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Rates and waiting times of elective surgeries in Queensland: an aggregated data analysis by Indigenous status, 2013–2022

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ABSTRACT

Objectives To compare elective surgeries rates and waiting times between Indigenous and non-Indigenous patients in Queensland.

Design Aggregated annual data analysis from July 2013 to December 2022 on elective surgeries and waiting times.

Setting Public hospitals across Queensland.

Participants All patients who had elective surgery in Queensland public hospitals between 2013 and 2022.

Measures Rates and clinically recommended timeframes for elective surgeries.

Results Between 2013 and 2022, the overall estimated average rate of elective surgeries for Indigenous patients was 286 per 100 000 population, compared with 221 per 100 000 for non-Indigenous patients. Indigenous patients had higher rates of most elective surgeries except plastic and urological surgeries, where non-Indigenous patients had higher rates. Across all urgency categories, the percentages of elective surgery performed within clinically recommended timeframes were similar between Indigenous and non-Indigenous patients.

Conclusion Our findings may point to the efficacy of specific policy and service delivery innovations undertaken in Queensland. Due to the limitations of our aggregated data, this inference warrants careful interpretation. More studies with disaggregated data are needed.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Analyses are based on a large, aggregated dataset including all public hospital elective surgeries in Queensland over a decade.
⇒ The study provides evidence of shifting patterns in elective surgery rates and waiting times, suggesting that Queensland initiatives to reduce access barriers for Indigenous patients may be effective.
⇒ Aggregated data cannot capture individual-level confounders such as comorbidities, age and gender distributions, or socioeconomic conditions.
⇒ Limited clinical patient details are available such as severity of conditions.
⇒ The study only includes public hospital data; elective surgeries in private hospitals are not captured.

INTRODUCTION

Indigenous Australians experience profound and persistent health inequities compared with non-Indigenous Australians.[1–3] These disparities manifest across multiple health metrics, such as access to emergency treatments, primary care and surgical procedures including elective surgeries.[2–5] Elective surgery is a planned and scheduled surgical operation that is non-emergency but necessary, as opposed to emergency surgery, which is conducted in urgent or life-threatening situations.[6] Elective surgeries are crucial for enhancing quality of life, improving long-term health outcomes, enabling customised medical care and reducing surgical complication risks.[7] Elective surgeries can promote patient autonomy through shared decision-making, which is especially important for reducing health disparities among disadvantaged populations.[8]

Timely and proper access to elective surgeries is one of the critical factors influencing health disparities. According to the Australian Institute of Health and Welfare (AIHW), Indigenous Australians are less likely to be hospitalised for elective surgical operations compared with non-Indigenous Australians; however, they are twice as likely to undergo emergency surgery.[6] Moreover, the AIHW reported consistently longer waiting times for elective surgeries among Indigenous Australians in public hospitals, potentially contributing to worsening health conditions and elevated rates of morbidity and mortality.[9] Literature has highlighted various factors contributing to reduced access to elective surgeries for Indigenous Australians, including racism, cultural insensitivity, transportation issues and accommodation challenges.[10] In Queensland, there are approximately 237 000 Indigenous Australians, which represents 4.6% of the state's

population.[11] Queensland has adopted targeted healthcare measures over the last decade to eliminate gaps in access to elective surgeries, such as the cataract surgery programme, and has demonstrated progress in the improvement of surgical care for Indigenous patients.[12] However, full evaluations of their impact have been scarce.

This study aimed to compare the rates, trends and waiting times for elective surgery between Indigenous and non-Indigenous patients in Queensland. This study uses a 10-year population-level hospital data to present compelling evidence regarding trends in elective surgery rates and waiting times based on Indigenous status. The findings provide current evidence on Indigenous health, guiding future research and supporting initiatives to promote equitable access to surgical services.

