The growth of Australian public health graduates and courses, 2001-2018: implications for education and employment opportunities

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Abstract

Objectives: To describe the numbers of degree completions, variety of available courses and demographics of students who study public health in Australia.

Methods: We utilised national completions data from universities between 2001 and 2018 and analysed data for students who had completed degrees labelled as public health at the bachelor's and master's by coursework level.

Results: There have been 21,000 master's by coursework public health graduates since 2001, and 15,770 public health bachelor's degrees. Nearly two-thirds of all students study in a 'broad' degree, such as a Bachelor of Health Science or Master of Public Health. There has been an increase in the proportion of overseas students and a decreasing proportion of Indigenous students over this time.

Conclusions: Given the growth of graduates with public health degrees, there should be an increased focus on relevant job opportunities, as supply may be outpacing demand.

Implications for public health: We note three potential issues with public health education and practice in Australia. Firstly, there may be an oversupply of graduates relative to opportunities. Secondly, there may be inconsistencies in the delivery of public health courses. Thirdly, curricula may need to be revised, owing to differences in student composition.

Key words: public health education, undergraduate education in public health, public health workforce pipeline, postgraduate education in public health, degree conferrals

People who work in public health are essential to the maintenance and promotion of health, yet despite this, their numbers and their education pathways remain incompletely understood. Given the growing public recognition of the role public health plays in pandemic responses, it is more important than ever to understand the supply of public health workers.

There is no perfect approach to forecasting the supply of the public health workers and this is due to lack of consensus on who this workforce should include. One approach is to count the completions of public health courses and use this information to make inferences about the supply of persons who will perform public health services in the future. Research examining public health course conferrals has been undertaken in North America recently,[1-5] but in Australia, there is a paucity of such research. The most comprehensive work in Australia was a national survey completed in the early 1990s,[6] finding 42 postgraduate public health completions in 1988 and 189 completions in 1993. This research was extended in the Public Health Education and Research Program Review (PHERP review)[7] in 2005, finding a total of 4,183 Master of Public Health (MPH) completions between 1987 and 2003. Presumably much has changed since then, and these changes are of interest to public health educators and those responsible for employing people with public health education.

It is not only the numbers of graduates but also the types of courses considered to be public health that are important to understand. The flagship public health course is the MPH, but it is by no means the only course available, with courses also available at the undergraduate level and through more specialised course offerings. There are potential issues associated with the increased expansion of public health education, such as the delineation between undergraduate and postgraduate offerings and the relationship between courses offered and the job market.

For example, recent Australian research examined job advertisements for public health jobs,[8] and while it showed that a public health qualification was the most commonly required qualification, very few employers specified which level of qualification (e.g. undergraduate or postgraduate) they considered essential. Furthermore, due to the broad nature of public health, many Australian courses are classified as public health, leading to a heterogeneous set of course offerings. For example, the Commonwealth Register of Institutions and

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Courses for Overseas Students (CRICOS)[9] lists 119 registered master's by coursework courses as 'public health' in Australia, and a further 60 for bachelor's courses, which is nearly as many course offerings as there were public health graduates in 1993. Therefore, it is important to consider what courses are now considered public health, and how many students study them, to highlight potential issues of quality and consistency of education.

It is also important to understand the students who study public health. As has been discussed in other areas,[10] the group who specialise in a field will ultimately shape the field. In public health, the student body will eventually play a role in determining public health policies, which will affect all Australians. Of particular importance in Australia are the proportion of Indigenous students and the proportion of overseas students. In 2005, the Federal Government of Australia released the PHERP review,[7] which followed a period of investment in public health education and training. Included in the PHERP review were recommendations about addressing gaps and priorities in public health education. Among these was the recommendation that "…universities seek to actively recruit Indigenous Australians [into MPH courses]". Whether or not the proportion of Indigenous Australians has increased during this time has not been formally examined. Secondly, the proportion of overseas students in Australian universities has increased over the past twenty years, from 22% of all course completions in 2001 to 37% by 2018.[11] Understanding how the share of overseas students in public health is changing may help guide decisions on curriculum development, as they may wish to learn skills that can be implemented in their country of origin.

