

Employment Trends Among Public Health Doctoral Recipients, 2003–2015

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Objectives. To examine postgraduation employment trends among graduates of doctoral programs in public health from 2003 to 2015.

Methods. We analyzed pooled cross-sectional data from a census of graduates receiving a research doctorate from US accredited institutions. The outcome of interest was employment status. Covariates included public health discipline, sociodemographic characteristics, and institutional attributes.

Results. Of 11 771 graduates, nearly two thirds secured employment in either academic (34.8%) or nonacademic (31.4%) settings at the time of graduation. The proportion of those still seeking employment increased over time. Individuals who were White, younger, trained in either biostatistics or epidemiology, or from an institution with the highest level of research intensity were significantly more likely to secure employment. Academic employment was the most common setting for all 5 public health disciplines, but we observed differences in employment patterns (e.g., government, nonprofit, for-profit) across disciplines.

Conclusions. Certain characteristics among public health doctoral recipients are correlated with postgraduation employment. More research is needed, but the observed increase in individuals still seeking employment may be attributable to increases in general public health graduates from for-profit institutions. (*Am J Public Health.* 2018; 108:1171–1177. doi:10.2105/AJPH.2018.304553)

 See also Meschke, p. 1130.

Increases in health care expenditures,^{1,2} population size,² and the prevalence of chronic diseases^{3,4} have galvanized a new focus on population health in both the US health delivery system^{5,6} and society at large.⁷ Public health research emphasizes a population-based approach to long-term health promotion⁸ and the protection of people in their daily environments,⁹ complementing the traditional biomedical and clinical approach.¹⁰ As such, the number of individuals receiving doctoral degrees in public health has increased,¹¹ and the demand for such individuals in academia, hospitals, government agencies, and other settings appears to be growing.^{12,13}

Doctoral-prepared public health professionals have historically been employed in both academic and nonacademic settings.^{14,15} The broader literature has examined non-academic employment opportunities for PhD graduates, but much of the literature focuses on doctoral recipients in the social sciences,¹⁶

liberal arts,¹⁷ or engineering.¹⁸ Other studies have examined nonacademic employment trends for doctoral graduates of clinical disciplines,^{19,20} such as nursing,¹⁹ medicine,²⁰ life sciences,²¹ or biomedical science and technology.²² Separately, the literature has also explored the impact of student values and preferences,^{18,23,24} academic mentorship,²⁵ industry incentives and benefits,^{26,27} the demands of academia,²⁸ and the availability of academic positions²⁹ vis-a-vis nonacademic employment trends. Given the presumed increased demand for, and production of, public health doctoral recipients, surprisingly little is known about trends in employment

prospects for recent doctoral graduates trained in the core knowledge areas of public health.

In this study, we evaluated employment trends among those earning research doctorates in biostatistics, epidemiology, environmental health sciences, health services administration, and other public health disciplines (social and behavioral sciences only available in 2014 and 2015 because of data set limitations).³⁰ We utilized data from the restricted-use files of the National Science Foundation's Survey of Earned Doctorates (SED),³¹ which is collected annually from all doctoral recipients from US institutions of higher education. We were interested in the proportions of individuals who gain employment at or around the time of graduation, the settings in which these individuals gain employment, and how these trends may differ by core public health knowledge area and over time. Lastly, we were interested in the characteristics of individuals and their programs that correlate with job placements in various settings. We believe this work will be of interest to current and future doctoral students, schools and programs of public health, administrators of doctoral programs, and employers seeking research expertise from individuals trained in public health.

