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Socio-demographic profile of medical students in Aotearoa, New Zealand (2016–2020): a nationwide cross-sectional study

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ABSTRACT

Objective To determine the socio-demographic profile of all students enrolled to study medicine in Aotearoa New Zealand (NZ).

Design and setting Observational, cross-sectional study. Data were sought from the Universities of Auckland and Otago, the two NZ tertiary education institutions providing medical education, for the period 2016–2020 inclusive. These data are a subset of the larger project 'Mirror on Society' examining all regulated health professional enrolled students in NZ. Variables of interest: gender, citizenship, ethnicity, rural classification, socioeconomic deprivation, school type and school socioeconomic scores. NZ denominator population data (18–29 years) were sourced from the 2018 census.

Participants 2858 students were enrolled to study medicine between 2016 and 2020 inclusive.

Results There were more women (59.1%) enrolled to study medicine than men (40.9%) and the majority (96.5%) were in the 18–29 years age range. Māori students (rate ratio 0.92; 95% CI 0.84 to 1.0) and Pacific students (rate ratio 0.85; 95% CI 0.73 to 0.98) had lower overall rates of enrolment. For all ethnic groups, irrespective of rural or urban origin, enrolment rates had a nearly log-linear negative relationship with increasing socioeconomic deprivation. Enrolments were lower for students from rural areas compared with those from urban areas (rate ratio 0.53; 95% CI 0.46–0.61). Overall NZ's medical students do not reflect the diverse communities they will serve, with under-representation of Māori and Pacific students and students who come from low socioeconomic and rural backgrounds.

Conclusions To meaningfully address these issues, we suggest the following policy changes: universities commit and act to Indigenise institutional ways of knowing and being; selection policies are reviewed to ensure that communities in greatest need of doctors are prioritised for enrolment into medicine (specifically, the impact of low socioeconomic status should be factored into selection decisions); and the government fund more New Zealanders to study medicine.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study captures the socio-demographic profile of all medical students in New Zealand, over a 5-year period.
⇒ The inclusion of senior Māori researchers, Pacific researchers and researchers with health professional workforce expertise has supported the study positioning to examine ethnic equity issues appropriately.
⇒ Rural/urban geographical status is not fixed and 18–29 years old are mobile, thus finding an accurate numerator and denominator is challenging.
⇒ We are not able to report on gender diversity due to institutional coding practices.

INTRODUCTION

To have the greatest positive impact on health outcomes, the population of doctors as a whole should mirror the society which they take an oath to serve.[1 2] To achieve this, those who are enrolled in medical school should broadly mirror the demographics of the people they will ultimately work for. Moreover, medical education institutions have an obligation to improve the health of the communities they serve.[3]

University education of doctors in Aotearoa New Zealand (NZ) commenced at the University of Otago in 1875 and at the University of Auckland in 1968. Despite this long history of medical education in NZ, the medical workforce has not demographically represented our society. Under-representation of doctors who are Māori, Pacific, from regional and rural backgrounds, and from schools serving low socioeconomic communities continues in 2022.[4] For many years it has been the case that about 40% of doctors working in NZ are overseas trained,[4] and NZ continues to import about 1.7 doctors for every domestic medical graduate. While overseas medical graduates help fill the workforce need, more than 60%

leave NZ within 2 years[4] and there is a continuing relative shortage of locally trained doctors.

The under-representation of Māori doctors and Pacific doctors has contributed to profoundly negative health outcomes for those populations.[5] For example, in NZ Māori life expectancy is reduced by more than 7 years compared with non-Māori.[6] To help address under-representation both the Universities of Otago and Auckland instituted policies, beginning in the 1950s at Otago and the 1970s at Auckland, to increase the proportion of Māori students and Pacific students studying medicine.[1 2 7–9] In NZ these policies are enabled by the[10] Education and Training Act 2020 which allows for preferential selection for 'a class of persons that is under-represented among the students undertaking the programme'.[10]

Concerns about the sustainability of the rural healthcare workforce have been raised for several decades, both internationally and in NZ.[11 12] A review of the rural primary healthcare workforce in NZ in 2005 highlighted the risks of a declining rural health workforce, particularly of general practitioners (GPs), in the face of increasing rural healthcare need.[13] The report also advocated for recruiting students from rural areas, as they are more likely to return to work in rural areas.[13 14] Consequently, policies to increase the proportion of students from regional and rural backgrounds have been in effect at both the Universities of Otago and Auckland since 2003/2004.[15 16] In 2012 the University of Auckland modified the criteria to a regional-rural admission scheme reflecting the need to also increase the regional workforce.[15 17]

Although for nearly 30 years there have been similar numbers of men and women admitted to Australasian medical schools, women remain under-represented in the medical workforce, particularly in some specialties, and in senior medical leadership roles and earn less than their male counterparts.[4 18] In NZ in 2021 women made up less than half of the medical workforce (46.6%), but are anticipated to outnumber men by 2025.[4]

Previously we have reported on students accepted into the first 'professional' year of all health professional programmes leading to registration under the NZ Health Practitioners Competence Assurance Act 2003[19] during the 5-year period 2016–2020.[20] The purpose of this substudy is to report on the students accepted to study medicine (starting in Year 2) between 2016 and 2020 inclusive to document whether medical student cohorts in NZ mirror NZ's society.