We developed three research aims related to numbers of students, courses of study, and composition of students in public health who completed bachelor's or master's by coursework study in Australia. Firstly, we aimed to describe the number of public health course completions over time. Secondly, we aimed to describe the types of courses that are classified as public health and examine the proportion of students enrolled in these. Thirdly, we aimed to describe the composition of students completing public health courses, in terms of the proportion of Indigenous students, the proportion of overseas students and other available demographics.

Methods

Courses classified as public health

Labelling a course as 'public health' is a decision made by administrators at each higher education institution. Along with this label, we had access to the name of the course and institution providing it, thus we were able to categorise these courses at a more granular level. We chose to categorise courses according to the Australian Classification of Education (ASCED) field codes, in order to provide more granular information about which courses in Australia are labelled as public health. ASCED codes are the Australian Bureau of Statistics' classification system of higher education fields, which classifies courses by a hierarchical coding system. For example: 06 is health, 0613 is public health, and 061303 is environmental health. Using these codes, we mapped the course name to the most specific ASCED code given the information. For example, a Master of Epidemiology that was previously labelled as 'public health' was mapped to 061311, corresponding to 'Epidemiology' in the ASCED codes. We combined this mapping with the proportion of enrolled students to give a sense of which courses labelled public health were most common. Student completions data did not contain course names and thus we were unable to conduct the same analysis for completions. Therefore, we refer to our cohort as 'students' when referring to data obtained from enrolment databases, rather than 'graduates' as we cannot be certain these students graduated. Furthermore, we considered the use of 'degree' and 'course' interchangeable and refer to them as courses in this article.

Numbers of course completions

To present numbers of course completions, we used national completions data from 2001 to 2018. These data are collected from statistical or business units in each higher education institution in Australia. These units collect data relating to the number of enrolments, commencements and graduations of their students, as well as demographic data. Datasets are sent to the Department of Education, Skills and Employment where they are collated and published in reports and serve as input to online data repositories, such as the Higher Education Data Cube – uCube.[11]

We defined a completion as a person who had completed a master's by coursework or bachelor's course when the field of education code was labelled 'public health'.

Composition of graduates

The composition of graduates was tabulated by using national completions data. We collected information about overseas status and Indigenous status and reported on sex, disability status and socioeconomic status (SES) in the Supplementary Material. When considering overseas graduates and Indigenous graduates, we compared rates in public health completions with rates of completions for any health completion using the uCube database.

All data analysis was done in a Jupyter Lab environment using Python 3.7.4. Numerical packages used for analysis were Pandas and NumPy, and Plotly was used for generating plots.

Results

Numbers of course completions

Figure 1 presents the numbers of completions of students from 2001 to 2018. In 2018, there were 2,023 completions of students in master's by coursework public health courses, representing a four-fold increase since 2001, when 510 graduates completed study. There were 21,367 students who completed a master's by coursework public health course over this period, with an average annual growth rate of 8.4%. The proportion of public health completions out of all health course completions has not changed substantially.

In 2018, there were 1,428 completions of bachelor's courses in public health, representing a near three-fold increase since 2001, when 532 graduates completed study. The total number of graduates over this period was 15,770, representing an average annual growth rate of 6%. During this time, bachelor's public health courses have consistently represented 3–4% of all bachelor's health courses.

Supplementary Figure 1 illustrates the number of completions of bachelor's and master's courses by location. For master's courses in public health, the majority of completions were in institutions in NSW, followed by Queensland and Victoria. Comparatively, the majority of bachelor's public health courses are completed in Victoria and Western Australia, followed by

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South Australia. There were few completions by institutions in the Northern Territory, Australian Capital Territory or Tasmania for either master's or bachelor's courses. Completions data for 2018 is tabulated and presented in the Supplementary Material.

Courses classified as public health

Table 1 presents the most specific ASCED codes that could be inferred given the information we had available. Course classifications were heterogeneous: we were able to further classify bachelor's public health courses into 12 ASCED categories, and we were able to classify master's by coursework public health courses into 22 ASCED categories. For bachelor's level courses labelled 'public health', the majority of enrolments (67.8%) can only be classified as a 'health' course (e.g. Bachelor of Health, Bachelor of Health Science). The second and third most common classifications are for public health courses (12%) and occupational health and safety courses (7.4%). For master's by coursework courses, the majority of enrolments (63.9%) were for public health courses, such as the MPH and the Master of International Public Health. Other common classifications included 'business and management', e.g. the Master of Health Services Management (7.3%), occupational health and safety (7.3%) and medical studies, e.g. the Doctor of Medicine (4.1%).

