Received: 28 March 2023 | Revised: 8 June 2023 | Accepted: 10 July 2023

DOI: 10.1111/ajr.13027

ORIGINAL RESEARCH

AJRH National Rural Health Alliance WILEY

Rural origin student representation in health courses at the University of Tasmania: 2011–2020

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Funding information
Rural Health Multidisciplinary Training (RHMT) program

Abstract

Objective: To describe longitudinal trends in the admission and completion of domestic Tasmanian rural origin students in health courses at the University of Tasmania (UTAS).

Methods: A retrospective audit of records for all domestic Tasmanian students admitted to, or who completed a health course offered by UTAS between 2011 and 2020 was conducted. Data extracted from student records included gender, age, Indigenous background, rural origin (based on residential address outside of Launceston or Hobart at the time of application), health discipline, year of admission and/or completion. Data were analysed in STATA.

Results: Between 2011 and 2020, 7516 domestic Tasmanian students were admitted to health courses at UTAS, of which 22.6% were rural origin (vs. a rural population of 36.7%). Students admitted were mostly female (77.0%) and studying nursing (51.1%). Rural origin students were more likely to study at the regional campus in Launceston than in Hobart, the capital city (OR, 3.79 [3.4–4.3, $p < 0.00$]). Over this same period, 5086 students completed a health course. There was little difference in completion rates among regional vs. rural origin students (OR, 1.04 [1.0–1.1, $p < 0.00$]); however, completion rates decreased with increasing remoteness. Indigenous and male students were less likely to complete than non-Indigenous (OR, 0.73 [0.7–0.8, $p < 0.05$]) and female students (OR, 0.97 [1.0–1.0, $p < 0.05$]) respectively.

Conclusions: Tasmanian rural origin students are admitted to a range of health courses at UTAS and many complete. However, additional measures are needed to attract a greater number of local rural origin students to study health courses and to support them through to course completion.

KEYWORDS

education, rural and remote education, rural health, rural workforce development, workforce planning

1 | INTRODUCTION

Providing the near seven million Australians residing outside of metropolitan cities with equitable and timely access to healthcare remains challenging. As outlined by the 10-year *Stronger Rural Health Strategy*,[1] improving accessibility to healthcare in non-metropolitan Australia relies on both recruitment and retention of a range of tertiary qualified health professionals to rural and remote communities. One initiative to support this is expansion of the Rural Health Multidisciplinary Training (RHMT) program, an Australian Commonwealth Government funding initiative supporting the work of a network of University Departments of Rural Health and Rural Clinical Schools across Australia.[2] The RHMT program aims to improve the size and composition of the rural health workforce through a variety of mechanisms that include: targeted rural health research; initiatives that increase the participation of rural origin students in health courses and student exposure to quality rural (MM2-7) placement experiences as part of their training.[2] These approaches have been shown to have a positive impact on rural workforce development over time,[3] and are supported by the growing body of literature which demonstrates that lived rural experience and quality rural placements are both precursors to rural health workforce participation.[4,5]

The RHMT program prescribes participating universities with minimum expectations for rural origin student enrolments in health courses.[2] Within rural medical training, participating medical programs are required to ensure at least 25% of the commonwealth-supported placements are for students of rural origin.[2] For rural multidisciplinary and dental training, rural origin student enrolment targets are prescribed on an institutional basis and reflect the demography and profile of the participating universities health courses.[2] Although there are several studies that have investigated rural origin student representation in medicine[6–8] and other health courses[9–12] from participating universities, this has largely been as part of exploring rural health workforce participation post-qualifying. Few studies have systematically explored rural origin student representation in health courses over time. Such investigations are important because they can help drive and shape policy change, as well as direct resources and support within tertiary institutions to facilitate rural health workforce development.

As a participating university in the RHMT program, the University of Tasmania (UTAS) offers a unique opportunity to explore the issue of rural origin student representation in health courses. As the sole tertiary provider physically located in the state of Tasmania, it has a captive audience of local students who can choose to study health courses at one of two regional (MM2) campus locations (Hobart, Tasmania's capital city, or Launceston), or a rural (MM3) campus (Cradle Coast, located in Burnie on the north west coast). Students can also study at a metropolitan (MM1) campus located on mainland Australia (Rozelle, located in Sydney). Being a geographically isolated island state, local students are exclusively of regional, rural and remote origin (MM2-7), with the state's largest population centres of Hobart and Launceston both classified as regional (MM2).[13] In addition to the absence of metropolitan (MM1) residents, Tasmania also has a higher proportion of its population residing in rural and remote areas (MM3-7) (36.7%) compared to Australia collectively (19.7%), and other mainland states such as Victoria (16.2%), New South Wales (22.9%) and Queensland (17.3%).[14] This suggests that UTAS may support a proportionately larger number of rural origin students than any other tertiary institution.