METHODS

We utilized a repeated cross-sectional design to analyze survey responses from the most current SED restricted-use data corresponding to the years 2003 to 2015. With

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a response rate above 90%, nearly all individuals who are awarded a research doctorate from an accredited US institution complete the SED at approximately the time of graduation.³¹ Research doctorates as defined by the National Science Foundation include any terminal degree that requires completion of original research in the form of a dissertation or thesis.³¹ While the PhD degree is the most common research doctorate, each university determines which of its degrees are eligible for participation in the SED. As such, respondents may have also been graduates of other doctoral degree programs (e.g., DrPH, ScD) conditional on the degree being considered a terminal research degree by their university. The SED collects data on respondents' sociodemographic characteristics, field(s) of study, financial support, institutional characteristics, and expected postgraduation career trajectory.³¹

Our analysis focused on those who earned a doctoral degree in 1 of the core public health knowledge areas and responded to the employment questions on the SED. Respondents were asked to specify the primary field of their dissertation research by selecting from a list of 317 predetermined codes representing distinct disciplines. The SED included discrete categories for biostatistics, epidemiology, and environmental health, as well as a distinct public health category that we heretofore refer to as “general public health.” In addition, health services administration included individuals who selected either “health policy analysis” or “health systems/services administration” on the SED. Social and behavioral science is recognized as a core public health discipline³⁰; however, a category for this discipline was not added to the SED until 2014 (listed as “health and behavior” under health sciences). Keeping with this discipline's recognition in public health but understanding the limitations of the data, we grouped respondents who selected the social and behavioral science category in 2014 and 2015 into the “general public health” category to maintain consistency throughout the analysis.

The primary dependent variable of interest was respondent's postgraduation employment status. Specifically, we were interested in whether the respondent had secured any employment at the time of survey administration, and, if so, whether that employment

was in an academic (e.g., institution of higher education) or nonacademic setting. Among respondents with employment in a nonacademic setting, we were further interested in whether it was in a for-profit, governmental, not-for-profit, or “other” nonacademic organization. For our analysis, we included postdoctoral fellowships as employment in the category that described the setting where the fellowship will take place. Moreover, respondents who indicated that they would continue their predoctoral employment were considered to have secured employment in the setting where that predoctoral employment took place.

Our model covariates were gender, age, race, Hispanic ethnicity, marital status, and number of children, as well as the primary field of study and characteristics of the degree-granting institution. We also included variables for year of graduation, receipt of tuition remission as a doctoral student, and control variables for postdoctoral fellowship employment and an indicator for returning to predoctoral employment. We coded degree-granting institutions by type (e.g., public, private–nonprofit, private–for-profit) and level of research activity as classified by the Carnegie Classification of Institutes of Higher Education (CCIHE).³²

We examined the frequency, distribution, and other descriptive statistics for all covariates. We used χ^2 analysis to examine bivariate relationships between employment status and categorical variables. We used analysis of variance to compare the mean age of respondents by employment status. Lastly, we conducted binary and multinomial logistic regression models to identify factors associated with postgraduation employment status. Our regression models controlled for all previously mentioned model covariates. We examined trends over time by including a linear time indicator for year of graduation in each model. We conducted all analyses with SPSS version 24 (IBM, Somers, NY) and considered statistical significance at the $P < .05$ level.

RESULTS

From 2003 to 2015, there was a total of 11 771 public health doctoral recipients, 10 479 (89.0%) of whom reported their postgraduation employment status and were

therefore included in our analyses. Descriptive statistics on the included sample are displayed in Table 1. A majority were female (67.2%), White (54%), US citizens (72.7%), and received their doctoral training from institutions classified with the highest level of research activity by the CCIHE (81.3%). At the time of the survey, a majority of respondents (66.2%) indicated that they had secured employment in either an academic setting (34.8%) or a nonacademic setting (31.4%). When we examined employment trends over time (Figure 1), we observed that the proportion of respondents seeking employment or pursuing further education increased over time while the proportion of those who secured any employment (academic or nonacademic) decreased over time.