Composition of graduates

As shown in Figure 2, there was an increase in Indigenous graduates (as a proportion of domestic graduates) until 2005 for both master's and bachelor's public health courses (4.2% and 5.8%, respectively), but since then, these proportions have been in decline. In 2018, these figures are much closer to the rates found in health degrees in general.

Over the same period of time, there has been a substantial increase in the proportion of overseas graduates in bachelor's and master's public health courses. In both course levels, most of the rise occurred over one year (2001–2002 for master's by coursework, and 2012–2013 for bachelor's courses). In 2018, the proportion of overseas graduates in bachelor's public health courses was similar to bachelor's health degrees more generally, whereas the proportion of overseas graduates in master's by coursework public health degrees was more than double the proportion in all health degrees at the master's level. Data on sex, disability and SES for 2018 are available in the Supplementary Material.

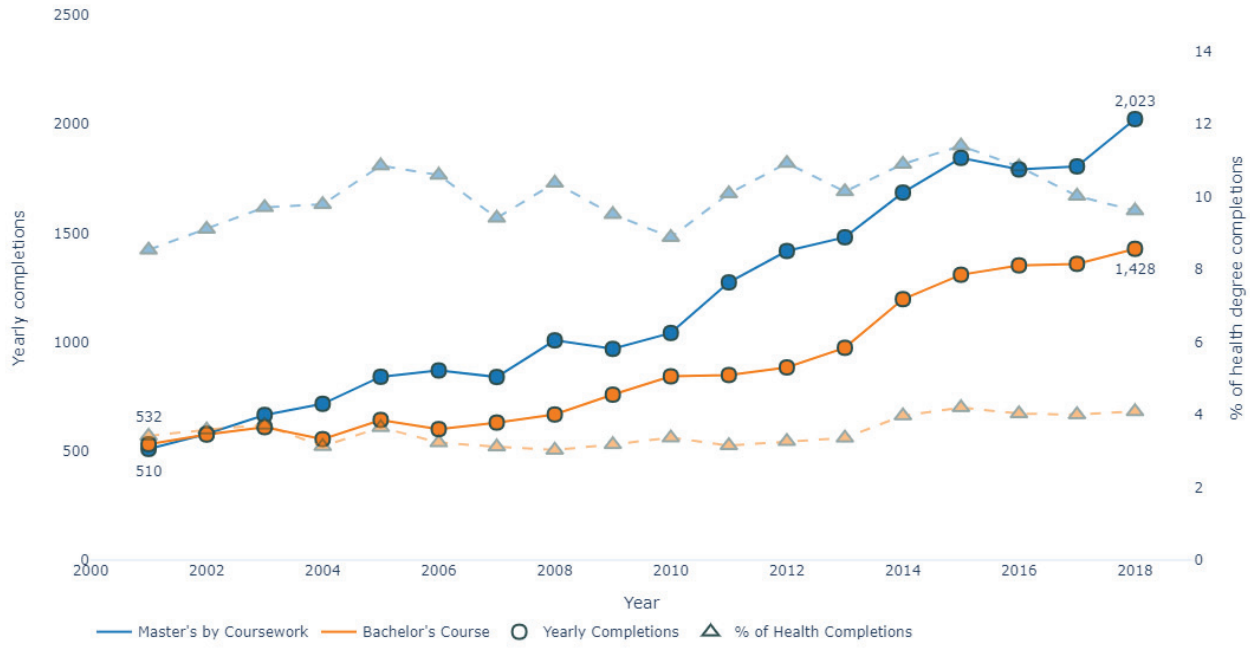
Discussion

Number of course completions

We presented national data on the number of completions for public health courses in master's by coursework and bachelor's courses in Australia from 2001 to 2018. This is the first presentation of this information since 2003, providing 18 years of completions data and delineating between bachelor's and master's completions. Since 2001, completions have increased 3.5-fold for master's by coursework courses and 2.2-fold for bachelor's courses. One clear difference between findings in the US and findings in Australia is that the number of completions in Australia for bachelor's and master's courses were nearly identical in 2001 but have since grown apart. At a glance, this appears to be the opposite in the US, with master's courses in public health being more common initially,[1,3,5] but undergraduate public health courses increasing in popularity (we note that the apparent difference may be due to differences in how courses are labelled). Leider states that bachelor's courses may soon overtake master's courses in popularity; whereas, in Australia, that seems unlikely to happen based on recent trends. Overall, the growth of public health education in Australia is in line with more general trends in higher education, with postgraduate coursework enrolments doubling in the past thirty years, and doubling as a share of total enrolments, from 11% to 22%.[12]