Understanding rural origin student representation at UTAS is important for local health workforce planning given that these students are expected to contribute to the state's rural health workforce. Tasmania has a high need for healthcare services, which in part, is a consequence of the state's ageing population, high rates of chronic disease and low socio-economic status

What is already known about this subject?

- Recruitment and retention of health professionals in rural and remote areas of Australia is a persistent challenge.
- Rural origin (having lived in a rural area) is a strong predictor of future rural practice for health professional graduates.

What this study adds?

- Longitudinal student data on health courses is necessary to assess representation and patterns in rural origin student admissions and completions over time.
- Analysis of rural origin student admissions and completions data can identify where additional recruitment efforts and support strategies may be needed for health courses.
- More effective strategies are needed to increase the number of students from groups found to be underrepresented in health courses and to increase completion rates.

which impacts both health literacy and behaviours that contribute to poorer health outcomes.[15] However, Tasmania's geographical isolation, rural characteristics and population dispersion impacts both health workforce supply and distribution, especially allied health professionals.[15] Although overall growth in the health workforce has been seen over the last decade, the north and north-west of the state continue to have less access to a range of health, welfare and care professionals.[16] The absence of local courses for several allied health disciplines including physiotherapy, occupational therapy and speech pathology, has exacerbated health workforce shortages across Tasmania,[17] with the requirement for Tasmanian students to relocate interstate for their preferred course likely to be both financially and socially prohibitive.[18] Focusing on place-based opportunities to develop a 'home grown' health workforce to address specific workforce challenges has therefore become an important policy platform and strategy for both the Tasmanian Department of Health and UTAS.[17,19]

Given the importance of rural origin students to future rural health workforce, and the unique opportunity UTAS provides to explore this issue, the overarching aim of this study was to examine rural origin student representation in health courses at this institution over time. This information is anticipated to provide much needed guidance to the RHMT program and UTAS regarding rural origin enrolment targets, together with the Tasmanian Department of Health and the broader Tasmanian community on strategies to build a sustainable rural health workforce within the state.

2 | METHODS

2.1 | Study design

This study involved a retrospective audit of records for domestic Tasmanian students offered admission to, or who completed a health course at the University of Tasmania between 2011 and 2020.

Domestic Tasmanian students were defined as students who had a Tasmanian residential address upon course application and were either Australian citizens or permanent residents of Australia. Health courses were defined as those enabling graduates to enter the workforce as a broadly recognised health professional (File S1), and were mapped to one of 11 health disciplines: environmental health, exercise science, laboratory medicine, medicine, nutrition, nursing, paramedicine, psychology, pharmacy, medical radiation science and social work.

Ethical approval to undertake the study was granted by the University of Tasmania Human Research Ethics Committee (Project ID: 26778).

2.2 | Data collection

Student Systems and Administration, and Progression and Graduations, are administrative departments at UTAS responsible for collecting and maintaining electronic records for all individuals who apply to study, receive a course offer, enrol and who subsequently graduate with a degree at UTAS. In July 2021, an application was made to both departments to extract records for any student offered admission to, or who had completed a health course at UTAS since 2011. A database of admission and completion records was subsequently provided containing 30 data variables, of which 17 were retained for this study including: UTAS student ID number; name; date of birth; gender; citizenship; Indigenous background; residential address upon course application; admission year; course code; degree title; campus location and study attendance mode (on/off campus). All records were cleaned to remove students: admitted to, or who completed a course in 2021 given full year data were not available at the time of the data request; admitted to, or who completed a health course not included in this study; or who had an international and interstate address on course application (Files S2 and S3). Duplicate admission and completion records were also removed and only the earliest included health course admission or completion record retained.

2.3 | Data coding and analysis

Additional variables were created for each record prior to analysis: the health discipline based on individual course code; degree level (undergraduate or postgraduate) and a coding of geographical remoteness using the categories described by the Modified Monash Model (MM).[13] MM categories were coded based on the suburb of the student residential address at the time of course application, with MM2 reflecting students of regional origin and MM3-7 students of rural origin.

Once additional variables had been added, admission and completion data were subject to quantitative analyses, with inferential and descriptive statistics performed. Logistic regression was conducted to identify predictive factors for course admission and completion including: origin (regional (MM2) vs. rural (MM3-7)); gender (male vs. female) and campus location (Hobart vs. Launceston vs. Cradle Coast). Stata version 17.0 (StataCorp, https://

www.stata.com/) was used for all statistical analyses and a *p*-value of <0.05 was accepted as statistically significant.