In bivariate analyses (Table A, available as a supplement to the online version of this article at <http://www.ajph.org>) postgraduation employment status was associated with various respondent and institutional characteristics. Men were more likely to secure any employment (either academic or nonacademic) at the time of the survey (68.4% vs 63.2%), but a higher proportion of women secured employment in academic settings (35.2% vs 33.8%; $P < .01$). With respect to race, White respondents were the most likely to have secured positions in academic settings (39.4%), Asian respondents were the most likely to have secured positions in nonacademic settings (33.5%), and Black respondents were most likely to be seeking employment at the time of the survey (29.4%; $P < .01$). Respondents who secured academic employment were significantly younger than their counterparts who secured nonacademic employment (36.1 years vs 37.5 years; $P < .01$). Respondents who were married reported higher rates of academic employment (35.4% vs 33.1%) as well as nonacademic employment (31.6% vs 30.7%; $P < .01$).

While doctoral recipients from public (35.4%) or nonprofit (37.0%) educational institutions were more likely to have secured employment in an academic setting, those from for-profit educational institutions were more likely to have secured nonacademic employment (40.6%; $P < .01$). Graduates from for-profit institutions were still seeking employment at the time of survey at higher rates than were those from public and

TABLE 1—Characteristics of Public Health Doctoral Recipients Who Reported Employment Status: United States, 2003–2015

| Characteristics | No. (%) or Mean \pm SD |
|--|--------------------------|
| Discipline | |
| Biostatistics | 1556 (14.8) |
| Environmental health sciences | 669 (6.4) |
| Epidemiology | 3417 (32.6) |
| Health services administration | 1048 (10.0) |
| General public health | 3789 (36.2) |
| Gender | |
| Male | 3440 (32.8) |
| Female | 7039 (67.2) |
| Race/ethnicity | |
| White | 5622 (54.0) |
| Black | 1170 (11.2) |
| Hispanic | 537 (5.2) |
| Asian | 2767 (26.4) |
| Other | 322 (3.1) |
| Age, y | 36.9 \pm 7.97 |
| Marital status | |
| Married | 6824 (66.5) |
| Not married | 3430 (33.5) |
| No. dependents | |
| 0 | 6542 (64.6) |
| 1 | 1814 (17.9) |
| 2 | 1328 (13.1) |
| \geq 3 | 447 (4.4) |
| US citizen | |
| Yes | 7615 (72.7) |
| No | 2864 (27.3) |
| Institution type | |
| Public | 6532 (62.8) |
| Nonprofit | 3317 (31.9) |
| For-profit | 545 (5.2) |
| Research activity level (CCIHE) | |
| Highest (R1) | 8431 (81.3) |
| Higher (R2) | 531 (5.1) |
| Moderate (R3) | 679 (6.5) |
| All other, not listed | 730 (7.0) |
| Tuition remission | |
| None | 2755 (27.1) |
| Partial | 3348 (32.9) |
| Full | 4064 (38.8) |
| Job status | |
| Secured, academic | 3642 (34.8) |
| Secured, nonacademic | 3295 (31.4) |
| No secured employment | 3542 (33.8) |

*Continued***TABLE 1—Continued**

| Characteristics | No. (%) or Mean \pm SD |
|---|--------------------------|
| Negotiating | 1239 (11.8) |
| Seeking | 1958 (18.7) |
| Other education ^a or no work plans | 345 (3.3) |

Note. CCIHE = Carnegie Classification of Institutes of Higher Education. The sample size was $n = 10\,479$.

^aIncludes doctoral recipients who planned on pursuing additional education after degree completion.

