

The Equity Gap in Australia's Dental Health

AI image analysis of 81,919 patients reveals stark differences in disease severity between private and public dental settings.

ABOUT THIS DATA

Two patient populations were analysed using the same AI image analysis system. All findings are derived from dental radiographs (OPGs and intraoral films) and clinical photographs, processed through standardised ICDAS, ICCMS, and periodontal staging protocols. Prevalence rates are age-standardised to the WHO World Standard Population to correct for the substantially older public-sector cohort (median age 66 vs 43 years). Adjusted odds ratios (AOR) are from 1:1 propensity score matching on age and sex, with 95% CIs from bootstrap resampling (300 iterations).

1.7x**Missing Teeth**

Public 49.6% vs Private 28.5%

1.9x**Tooth Wear**

Public 85.0% vs Private 45.6%

1.3x**Deep Caries (RC5–6 / Pulp)**

Public 18.7% vs Private 14.2%

2.2x**Advanced Bone Loss (Stage III–IV)**

Public 23.7% vs Private 10.9%

6.2x**Root Surface Caries**

Public 3.9% vs Private 0.6%

4.9x**Complete Edentulism**

Public 2.0% vs Private 0.4%

TWO COUNTERPOINTS WORTH NOTING

0.8x**Periapical Pathology**

Public 8.1% vs Private 10.8%

0.8x**Secondary Caries**

Public 23.4% vs Private 31.2%

Not every finding is worse in the public sector. Both periapical pathology and secondary caries are lower in public patients. But these numbers do not indicate better outcomes. They reflect fewer teeth. Public sector patients have more extractions and fewer restorations. A tooth that has been removed cannot develop a periapical lesion. A filling that was never placed cannot develop recurrent decay. These are not markers of health. They are markers of absence.

01 MISSING TEETH

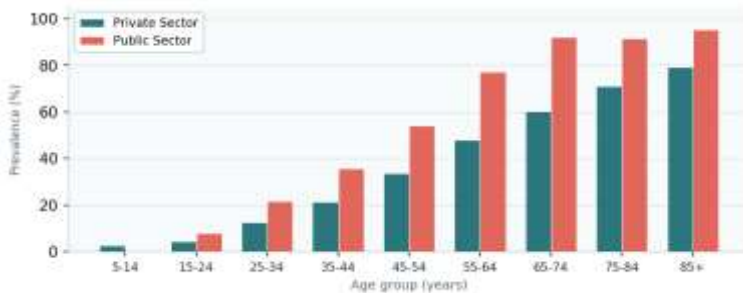
1.7x

Public 49.6% vs Private 28.5%

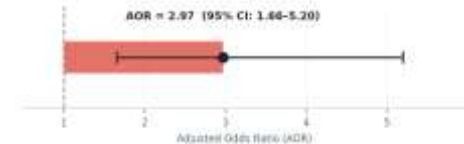
Definition & Measurement

Single and multiple missing teeth were identified from radiographic and clinical images. Single missing tooth: one tooth absent. Multiple missing teeth: two or more absent. This category excludes fully edentulous arches, which are captured separately under Complete Edentulism.

Missing Teeth — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 2.97 (95% CI: 1.66–5.20)

Interpretation

After age standardisation, public sector patients are 1.7 times more likely to present with at least one missing tooth. The gap is sharpest for multiple missing teeth and widens with age — the cumulative result of later detection, deeper caries, more advanced bone loss, and fewer restorative interventions across the life course.

02 TOOTH WEAR

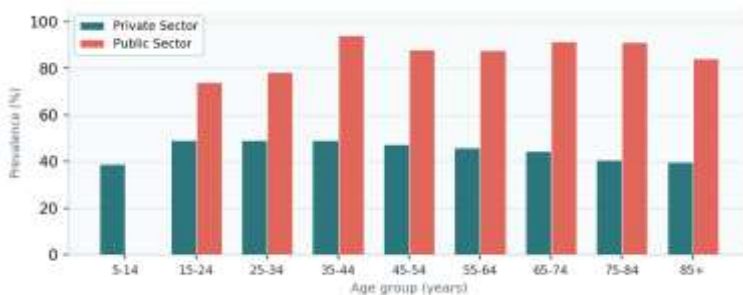
1.9x

Public 85.0% vs Private 45.6%

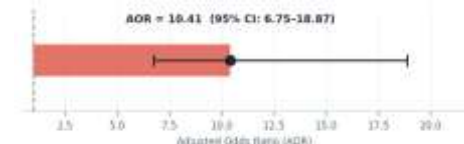
Definition & Measurement

Tooth wear was graded on a 4-point scale. Score 1 (Mild): wear limited to enamel or $\leq 25\%$ surface loss. Score 2 (Moderate): dentine exposure $< 50\%$, or vertical crown height loss $\leq 1/3$. Score 3 (Severe): dentine exposure $> 50\%$, or crown height loss $> 1/3$ but $< 2/3$. Score 4 (Extreme): complete enamel loss, crown height loss $\geq 2/3$, or visible pulp exposure. Prevalence reflects any detectable wear.