3 | RESULTS

3.1 | Student admissions

Over the 10-year period, 7516 domestic Tasmanian students were admitted to health courses at UTAS, of which just under a quarter ($n=1699$, 22.6%) were of rural origin (Table 1). Most of the students were admitted to undergraduate degrees ($n=6888$, 91.6%) and chose to study on campus ($n=6063$, 80.7%). Although around half of regional origin students were admitted to either the Hobart ($n=3279$, 56.4%) or Launceston ($n=2515$, 43.2%) campuses, rural origin students were more than three times more likely to study at the Launceston campus than Hobart (OR, 3.79 [3.4–4.3), $p<0.00$]). Admissions to the Cradle Coast campus were almost exclusively rural origin students, with around one in 10 ($n=191$, 11.2%) of all the rural origin students studying at this campus over the study period. Almost all students chose to study at one of the three Tasmanian campuses, with only 14 (0.2%) students admitted to the metropolitan campus in Sydney, 13 of which were regional origin.

There was a 31.3% increase in the overall number of regional and rural origin admissions to health courses over the 10-year period (File S4). However, the proportion of rural origin admissions only rose from 20.2% in 2011 to 22.1% in 2020 (range 20.2%–26.3%, mean 22.5%) illustrating minimal gains in rural origin student admissions over time. When considering population distribution across MM categories and drawing upon 2016 census data as the population reference point, rural origin students were proportionately underrepresented in course admissions over the study period (Table 2).

There was an obvious gender bias. Most admissions were female ($n=5788$, 77.0%) (Table 1). However, proportionately, fewer males of rural origin ($n=318$, 18.7%) were found to be admitted than males of regional origin ($n=1409$, 24.2%). Over the 10-year period, 278 (3.7%) admitted students identified as Aboriginal or Torres Strait Islander (ATSI). A greater proportion of rural origin students identified as ATSI ($n=126$, 7.4%) than regional origin students ($n=152$, 2.6%).

3.1.1 | Student admissions by health discipline

Over time, all health disciplines have shown an increase in admissions except laboratory medicine and environmental science (no longer offered at UTAS) (File S5). Nursing accounted for around half of all admissions ($n=3842$, 51.1%) (Table 3). Proportionately, more regional origin students were admitted to medicine, pharmacy and psychology ($n=714$, 12.3%; $n=332$, 5.7% and $n=131$, 2.3%) than rural origin students ($n=109$, 6.4%; $n=59$, 3.5% and $n=10$, 0.6%). Conversely, a greater proportion of rural origin students were admitted to social work ($n=298$, 17.5%) compared to regional students ($n=846$, 14.5%). Psychology, medicine and pharmacy admissions comprised more than 80% of regional students (Table 4). In contrast, medical radiation science and nutrition science recorded the highest proportion of rural origin students (45.1% and 32.7% respectively).

Individual health disciplines were all found to be female dominated except for exercise science, which recorded a higher proportion of male students than female among both regional ($n=151$, 63.2%) and rural ($n=48$, 52.2%) origin cohorts (Table 5). Among all other health disciplines, the highest proportion of male students were found to be admitted to medicine ($n=362$, 44%), while the lowest proportion were admitted to psychology ($n=16$, 11.3%). Courses most feminised were psychology, nursing and social work, all of which recorded over 80% of female students. Proportionately, fewer males of rural origin were admitted than regional origin male students to all health disciplines except for paramedicine (Table 5). Longitudinal analysis found little change in this gender division across admissions over the 10-year period (File S6).

A similar proportion of regional origin (44.2%) and rural origin (45.7%) students commenced health courses directly after completing secondary schooling. As such, the average age of students on admission was comparable between regional origin (mean 25.5 years, standard deviation 9.4 years) and rural origin student cohorts (mean 26.8 years, standard deviation 10.4 years) (Table 6). A higher average age on admission was observed for social work, psychology and nursing disciplines regardless of origin (Table 6).

3.2 | Student completions

Over the same period 10-year period, 5086 domestic Tasmanian students completed a health course, of which 1114 (21.9%) were of rural origin (Table 1). Most completions were for undergraduate degrees ($n=4721$, 92.8%), and for students studying at either the Hobart ($n=2746$, 54.0%) or Launceston campuses ($n=2199$, 43.2%). Almost twice as many rural origin students completed at the Launceston campus ($n=655$, 58.8%) compared to Hobart ($n=339$, 30.4%), with this trend reversed for regional origin students. Except for 2020, there has been an increase in the number of course

TABLE 1 Admissions and completions in health courses at UTAS between 2011 and 2020 by origin.