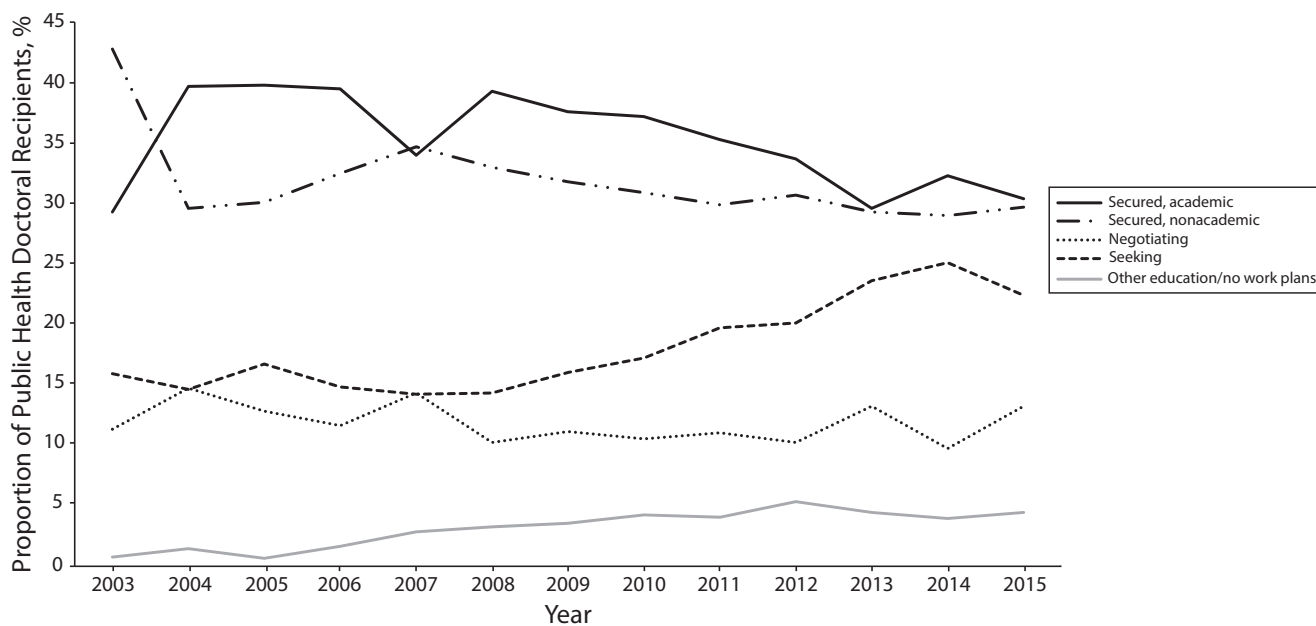
nonprofit institutions (33.6% vs 19.0% vs 15.8%; $P < .01$). Lastly, receipt of full tuition remission as a doctoral student was significantly associated with academic employment ($P < .01$), whereas no tuition remission was associated with employment in nonacademic settings ($P < .01$).

Employment setting by discipline, for those with secured employment, is displayed in Table 2. Academic employment was the most common setting of employment for each of the public health disciplines. Graduates of biostatistics doctoral programs were next most commonly employed in for-profit settings, while those with degrees in environmental health, epidemiology, or general public health were next most commonly employed in governmental settings. Doctoral recipients from health services administration were next most commonly employed in nonprofit settings. The overall relationship between discipline and employment status was statistically significant ($P < .01$). From Table 2, data indicate that, overall, graduates of biostatistics had the highest rate of any secured employment (70.9%), followed by epidemiology (67.6%), health services administration (65.5%), environmental health sciences (65.2%), and general public health (60.4%).

Table 3 displays characteristics associated with postgraduation employment status. We found that female (odds ratio [OR] = 0.99; $P < .01$), Black (OR = 0.60; $P < .01$), or Asian (OR = 0.77; $P < .01$) respondents were less likely to secure any employment when compared with male and White graduates, respectively. Each of these characteristics was associated with a greater likelihood of still seeking employment at the time of the survey