Tooth Wear — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 10.41 (95% CI: 6.75–18.87)

Interpretation

Tooth wear shows the largest disparity of all conditions examined. After age and sex adjustment, public sector patients are more than 10 times more likely to have detectable tooth wear. This reflects parafunctional habits, dietary acid exposure, and the near-absence of preventive monitoring, protective splinting, or early intervention in the public cohort.

03 DEEP CARIES (RC5–6 / PULP)

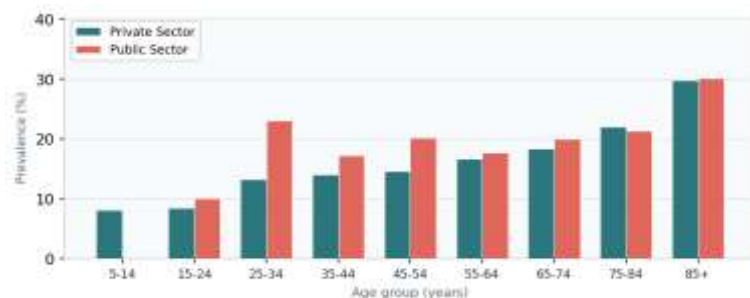
1.3x

Public 18.7% vs Private 14.2%

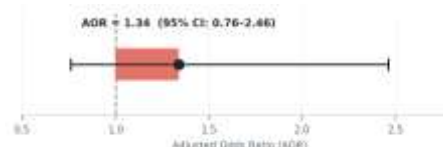
Definition & Measurement

Deep caries reaching the pulp was staged using ICCMS radiographic criteria (RC5: radiolucency in the inner 1/3 of dentine; RC6: radiolucency into the pulp) and ICDAS clinical criteria (Code 5: <50% carious cavity with visible dentine; Code 6: >50% cavity with visible dentine). Caries at this depth typically necessitates root canal treatment or extraction.

Deep Caries (RC5–6 / Pulp) — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 1.34 (95% CI: 0.76–2.46)

Interpretation

Public sector patients present with caries that has already reached the inner dentine or pulp at a higher rate, even after standardisation. Caries at this depth means the window for a simple restoration has typically closed. The clinical consequence is root canal treatment or extraction.

04 ADVANCED BONE LOSS (STAGE III–IV)

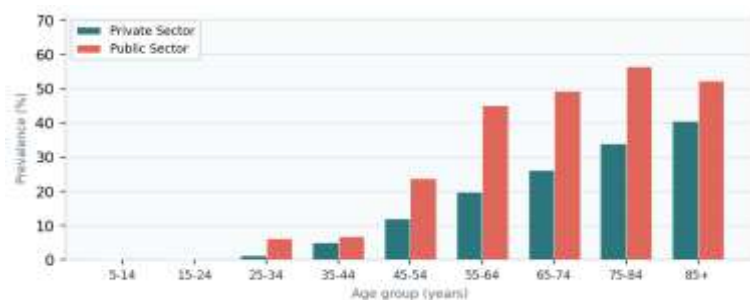
2.2x

Public 23.7% vs Private 10.9%

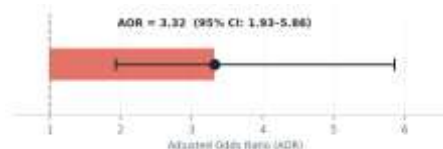
Definition & Measurement

Alveolar bone loss was staged radiographically using the 2017 AAP/EFPP periodontal classification. Stage III: horizontal bone loss to middle or apical third, and/or vertical bone loss ≥ 3 mm, and/or furcation involvement, and/or ≤ 4 missing teeth. Stage IV: the above plus ≥ 5 missing teeth, < 20 remaining, and/or tooth drifting or flaring. This category captures advanced-to-severe periodontal destruction only.

Advanced Bone Loss (Stage III–IV) — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 3.32 (95% CI: 1.93–5.86)

Interpretation

More than one in five public sector patients presents with Stage III–IV bone loss after age standardisation, compared to one in ten in private practice. This pattern — advanced disease at first presentation — is consistent with a population in whom periodontal disease is diagnosed late and managed infrequently.

