Dental Caries Burden in Primary Care under Indonesian National Health Insurance: A Claim-Based Study

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Background : Dental caries is preventable but remains highly prevalent in Indonesia, burdening individuals and the healthcare system. In the National Health Insurance (NHI) capitation-based primary health care (PHC) system, dentists may be disincentivized to treat severe cases. This study examines how individual and contextual factors influence dental caries burden in Indonesia's PHC.

Methods : We analyzed 21,285 NHI members (age 15–75; 38.8% male) with caries-related PHC visits in 2022, from 33,244 non-referral claims nested in 34 provinces. The most severe diagnosis was classified as advanced (pulpal/periapical) or early-only lesions. Insurance type indicated socioeconomic status (SES; subsidized = lower SES). Covariates included age, sex, marital status, residency, and facility type. Province-level factors included dentist adequacy, Gini index, and human development index. Weighted multilevel Poison regression with random intercepts estimated Risk Ratio (RR) for the binary outcome, stratified by dentist adequacy (adequate = ≥75.5% of PHC with ≥1 dentist).

Results : Of participants, 20.7% were lower SES. Early lesions-only were found in 13.5% of lower-SES and 17.8% of higher-SES individuals. In areas with adequate dentist supply, higher SES participants were more likely to present with early lesions-only (RR 1.36, 95% CI 1.12–1.55) indicating lower disease severity, but not in inadequate dentist areas. The effect of provincial inequality differed by dentist adequacy: in adequate areas, higher inequality increased the likelihood of coming with early lesions-only (RR 1.39, 95% CI 1.06–1.81), whereas in inadequate areas, higher inequality reduced it (RR 0.60, 95% CI 0.44–0.81).

Conclusion : Both individual and contextual factors shape the dental caries burden in PHC. Higher SES reduces severity only where dental infrastructure is adequate, while inequality worsens burden in low-resource regions. Strengthening dental healthcare capacity could reduce burden in PHC.

Commute Walking Activities Changes Following Residential Relocation in the Tokyo Metropolitan Area

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Background : Neighborhood walkability is a well-established determinant of walking activities. However, there is limited knowledge regarding the alterations in walking behaviors after residential relocation, especially within the densely populated East Asian metropolitan context.

Objective : This study examined how residential relocation affects residents' walking activities for commuting across neighbourhoods with varying levels of walkability in the Tokyo Metropolitan Area (TMA).

Methods : We used cross-sectional survey data from 6,175 residents, collected between February and March 2023. Commute walking activities were self-reported, and neighborhood walkability was assessed using the Japan Postcode Level Walkability Index. The movers were classified into nine sub-groups according to the walkability levels of their previous and current neighborhoods (e.g., low to high, high to low). Multilevel ordinal logistic regression was used to assess perceived changes in commute walking.

Results : Movers from high- to medium-walkability areas (H to M) (OR = 1.38, 95% CI: 1.05–1.82) and high- to low-walkability areas (H to L) (OR = 1.95, 95% CI: 1.28 – 2.96) both significantly increased their commute walking. Meanwhile, movers in the medium-to-high walkability (M to H) group (ORs = 0.55 (0.41 – 0.72)) were likely to decrease their commute walking compared with non-movers from low walkability areas.

Discussion : The results showed that movers relocating from high- to low-walkability areas reported unexpected increases in commuting-related walking, reflecting the unique role of suburban transit and workplace geography within the TMA.

Conclusion : This study highlights how relocating to neighborhoods with varying walkability levels within the TMA can influence walking activities. This offers a new perspective by providing an important counterpoint to Western-centric models.

Prediction models of diabetes mellitus and long-term care using health check-up data in older adults

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This study aimed to develop prediction models for the onset of diabetes mellitus (DM) and long-term care insurance (LTCI) certification using health check-up data among community-dwelling older adults. This retrospective study used data on LTCI certification, medical claims, health check-ups, and basic resident registration in Nobeoka City between 2014 and 2022. Among 21,230 individuals aged ≥65 years who underwent health check-ups at least once, 21,126 were included in model development after excluding those with existing DM, prior LTCI certification, or missing laboratory data. Predictors included age, sex, body mass index, blood pressure, laboratory data (e.g., lipoprotein cholesterol, hemoglobin A1c), and questionnaire data (e.g., smoking, exercise). The outcomes were new-onset DM (defined by diagnosis and medication) and new LTCI certification within five years. Data were randomly split into training and test sets. Prediction models were developed using XGBoost with 50-time under-sampling to address class imbalance and ensemble bagging methods to reduce overfitting in training datasets (N=10,548 for DM; N=14,473 for LTCI). Model performance was evaluated using the area under the curve (AUC) with 95% confidence intervals in the test datasets (N=4,521 for DM; N=6,204 for LTCI). For the DM model, data from 15,134 individuals were included in the model (mean age 74±7 years; 40% male), with 437 (3%) developing DM. For the LTCI model, 20,677 individuals were included (mean age 69±10 years; 43% male), with 1,874 (9%) newly certified. The DM model achieved an AUC of 0.807 (95% CI: 0.758–0.856), with a sensitivity of 0.70 and a specificity of 0.76. The LTCI model achieved an AUC of 0.829 (95% CI: 0.812–0.846), with a sensitivity of 0.71 and a specificity of 0.79. Health check-up data can be useful in predicting new-onset DM and LTCI certification among older adults. These models may help identify individuals at high risk and support early intervention strategies.