(all $P < .01$). Compared with degree recipients in general public health, those in biostatistics (OR = 1.51; $P < .01$) or epidemiology (OR = 1.22; $P < .01$) reported having secured any employment at higher rates. Compared with graduates from institutions with the highest CCIHE level of research intensity (i.e., R1), those from institutions categorized as moderate research activity (i.e., R3) were less likely to report securing any employment at the time of the survey (OR = 0.66; $P < .01$). Similarly, those from institutions classified as other than R1 were more likely to report still seeking employment (all $P < .01$). Compared with respondents graduating from a public institution, those from not-for-profit institutions were significantly less likely to be seeking employment (OR = 0.85; $P = .01$), while graduates from for-profit institutions were significantly more likely to be seeking employment at the time of survey (OR = 1.95; $P < .05$). Lastly, over time, respondents were significantly less likely to report having secured any employment (OR = 0.95; $P < .01$) and more likely to report still seeking employment (OR = 1.11; $P < .01$) at the time of the survey.

We also display the characteristics associated with securing academic and nonacademic employment in Table 3. Generally, many similar characteristics were associated with both academic and nonacademic employment. For example, respondents who were older, Black or Asian race, or had 3 or more dependents were less likely to secure academic and nonacademic employment. Graduating from an institution categorized with the highest CCIHE research intensity (i.e., R1) increased the odds of securing both academic and nonacademic employment. Over time, both academic and nonacademic employment were less likely to be reported by respondents (both $P < .01$). On the other hand, having received full tuition remission as a doctoral student increased the likelihood of securing an academic job (OR = 1.58; $P < .01$), while graduating from a for-profit institution decreased the odds of securing an academic job (OR = 0.33; $P < .01$). However, whereas graduates with degrees in biostatistics were more likely than were those from general public health (the reference group) to report having secured both academic (OR = 1.26; $P < .01$) and nonacademic jobs (OR = 2.03; $P < .01$), those from all



Note. The sample size was n = 10 479.

FIGURE 1—Trends in Postgraduation Status Among Public Health Doctoral Recipients: United States, 2003–2015

other disciplines were also more likely than were those from general public health to report securing nonacademic employment.

DISCUSSION

Using a near census of all US graduates, we found that nearly two thirds of all doctoral-trained public health graduates had secured employment at or around the time of graduation. Of those, more than half secured employment in academic settings, while the frequency of nonacademic employment differed by public health discipline. Furthermore, we found that a number of demographic characteristics, doctoral training attributes, and

institutional factors were associated with the likelihood of securing employment in either academic or nonacademic settings.

Notably, we found a downward trend in secured employment (irrespective of employment type) over the study period from 2003 to 2015. Concurrently, we observed an increase in the number of respondents who were seeking employment during the same time period. Some have suggested that there is an “overproduction” of doctoral-trained individuals in many sciences and, thus, a shortage of available positions.²⁹ Notably, during this time period, we observed an increase in the number of graduates trained in general public health or who received degrees from for-profit institutions and institutions

with lower research intensity (data not shown)—all groups that were less likely to secure any employment at graduation. However, our findings could also be attributed to the fact that the SED is administered at or around the time of graduation, which varies by doctoral recipient and institution. Thus, depending on the type of employment, the employee search and hiring cycle may not align with graduation dates. For trends observed with academic employment, an alternate explanation for the decline over time could be the documented increase in onerous administrative processes associated with faculty recruitment, which delays the time to successfully secure an academic position, especially in large institutions.³³

TABLE 2—Public Health Doctoral Recipients’ Employment Plans, by Public Health Discipline: United States, 2003–2015

| Discipline | Academic Employment, % | Non-Academic Employment, % | | | | Negotiating Employment, % | Seeking Employment, % | No Work Plans, % |
|--------------------------------|------------------------|----------------------------|-----------|------------|-------|---------------------------|-----------------------|------------------|
| | | Government | Nonprofit | For-Profit | Other | | | |
| Biostatistics | 37.7 | 6.9 | 3.5 | 20.4 | 2.4 | 11.5 | 14.9 | 2.4 |
| Environmental health sciences | 32.9 | 19.0 | 3.3 | 7.8 | 2.2 | 10.5 | 20.8 | 2.2 |
| Epidemiology | 35.8 | 15.7 | 5.6 | 6.6 | 3.9 | 12.3 | 15.7 | 3.9 |
| Health services administration | 29.8 | 9.8 | 12.5 | 9.7 | 3.7 | 11.8 | 17.5 | 3.7 |
| General public health | 34.3 | 11.7 | 6.7 | 4.5 | 3.2 | 11.8 | 22.9 | 3.2 |

Note. The sample size was n = 10 479. Statistical test: χ^2 analysis, $P < .01$.

