Worker Protection in the Gig Economy: Algorithmic Definitions and Tax-Based Insurance

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Introduction : AI-driven algorithms have reshaped the digital platform economy, creating significant occupational health and equity challenges. Efficiency-focused algorithms often undermine worker well-being. This study reframes algorithmic justice—encompassing fairness, transparency, accountability, and safety—within occupational health, assesses risks for gig workers, and proposes a novel algorithmic tax and insurance system.

Methods : We conducted a systematic review of the health impacts of algorithms, analyzing risks like economic-health trade-offs. We examined Korean gig worker health using the Korean Working Conditions Survey (KWCS) and occupational data, reviewed legal frameworks like the EU and Korean AI Acts, and assessed the feasibility of the proposed tax and insurance system based on social insurance literature.

Results : Our results show that algorithmic justice in occupational health requires mitigating discrimination (fairness), ensuring clear decision-making (transparency), mandatory human oversight, and protecting worker rights. Algorithms are linked to increased accident risks and stress. In South Korea, delivery workers face a threefold higher fatality rate. KWCS data reveal gig workers have elevated health risks (OR: 1.17, 95% CI: 0.96–1.42) and sleep disorders (OR: 1.58, 95% CI: 1.20–2.07). The proposed algorithmic tax and insurance system offers a viable safety net.

Conclusion : In conclusion, algorithms in the gig economy worsen health inequities. Integrating algorithmic justice principles into occupational health policy is crucial. An algorithmic tax and insurance system can provide essential safeguards, requiring collaboration across legal, technical, and ethical domains to ensure health equity for all gig workers.

Trends of maternal healthcare service indicators in low- and middle-income countries, 2000-2030

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Introduction : Despite global commitments to universal health coverage (UHC), systematic assessments of progress in maternal health service coverage remain limited in low- and lower-middle income countries (LMICs). This study estimated recent trends and developed projections of maternal health service indicators up to 2030.

Methods : Data from 197 nationally representative household surveys, such as Demographic and Health Surveys and Multiple Indicator Cluster Surveys, across 44 LMICs in South Asia, Southeast Asia, and Sub-Saharan Africa (SSA) were used. Indicators of maternal health service included coverage of single antenatal care (ANC) visit, four or more ANC visits, institutional delivery, and skilled birth attendance. A Bayesian hierarchical regression model was used to assess trends and develop projections up to 2030 under three scenarios: business-as-usual scenario, a better scenario (assuming increased investment in health) and an ambitious scenario (with increased investment and optimal health workforce density).

Results : In the business-as-usual scenario, 38 out of 44 countries are projected to achieve the 80% coverage target for a single ANC visit by 2030, while only nine countries are on track to meet the target for four ANC visits. Under the better scenario, 17 countries are expected to achieve the 80% coverage of four ANC visits by 2030, while 38 countries may reach the target under the ambitious scenario. Progress in delivery care was rapid in countries from all regions except Central Africa. In the business-as-usual scenario, coverage of institutional delivery is projected to reach the 80% target in 33 countries. Under the better scenario, 36 countries are projected to achieve 80% target.

Conclusion : Substantial progress has been made to expand coverage of maternal healthcare services in LMICs of Asia and SSA, but much higher pace of progress is required to achieve the UHC target by 2030.

Impact of Age of Onset and Sex on Disease Progression of Psoriasis: A Cohort Study using a Claims Database

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Background : Psoriasis is a prevalent systemic inflammatory disease worldwide. Its severity has been considered to be affected by age of onset and sex; however, the associations between those factors and disease progression remain controversial. This study aimed to investigate the impacts of age of onset and sex on the risk of progression of psoriasis.

Methods : We conducted a retrospective cohort study using a Japanese claims database from April 2013 to March 2024. We identified patients with a new diagnosis of psoriasis vulgaris. The study assessed two exposures: age of onset (≥40 years [late-onset] vs. <40 years [early-onset]) and sex (female vs. male). The primary outcome was the development of severe psoriasis, defined as the initiation of systemic therapy or phototherapy. The secondary outcome was a composite of newly diagnosed psoriatic arthritis, erythroderma, or pustular psoriasis. We used multivariate Cox proportional hazards models to calculate adjusted hazard ratios (aHRs) with 95% confidence intervals (CIs).