METHODS

This study used data that were obtained from Queensland Health and Australian Bureau of Statistics. Elective surgery data were obtained from Queensland Health via a formal data request submitted to the Statistical Services Branch. Queensland Health provided anonymised, aggregated annual data regarding elective surgeries conducted in public hospitals across Queensland from July 2013 to December 2022. The dataset contained information on 11 surgical specialties based on clinical urgency and scheduling status. The surgical specialties consist of cardiothoracic, general, gynaecological, neurosurgery, plastic, ophthalmological, orthopaedic, otolaryngological, urological, vascular and other minor elective surgeries. Elective surgeries were further classified into three urgency categories in accordance with national elective surgery definitions:

- Category 1 (urgent): recommended within 30 days.
- Category 2 (semi-urgent): recommended within 90 days.
- Category 3 (non-urgent): recommended within 365 days.

Population counts for each year, stratified by Indigenous status, were obtained from the Australian Bureau of Statistics for 2 years: 2016 and 2021. Based on these figures, population growth rates were calculated (Equation 1), and population sizes for years from 2013 to 2015 were estimated through extrapolation (Equation 2).

$$\text{Equation 1}: \text{Growth rate} = \frac{\frac{\text{Population}_{2021} - \text{Population}_{2016}}{\text{Population}_{2016}}}{5} \times 100\%$$

$$\text{Equation 2}: \text{Population}_{t+1} = \text{Population}_{t} \times (1 + \text{growth rate})$$

Statistical analysis

Independent two-sample t-tests were used to compare the average of annual surgery rates per 100 000 population between Indigenous and non-Indigenous patients. The differences in rates were presented as means with SD and 95% CIs. To assess trends in surgery frequency over time, a negative binomial regression model was used, with the number of elective surgeries as the outcome variable, the calendar year as the predictor and the logarithm of population size included as an offset term to account for differences in population denominators. Separate models were fitted for Indigenous and non-Indigenous patients. Results were presented as incidence rate ratio (IRR) and corresponding 95% CIs. Additionally, for each of the three categories of surgery (urgent, semi-urgent and non-urgent), an independent two-sample t-test was used to compare the average proportion of patients who received surgeries during the recommended period between Indigenous and non-Indigenous patients. The differences in rates were presented as means with SD and 95% CIs. Factors of gender, age, median waiting times and place of residence (urban/rural) were not considered in the analysis. Data analyses were performed using R software.

Patient and public involvement

The patients and public were not involved in the development of the research design or outcome measures. Study findings were made publicly available to the general public through open access journal articles.

RESULTS

Between 2013 and 2022, the overall estimated mean rate (SD) of elective procedures for Indigenous Australians was 286 (219) per 100 000 population, compared with 221 (173) per 100 000 for non-Indigenous Australians. Table 1 and figure 1 show that Indigenous patients had higher average rates of elective surgery than non-Indigenous patients in most elective surgical specialties. The greatest gaps were observed in otolaryngology with a mean difference of 261.0 (95% CI 214.0 to 309.0), gynaecology 163.0 (95% CI 134.2 to 193.2) and general surgery 106.0 (95% CI 63.7 to 147.0), p<0.001. Indigenous Australians had lower rates of plastic −50.6 (95% CI −71.8 to −29.5) and urological −61.5 (95% CI −78.2 to −44.7) surgeries, but there was no significant difference in neurosurgery 4.2 (95% CI −1.3 to 9.7).

Figure 1 illustrates the trends in elective surgery rates for 11 surgical specialties (per 100 000 population) among Indigenous and non-Indigenous patients from 2013 to 2022. Indigenous patients constantly demonstrated greater$_{(2)}$surgery rates than non-Indigenous patients across the majority of surgical specialties. Trends in most elective surgery specialties remained relatively constant throughout the analysis period, with just slight variations. The discrepancy between Indigenous and non-Indigenous patients continued over the decade, demonstrating maintained higher elective surgery rates among Indigenous patients.