Population-Attributable Fraction of Poor Oral Health for Diabetes: JAGES Health Checkup Study

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Objectives : Oral diseases have been associated with an increased risk of diabetes. However, few studies have compared the effects of multiple oral conditions on diabetes risk using actual measured outcomes. This study aimed to compare and examine the relationship between four oral conditions and diabetes risk in older Japanese adults and their contribution.

Methods : This cross-sectional study combined data from the 2022 Japan Gerontological Evaluation Study (JAGES) survey of independent older adults aged ≥65 years and 2022 specific health checkup data. The dependent variable was a binary classification: those with HbA1c <6.5% and no diabetes treatment (non-diabetes group), and those with HbA1c ≥6.5% or receiving diabetes treatment (diabetes group). Independent variables included number of teeth, dry mouth, swallowing difficulties, and chewing difficulties. Poisson regression analysis was conducted to calculate the prevalence ratios (PRs) and 95% confidence intervals (CIs) for diabetes associated with each oral condition. Additionally, the population-attributable fraction (PAF) of diabetes was calculated for each variable.

Results : The total number of participants was 26,744 (45.6% male; mean age = 75.6 ± 5.8). The prevalence of diabetes was 13.2%. Those with 20–23 teeth had a significantly higher risk of diabetes (PR = 1.12; 95% CI = 1.01–1.24) compared to those with ≥28 teeth, and this risk increased significantly with fewer teeth. The PAF for number of teeth was 11%, which was higher than the PAF for BMI ≥25 (10%). Additionally, dry mouth was associated with a higher risk of diabetes (PR = 1.13; 95% CI = 1.05–1.22) compared to those without dry mouth. The PAF for dry mouth was 3%, similar to the PAF for walking <30 minutes /day (3%). For the other variables, there were no significant differences.

Conclusions : Fewer teeth and dry mouth were associated with an increased risk of diabetes and showed a greater contribution than other factors.

Trajectories of physical activity over 21 years and medication costs for chronic diseases

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Background : Little is known about the economic burden associated with trajectories of physical activity (PA) in mid-aged women. We identified the associations of PA trajectories using 21 years of data with medication costs for chronic diseases for women aged 47–52 at baseline.

Methods : Data were from the 1946–1951 cohort of the Australian Longitudinal Study on Women's Health (N=8489). Surveys were mailed at three-year intervals from 1998 (age 47–52) to 2019 (age 68–73). Cumulative medication costs for diabetes, hypertension, hyperlipidaemia, pain, and mental disorders were calculated for the period 2019 to 2022 (age 71–76) using Pharmaceutical Benefits Scheme, which covers prescription medicines subsidised under Australia's universal health insurance system. Group-based trajectory modelling was used to identify trajectories of PA. Zero-inflated gamma regression models were used to examine associations between PA trajectories and medication costs. Additionally, simulated medication costs were estimated by manipulating PA trajectories, and differences from the natural course were calculated.

Results : Five trajectories were identified: Low (14.0% of participants), Moderate (50.8%), Increasing (20.9%), Declining (7.9%), and High (6.3%). The median of 21-year PA (MET-min/week) was 196 in the Low, 745 in the Moderate, 1571 in the Increasing, 1679 in the Declining, and 2509 in the High group. Compared with women in the Low group, those in the Increasing and High groups had lower medication costs across all diseases. Women in the Moderate and Declining groups incurred lower medication costs for hypertension, hyperlipidaemia, pain, and mental disorders. Estimated medication costs indicated that if women in the Low group transitioned to the Moderate group, annual medication costs could decrease by AUD 13 million.

Conclusions : These findings suggest that increasing PA in low-active women at this life stage could significantly reduce medication costs in early older age.