The number of completions is important to consider in its own right. In Australia, increased numbers of public health

Figure 1: Number of completions of Bachelor's and Master's public health degrees from 2001–2018. Dotted line represents the proportion of these degrees out of all health degrees for the same year.



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completions correspond to increased completions in health courses overall, as public health completions have maintained a consistent share of all health completions. However, different courses have different labour markets, and it is not a given that public health courses (or any course in particular) should grow proportionally over time. A previous study of job demand for public health in Australia showed that demand had increased between 14% and 60% from 2003 to 2018.[8] This is far less than the growth of course completions in the same time frame, with growth in completions over this time being two- to three-fold higher than the growth in job advertisements. However, one may expect demand to change given the events of 2020. As state and federal governments are major employers of public health workers, we may expect COVID-19 to increase demand for these graduates. This year has seen repeated calls for a bolstering of the public health workforce at state and federal levels in order to better protect the nation's health,[13-15] and it is reasonable to suggest that those trained in public health could fulfil such roles. Another important reason to consider job opportunities carefully is because the popularity of public health degrees may rise as a result of COVID-19, as similar trends have been observed in Canada after SARS in 2003.[3] Further research to examine the relationship between labour supply and demand could elucidate these potential issues.

Table 1: Most specific classification of courses which were labelled as public health courses. Row values represent the percentage of enrolments out of the total enrolments for the course level (Bachelor's or Master's by Coursework). Note: Data was available from 2015 – 2018.

Course Level	ASCED Code	Course Classification	% of enrolments
Bachelor's courses	01	Natural and Physical Sciences	1.7%
	06	Health	67.8%
	0613	Public Health	12.0%
	061301	Occupational Health and Safety	7.4%
	061303	Environmental Health	<1%
	061305	Indigenous Health	1.1%
	061307	Health Promotion	5.6%
	061309	Community Health	1.9%
	061311	Epidemiology	<1%
	061399	Public Health NEC	<1%
	09	Society and Culture	0.0%
	0903	Studies in Human Society	<1%
	0905	Human Welfare Studies and Services	<1%
	NA	Not Classifiable	<1%
		Total	**100%**
Master's courses	01	Natural and Physical Sciences	<1%
	0101	Mathematical Sciences	1.3%
	06	Health	2.4%
	0601	Medical Studies	4.1%
	0603	Nursing	<1%
	0605	Pharmacy	<1%
	0611	Veterinary Studies	<1%
	0613	Public Health	63.9%
	061301	Occupational Health and Safety	6.2%
	061303	Environmental Health	<1%
	061305	Indigenous Health	<1%
	061307	Health Promotion	2.8%
	061309	Community Health	<1%
	061311	Epidemiology	2.9%
	061399	Public Health NEC	1.2%
	08	Management and Commerce	0.0%
	0803	Business and Management	7.3%
	09	Society and Culture	0.0%
	0901	Political Science and Policy Studies	1.1%
	0903	Studies in Human Society	<1%
	0905	Human Welfare Studies and Services	2.5%
	0907	Behavioural Science	<1%
	0913	Librarianship, Information Management and Curatorial Studies	<1%
	0919	Economics and Econometrics	<1%
	NA	Not Classifiable	<1%
		Total	**100%**

Courses classified as public health

To our knowledge, we are the first group in Australia to categorise and enumerate the variety of courses that are labelled by administrators as 'public health' courses. These results are more heterogeneous than might have been expected: where one might have been expecting strictly conventional public health courses (e.g. MPH, epidemiology, etc.), a great variety of courses have been labelled as public health, some of which may be inappropriate on face value. This itself is an important finding: public health is hard to define. Research that compared the units available, duration and cost of these courses would refine our knowledge of these differences.