	Regional origin (MM2)			Rural origin (MM3-7)			Total		
	Admissions *n* (%)	Completions *n* (%)	Completion rate %	Admissions *n* (%)	Completions *n* (%)	Completion rate %	Admissions *n* (%)	Completions *n* (%)	Completion rate %
Campus									
Hobart	3279 (56.4)	2407 (60.6)	73.4	443 (26.1)	339 (30.4)	76.5	3722 (49.5)	2746 (54.0)	73.8
Launceston	2515 (43.2)	1544 (38.9)	61.4	1064 (62.6)	655 (58.8)	51.6	3579 (47.6)	2199 (43.2)	61.4
Cradle Coast	10 (0.2)	15 (0.4)	150.0	191 (11.2)	118 (10.6)	61.8	201 (2.7)	133 (2.6)	66.2
Darlinghurst/ Rozelle – Sydney	13 (0.2)	6 (0.2)	46.2	1 (0.0)	2 (0.2)	200.0	14 (0.2)	8 (0.2)	57.1
Degree level									
Undergraduate	5300 (91.1)	3670 (77.7)	69.2	1588 (93.5)	1051 (94.3)	66.2	6888 (91.6)	4721 (92.8)	68.5
Postgraduate	517 (8.9)	302 (22.3)	58.4	111 (6.5)	63 (5.7)	56.8	628 (8.4)	365 (7.2)	58.1
Attendance mode									
On campus	4711 (81.0)	n/a	–	1352 (79.6)	n/a	–	6063 (80.7)	n/a	–
Off campus	1106 (19.0)	n/a	–	347 (20.4)	n/a	–	1453 (19.3)	n/a	–
Gender									
Male	1409 (24.2)	939 (23.6)	66.6	318 (18.7)	206 (18.5)	64.8	1727 (23.0)	1145 (22.5)	66.3
Female	4407 (75.8)	3033 (76.4)	68.8	1381 (81.3)	908 (81.5)	65.7	5788 (77.0)	3941 (77.5)	68.1
Aboriginal or Torres Strait Islander									
Yes	152 (2.6)	79 (2.0)	52.0	126 (7.4)	60 (5.4)	47.6	278 (3.7)	139 (2.7)	50.0
No	5665 (97.4)	3893 (98.0)	68.7	1573 (92.6)	1054 (94.6)	67.0	7238 (96.3)	4947 (97.3)	68.3
Total	5817 (100.0)	3972 (100.0)	68.3	1699 (100.0)	1114 (100.0)	65.6	7516 (100.0)	5086 (100.0)	67.7

TABLE 2 UTAS admissions and completions 2011–2020 proportionate to population by Modified Monash Model (MM) category.

MM category	Tasmanian population[a] *n* (%)	Admissions *n* (%)	Completions *n* (%)	Completion rate %
MM2 (regional)	320 828 (63.3)	5817 (77.4)	3972 (78.1)	68.3
MM3 (large rural town)	79 257 (15.6)	899 (12.0)	620 (12.2)	69.0
MM4-5 (medium/small rural town)	95 750 (18.9)	762 (10.1)	474 (9.3)	62.2
MM6-7 (remote/very remote)	10 901 (2.2)	38 (0.5)	20 (0.4)	52.6
Total	506 736 (100.0)	7516 (100.0)	5086 (100.0)	67.7

[a]Tasmanian population figures extracted from Versace et al. (2021).[14]

completions for regional and rural origin students over the 10-year period (File S4). However, proportionately, rural origin student completions were underrepresented relative to population size (Table 2).

The overall crude completion rate across the 10-year period was 67.7% (Table 1). There was little difference between regional and rural origin student cohorts in terms of course completion (OR, 1.04 [1.0–1.1, $p < 0.00$]), with the completion rate for regional origin students being 68.3% compared to 65.6% for rural origin students. However, further analysis by individual MM category showed a decline in completion rates with increasing MM, with a crude completion rate of only 52.6% for the most remote (MM6-7) students compared to 68.3% for MM2 students, and 69.0% for MM3 students (Table 2).

Overall completion rates were highest at the Hobart campus (73.8%), followed by Cradle Coast (66.2%) and Launceston (61.4%), with this pattern observed across both regional and rural origin student cohorts (Table 1). ATSI students were less likely to complete their course than non-ATSI students (OR, 0.73 [0.7–0.8, $p < 0.05$]). The overall completion rate for ATSI students was only 50% compared to 68.3% for non-Indigenous students, with notably lower completion rates among Indigenous students of rural origin (47.6%) compared to regional origin (52.2%). Males were also less likely than females to complete (OR, 0.97 [1.0–1.0, $p < 0.05$]). The overall completion rate for female students was 68.1% while for male students it was 66.3%, with both male and female students of rural origin showing lower completion rates than their regional origin peers (64.8% vs. 66.6% and 65.7% vs. 68.8% respectively).

3.2.1 | Student completions by health discipline

Regional and rural origin students showed similar patterns of completion rates across disciplines, with the highest recorded for psychology, followed closely by medicine (Table 3). However, rural origin students showed higher completion rates than regional students for both pharmacy (81.4% vs. 70.5%) and paramedicine (68.5% vs. 60.9%). The lowest completion rate was evident in social work for both regional (59.5%) and rural (55.0%) origin student cohorts.

Analysis of gender and origin across individual health disciplines revealed higher completion rates for males of rural origin than males of regional origin in medicine (88.9% vs. 83.9%), pharmacy (90.9% vs. 59.7%), psychology (100.0% vs. 64.3%) and medical radiation science (81.8% vs. 66.7%) (Table 5). Females of rural origin had a higher completion rate in paramedicine than females of regional origin (73.6% vs. 52.2%) (Table 5).