05 ROOT SURFACE CARIES

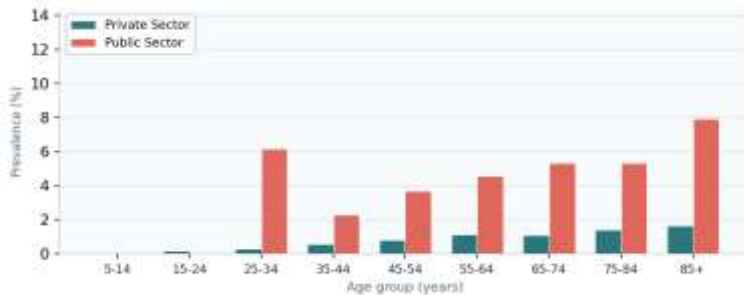
6.2x

Public 3.9% vs Private 0.6%

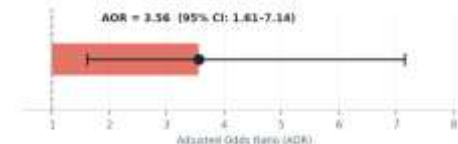
Definition & Measurement

Root surface caries develops on exposed root surfaces following gingival recession. Identified as a clearly demarcated area at or below the cemento-enamel junction (CEJ) with discolouration and cavitation or anatomical contour loss ≥ 0.5 mm. A marker of an ageing dentition with a history of periodontal disease.

Root Surface Caries — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = **3.56** (95% CI: 1.61–7.14)

Interpretation

Root surface caries is more than six times more prevalent in the public sector. This reflects both the higher burden of periodontal disease exposing root surfaces and the absence of preventive interventions — fluoride, resin infiltration, monitoring — that arrest early root lesions in private practice.

06 COMPLETE EDENTULISM

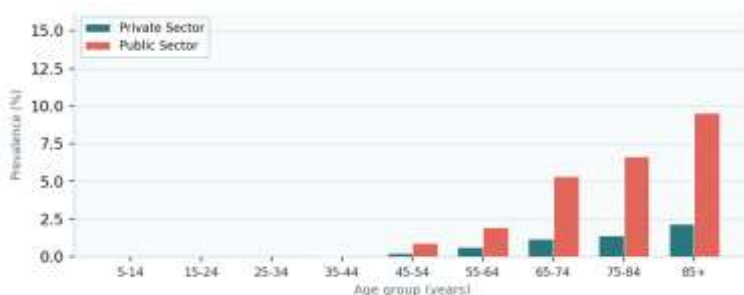
4.9x

Public 2.0% vs Private 0.4%

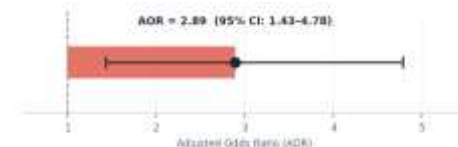
Definition & Measurement

Complete edentulism reflects full arch tooth loss — maxillary arch, mandibular arch, or both. This is the most extreme oral disease outcome: irreversible, profoundly affecting nutrition, speech, and quality of life, and almost entirely preventable with timely dental care.

Complete Edentulism — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = **2.89** (95% CI: 1.43–4.78)

Interpretation

Complete edentulism is nearly five times more prevalent in the public sector after age standardisation, and the adjusted odds ratio of 2.9 confirms this gap persists after controlling for age. These are largely preventable outcomes — the final consequence of disease that was not managed at any earlier clinical stage.

07 COUNTERPOINT PERIAPICAL PATHOLOGY

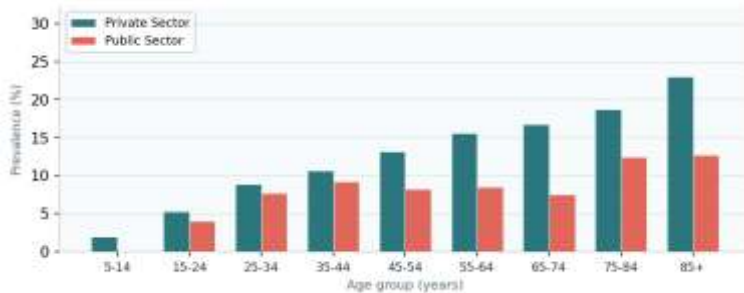
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Public 8.1% vs Private 10.8%

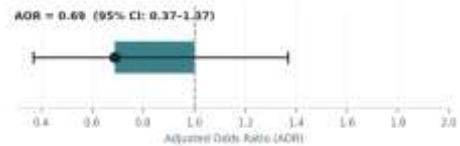
Definition & Measurement

Periapical findings include radiolucent areas (infection or inflammation at the root apex, consequent to untreated deep caries or failing endodontic treatment) and radiopaque areas (sclerotic bone or condensing osteitis). Prevalence reflects any periapical finding on radiographic review.