METHODS

Methods have previously been published[20] and are summarised.

Position statement

It is essential to contextualise this study within NZ's colonial history. The authors acknowledge the Indigenous rights of Māori and that these rights have been systematically breached. These breaches preceded the signing of Te Tiriti o Waitangi in 1840 and continued unabated after the signing.[21] These actions have, and continue to, privilege NZ Europeans and exclude Māori.[21–24] In addition, Pacific peoples, a collective term used to describe the more than 40 different ethnic groups with ancestral links to the Pacific islands, but who now live in NZ, have also been excluded.[25] While exclusion is not limited to Māori and Pacific peoples, they deserve specific attention given the Indigenous rights and high health needs of Māori and the historical relationship (at times fraught) and high health needs of Pacific peoples in NZ society.

In undertaking this research senior Māori researchers and Pacific researchers have contributed to the design, data analysis and interpretation of the data to ensure that the research is safe and positive for Māori and Pacific peoples and will lead to recommendations that address inequity within the health workforce and improve health outcomes.

Study population

Entry into medicine in NZ may occur in two ways: (1) following application as an undergraduate within the first year of a health sciences or biomedical sciences degree at the University of Auckland or the University of Otago (only two universities offer medicine in NZ), or (2) following application as a graduate with a completed undergraduate or postgraduate qualification from eligible universities. Both pathways equate to 'Year 1' of a MBChB degree. All students (domestic and international) accepted into Year 2 of medical school during the 5-year period 2016–2020 inclusive were eligible to be included in the study.

Data sources

Routinely collected student data were extracted from each participating tertiary institution's central student records system. NZ denominator population data (18–29 years) were sourced from the 2018 census.

Variables

Gender

Gender data were limited to the binary categories of male or female because this is how data were provided by the universities.

Citizenship

Student citizenship was classified into the following categories: NZ citizens and permanent residents; Tokelau/Niue/Cook Island citizens; Australian citizens; international citizens. For tertiary institution purposes, based on the allocation of funding by the Tertiary Education Commission, domestic students are those students who are NZ citizens, or NZ permanent residents, or citizens of Tokelau/Niue/Cook Islands, or Australia.

Ethnicity classification/definitions

When students enrol at an NZ university they can nominate up to three ethnicities they identify with. Using Stats NZ (SNZ, NZ's official data agency) ethnicity classifications[26] we counted ethnicity by the total response method:

1. Five level-1 groupings Māori, Pacific, Asian, other and European; classified according to the total response method (see below).
2. Seventeen level-2 groupings classified according to the total response method.

The 'Asian' category, as used in the NZ health sector, includes students from East, South and Southeast Asia but excludes people from the Middle East and Central Asia. The MELAA abbreviation refers to the grouping of Middle Eastern, Latin American and African.[26]

Rural classification

Two rural/urban classifications were used to describe the geographical distribution of students' home addresses at the time of their application to medical school: (1) SNZ urban accessibility classification[27] and (2) the Geographical Classification for Health (GCH).[28]

Socioeconomic deprivation

Socioeconomic deprivation was measured using the NZDep2018 (NZDep) index of socioeconomic deprivation for small areas.[29] Each NZDep index is created for small geographical areas, termed meshblocks. The NZDep scale runs from 1 to 10 where a value of 10 indicates that the meshblock is in the most deprived 10% of small areas in NZ.

In order to link the student and NZDep data sets, a commercial online service (Addy Limited) was used to geocode the home residence of each domestic student to the meshblock that contained it. The corresponding NZDep value for each of these meshblocks was added using a concordance file obtained from the University of Otago, Wellington.[30]

Secondary school type and socioeconomic scores

Secondary schools most recently attended by medical students were categorised according to their designation: state (the majority of schools in NZ; government-owned and fully state funded); state integrated (mostly schools that started as private or religious schools and have become part of the state system); private (non-state schools that must meet certain standards to be registered; privately funded); unlisted (there was a small number of unlisted schools, which had recently closed); correspondence (a state-funded distance education school that offers programmes that are mostly delivered online); home schooling (parents educate their child at home).