The other important finding is the continued popularity of the MPH. On one hand, the fact that nearly two-thirds of master's by coursework students study in the MPH or a similar course may not be surprising. The MPH carries international recognition and provides a broad overview of public health knowledge. However, given the development of more specialised courses such as a Master of Epidemiology, Biostatistics or Health Economics, it would be worthwhile researching the motivation of students who study MPH courses. In the PHERP review,[7] students were asked about their motivation for enrolling in an MPH; 30% stated their main reason was to acquire knowledge and skills and 15% stated their main reason was to change career. The literature concerning why students enrol in MPHs is scarce. For example, Zweigenthal et al. interviewed South African physicians who have enrolled in an MPH, finding skills acquisition and career change to be common considerations.[16] Given ambiguities between the purpose of undergraduate and postgraduate public health courses,[17] student motivations should be better understood, and their motivations should be in line with the purposes of the courses, which may be to broaden knowledge or to prepare students for a profession. This is especially important given that some

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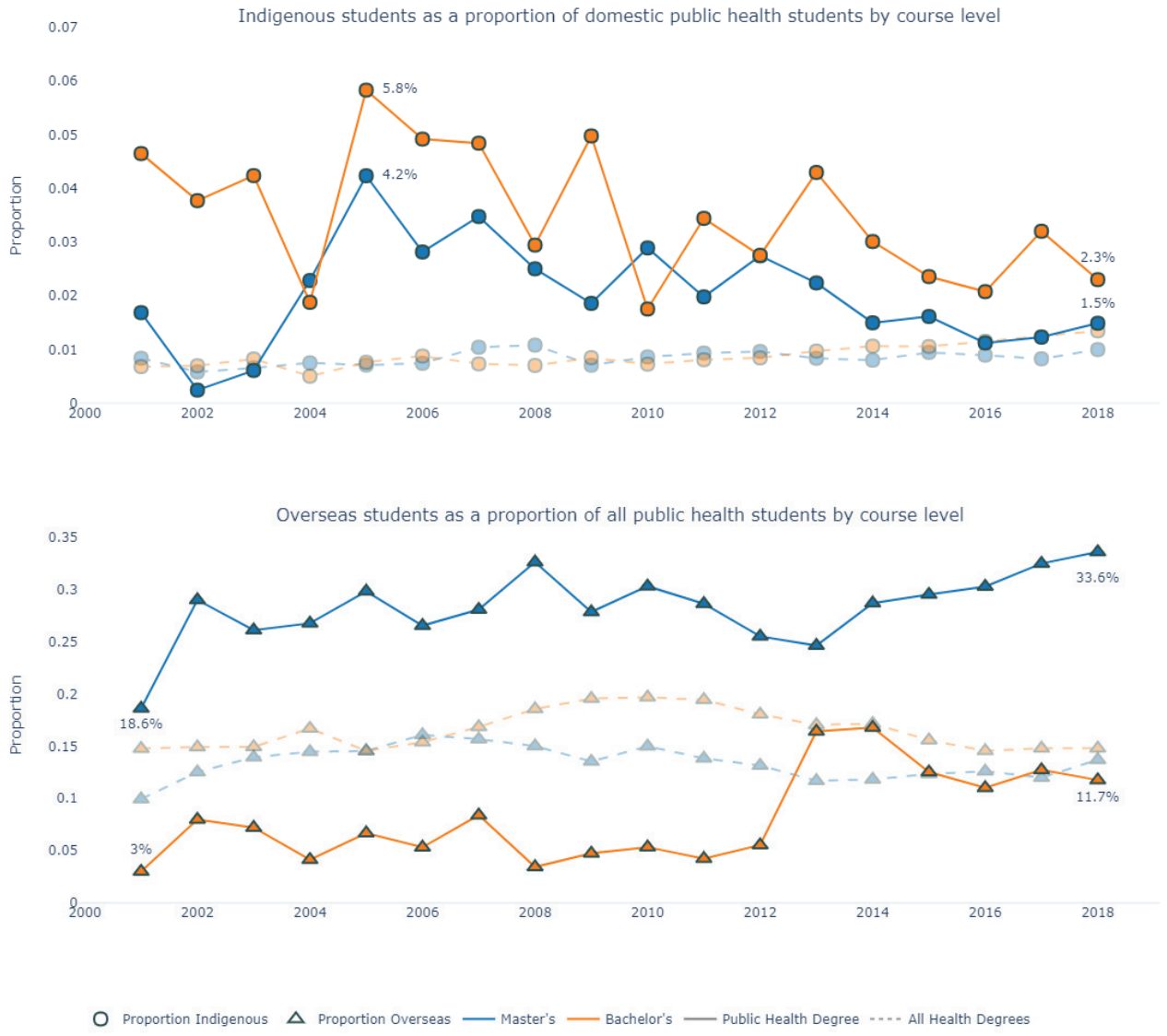
Figure 2: Indigenous students as a proportion of domestic public health students by course level (top). Overseas students as a proportion of all public health students by course level (bottom).