4 | DISCUSSION

UTAS has seen growth in both the number of admissions and completions of local students in health courses over the past decade. This is consistent with the general trend of increased health student enrolments at tertiary institutions across Australia.[20] Just under a quarter of admissions (22.6%) and completions (21.6%) were students of rural origin, indicating that UTAS does attract students outside of Hobart and Launceston to study health degrees, and many of them go on to gain a health qualification. However, considering that 36.7% of Tasmanians live in rural and remote areas, and assuming a similar age profile across regional and rural/remote populations, rural origin students appear underrepresented. Further, little change in the proportion of rural origin students represented in health courses was evident over time. This suggests that an aspirational target for UTAS may be to increase rural origin student representation in both health course admissions and completions. This could be achieved through targeted strategies to attract rural origin students to health courses, together with supports to ensure their successful journey through to course completion.[21]

TABLE 3 Admissions and completions in health courses at UTAS between 2011 and 2020 by health discipline and origin.

Health discipline	Regional origin (MM2)			Rural origin (MM3-7)			Total		
	Admissions *n* (%)	Completions *n* (%)	Completion rate %	Admissions *n* (%)	Completions *n* (%)	Completion rate %	Admissions *n* (%)	Completions *n* (%)	Completion rate %
Environmental health	16 (0.3)	22 (0.6)	[a]	7 (0.4)	6 (0.5)	[a]	23 (0.3)	28 (0.6)	[a]
Exercise science	239 (4.1)	146 (3.7)	61.1	92 (5.4)	58 (5.2)	63.0	331 (4.4)	204 (4.0)	61.6
Laboratory medicine	124 (2.1)	81 (2.0)	65.3	43 (2.5)	28 (2.5)	65.1	167 (2.2)	109 (2.1)	65.3
Medicine	714 (12.3)	596 (15.0)	83.5	109 (6.4)	91 (8.2)	83.5	823 (10.9)	687 (13.5)	83.5
Nursing	2932 (50.4)	2012 (50.7)	68.6	910 (53.6)	614 (55.1)	67.5	3842 (51.1)	2626 (51.6)	68.3
Nutrition science	74 (1.3)	13 (0.3)	[a]	36 (2.1)	3 (0.3)	[a]	110 (1.5)	16 (0.3)	[a]
Paramedicine	353 (6.1)	215 (5.4)	60.9	89 (5.2)	61 (5.5)	68.5	442 (5.9)	276 (5.4)	62.4
Pharmacy	332 (5.7)	234 (5.9)	70.5	59 (3.5)	48 (4.3)	81.4	391 (5.2)	282 (5.5)	72.1
Psychology	131 (2.3)	111 (2.8)	84.7	10 (0.6)	11 (1.0)	110.0	141 (1.9)	122 (2.4)	86.5
Medical radiation science	56 (1.0)	39 (1.0)	69.6	46 (2.7)	30 (2.7)	65.2	102 (1.4)	69 (1.4)	67.6
Social work	846 (14.5)	503 (12.7)	59.5	298 (17.5)	164 (14.7)	55.0	1144 (15.2)	667 (13.1)	58.3
Total	5817 (100.0)	3972 (100.0)	68.3	1699 (100.0)	1114 (100.0)	65.6	7516 (100.0)	5086 (100.0)	67.7

[a]Completion rate not calculated as courses not offered for full ten-year period.

4.1 | Attracting rural origin students to study

Expanding health course offerings and number of student places at Launceston and Cradle Coast campuses may auger well for greater rural student representation given this study observed a greater proportion of rural origin students studied at these campus locations. This strategy recognises the social and financial constraints of relocating for higher education[22–24] and aligns with the call to increase access to health courses in rural and remote areas.[18] Adopting a rural pipeline approach,[25] course offerings at these campus locations should reflect consideration of local workforce shortages. The north west coast of Tasmania has historically experienced the lowest per capita numbers of nursing, medicine and allied health professionals.[16] However, this study found that courses such as medicine, paramedicine, pharmacy and psychology, all of which recorded higher numbers of regional students than rural have, historically, only been available at the Hobart campus. Offering courses for health professions which are in short supply at the Launceston and Cradle Coast campuses, attracting local students and providing quality rural training experiences will all likely positively contribute to rural health workforce growth and distribution across the state.[1]

Positively, UTAS is cognisant of the impact of limited health course availability across campus locations and has subsequently embarked on an allied health expansion project, aiming to extend health course offerings and availability across the state to promote equity of access and better support health workforce needs.[26] This project introduced the state's first ever Master of Physiotherapy and Master of Speech Pathology courses in 2022, which are able to studied at all campus locations in Tasmania; a strategic decision which supports rural origin students who may wish to study these disciplines.[26] From 2023, pharmacy courses are also now offered at both the Launceston and Cradle Coast campuses, while psychology is being offered for the first time at the Launceston campus. This will likely provide further scope and access to health training opportunities for rural origin students who are more likely to study at these campus locations. It will be important in the coming years to examine student enrolments in these new course and campus offerings to identify any change in rural origin student participation. Further, tracking of work locations of graduates from these newly established health courses and campus offerings will provide much needed evidence regarding the role of place-based training in promoting rural health workforce growth.