The Ministry of Education uses a school rating scale to indicate the extent to which it draws its students from low socioeconomic communities. In contrast to the NZDep categories, decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities, and decile 10 schools are the 10% of schools with the lowest proportion of these students.

One hundred and seventy-one students (6.3%) did not have a school decile recorded. For most of these students (64.3%) the last recorded school was overseas, noting that these analyses were restricted to NZ citizens and permanent residents. A large number of private schools did have a decile recorded, and those that did not are included as '10' (most advantaged). Of the 27 private schools (464 students), 20 schools (424 students) did have a decile recorded, 70% were decile 10 and 20% were decile 9.

Statistical analyses

All data manipulation and analyses were carried out using R statistics software.[31] Tabulated counts of students were merged with matching population denominator data sets obtained from SNZ. Enrolment rates per 100 000 population were calculated with 95% Wilson binomial CIs. Enrolment rate ratios for each ethnicity were calculated by dividing the ethnicity specific enrolment rate by the enrolment rate for the total population. Deprivation adjusted ratios were calculated by first standardising rates to the total population using the direct method. SEs and 95% CIs were calculated using the method outlined by Zhu *et al*,[32] to account for correlation due to nesting of each ethnicity within the total population.

Ethics and confidentiality

Ethics authorisation for this study was received from both universities.

Patient and public involvement statement

None.

RESULTS

Data were received from both the Universities of Auckland and Otago. For the years 2016–2020 inclusive, 2858 students were enrolled to study medicine. Of these, 94.3% were either NZ citizens or permanent residents, 0.8% Australian citizens and 4.9% international students online supplemental table 1.

Age and gender

There were more women (59.1%) enrolled to study medicine than men (40.9%). The percentage of women per year ranged from 58.6% to 60.1%. As expected, most students were in the 18–29 years age range (figure 1).

School types and socioeconomic rating

In total, 62.1% of medical students had attended a state school, 16% a state integrated school and 17.1% a private school (online supplemental table 2). The distribution of students according to the socioeconomic decile rating of the school, and by school type, is shown in figure 2. The distribution is heavily skewed towards schools rated as being towards the socioeconomically advantaged end of the 10-point rating scale.

Ethnicity and socioeconomic deprivation

Māori students (rate ratio 0.92; 95% CI 0.84 to 1.0) and Pacific students if considered collectively had lower overall rates of enrolment, although only Cook Island Māori had a rate ratio which did not overlap 1 (figure 3).

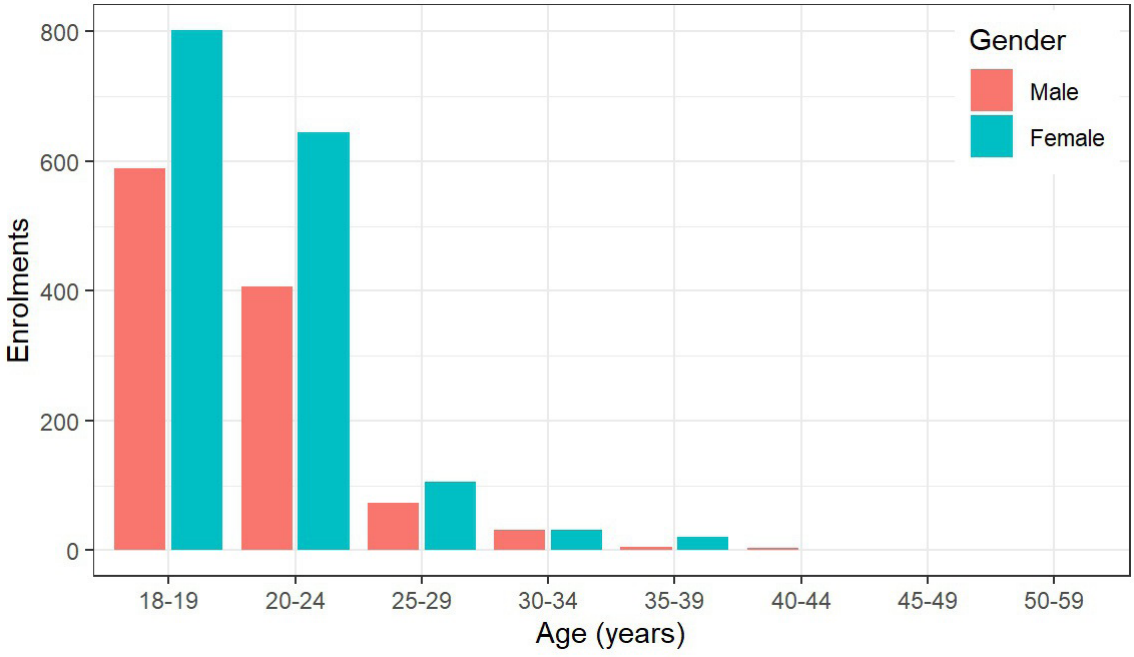

Figure 1 Enrolments by age and gender, New Zealand citizens and permanent residents, 2016–2020 inclusive.