students may have no clinical background, and therefore these students may have different expectations and desires than students who do.

Composition of graduates

In 2005, the PHERP review made a recommendation to actively recruit Indigenous graduates into MPH courses.[7] However, the proportion of domestic public health graduates who are Indigenous since 2005 has declined. The PHERP review suggested several reasons for a low participation rate, including a lack of Indigenous content in curriculum and a lack of support for Indigenous graduates, and there has been some notable work in this area, including the development of curriculum frameworks for Aboriginal and Torres Strait Islander public health education.[18] However, a recent review of Australian public health courses suggests Indigenous health competencies are not always covered.[19] This decline may be reflective of increased barriers within public health education, or increased access to other degrees, and future research should determine which of these is the case.

The second trend is the large increase in master's public health overseas graduates, especially relative to other health courses. This is more difficult to interpret on its own. It may be a positive finding, indicating that Australia is a regional hub for public health education. However, it may represent something more artefactual, such as a common course for overseas clinicians before their registrations are approved. These suggestions are merely hypotheses, and a greater understanding of the motivations and outcomes of overseas graduates relative to domestic graduates is warranted given the substantial rise in overseas participation rates, as this may impact what curricula is developed and how it is delivered.

Limitations

Our research is subject to limitations that warrant discussion. Most importantly, the number of completions of public health courses are affected by which courses are considered to be in the public health field. As shown in our results, there is variation in what is considered part of this field, and thus,

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the number of completions (in particular for bachelor's courses) should be considered an estimate of the upper limit of completions. Related to this is the use of national enrolments data to classify courses labelled as public health. It would have been desirable to use the course names for completed courses, as our research aims relate to graduates who may potentially become public health workers, but these data were not available. We assumed that attrition rates for courses were the same, but this may not have been the case. For example, a Bachelor of Health may have a different attrition rate than a Bachelor of Public Health. However, we do not believe this is likely to change our main findings, which are that the majority of bachelor's and master's by coursework students study a small set of broad public health courses, as these courses account for a far greater share of students than any other course. Finally, there are other public health course levels in Australia beyond bachelor's and master's by coursework, ranging from associate's to doctoral studies. We were unable to access data to explore these courses in depth, but their growth or decline should be examined in future research.

Conclusions

Since 2001, there has been a substantial increase in the number of public health course completions in Australia. While there are a variety of courses that deliver public health education, two-thirds of students are enrolled in a handful of these, including a broad health course at bachelor's level and the MPH. Over this time, there has been a decline in the proportion of Indigenous graduates in public health and an increase in the proportion of overseas graduates, both of which are uncharacteristic of broader trends in health courses in Australia.

These findings highlight three potential issues in public health education. Firstly, Australia may be graduating too many public health students relative to opportunities. Secondly, Australia may not have consistency in the delivery of public health education across all courses that are labelled public health, owing to the heterogeneity of course offerings. Thirdly, due to changes in student composition, namely in overseas students, curricula may need to be revised to ensure student expectations are being met. Further research should investigate the relationship between course completions and the job market, and student motivations for studying public health courses, with emphasis on Indigenous and overseas graduates.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary Figure 1: Public Health completions by location, Bachelor's and Master's by coursework.

Supplementary Table 1: Supplementary Table showing the locations where public health completions occurred in 2018.

Supplementary Table 2: Supplementary table showing composition of students in 2018.

Supplementary Table 3: Bachelor's public health course classifications - Number of enrolments 2015 - 2018.

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