TABLE 3—Factors Associated With Public Health Doctoral Recipients' Postgraduation Employment Status: United States, 2003–2015

| Variables Included in Regression Models | Current Employment Status (n = 10 134) | | | Secured Employment (n = 6 937) | |
|---|---|---|--|---|--|
| | Any Secured Employment, ^a OR (95% CI) | Negotiating with Employer, ^b OR (95% CI) | Still Seeking Employment, ^b OR (95% CI) | Academic Employment, ^c OR (95% CI) | Nonacademic Employment, ^c OR (95% CI) |
| Individual characteristics | | | | | |
| Female | 0.86 (0.78, 0.95) | 1.01 (0.87, 1.16) | 1.20 (1.06, 1.37) | 0.94 (0.83, 1.05) | 0.89 (0.78, 1.00) |
| Age | 1.00 (0.99, 1.01) | 1.03 (1.02, 1.04) | 1.06 (1.05, 1.06) | 0.96 (0.95, 0.97) | 0.96 (0.95, 0.96) |
| Race/ethnicity | | | | | |
| White (Ref) | 1 | 1 | 1 | 1 | 1 |
| Black | 0.60 (0.52, 0.70) | 1.24 (0.98, 1.57) | 1.69 (1.39, 2.07) | 0.62 (0.52, 0.76) | 0.78 (0.63, 0.96) |
| Hispanic | 0.86 (0.71, 1.04) | 0.93 (0.68, 1.25) | 0.93 (0.71, 1.22) | 1.02 (0.80, 1.30) | 1.14 (0.88, 1.48) |
| Asian | 0.69 (0.61, 0.79) | 1.11 (0.92, 1.36) | 1.69 (1.42, 2.00) | 0.59 (0.51, 0.70) | 0.84 (0.71, 0.99) |
| Mixed race or other | 0.95 (0.73, 1.23) | 0.99 (0.66, 1.47) | 1.11 (0.78, 1.59) | 0.98 (0.72, 1.34) | 0.93 (0.66, 1.31) |
| US citizen (birth or naturalized) | 1.17 (1.03, 1.34) | 0.99 (0.82, 1.21) | 0.91 (0.77, 1.07) | 0.94 (0.80, 1.10) | 1.11 (0.94, 1.31) |
| Married | 1.12 (1.02, 1.24) | 0.96 (0.82, 1.12) | 0.90 (0.79, 1.03) | 1.11 (0.98, 1.26) | 1.03 (0.90, 1.17) |
| No. dependents | | | | | |
| 0 (Ref) | 1 | 1 | 1 | 1 | 1 |
| 1 | 0.97 (0.86, 1.10) | 1.13 (0.94, 1.37) | 1.04 (0.88, 1.23) | 0.96 (0.82, 1.11) | 0.87 (0.74, 1.02) |
| 2 | 1.05 (0.91, 1.20) | 1.16 (0.93, 1.46) | 1.06 (0.87, 1.29) | 0.97 (0.82, 1.16) | 0.81 (0.67, 0.99) |
| ≥3 | 0.89 (0.72, 1.11) | 1.98 (1.39, 2.83) | 1.22 (0.86, 1.72) | 0.65 (0.47, 0.89) | 0.63 (0.45, 0.87) |