Enrolment rates by ethnic group and socioeconomic deprivation are shown in online supplemental figure 1; for all ethnic groups enrolment rates had a nearly log-linear negative relationship with increasing small area socioeconomic deprivation (NZDep2018). Figure 4 shows unadjusted and deprivation-standardised rate ratios for enrolment for different ethnic groups relative to the total population.

Rural/urban distribution and deprivation

The proportion of enrolments were higher for students from urban areas compared with those from rural areas (figure 5). Similar to the findings for ethnicity, both urban and rural cohorts displayed a nearly log-linear negative relationship with increasing small area socioeconomic deprivation (NZDep2018) (online supplemental figure 2). Using a binary GCH classification that collapses U1 and U2 into urban and R1, R2 and R3 into rural, the unadjusted rural:urban rate ratio is 0.49 (0.43, 0.57). This remains unchanged after adjusting for socioeconomic deprivation (NZDep2018), 0.53 (0.46–0.61) (online supplemental figure 2).

DISCUSSION

Summary of findings

This is the first nationwide cross-sectional study of all students enrolling to study medicine. In the 5 years between 2016 and 2020, 94% of enrolling medical

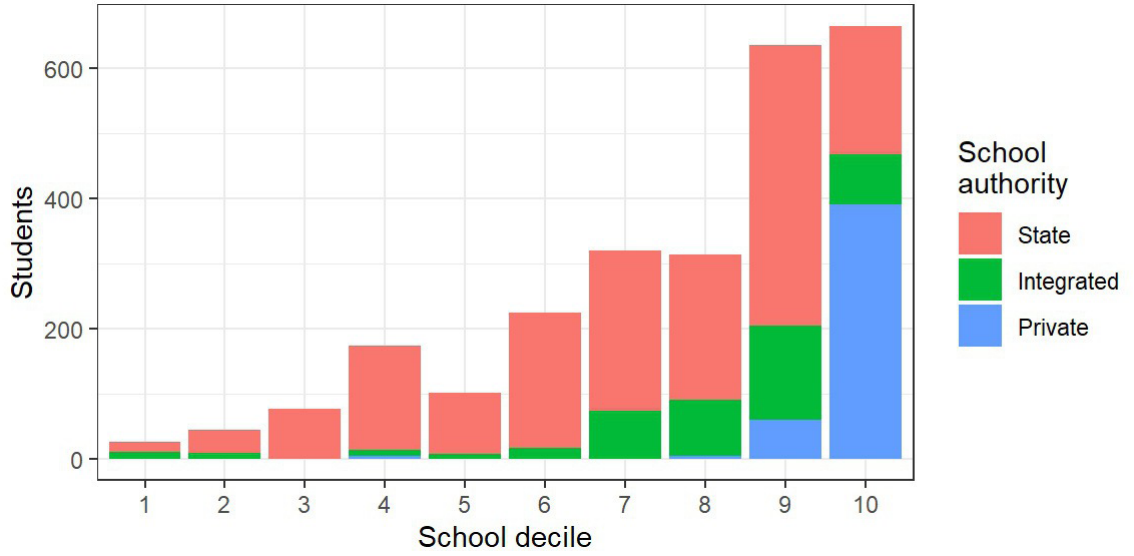

Figure 2 Enrolments by school decile and authority, New Zealand citizens and permanent residents, 2016–2020 inclusive.