Table 2 shows the findings of negative binomial regression analysis that looked at trends in the average number of admitted patient care episodes for 11 elective surgery specialties between 2013 and 2020, stratified by

Table 1 Mean (SD) rates of 11 elective surgery specialties per 100 000 population by Indigenous status

Surgery specialty	Indigenous	Non-Indigenous	Difference 95% CI	P value
Cardiothoracic	67.4 (12.5)	49.1 (8.8)	18.3 (8.1 to 28.6)	**<0.001**
Otolaryngology	480.3 (63.6)	219.0 (27.7)	261.0 (214.0 to 309.0)	**<0.001**
General	697.0 (54.2)	591.4 (29.5)	106.0 (63.7 to 147.0)	**<0.001**
Gynaecology	488.2 (38.6)	324.9 (20.9)	163.0 (134.2 to 193.2)	**<0.001**
Ophthalmology	271.7 (31.6)	215.0 (16.3)	56.0 (32.6 to 81.0)	**<0.001**
Orthopaedic	542.4 (45.6)	445.9 (56.1)	96.5 (48.3 to 145.1)	**<0.001**
Plastic	148.0 (25.9)	198.6 (18.0)	–50.6 (–71.8 to 29.5)	**<0.001**
Urological	185.7 (18.5)	247.1 (17.2)	–61.5 (–78.2 to 44.7)	**<0.001**
Vascular	119.7 (6.8)	56.8 (2.0)	63.0 (58.0 to 68.0)	**<0.001**
Neurosurgery	39.7 (7.0)	35.6 (4.1)	4.17 (–1.3 to 9.7)	0.120
Other	100.4 (7.9)	43.1 (5.8)	57.4 (50.7 to 64.0)	**<0.001**

P values in bold are statistically significant difference.

Indigenous status. The IRRs for the majority of elective surgical specialties were nearly 1.00, suggesting that the rates of both Indigenous and non-Indigenous populations remained relatively consistent throughout the study period. Cardiothoracic surgeries declined in both groups, with an IRR of 0.95 (95% CI 0.92 to 0.97) among Indigenous Australians and 0.95 (95% CI 0.94 to 0.97) among non-Indigenous Australians, indicating a 5% annual reduction. Orthopaedic surgeries were also decreased in both groups. Plastic and urological surgeries increased steadily in both groups. For Indigenous patients, IRRs were 1.05 for plastic surgery and 1.03 for urological surgery, representing a 5% and 3% annual rise, respectively.

Table 3 shows the proportion of elective surgeries conducted within the clinically recommended timeframe in Queensland (QLD) over 10 years. There were no statistically significant differences between Indigenous and non-Indigenous patients in any of the categories examined (urgent, semi-urgent and non-urgent).

Figure 2 shows trends in the percentage of elective surgeries done on clinically recommended timeframe among Indigenous and non-Indigenous patients in QLD from 2013 to 2022. In 2016, both populations experienced