Affirmative selection practices that favour rural origin and Indigenous students, cautiously moderating standards of entry for these students, establishing

TABLE 4 Origin of students studying by health discipline.

	Admissions			Completions		
Health discipline	**MM2 *n* (%)**	**MM3-7 *n* (%)**	**Total *n* (%)**	**MM2 *n* (%)**	**MM3-7 *n* (%)**	**Total *n* (%)**
Environmental health	16 (69.6)	7 (30.4)	23 (100.0)	22 (78.6)	6 (21.4)	28 (100.0)
Exercise science	239 (72.2)	92 (27.8)	331 (100.0)	146 (71.6)	58 (28.4)	204 (100.0)
Laboratory medicine	124 (74.3)	43 (25.7)	167 (100.0)	81 (74.3)	28 (25.7)	109 (100.0)
Medicine	714 (86.8)	109 (13.2)	823 (100.0)	596 (86.8)	91 (13.2)	687 (100.0)
Nursing	2932 (76.3)	910 (23.7)	3842 (100.0)	2012 (76.6)	614 (23.4)	2626 (100.0)
Nutrition science	74 (67.3)	36 (32.7)	110 (100.0)	13 (81.2)	3 (18.8)	16 (100.0)
Paramedicine	353 (79.9)	89 (20.1)	442 (100.0)	215 (77.9)	61 (22.1)	276 (100.0)
Pharmacy	332 (84.9)	59 (15.1)	391 (100.0)	234 (83.0)	48 (17.0)	282 (100.0)
Psychology	131 (92.9)	10 (7.1)	141 (100.0)	111 (91.0)	11 (9.0)	122 (100.0)
Medical radiation science	56 (54.9)	46 (45.1)	102 (100.0)	39 (56.5)	30 (43.5)	69 (100.0)
Social work	846 (74.0)	298 (26.0)	1144 (100.0)	503 (75.4)	164 (24.6)	667 (100.0)
Total	5817 (77.4)	1699 (22.6)	7516 (100.0)	3972 (78.1)	1114 (21.9)	5086 (100.0)

alternative entry pathways and quarantining course places may further build a pipeline of students currently underrepresented in health courses at UTAS.[8,27] This has proven effective in medicine and could be more broadly applied to other health courses at UTAS, particularly allied health. Building stronger partnerships with local health providers in rural communities may also prove successful in increasing rural origin representation in health courses at UTAS. This approach has been successful for the collaborative (University of Tasmania/Charles Sturt University) medical radiation science course. Local radiography services who have experienced long term workforce shortages also offer bonded scholarships to local students. This provides financial support, placement opportunities and an employment pathway for local rural origin students and in turn, workforce solutions for the region. This strategy echoes the literature which suggests the positive impact of bonded scholarships on both medical and allied health workforce participation.[28] UTAS may therefore have a role in building capacity among health service providers to offer bonded scholarships for health professions where there is an identified workforce shortage in rural areas of the state.

Finally, a lack of understanding and awareness about higher education, and in particular, health careers, is a notable barrier for students exiting high school from rural areas.[22,29] Given that not all health professions may be visible in small communities,[18] targeted marketing within rural and remote areas of Tasmania is needed. This marketing needs to offer information on health courses, university life, future career pathways and jobs availability, all of which will likely improve the intention of rural high school leavers to attend university.[22,29] Marketing could especially target male students in these areas, with this study observing fewer rural origin male students seek entry into health courses. This marketing would need to consider adopting gender neutral language and promotion of health careers as attractive to help challenge sociocultural barriers of gender roles and expectations that may exist in rural areas.[30]

4.2 | Increasing rural origin student completions

Completion rates in this study were largely consistent with tertiary education outcomes for non-metropolitan students.[31,32] However, given the increased likelihood that rural origin students will contribute to the future rural health workforce, greater efforts to support them to complete their chosen health course at UTAS are needed.[33] Course completion rates were also notably lower among Indigenous students, male students and those studying social work. This conflicts with the literature which suggests females are more likely to leave tertiary study,[24] suggesting that targeted efforts could be made towards more-at-risk or vulnerable members of the health student population to boost completion rates.

Given the cost prohibitive nature of accessing higher education, especially when relocation is required,[22,23] rural students may fail to complete their course due to socioeconomic factors.[24,33,34] This is especially relevant in Tasmania where around half of the population are living in areas facing the highest disadvantage.[14] Ensuring rural students from disadvantaged backgrounds can access financial support for tuition and accommodation will likely improve course completion rates.[24] UTAS is known

TABLE 5 Gender of admissions and completions by origin and health discipline.