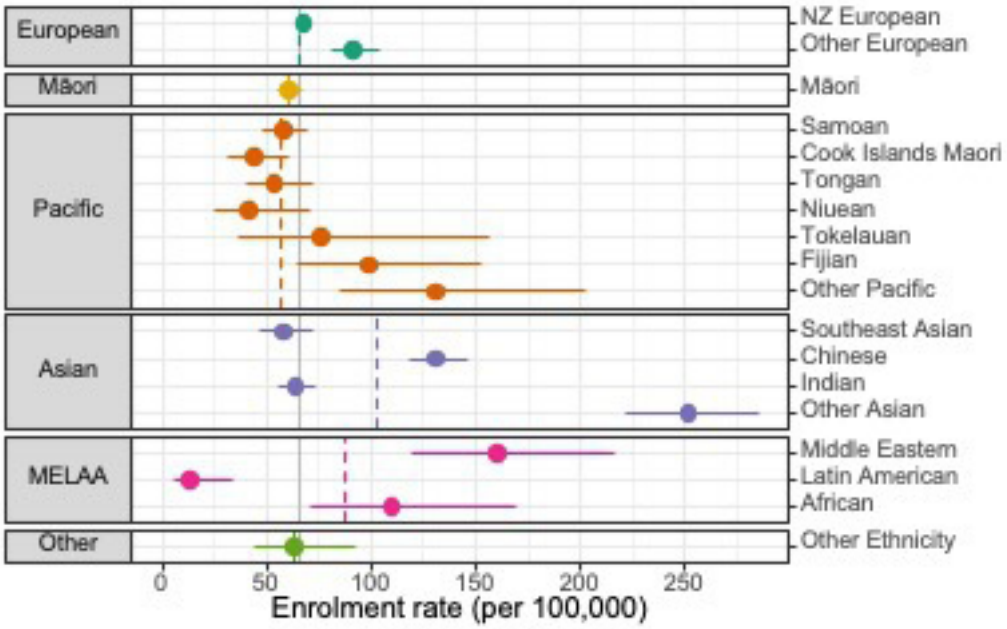

Figure 3 Enrolment rates by ethnicity*, ages 18–29 years inclusive, NZ citizens and permanent residents, 2016–2020 inclusive. *Ethnicity: total response. Vertical grey line indicates overall enrolment rate, dashed line indicates enrolment rate for level 1 ethnic group, dots (horizontal lines) represent enrolment rate (95% CI) for level 2 ethnic group; MELAA, Middle Eastern, Latin American or African; NZ, New Zealand.

students, the cohort, were NZ citizens or permanent residents and predominately women. Unfortunately, beyond these data, the cohort does not reflect NZ society. The cohort was heavily skewed by students from schools serving high socioeconomic communities irrespective of school type. Similarly, the impact of socioeconomic privilege was seen across all ethnicities with a nearly linear negative relationship with increasing small area deprivation. These findings were confirmed by the deprivation adjusted enrolment for Māori, Pacific and Asian ethnicities which were higher than that for the rest of the cohort. That said, Māori and in particular Pacific were under-represented in the cohort, while some Asian and MELAA ethnicities were over represented. Students from rural backgrounds were under-represented.

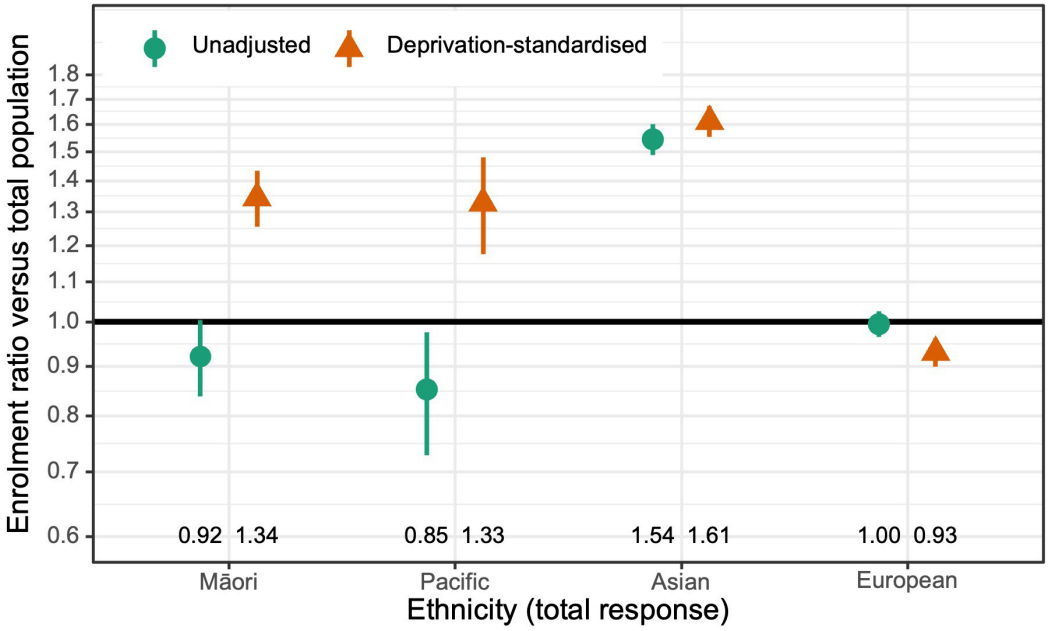

Figure 4 Differences in enrolment rates by ethnicity*, ages 18–29 years inclusive, NZ citizens and permanent residents, 2016–2020 inclusive. *Ethnicity: total response. European includes NZ and other European. Dots (horizontal lines) represent rate ratios (95% CI). The reference group, represented by a solid black at 1.00, is the total population aged 18–29 years inclusive. Rate ratios are unadjusted, or direct-standardised for NZ deprivation indexed to the total population. NZ, New Zealand.

