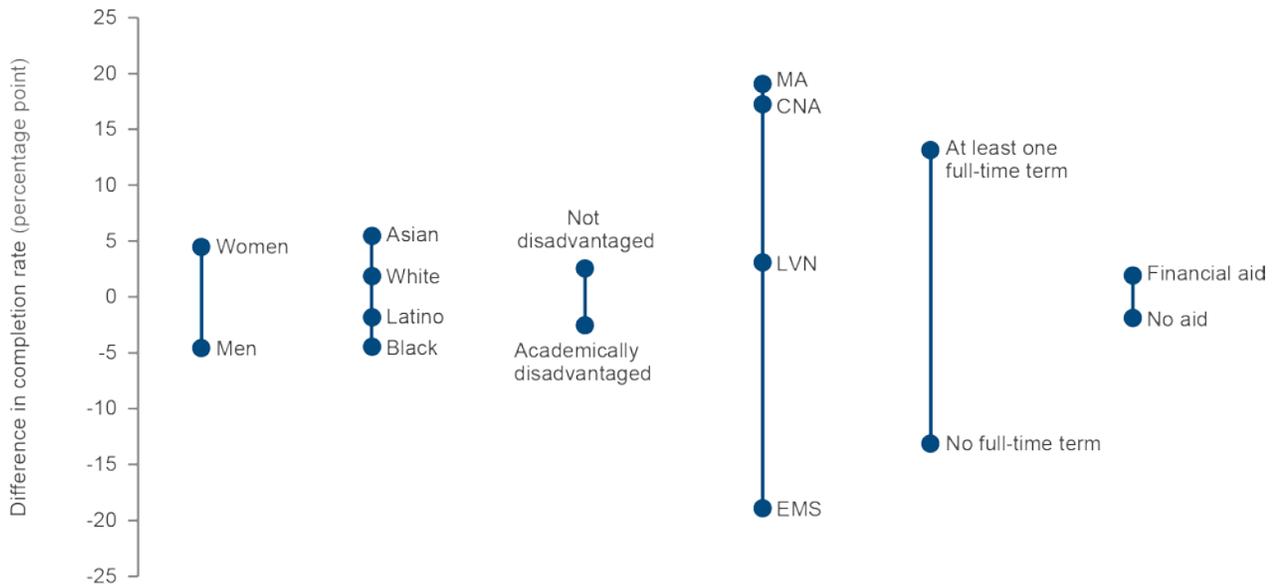
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<sup>16</sup> Specifically, these are estimates from a linear probability regression model. We have modeled a wide variety of factors and only present here those that are statistically significantly correlated with completion of a health pathway. See Technical Appendix for more detail.

<sup>17</sup> See [Technical Appendix B](#) for additional detail on these student characteristics.

**FIGURE 11**

Factors related to successful completion of health pathways



SOURCE: Author calculations from CCCCO MIS database.

NOTE: Includes all students who earned a health award between 2000 and 2009 in one of the four most common initial awards (MA, EMS, CNA, LVN) and subsequently returned and completed at least 2 health units. Plotted are coefficients from a regression model that adjusts for the following student characteristics: sex, age and education level at first health award, race/ethnicity, disabled status, limited English proficiency, enrollment in courses classified as basic skills courses, GPA prior to first health award, full-time course load (more than 12 units) in at least one term post first health award, financial aid receipt, and the first degree students earned to start pathway. The differences between related coefficients are normalized so as to be centered around zero, and the vertical length represents the difference in coefficient values. Only results significant at the 1% level are shown.

There is little difference in the pathway completion rates of MA and CNA students. Students who start with an LVN are 10 points less likely to complete a pathway and EMS students are about 30 points less likely. These differences may be driven by the value of the initial credential, the difficulty of the next step on the student’s pathway, or other program-specific factors.

