Using Systems Thinking to Explore the Drivers of Childhood Gastroenteritis in Queensland

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Background : Australia is a high-income country with advanced water, sanitation and hygiene (WASH) infrastructure. Yet, it continues to grapple with gastroenteritis as a persistent public health challenge, with major venues of transmission including domestic households, childcare facilities and schools. This persistence is attributed to the complex nature of the disease involving multiple causes, diverse sources, and varied transmission routes and its strong linkage to dynamic human behaviours Addressing this challenge requires a holistic approach to understanding evolving behaviours such as hand and environmental hygiene. This study aimed to explain the persistence of gastroenteritis as a public health challenge, focusing on domestic, childcare and school settings, by developing and analysing a causal loop diagram (CLD), a systems thinking tool that visually integrates empirical data and theoretical insights into causal relationships and feedback loops.

Methods : The CLD was developed using published quantitative and qualitative studies to identify key variables and their relationships and refined through expert consultation.

Results : Key variables influencing the gastroenteritis transmission were identified across domestic, childcare, and school settings. The CLD included nine balancing (B) and 13 reinforcing (R) feedback loops. Public health responses and parental awareness emerged as central elements, with the highest number of connections and involvement in multiple feedback loops. Initial insights highlighted the multi-sectoral nature of the problem, as well as delays in public health response and healthcare-seeking behaviours.

Conclusions : The CLD highlights interconnected feedback loops across homes, schools, and childcare settings, emphasizing the need for an integrated intervention such as supportive policies like paid leave and fee reimbursements to working parents.

Proteomic profiles related to kidney function and dietary associations: UKB and YMoC study

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Background : Estimated glomerular filtration rate (eGFR) is a key marker of kidney function. Proteomic profiles capture molecular pathways of renal impairment, and diet is a modifiable determinant of kidney health.However, few large-scale discovery–replication studies have integrated the proteome with nutrition data.

Objective**:** To identify plasma proteins associated with eGFR, replicate findings across cohorts, and examine correlations with dietary nutrient intake.

Methods : We applied a two-stage discovery (UK Biobank, UKB) and replication (Yamanashi multi-omics cohort, YMoC) design. In UKB (n=41,992; mean age 56.8y; 54.1% women), associations between eGFR and plasma proteins were evaluated using covariate-adjusted linear regression models, controlling the false discovery rate (FDR) at $q<0.05$. Replication in YMoC required concordant effect direction and $q<0.05$. In YMoC (n=162; mean age 54.2y; 40.1% women), we analyzed correlations with energy-adjusted nutrient intakes from a food frequency questionnaire (FFQ). Partial Spearman correlations between residualized nutrients and proteins were calculated, adjusting for age, sex, BMI, smoking, exercise, and income, with FDR controlled at $q<0.1$.

Results : We identified an overlap set of 69 proteins significantly associated with eGFR in both cohorts. Among the identified proteins, 140 nutrient–protein pairs were significant ($q<0.1$). Ethanol intake showed a moderate negative correlation with beta-2-microglobulin (B2M), a marker of renal dysfunction ($r=-0.333$, $q=0.0027$). Carbohydrate intake was positively associated with insulin-like growth factor binding protein 2 (IGFBP2), involved in metabolic and renal pathways ($r=0.322$, $q=0.0074$).

Conclusion : Using a replication-based design, we identified eGFR-related proteins and their dietary correlates. The observed significant correlations suggest diet–proteome–kidney links. Further validation is needed to clarify pathways and contribute to personal prevention.

Youth Bone-Strengthening Habits and Older Adult Bone Mass: Accounting for Later-Life Habits

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Background : To provide evidence for recommending bone-strengthening habits from youth for bone health in later life, such as exercise, nutrition, and sun exposure, we examined their association with bone mass in older adults, accounting for the influence of later-life habits.

Methods : We investigated 1,624 adults aged 40-79 years (34.5% male, median age: 69) in Kamisu city, Japan. Bone-strengthening habits were assessed using a 9-item questionnaire on jumping, climbing, and lifting activities; intake of dairy products, small fish, beans, and meat; and sun exposure, with frequency scored on a 3-point scale (from “less than once a month" to "4 or more days a week") for both youth and later life. The primary outcome was quantitative ultrasound T-score for heel. We used a multiple regression analysis to evaluate the association between youth habits scores and later-life bone mass, adjusting for sex, age, body mass, smoking, drinking, and chronic disease. An interaction term was included to test the association was modified by later-life habits levels. All analyses were conducted with a 5% significance level (variance inflation factor < 5).