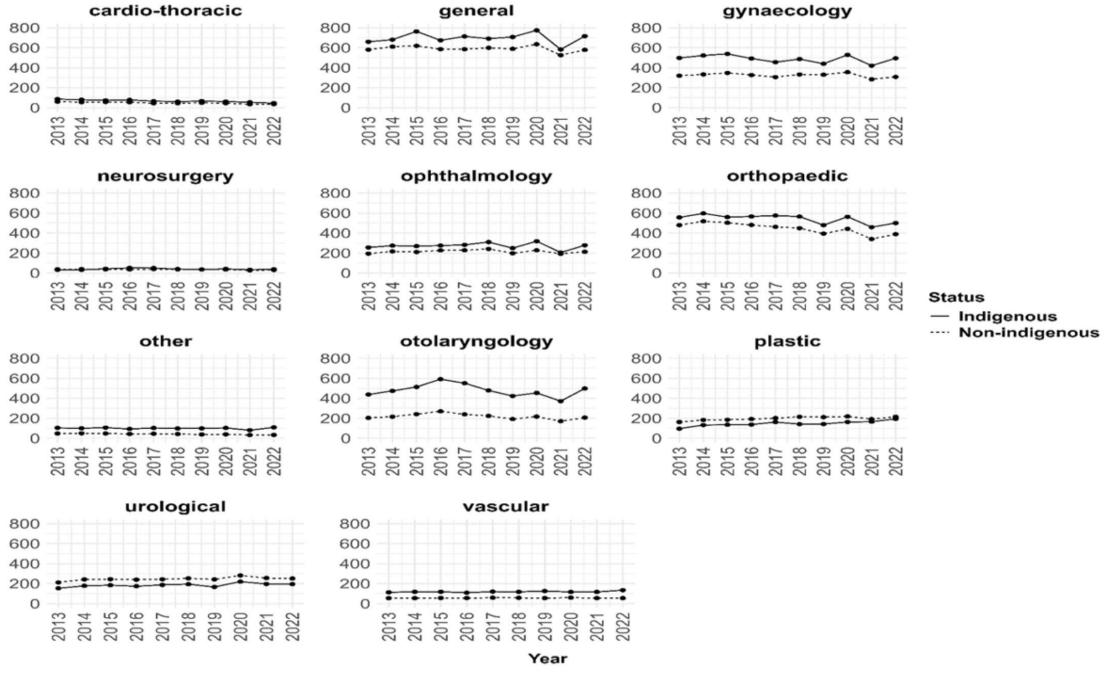

Figure 1 Trends of different specialties of elective surgery over 10-year period among Indigenous and non-Indigenous patients.

Table 2 IRRs for elective surgery admissions over time, stratified by surgery specialty and Indigenous status, 2013–2020

Surgery specialty	Indigenous group, IRR (95% CI)	Non-Indigenous group, IRR (95% CI)
Cardiothoracic	0.95 (0.92 to 0.97)	0.95 (0.94 to 0.97)
Otolaryngology	0.99 (0.96 to 1.02)	0.99 (0.96 to 1.02)
General	0.99 (0.97 to 1.01)	1.01 (0.99 to 1.02)
Gynaecology	0.99 (0.97 to 1.01)	1.01 (0.99 to 1.02)
Neurosurgery	1.02 (0.97 to 1.07)	0.98 (0.97 to 0.99)
Ophthalmology	1.02 (0.99 to 1.04)	1.01 (0.99 to 1.03)
Orthopaedic	0.98 (0.97 to 1.01)	0.97 (0.95 to 0.98)
Plastic	1.05 (1.02 to 1.08)	1.04 (1.03 to 1.05)
Urological	1.03 (1.01 to 1.05)	1.03 (1.01 to 1.04)
Vascular	1.01 (0.98 to 1.03)	1.01 (1.00 to 1.02)
Other	0.99 (0.97 to 1.02)	0.96 (0.95 to 0.97)

IRR, incidence rate ratio.

a significant increase in the percentage of timely elective surgeries across all urgency categories. Then, the rates predominantly decreased, especially from 2019 onwards, with more significant reductions in semi-urgent and non-urgent surgeries. However, Indigenous and non-Indigenous patients showed similar trends over time, with no significant or consistent differences in timely access to elective surgeries.

DISCUSSION

This paper examined the rates of elective surgeries between 2013 and 2022 among Indigenous and non-Indigenous patients across various surgical specialties. Our findings indicate that Indigenous people in Queensland showed higher elective surgery rates across most specialties, except plastic and urological procedures which were more common among non-Indigenous patients, while elective rates for neurosurgery were similar. This finding contradicts prior historical patterns indicating under-representation of Indigenous people in elective surgeries. For instance, Ishak documented that Indigenous patients in New South Wales between 1989 and 1995 had almost half the surgical admission rate in comparison to non-Indigenous patients, and they were more likely to undergo emergency surgeries rather than elective surgeries.[13] Similarly, national data from the AIHW showed that Indigenous Australians had much lower overall rates of elective surgery than non-Indigenous Australians (48.9 vs 85.5 per 1000 patients).[14] Kelaher *et al* found that Indigenous populations had significantly lower rates of cataract surgery compared with the national average.[15] Furthermore, a recent AIHW report indicated that between 2017 and 2019, Indigenous people had a lower rate of elective surgery than non-Indigenous people (61–82 per 1000 people).[16] Our year-by-year trends analysis indicated that Indigenous Queenslanders had consistently higher elective surgery rates than non-Indigenous Queenslanders across most specialties between 2013 and 2022. Regional and workforce factors may account for the higher rates of plastic surgery among non-Indigenous patients compared with Indigenous individuals. Most of the elective cosmetic and reconstructive surgeries are performed in urban areas, whereas a significant number of Indigenous Queenslanders live in rural areas with limited access to surgical services.[17] According to the Australian Society of Plastic Surgeons, workforce maldistribution is a significant barrier to equitable access, as less than 10% of plastic surgeons practise in rural Australia.[17] Cultural factors, health literacy and comorbidities may limit Indigenous access to specialised urological surgical services, such as kidney transplantation.[18] The similar neurosurgery rates between Indigenous and non-Indigenous populations may be attributed to the clinical urgency, standardised referral pathways to tertiary hospitals and similar prevalence across populations.[19] There was a notable decrease in elective surgery rates for both Indigenous and non-Indigenous patients in 2021, likely reflecting the impact of the COVID-19 pandemic on surgical services; however, the rates had started to increase again by 2022.