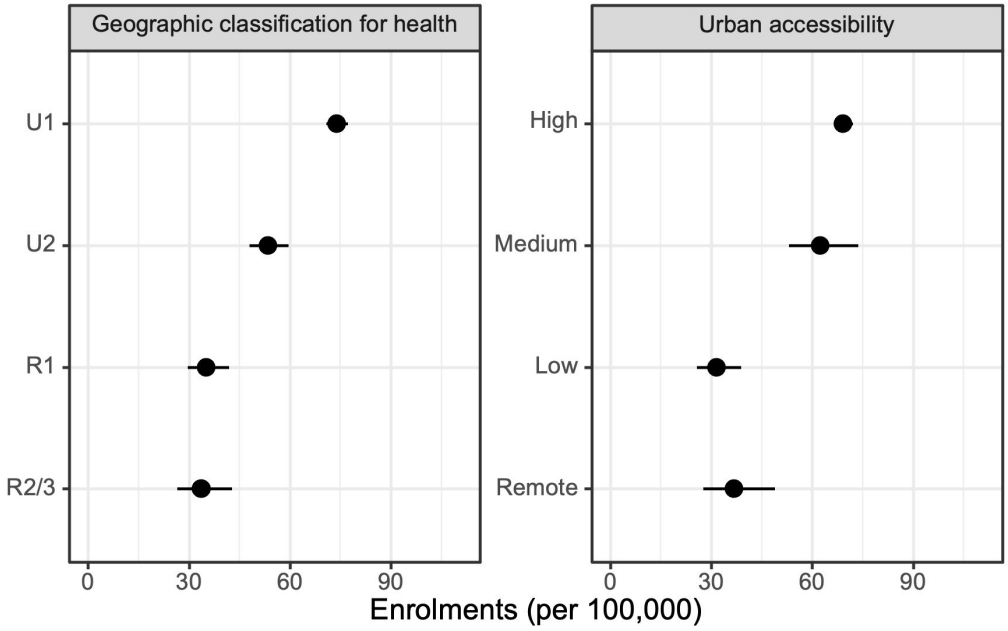

Figure 5 Enrolments by geographical area*, ages 18–29 years inclusive, New Zealand citizens and permanent residents, 2016–2020 inclusive. *Geographical area: Geographical Classification for Health (GCH) and urban accessibility (see Methods section for details); for GCH the R2 and R3 categories are combined because of very small numbers in the R3 category. Dots (lines) represent enrolment rate (95% CI) within each geographical area. Major, large and medium urban areas have been included in the high accessibility category.

Socioeconomic status

Socioeconomic status, irrespective of ethnicity, appears to be the most important determinant of being enrolled to study medicine in NZ. This is suggested not just by socioeconomic deprivation (NZDep), but by school socioeconomic ranking, irrespective of being a public, state integrated or private school. A school decile does give an indication of the overall socioeconomic mix of students in a school. However, school deciles do not allow generalisations about all students in a school. Therefore, the school decile data does need to be interpreted with a degree of caution. Given the limited utility of school decile as a marker of socioeconomic status it will be replaced by an Equity Index from January 2023.[33] On the other hand, we used geocoding to determine NZDep2018 scores and the findings are consistent across all ethnicities and degree of rurality.

Consistent with this study, a 1993 review of the previous 25 years of medical students enrolled at what was then the 'Auckland School of Medicine', demonstrated that 70% of medical students came from the two highest quintiles of socioeconomic status and were more likely to have parents working as professionals.[31] A 2016 study at the University of Otago showed a similar distribution, with the majority of health professional students coming from privileged backgrounds.[2] The University of Auckland has a policy to enable students who have attended decile 1–3 schools, a proxy for low socioeconomic status, to preferentially enrol, but for 2023 this is limited to only five medical students.[34] That said, students enrolled into medicine via other equity-targeted selection pathways may also experience socioeconomic deprivation. Between 2002 and 2009 20.8% of Māori and Pacific Admission Scheme (MAPAS), 7.4% of Rural Origin Medical Preferential Entry and 3.1% of other enrolled medical students at the University of Auckland attended decile 1–3 schools.[35]