| Training characteristics | | | | | |
| Discipline | | | | | |
| General public health (Ref) | 1 | 1 | 1 | 1 | 1 |
| Biostatistics | 1.51 (1.30, 1.76) | 0.78 (0.62, 0.97) | 0.58 (0.47, 0.71) | 1.26 (1.06, 1.50) | 2.03 (1.68, 2.46) |
| Environmental health sciences | 1.05 (0.87, 1.27) | 0.89 (0.66, 1.19) | 1.06 (0.83, 1.34) | 0.86 (0.69, 1.08) | 1.34 (1.05, 1.70) |
| Epidemiology | 1.18 (1.06, 1.31) | 0.93 (0.79, 1.09) | 0.72 (0.62, 0.83) | 1.07 (0.94, 1.21) | 1.42 (1.24, 1.64) |
| Health services administration | 1.17 (0.99, 1.36) | 0.95 (0.74, 1.20) | 0.70 (0.57, 0.87) | 0.97 (0.79, 1.18) | 1.64 (1.34, 2.02) |
| Full tuition remission | 1.12 (1.02, 1.23) | 0.85 (0.74, 0.98) | 0.61 (0.54, 0.69) | 1.58 (1.42, 1.77) | 1.12 (0.99, 1.26) |
| Fiscal year of doctorate | 0.95 (0.94, 0.97) | 1.01 (0.99, 1.02) | 1.06 (1.05, 1.08) | 0.96 (0.94, 0.97) | 0.95 (0.94, 0.97) |
| Intend to live in United States | 1.01 (0.86, 1.19) | 0.71 (0.56, 0.90) | 0.93 (0.75, 1.16) | 6.95 (5.05, 9.56) | 0.51 (0.42, 0.61) |
| Institution characteristics | | | | | |
| Status | | | | | |
| Public (Ref) | 1 | 1 | 1 | 1 | 1 |
| Private, nonprofit | 1.06 (0.97, 1.17) | 1.07 (0.93, 1.24) | 0.85 (0.75, 0.97) | 1.08 (0.97, 1.21) | 1.03 (0.91, 1.16) |
| Private, for-profit | 1.22 (0.82, 1.81) | 1.63 (0.74, 3.59) | 1.95 (1.01, 3.76) | 0.33 (0.16, 0.66) | 0.66 (0.33, 1.31) |
| Research activity level (CCIHE) | | | | | |
| Highest (R1; Ref) | 1 | 1 | 1 | 1 | 1 |
| Higher (R2) | 0.85 (0.70, 1.04) | 1.31 (0.95, 1.81) | 1.59 (1.22, 2.06) | 0.67 (0.53, 0.86) | 0.67 (0.51, 0.88) |
| Moderate (R3) | 0.59 (0.41, 0.85) | 2.13 (1.12, 4.07) | 2.63 (1.54, 4.47) | 0.35 (0.20, 0.60) | 0.51 (0.29, 0.90) |
| All other, not listed | 0.75 (0.64, 0.89) | 1.65 (1.28, 2.12) | 1.34 (1.07, 1.69) | 0.72 (0.58, 0.88) | 0.57 (0.45, 0.71) |