Results : The bone-strengthening habit score was lower in later life than in youth. The youth bone-strengthening habit score was positively associated with the T-score [$+1.2\times10^{-2}$ (95% CI: 0.8, 2.4)], and this association was not modified by current habit levels (p for interaction = 0.325). Compared to those with lower scores in both youth and later life, T-score was greater in the group with higher score in youth but lower in later life [$+15.0\times10^{-2}$, (5.2, 24.7)] and the group with higher scores in both youth and later life [$+14.8\times10^{-2}$, (5.0, 24.7)]. However, those with lower score in youth and higher in later life did not show a significant association [$+0.04\times10^{-2}$, (-1.1, 1.2)].

Conclusion : Bone-strengthening habits in youth were positively associated with bone mass in older adults, irrespective of later-lifehabits.

Association Between Loneliness and Job Turnover Among Older Workers

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Objective : With an increasing number of older adults continuing to work after retirement, they have become an important part of the labor force in aging societies. Although loneliness has been linked to job turnover among younger and middle-aged workers, its impact on older workers remains unclear. This study aimed to examine whether loneliness is associated with subsequent job turnover among older workers.

Methods : We analyzed 594 retired civil servants aged 60 years or older (528 men and 66 women) from the Aichi Workers' Cohort Study who participated in both the 2022 baseline and 2024 follow-up surveys, after excluding those not working at baseline and those with missing data. Loneliness was assessed using the three-item Japanese short version of the UCLA Loneliness Scale, with responses ("never," "rarely," "sometimes," "always") scored from 1 to 4. Based on total scores, participants were classified into three categories: "never" (≤3), "rarely" (4–6), and "present" (≥7). We examined the association between loneliness in 2022 and job turnover in 2024 using logistic regression, adjusting for sex, age, commuting status, cohabitation, depressive symptoms, self-rated health, instrumental activities of daily living, alcohol consumption, smoking status, body mass index, sleep duration, and histories of cardiovascular disease, hypertension, diabetes, and dyslipidemia.

Results : Over the two-year follow-up, 109 participants (18.3%) left their jobs. Compared with those reporting "never", among whom 9.3% left their jobs, the multivariable-adjusted odds ratios (95% confidence intervals) for job turnover were 2.47 (1.14–5.32) for the "rarely" (18.6%) and 3.11 (1.36–7.12) for the "present" (23.2%).

Conclusion : Among workers aged 60 and older, the presence of loneliness was significantly associated with subsequent job turnover. These findings suggest that addressing loneliness may be important for supporting continued work among older workers.

The association between caregiving time and lifestyles among Japanese adults.

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Background and Objective : The Caregiving burden is a growing social issue in aging societies. Although previous studies have examined caregivers' health, limited research has focused specifically on lifestyle in caregivers of various age groups. This study aimed to investigate the association between caregiving time and lifestyles among Japanese adults.

Methods : This cross-sectional study analyzed data from a web-based survey conducted from January to February 2025, including 1,168 men and women aged 21–69 years. Participants were classified as non-caregivers, caregivers for parents, or caregivers for spouses. Caregivers for parents were further divided into three groups based on their caregiving time. Dietary habits (e.g., breakfast skipping, instant food consumption, eating speed, snacking, eating out), physical activity, alcohol drinking, and smoking statuses were assessed. The proportions of these lifestyles were calculated according to the caregiving categories, and the association was tested using a chi-squared test.

Results : Of the 1,168 participants, 700 were non-caregivers, 410 were parents' caregivers, and 53 were spouses' caregivers. Among those caring for parents, the proportions of non-smokers, non-drinkers, participants with low physical activity, and those who ate breakfast showed a U-shaped pattern, with the highest proportions found in the groups with the lowest and highest caregiving times ($p<0.05$). Among caregivers for spouses, the proportions of smoking, eating late-night meals, consuming instant food frequently, and drinking alcohol were higher than among non-caregivers ($p<0.05$).

Conclusion : Caregiving time was associated with specific lifestyle behaviors among Japanese adults. These findings could support the need for lifestyle support strategies tailored to caregivers. Further studies are needed to clarify the impact of these behaviors on the health of caregivers.