Table 3 Percentage of elective surgeries conducted on time by surgical category and Indigenous status

Surgery category	Indigenous	Non-Indigenous	95% CI for difference	P value
1 (urgent)	93.8	92.8	(–2.7 to 4.6)	0.59
2 (semi-urgent)	83.3	84.9	(–10.9 to 7.7)	0.77
3 (non-urgent)	88.2	89.2	(–9.7 to 7.6)	0.18

Our analysis also indicated that there was no significant difference in the proportions of elective surgeries performed within the clinically recommended timeframe between Indigenous and non-Indigenous patients. This finding contradicts prior reports indicating that Indigenous patients frequently had difficulty receiving timely surgical care.[6 9 16] AIHW reports consistently show that Indigenous patients experience longer median waiting times for elective surgery than non-Indigenous patients. For example, during the period of 2013–2014, the median waiting times for elective surgery for Indigenous patients were 41 days versus the 36 days recorded for other Australians.[9] Between mid-2017 and mid-2019, Indigenous patients had a median waiting time of 49 days, compared with 40 days for non-Indigenous patients.[16] Furthermore, in the 2023–2024 period, Indigenous patients had a median waiting time of 56 days, which was longer than the 46 days that non-Indigenous patients had to wait.[6]

The increased rates of elective surgery among Indigenous individuals in Queensland may suggest improved access; however, this inference warrants careful interpretation. In the absence of accurate clinical and demographic data to assess relative need between Indigenous and non-Indigenous patients, we cannot reliably conclude that the observed utilisation indicates equity. However, the absence of differences in surgical timeliness, combined