	Regional origin (MM2)						Rural origin (MM3-7)					
	Admissions		Completions		Completion rate		Admissions		Completions		Completion rate	
Discipline	Males *n* (%)	Females *n* (%)	Males *n* (%)	Females *n* (%)	Males %	Females %	Males *n* (%)	Females *n* (%)	Males *n* (%)	Females *n* (%)	Males %	Females %
Environmental health	4 (25.0)	12 (75.0)	6 (27.3)	16 (72.7)	[a]	[a]	3 (42.9)	4 (57.1)	1 (16.7)	5 (83.3)	[a]	[a]
Exercise science	151 (63.2)	88 (36.8)	95 (65.1)	51 (34.9)	62.9	58.0	48 (52.2)	44 (47.8)	31 (53.5)	27 (46.6)	64.6	61.4
Laboratory medicine	58 (46.8)	66 (53.2)	37 (45.7)	44 (54.3)	63.8	66.7	12 (27.9)	31 (72.1)	7 (25.0)	21 (75.0)	58.3	67.7
Medicine	317 (44.4)	397 (55.6)	266 (44.6)	330 (55.4)	83.9	83.1	45 (41.3)	64 (58.7)	40 (44.0)	51 (56.0)	88.9	79.7
Nursing	425 (14.5)	2507 (85.5)	252 (12.5)	1760 (87.5)	59.3	70.2	88 (9.7)	822 (90.3)	50 (8.1)	564 (91.9)	56.8	68.6
Nutrition science	23 (31.1)	51 (68.9)	5 (38.5)	8 (61.5)	[a]	[a]	6 (16.7)	30 (83.3)	0 (0.0)	3 (100)	[a]	[a]
Paramedicine	125 (35.4)	228 (64.6)	96 (44.7)	119 (55.4)	76.8	52.2	36 (40.5)	53 (59.6)	22 (36.1)	39 (63.9)	61.1	73.6
Pharmacy	129 (38.9)	203 (61.1)	77 (32.9)	157 (67.1)	59.7	77.3	22 (37.3)	37 (62.7)	20 (41.7)	28 (58.3)	90.9	75.7
Psychology	14 (10.7)	117 (89.3)	9 (8.1)	102 (91.9)	64.3	87.2	2 (20.0)	8 (80.0)	2 (18.2)	9 (81.8)	100.0	1.13
Medical radiation science	15 (26.8)	41 (73.2)	10 (25.6)	29 (74.4)	66.7	70.7	11 (23.9)	35 (76.1)	9 (30.0)	21 (70.0)	81.8	60.0
Social work	149 (17.6)	697 (82.4)	86 (17.1)	417 (82.9)	57.7	59.8	45 (15.1)	253 (84.9)	24 (14.63)	140 (85.4)	53.3	55.3
Total	1410 (24.2)	4407 (75.8)	939 (23.6)	3033 (76.4)	67.1	69.3	318 (18.7)	1381 (81.3)	206 (18.5)	908 (81.5)	66.3	66.8

[a]Completion rates not reported as courses were not available for full 10-year period.

TABLE 6 Age of students on admission by health discipline.

Health discipline	Regional origin (MM2)	Rural origin (MM3-7)	Total
	Mean age (years) (standard deviation)	Mean age (years) (standard deviation)	Mean age (years) (standard deviation)
Environmental health	26.9 (8.6)	24.1 (8.5)	26.1 (8.5)
Exercise science	21.0 (5.5)	20.4 (3.6)	20.8 (5.1)
Laboratory medicine	21.8 (5.3)	22.2 (6.0)	21.9 (5.5)
Medicine	20.0 (2.7)	19.8 (2.6)	20.0 (2.7)
Nursing	26.1 (9.1)	26.7 (10.0)	26.3 (9.3)
Nutrition science	23.4 (6.7)	23.2 (8.9)	23.4 (7.4)
Paramedicine	24.0 (7.2)	24.6 (8.6)	24.1 (7.5)
Pharmacy	21.9 (5.9)	21.2 (5.2)	21.8 (5.8)
Psychology	29.6 (7.6)	28.6 (6.8)	29.5 (7.5)
Medical radiation science	20.0 (4.3)	20.5 (6.6)	20.2 (5.4)
Social work	31.6 (11.1)	35.4 (11.8)	32.6 (11.4)
Total	25.5 (9.0)	26.8 (10.4)	25.8 (9.4)

to have a range of scholarship opportunities available, some of which are targeted towards rural origin students. Financial support when undertaking rural placement experiences will also be important given this is a source of significant stress, especially in circumstances of prolonged course required clinical placement times.[35] This is especially pertinent given the move to lengthen rural placement experiences,[2] and the fact that rural students are more likely to self-select rural placements during training.[4]