Results : A total of 22,484 patients were included in the analysis. The incidence rate of severe psoriasis per 1,000 person-years was higher in the late-onset group (168.02) than in the early-onset group (133.85). After adjusting for potential confounders, late-onset psoriasis was associated with a significantly increased risk of the primary outcome (aHR, 1.24; 95% CI, 1.19–1.32) and the secondary outcome (aHR, 2.07; 95% CI, 1.54–2.79) compared to early-onset. In contrast, no significant difference in the risk of developing severe psoriasis was found between females and males (aHR, 0.97; 95% CI, 0.93–1.02).

Conclusion : This study demonstrated that patients with late-onset psoriasis had a higher risk of disease progression than those with early-onset, whereas sex was not associated with the risk. Our findings underscore the importance of vigilant monitoring of patients with late-onset psoriasis to mitigate the risk of severe long-term outcomes.

A longitudinal study of plasma and urinary metabolites in relation to early albuminuria

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Background : Early detection of chronic kidney disease (CKD) is an important public health issue, and reliable biomarkers are needed. In our previous analysis of the Tsuruoka Metabolome Cohort Study (TMCS), we identified plasma and urine metabolites associated with longitudinal eGFR decline. However, kidney damage is also reflected in urinary albumin excretion. This study aimed to investigate whether the metabolites associated with eGFR decline are also related to the development of early albuminuria.

Methods : We analyzed 1,668 men and women aged ≥60 years who participated in both Wave 1 (2012–2014) and Wave 3 (2018–2020) of the TMCS, excluding those with a history of cardiovascular disease, cancer, or baseline early albuminuria. Ninety-four plasma and 123 urine polar metabolites were measured at baseline using CE-MS, a platform validated for large-scale metabolomics at the Keio IAB laboratory. Early albuminuria was defined as urinary albumin-creatinine ratio (UACR) ≥5 mg/g creatinine. Among metabolites previously associated with eGFR decline, we tested their association with incident early albuminuria over 6.5 (±0.9) years using mixed regression models, adjusting for alcohol intake, smoking, hypertension, and diabetes.

Results : During follow-up, 21 participants developed incident early albuminuria. Among the candidate metabolites, plasma choline and mucate, and urinary choline were associated with the onset of early albuminuria after adjustment for confounders and measurement batch effects.

Conclusion : This study tested whether biomarkers related to eGFR decline also predict early albuminuria. The findings show that choline (plasma and urine) and mucate (plasma) are associated with both outcomes. These results suggest that specific metabolites may serve as shared biomarkers of kidney function decline and early renal injury, highlighting their potential value for early detection and risk stratification in CKD.

Sleep Disturbances as a Predictor of Cerebrovascular Disease and All-Cause Mortality

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Sleep disturbances and deficiencies are common in patients with cerebrovascular disease (CeVD), including stroke, and may be modifiable risk factors for circulatory disease and mortality. This study investigated the associations between poor sleep characteristics and the incident CeVD and/or all-cause mortality in middle-aged adults. A total of 9,350 participants from the Korean Genome and Epidemiology Study – Ansan and Ansung (mean age, 52.1 ± 8.9 years) were linked to the Health Insurance Review and Assessment Service national database to assess incident CeVD and mortality over 23 years. Sleep characteristics included self-reported sleep duration (<6, 6-7, 7-8 [reference], 8-9, ≥9 hours), insomnia symptoms, and mid-sleep timing (MST; earlier, intermediate, and later types). Multivariate Cox regression models were applied, adjusting for age, sex, area, marital status, body mass index, smoking and drinking status, regular exercise, hypertension, and diabetes at baseline. During a mean follow-up of 15.3 years, 1,848 participants developed CeVD, including 107 hemorrhagic and 891 ischemic strokes. Insomnia was associated with an higher CeVD risk in the overall population (HR = 1.20, 95% CI: 1.04-1.38), particularly in men (HR = 1.32, 95% CI: 1.02-1.70). Insomnia was also linked to higher all-cause mortality (HR = 1.22, 95% CI: 1.06-1.40). Compared with the intermediate-type mid-sleep timing (-1SD [1.3 h] ≤ MST ≤ +1SD [3.6 h]), earlier-type (< -1SD) was associated with greater risk of CeVD (HR = 1.13, 95% CI: 1.01-1.28), with a stronger effect observed in women (HR = 1.23, 95% CI: 1.06-1.44). In addition, sleep duration ≥9 hours was associated with higher all-cause mortality (HR=1.25, 95% CI: 1.10-1.46) compared with the 7-8 hour reference group. Diverse sleep disturbances and deficiencies are prospectively associated with elevated risks of CeVD and all-cause mortality in middle-aged adults.