The last two factors shown in Figure 11 relate less to student demographics and more to potentially effective interventions. We find that students who enroll full time for at least one term after they earned their first health award are much more likely to obtain a second credential. In fact, full-time attendance increases completion by 26 points, which overwhelms differences across racial groups, for instance. We also find that a statistically significant, but much smaller, difference (4 percentage points) in completion is driven by the receipt of some financial aid after return to college.

These results suggest that helping students build momentum toward a second credential by encouraging full-time attendance and ensuring access to financial aid could increase the share of students who complete health pathways, potentially boosting their economic mobility. However, these findings seem to run counter to the notion that once started on a career pathway, students can maintain employment and earn additional credentials simultaneously. We find that a large share of students who reenroll for a second credential attend full-time for at least one term—they either maintain a full-time courseload while working or work less than full time. Unfortunately, we cannot distinguish between these possibilities. Nonetheless, policy and practice might identify and provide support for students who work and take courses full time. Policymakers might also explore ways to increase completion among students who are unable to attend full time.

## Conclusion

Career technical education has attracted a lot of recent policy attention, and with good reason. Health CTE programs, in particular, meet wide-ranging training needs of the health care industry and serve a diverse student body. To the extent that career pathways in health programs at California's community colleges can train even more—and more diverse—students, they can play a key role in meeting the state's workforce needs and ensuring opportunity for traditionally underrepresented students.

We find that only 13 percent of health students who earn a health CTE credential in California obtain multiple health credentials. Although this small share is partially explained by the fact that many health students earn high-value credentials from the outset, a majority of students who complete a health program do not return for a second credential, and an even smaller number obtain multiple awards that prepare them for higher-level careers.

Students who do earn multiple credentials that open up what we consider to be upward career trajectories experience wage returns that, in the end, are quite similar to students who initially achieve high-value credentials (e.g., an associate degree in registered nursing). This finding is promising, since pathways are envisioned as an alternative for students who would not necessarily earn a single high-value credential.

Today, the most common—and lucrative—pathways culminate in registered nursing degrees. Yet, many other long-term health programs afford sizeable labor market returns (Bohn, McConville, and Gibson 2016), and widening or creating pathways toward these occupations has the potential to generate upward mobility for more students.

We find that only 40 percent of students who complete the first step in a potential health pathway return to complete additional health coursework within three years. Efforts to improve information about the payoff to pathways and to support students along the way could increase this share. Male, Black, and Latino students are less likely to return than other student groups, as are those who by earn initial certificates in EMS. In a bit of good news, students who have some marker of disadvantage, whether academic or economic, seem to be a little more likely to continue on a pathway after an initial health award.

Only one-third of students who do reenroll eventually complete a pathway by earning a subsequent higher-level health degree. Increasing completion among these students could have the most immediate effect on career pathway attainment overall. We find that male, Latino, Black, and academically disadvantaged students are the least likely to obtain subsequent credentials even after reenrolling. Again, while these student factors are particularly important to target, all students have relatively low odds of completion.

We find that full-time attendance and financial aid are positive contributing factors: students who attend full time for at least one term or who receive financial aid in at least one term are more likely to obtain a second, higher-value health credential. Understanding what students need to support their ability to attend full-time, whether it be child-care, alternative course schedules, or other resources is a key component to improving completion of health pathways. Furthermore, making subsequent training accessible to those who need to balance school and work is of primary importance.

This research identifies some high-return and in-demand programs in health; research on other CTE programs that can help create and expand pathways in other high-value areas holds much promise. Data are critical in helping policymakers decide where to make investments.

Overall, our research strongly supports the value of existing health training pathways in California's community colleges: earning multiple credentials pays off for a diverse set of students. Our findings also suggest that targeting certain student groups and addressing overall student access and affordability can increase the diversity

and the number of students who obtain multiple credentials in health. Ensuring that more students are aware of existing high-value health pathways and identifying additional combinations of credentials that could open up more career routes could enhance economic mobility for a larger share of Californians.

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