Periapical Pathology — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 0.69 (95% CI: 0.37–1.37)

Interpretation

Periapical pathology is marginally less prevalent in public sector patients after adjustment (AOR 0.69). This is not a marker of better outcomes. Many teeth that would have developed periapical lesions have already been extracted in the public cohort, removing them from the data. The lower rate reflects fewer teeth, not healthier teeth.

08 COUNTERPOINT SECONDARY CARIES

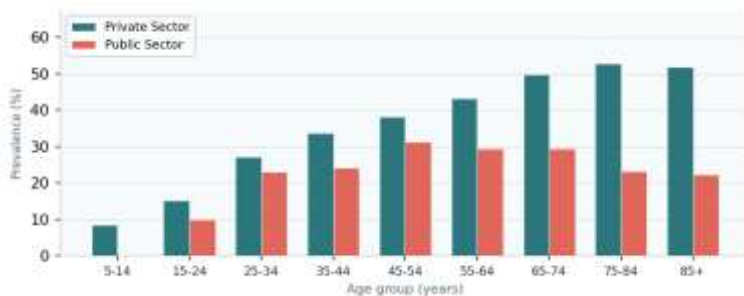
0.8x

Public 23.4% vs Private 31.2%

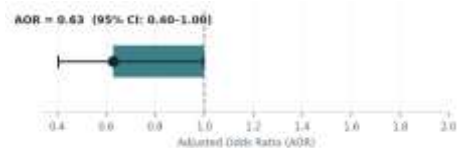
Definition & Measurement

Secondary (recurrent) caries develops around existing restorations and was staged using ICCMS radiographic criteria (RA1–RC6) applied to lesions adjacent to existing restoration margins. Each new lesion at a filling margin drives the restorative cycle forward: larger filling → crown → root canal → extraction.

Secondary Caries — Age-specific prevalence by sector



Adjusted Odds Ratio (PSM 1:1)



AOR = 0.63 (95% CI: 0.40–1.00)

Interpretation

Secondary caries is lower in the public sector (AOR 0.63). Public sector patients have fewer restorations; fewer fillings means fewer surfaces at risk of recurrent decay. The restorative cycle requires a tooth to be present and a filling to have been placed. In many public patients, it never began.

09 WHAT THIS DATA ASKS OF US

These findings come from the same AI image analysis system applied to dental radiographs and clinical photographs in both settings. The categories are identical. The staging is identical. What differs is the population — and the results are unambiguous.

Public sector patients present with more advanced disease across almost every measure. Their bone loss is further progressed. Their caries is deeper. Their teeth are more often missing. Tooth wear is dramatically more severe. The markers of end-stage dental disease — root remnants, complete edentulism, advanced bone loss — are consistently two to ten times more prevalent.

This is not a reflection of individual behaviour. It is a reflection of system design. When access to routine dental care depends on the ability to pay, the clinical consequences are visible in the data at population scale.

These are findings from 81,919 patients. More data from more public settings would strengthen these conclusions. But the direction is clear, and the gap is wide.

10 METHODOLOGY

Age Standardisation

All prevalence estimates were age-standardised to the WHO World Standard Population using direct standardisation, correcting for the substantially older age profile of the public-sector cohort (median age 66 vs 43 years). Nine age bands (5–14 through 85+) were used. Band-specific prevalence rates were weighted by WHO standard population weights and summed to produce an age-standardised prevalence for each sector.

Propensity Score Matching

To estimate adjusted odds ratios (AOR), 1:1 nearest-neighbour propensity score matching was performed. Propensity scores were estimated via logistic regression with age and sex as covariates. Matching was performed without replacement using Euclidean distance on the propensity score, yielding 147 matched pairs. AORs were estimated via logistic regression on the matched sample, adjusting for age, sex, and the binary condition indicator. 95% confidence intervals were derived from bootstrap resampling (300 iterations).

Patient Identification

Unique patients were identified by combining gender and date of birth. The dataset is one row per clinical observation; patients with multiple observations were deduplicated. A patient was classified as positive for a condition if any observation matched the relevant sub-category or observation-level codes.

Limitations

The public-sector sample (n=977) is substantially smaller than the private-sector sample, limiting statistical power and widening CIs for some conditions. Propensity score matching adjusts only for observed confounders (age, sex); unmeasured confounders — socioeconomic status, rurality, Indigenous status, dental attendance frequency — could influence observed differences. Conditions are classified from AI image analysis outputs; the same system and protocols were applied across both sectors.

All findings derived from AI image analysis of dental radiographs and clinical photographs using standardised ICDAS, ICCMS, and AAP/EFP periodontal classification protocols. Private sector: 80,942 patients | Public sector: 977 patients | Analysis year: 2025