Offering online study options can reduce financial burden by circumventing the need for relocation to a university campus. This study found one in five rural students were studying off campus. However, the literature suggests higher rates of course attrition when courses are studied online,[36] with several barriers to elearning including the need for self-direction and proficient computer literacy.[37] Blended learning models which offer both a combination of face-to-face and online content could have appeal to the different learning styles of rural students and promote course retention.[34] Of note, the new allied health courses offered at UTAS (Master of Physiotherapy and Master of Speech Pathology) have adopted a flipped curriculum approach, which enables students to study online content at home, supported by face-to-face teaching components which are accessible at any of the three campus locations across the state.[26]

Regardless of mode of study, educational supports more broadly are needed given that the transition to academic demands is often challenging for rural students.[22,33,38] This educational support may be especially important for courses which have a lower academic entry requirement and a high proportion of mature aged students, both of which can impact attrition.[31,36,39] Comprehensive orientation programs at the commencement of courses may result in improved student retention by outlining supports available, communicating university expectations and managing student expectations.[27,40] However, this support needs to continue throughout the first year of tertiary study and beyond as students adjust to the academic demands of university life.[34] Given the lower completion rates among Indigenous students, upscaling awareness of and utilisation of support programs will be an important strategy in promoting course completion among Indigenous students at UTAS.[41,42]

Finally, social supports should also underpin efforts to improve course completion rates among rural students.[22,33] With rural students having to relocate to study many health courses at UTAS, rural students face the challenge of transitioning from living in a small rural community to a larger university town, where they experience a sense of loss of community, feel like an 'outsider' in their new environment, and yet feel equally disconnected from their home town.[38] Mentoring and connection between fellow rural students who likely understand these unique experiences will be important to support retention efforts.[33] While there is a rural health student club at UTAS (Rustica), the focus is on promoting rural health careers to all health students, regardless of their background. Developing a student community comprising exclusively of rural origin students studying health disciplines could therefore be a future focus for UTAS to better support rural origin student retention and completion.

Similar social supports are needed for Indigenous students, with mental health concerns, burnout, negative experiences living on campus, poor alignment of their degree with interests and a lack of a fellow Indigenous cohort being some reasons for non-completion.[41] Ensuring the availability and utilisation of Indigenous Student Support Centres at universities are key for building a sense of community and belonging for Indigenous students.[27,41] This allows for a physical space where Indigenous students can connect with each other, with staff and with their own cultural identities. Retention of Indigenous students will also be strengthened through ensuring a culturally safe learning environment, through teacher and student participation in cultural awareness activities and increasing Indigenous perspectives in health course curricula.[27,41] Positively, UTAS has embedded these strategies as core tenants in their strategic plan to increase Aboriginal engagement in tertiary education in the state over the coming years.[42] This will hopefully lead to greater representation of Indigenous students in health courses and in time, the Tasmanian health workforce.

5 | LIMITATIONS

This study has some limitations. First, there were noted health course code changes over the 10-year period, which may have resulted in lost student data. Second, duplicate records were identified for students who applied to more than one health course over the study period. To answer the research question, duplicate data were removed by selecting the initial admission record for an included health course. Therefore, the results of this study may underreport the number of admissions to health courses and overreport students who failed to complete. Third, domestic Tasmanian students were defined as either Australian citizens or permanent residents, so these data included students who were not born in Australia. Finally, population analyses were done using a single (census) point in time and did not consider age profiles for each MM category. Whilst the Tasmanian population has remained relatively stable over this period, this approach may have over or underestimated the proportion of rural students expected to be studying health courses at UTAS.

6 | CONCLUSIONS

Students from rural areas of Tasmania do seek admission to health courses at UTAS, and many go on to complete their degree. However, strategies to attract a greater number of local rural origin students to health courses at UTAS are needed, together with supports to help them traverse university life and successfully complete their degree.

AUTHOR CONTRIBUTIONS

Belinda Jessup: Writing – original draft; writing – review and editing; conceptualization; methodology; formal analysis; investigation. **Nga Tran:** Formal analysis; writing – review and editing; investigation; methodology; conceptualization. **Terri Stevens:** Writing – review and editing; project administration; conceptualization; investigation; methodology; formal analysis. **Tony Barnett:** Conceptualization; supervision; formal analysis; writing – review and editing; methodology; investigation.

FUNDING INFORMATION

This research was supported by the Rural Health Multidisciplinary Training (RHMT) program.

ACKNOWLEDGEMENTS

Open access publishing facilitated by University of Tasmania, as part of the Wiley - University of Tasmania agreement via the Council of Australian University Librarians.

CONFLICT OF INTEREST STATEMENT

All authors do not have relevant conflicts of interest to declare.

ETHICAL APPROVAL

The University of Tasmania Human Research Ethics Committee (Project ID: 26778) provided ethical approval for the research.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Jessup B, Tran N, Stevens T, Barnett T. Rural origin student representation in health courses at the University of Tasmania: 2011–2020. Aust J Rural Health. 2023;31:944–956. https://doi.org/10.1111/ajr.13027