Similar findings have been described in other jurisdictions.[36 37] To improve access for those who experience socioeconomic deprivation suggested interventions include: holistic assessment of applicants taking into account parental education and occupation[36]; or reducing the academic entrance criteria for students from schools that have lower academic performance, typically associated with students who experience socioeconomic deprivation.[38]

Māori and Pacific peoples

Historically Māori have been enrolled at rates lower than the overall rate despite enabling legislation.[10] This is ultimately reflected in the under-representation of Māori in the medical workforce, with just 4.3% of the registered doctors identifying as Māori, well below the Māori population in NZ of 16.5%.[4] Similarly more than 8.1% of New Zealanders identify as Pacific compared with 2.1% of doctors.[4] Strenuous efforts have been made by both universities to increase the proportion of Māori students and Pacific students over several decades and have been partially successful.[1 2 7 9]

At the University of Auckland an equity-targeted admissions process for medical applicants with Māori or Pacific ancestry has been in operation since 1972.[1] In the 1990s Vision 2020 was adopted by the Faculty of Medical and Health Sciences as a high level strategy aiming to have at least 10% of Māori and Pacific in frontline clinical

roles by 2020. Although this has not yet been achieved, it is important to note that in 2022 30% of the cohort admitted to the University of Auckland were admitted via the MAPAS equity-targeted pathway[39] and the aim for the 2023 cohort is 40%.

At the University of Otago there has been an affirmative action policy for Māori students and Pacific medical students since 1951.[7] The latest iteration of that policy was implemented in 2012; the Mirror on Society policy (modified and re-named as Te Kauae Parāoa in 2021) aims to create equity in the health workforce in response to Tiriti o Waitangi obligations and to equity objectives. The policy applies to all the university's health professional programmes and defines five priority pathways for Māori, Pacific peoples, refugee-background, rural-background and low socioeconomic-background applicants. The number of Māori medical graduates has increased markedly over the past decade, with the graduating proportion of Māori students now at or above population parity (around 15+%).[2]

Although these equity-targeted policies have met with a degree of success through greater inclusion, more needs to be done. The work is part of the larger project of Indigenising academic institutions.[40] While our institutions have sought to focus on Indigenous inclusion, this is not adequate as the goal; as on its own it is inadequate for achieving a properly productive relationship with Māori.[40] Rather, the journey towards Indigenisation of the institutions, leading to the normalisation of Indigenous ways of being and knowing[40] is required for medicine to truly mirror NZ society. In a broad sense, the reorientation of all government educational institutions (preschools, schools and universities) is required, focused on good relationships between Māori and non-Māori,[40] to ultimately achieve health workforce and health outcomes, as envisaged in Te Tiriti o Waitangi. The invitation is to work throughout the continuum of education to realise the Indigenisation of the academy, which includes how equity admission pathways select students into medicine and how the institution supports students through to graduation within a culturally safe and Indigenous appropriate curriculum. Indigenisation measures include the need to better reflect and respond to the socio-demographic realities of Māori and Pacific peoples.

Gender

For some time those enrolling in medicine in NZ have been predominately woman. Despite this trend, in 2021 46.9% of doctors registered in NZ were women.[4] The Medical Council of New Zealand predicts that by 2025 female doctors will outnumber male doctors. While this numerical equality is to be celebrated, work remains to ensure that female doctors are able to participate in all disciplines and at the most senior levels of medical management. Women are under-represented among specialists in NZ and, while increasing, still only make up 37.3% of the specialist workforce, particularly in surgical disciplines, intensive care and ophthalmology.[4] This pattern is not unique to NZ. In the UK more than half of medical students are women, but only 36.6% of consultants are women.[41] The specialties which are particularly affected by under-representation in the UK are anaesthesia, critical care and pain medicine.[41] Evidence highlights several factors which might contribute to the imbalance, including gender stereotypes, implicit and explicit bias and that workplaces do not cater for the unique family (whānau), caregiving and physiological needs of women.[41]

Rurality

The very low rural rate of medical school enrolment, less than half the urban rate, has equity implications for students growing up in rural areas and for the future rural medical workforce. The results stand in contrast to Australia where rural rates are now slightly higher than metropolitan rates.[42] The rural disadvantage is also much larger than previously described in NZ.[2] This is likely to reflect a geographical classification that more clearly delimits the population considered rural for health purposes than a deterioration over time.[2 28]

Deprivation exerts a similar effect regardless of urban–rural status. Māori are more likely than non-Māori to live in rural areas and rural Māori face higher levels of socioeconomic deprivation and poorer health outcomes than rural non-Māori and urban Māori[43]; of the 28% of R3 residents who report Māori ethnicity, more than 70% live in NZDep2018 quintile five areas (the most socioeconomically deprived quintile of areas).[44] The impacts of rurality, ethnicity and deprivation should not be considered in isolation.