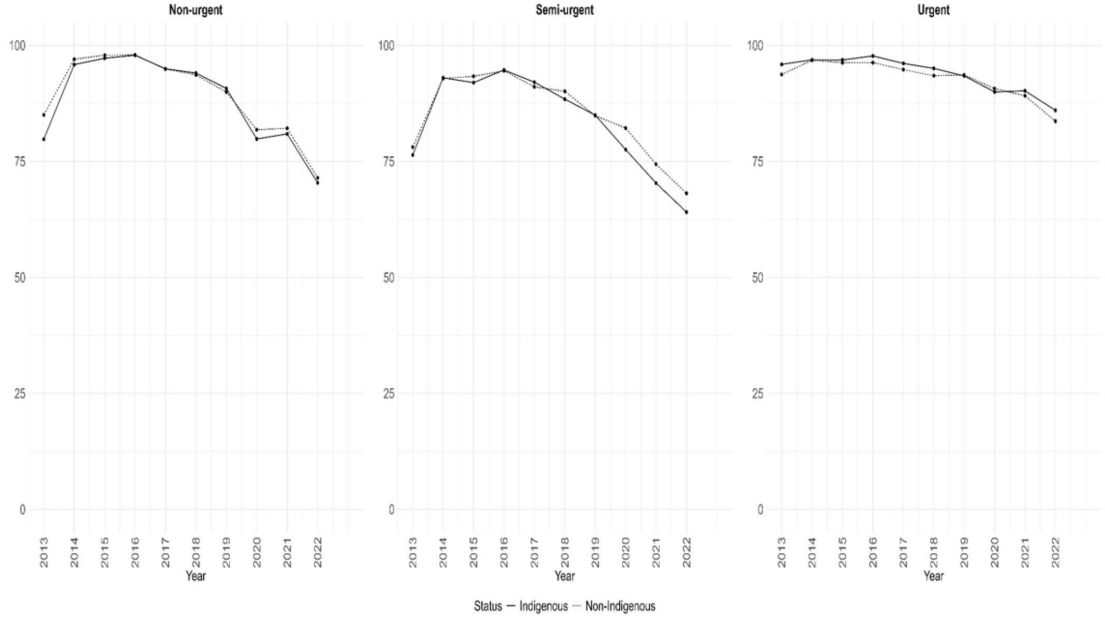

Figure 2 Proportions of elective surgeries completed within recommended timeframes by Indigenous status over 10-year period.

with increased elective surgery rates, may indicate the efficacy of specific policy and service delivery innovations in Queensland aimed at reducing access barriers for Indigenous people.

Queensland has implemented several innovative and culturally sensitive initiatives targeting Indigenous people. These include the ENT (ear, nose and throat) Outreach Programme, launched in the early 2000s to provide ENT surgical procedures for Indigenous children, and Surgery Connect, introduced in 2008 to enable suitable public hospital patients to access surgery in private hospitals.[20 21] Improving and Integrating Urban Indigenous Health Services, established in 2013, developed eye and ear surgical pathways to reduce lengthy waits for tertiary care.[22 23] The Cataract Pathway Program, launched in 2016, has delivered over 1000 cataract operations to restore sight for Indigenous Queenslanders.[12] While these initiatives were designed to enhance timely access, their effects may not be immediate, as uptake and system integration typically occur gradually. These initiatives are part of a larger health equity strategy recommended by the Making Tracks Together framework, which calls for each regional hospital and health service in Queensland to develop localised equity action plans and report on progress.[24] Furthermore, there are national strategies, including the National Aboriginal and Torres Strait Islander Health Plan 2021–2031, the expansion of Aboriginal Community Controlled Health Services, the integration of Indigenous health workers and the National Partnership Agreement on Closing the Gap, all of which have encouraged culturally safe, equitable and timely care.[25–27]

Our study has several limitations arising from the use of aggregated data. Our data did not include procedure-specific information for major surgeries such as joint replacements, coronary artery bypass grafting, hysterectomy or cholecystectomy, as well as variations across geographic regions (rural vs metropolitan) or individual facilities. The absence of individual-level information also restricted our ability to adjust for key confounders such as comorbidities, age, gender distribution and socioeconomic status, all of which may influence access and waiting times. Furthermore, our analysis was limited to public hospitals and did not include elective surgeries performed in private hospitals, which account for approximately 66% of all elective surgeries in Australia.[28] As Australians with high socioeconomic status are more likely to use private healthcare facilities, the non-Indigenous patients captured in our data may disproportionately represent individuals from lower socioeconomic groups. As a result, the patterns reported here reflect public sector activity and should not be generalised to the entire Queensland population. In addition, we were unable to evaluate postoperative outcomes, such as surgical site infections or complications, which are integral to understanding the overall quality and effectiveness of surgical care. Future studies linking individual-level waiting time, procedure-specific, geographic and postoperative outcome data are needed to provide a more comprehensive assessment of disparities in elective surgery access and outcomes.

In conclusion, our 10-year analysis indicates a shift from historical patterns, with Indigenous Queenslanders exhibiting higher rates of elective surgery than their non-Indigenous counterparts. These findings may indicate the efficacy of specific policy and service delivery innovations implemented in Queensland aimed at reducing access barriers for Indigenous people. However, due to the limitations of our aggregated data, this inference

warrants careful interpretation. More in-depth assessments will require further studies using disaggregated data.

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Patient consent for publication Not applicable.

Ethics approval Permission to use the aggregated data was obtained from Queensland Health via a formal data request submitted to the Statistical Services Branch. As the data were de-identified and population-based, formal ethics approval was not required.

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