Note. CCIHE = Carnegie Classification of Institutes of Higher Education; CI = confidence interval; OR = odds ratio.

^aStatistical test: binary logistic regression (Ref: no secured employment).

^bStatistical test: multinomial regression (Ref: any secured employment).

^cStatistical test: multinomial regression (Ref: no secured employment).

While academic employment accounted for the highest proportion of secured employment across all disciplines examined, we found differences among the types of non-academic employment. Second to academic

employment, degree recipients in biostatistics most often found jobs in for-profit industry. We suspect that these positions are in organizations that rely heavily on quantitative analyses, such as pharmaceutical companies or

medical device manufacturers. Graduates of environmental health, epidemiology, and general public health programs most often secured nonacademic employment in governmental settings. These settings could

include state and local health agencies, the Environmental Protection Agency, Centers for Disease Control and Prevention, and other units of the US Department of Health and Human Services. By contrast, the most-often-secured nonacademic employment for graduates of health services administration was nonprofit industry, which may include hospitals, health delivery systems, and foundations that fund health services research or other public health causes. More research is needed that catalogs the exact type of non-academic positions in which graduates from public health disciplines find placement.

Importantly, we found that Black and Asian graduates were less likely than were their White counterparts to secure any employment at the time of the survey, even after we controlled for differences by discipline and type of degree-awarding institution. Further analysis suggested that Blacks and Asians were both less likely to secure academic and nonacademic positions alike. This is similar to findings of other studies that note historical difficulties in hiring minority faculty members.³⁴ Aguirre states that long-running attempts to improve diversity among academic faculty have been ineffective because of structural barriers and a lack of understanding of the social forces faced by underrepresented groups who wish to enter academia.³⁴ Previous research suggests that these disparities can be attributed to the fact that minority graduates more frequently emanate from for-profit institutions with lower levels of research productivity and are thus less competitive for academic positions.³⁵ In our analysis, we found that minority status was independently associated with no secured job irrespective of the institutional factors previously examined. Given that our data suggest that doctoral students who receive full tuition remission were more likely to secure academic employment, more research is needed to examine whether minorities receiving full tuition remission have better job prospects overall, including in academic settings.

Limitations

Though this study is the first, to our knowledge, to examine national employment trends among public health doctoral recipients, a number of limitations exist. First,

the SED is administered at or around the time of graduation and respondents may not have secured a position until after that time. Moreover, given the repeated cross-sectional nature of our data, the relationships we present can only be interpreted as associations. An analysis of longitudinal data, which follows individuals over time (that is also available from the National Science Foundation in the Survey of Doctorate Recipients), is warranted to better understand the relationships we identified.

Another limitation was that the SED did not explicitly identify graduates from social and behavioral sciences until 2014. Therefore, it is possible that, before 2014, these individuals identified their primary field of study as general public health or the social science with which their doctoral research best aligned. Given that the Council on Education in Public Health recognizes social and behavioral sciences as a core public health discipline, it was necessary to include these individuals in our sample. However, our findings must be generalized to this group with caution.

Lastly, it is important to note that we examined doctoral graduates whose primary field was 1 of the public health disciplines described previously. As such, we did not examine individuals who identified as public health professionals who may have trained primarily in a different field (e.g., sociology, nutrition, genetics) and have added qualifications or professional interests in public health.

Public Health Implications

In conclusion, we believe that these findings will be of interest to administrators in academic settings, other faculty, and non-academic employers who are stakeholders of doctoral graduates from public health disciplines. These findings can better inform doctoral program curriculum and encourage collaboration between doctoral program leadership and institutions that employ graduates in nonacademic settings. In addition, these findings will be useful to doctoral students as they explore career prospects and pathways for future career opportunities. Further research is needed to explore the reasons for lags in employment as well as to determine how long it takes to secure

employment in both academic and non-academic settings. Importantly, future research should also examine whether trends in employment differ by specific doctoral degree received (e.g., PhD, DrPH, ScD) as these programs continue to evolve. Lastly, this study paves the way for future studies examining workforce development in public health research, which is increasingly gaining the attention of leadership in higher education, government, and private industry. **AJPH**

CONTRIBUTORS

B. L. Brown-Podgorski and N. Menachemi conceptualized the study. B. L. Brown-Podgorski drafted the first version of the article and conducted the analyses. A. M. Holmes, E. H. Golembiewski, and J. R. Jackson helped with the interpretation of the findings and with critical edits of the article. N. Menachemi supervised the study. All authors reviewed, revised, and approved the final draft of the article.

HUMAN PARTICIPANT PROTECTION

Our analysis of these data was deemed not human participants research by the Indiana University institutional review board.

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