NZ data, support an international body of literature, suggesting that rural origin is one of the strongest predictors of an intention to work rurally.[43 45] While the University of Auckland has a regional-rural admission scheme this special admission pathway does not fully meet the needs of the rural population. First, the proportion of rural students that enter the programme is below the population proportion of all rural students. In addition, the current regional-rural admission scheme also includes students from regional cities, potentially displacing rural students. A new rural definition will be introduced for selection to medicine at the University of Auckland in 2024 based on SNZ Urban Accessibility classification. The University of Otago has a similar programme that has recently moved to define rural based on the GCH. Reduced enrolment of rural origin students is therefore likely to be a significant contributor to the rural workforce shortage. The current rural origin schemes are failing to meet their objectives and need to be revisited, preferably in a nuanced way that considers the intersecting impacts of ethnicity, deprivation and rurality.

The most recent data on the rural general practice workforce (the predominant workforce in rural areas in Aotearoa NZ) shows a maldistribution with 16.6% of GPs working in rural communities compared with a population proportion of 24.3%, and 71% of GPs working in

urban settings compared with a population proportion of 65.5%.[4]

Study strengths and limitations

A key strength of the study is that all medical students enrolling in NZ are captured for analysis. The inclusion of senior Māori researchers, Pacific researchers and researchers with health professional workforce expertise has supported the study positioning to examine ethnic equity issues appropriately. This is a retrospective, cross-sectional study over a time limited period. Limitations include the reliance on the quality of data collected by the universities which is suboptimal for some variables (eg, ethnicity data collection does not align to NZ's ethnicity data protocols for the health sector).[26] Also, gender data collection is limited to the binary categories of male or female. Recent data suggests that approximately 1% of adults in NZ identify as transgender.[46] Although a relatively small proportion of the population, there is a growing body of work demonstrating that transgender people (including non-binary identities) report lower confidence in their GPs and experience discrimination in primary healthcare settings.[47] Moreover, speaking to the positive impact the medical workforce can have, transgender people that report supportive experiences in primary care in NZ also report lower psychological distress.[48] These data support the need to broaden our mirror on society to include gender diverse people.

A further limitation is that rural/urban status is not fixed and 18–29 years old are a mobile group. Finding an accurate numerator and denominator for the geographical analyses is therefore challenging. The home address provided by students when they enrolled at the Universities of Auckland and Otago may not reflect the rural urban status of the community they grew up in. Rural students experience greater educational disadvantage[49] and may need to study another undergraduate degree in order to achieve a high grade point average. As a result they may be older on enrolment into a medical programme. Many older rural origin students will have migrated several years prior to enrolment and may have provided an urban address. Equally the age profile of rural communities 'hollows out' considerably for the 15–30 years old age group as school leavers migrate to the city for tertiary education, training and work.[43] The census night rural population for this age group is therefore smaller than the equivalent 'rural origin' population. In addition, because of the small number of Pacific students classified as rural we were unable to analyse the interaction between ethnicity of rural students and socioeconomic status.

CONCLUSION

These data suggest that socioeconomic privilege is strongly associated with medical school enrolment in NZ. Of concern, Māori, Pacific and people from rural areas are under-represented in the cohort, despite longstanding and ongoing efforts to address these inequities. The longstanding government policy of relying on overseas medical graduates to work in NZ rather than training more doctors locally will have an ongoing dilutional effect on the representation of Māori, Pacific and rural people in the medical workforce of NZ.

To meaningfully address these issues, we suggest the following policy changes:

1. Universities commit and act to Indigenise institutional ways of knowing and being.
2. Selection policies are reviewed to ensure that communities in greatest need of doctors are prioritised for enrolment into medicine. Specifically, the impact of low socioeconomic status should be factored into selection decisions.
3. The government fund more New Zealanders to study medicine and reduce reliance on importing overseas trained doctors.

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Contributors WB, EC, KTE, GN, ZB, PB, CH, BK, DS, SS, CT, JW, DW and PC contributed to the design of the study protocol. PC and ZB initiated the project. The protocol was drafted by PC and was refined by WB, EC, KTE, GN, ZB, PB, CH, BK, DS, SS, CT, JW and DW. Statistical analysis was undertaken by JW. WB was responsible for drafting the manuscript. EC, KTE, GN, ZB, PB, CH, BK, DS, SS, CT, JW, DW and PC contributed to the manuscript and read and approved the final manuscript. WB is the guarantor.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study was approved by the University of Otago Human Ethics Committee (reference: 20/075). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available. Data will not be made available outside of the study team.

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