

## From Intention to Action: Understanding the Timing of Mobility Decisions in Epidemics

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During infectious disease outbreaks, human mobility plays a critical role in both transmission and control. Mobile phone data have been widely used to monitor movement, but they mainly capture outcomes of travel and provide little insight into the timing of decisions. To address this, we used hotel reservation records, which include both bookings and cancellations, to infer when people revised their travel plans in response to changing epidemic conditions. We then compared these decision signals with actual mobility observed in large-scale aggregated location data.

We developed a mobility avoidance index from hotel reservation data between 2015 and 2023 in four Japanese prefectures: Miyagi, Aichi, Osaka, and Fukuoka. The index reflects shifts in willingness to travel under varying epidemic contexts. Actual mobility was derived from anonymized mobile phone data, representing stay time outside of home and workplace. We treated observed mobility as the accumulated effect of past decision signals, enabling us to examine how decision timing translated into realized movement. The avoidance index closely matched observed mobility reductions, particularly for non-work travel, where explanatory power was higher than for commuting. Although hotel reservations capture only trips involving overnight stays, the avoidance patterns generalized well to broader mobility. The analysis also highlighted that timing matters: decisions made within the past five weeks were most influential for non-work travel, while commuting was shaped more by decisions within two weeks.

These results demonstrate that integrating hotel reservation data with mobile phone location data provides a new way to quantify the timing of mobility decisions during epidemics. Considering the lag between decision and action can improve epidemic forecasting and help guide more effective interventions.

## Trends in and determinants of child marriage: A nationally representative survey (1993 to 2022)

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**Introduction :** Child marriage (CM), defined as any formal or informal union in which either or both partners are under the age of 18, is a common phenomenon in low- and middle-income countries. Among South Asian countries, Bangladesh has the highest prevalence of CM. However, there is limited evidence on recent trends and determinants of CM in Bangladesh. Therefore, this study aims to analyze the trends in and determinants of CM in Bangladesh over the past three decades.

**Methods :** Data from 123,749 ever-married women aged 15 to 49 years were obtained from Bangladesh Demographic and Health Surveys conducted between 1993 and 2022. A multilevel logistic regression model was used to identify possible determinants of CM in Bangladesh.

**Results :** The prevalence of CM was 87.9% in 1993, decreasing to 67.4% by 2022. Women with secondary or higher education (OR=0.51) and their husbands with higher education (OR=0.32) were less likely to have married as children than their uneducated counterparts. Other significant factors associated with lower odds included being from the richest quintile (OR=0.83), having moderate to high access to mass media (OR=0.72), and residing in a community with higher levels of education and wealth (OR=0.87 and OR=0.88). Women from non-Muslim religious groups were less likely to have been married as children (OR=0.53). Significant regional variations were observed, with lower odds in Chattogram and Sylhet divisions compared to Dhaka.

**Conclusion :** Although decreasing, the prevalence of child marriage in Bangladesh still remains high. Poor educational attainment, low socioeconomic status, and limited access to media are key factors driving this practice. Our findings suggest that targeted interventions to improve school retention, reduce socioeconomic inequality, and increase awareness are essential. Focusing these efforts can help Bangladesh achieve Sustainable Development Goal (SDG) Target 5.3 to eliminate child marriage.

## Regional Health Disparities in Kanagawa Prefecture: Multilevel Evidence from 300,000 Adults

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**Background :** While several studies examined prefectural-level outcomes such as life expectancy, research on intra-prefectural disparities, particularly at the municipal level, remains limited. This study aimed to examine whether health behaviors and health outcomes are associated with environmental characteristics of residential areas, and to identify factors contributing to disparities within Kanagawa Prefecture.

**Methods :** The study included 326,233 National Health Insurance enrollees aged 40–74 years in Kanagawa who underwent health checkups in 2022. Outcomes were BMI, HbA1c, systolic/diastolic blood pressure, and health behaviors (breakfast skipping, smoking, insufficient sleep). Multilevel analyses were performed with postal code-level variables (walkability index, area deprivation index [ADI], and urban–rural classification) and municipal-level variables (libraries and parks per km<sup>2</sup>, criminal offenses per 1,000 population).

**Results :** Mean age was 65.9 years; 58.3% were female. Across 1,977 postal code and 56 municipal groups, significant predictors for BMI, HbA1c, and blood pressure included age, sex, and postal code means (all  $p < 0.01$ ). Breakfast skipping, smoking, and insufficient sleep were predicted by age (–0.068, –0.039, –0.015), female (–0.438, –1.334, 0.277), and postal code mean (9.357, 8.637, 5.717). Breakfast skipping was also associated with the number of libraries (0.010) and crime (–0.013). Smoking was also associated with ADI (0.015) and crime (–0.011). ICCs ranged from 0.004 to 0.025.

**Conclusions :** Health behaviors and outcomes were consistently associated with contextual indicators, suggesting that community health influences individuals. Crime was linked to breakfast skipping and smoking, while ADI was specifically related to smoking. Neighborhood social and environmental contexts should be considered in addressing disparities and promoting healthier behaviors.

## The relationship between adiponectin and the new-onset of lifestyle-related diseases

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**Background and Aims :** Adiponectin, known for its anti-atherosclerotic effects, was investigated for its association with new-onset lifestyle-related diseases.

**Participants and Methods :** The study included railway company workers who had serum adiponectin levels measured during 2014 health checkups. Participants were divided into high and low adiponectin groups, with the high group as the reference. Lifestyle-related diseases—hypertension (SBP  $\geq 140$  and/or DBP  $\geq 90$ ), diabetes (HbA1c  $\geq 6.0$ ), dyslipidemia (LDL  $\geq 140$  and/or HDL  $< 40$  and/or TG  $\geq 150$ ), and hyperuricemia (UA  $\geq 7.1$ )—were evaluated, with medication use indicating disease presence. Participants with a disease in 2014 were excluded from respective analyses. From 2015 to 2023, annual checkups identified new-onset cases, with follow-up censored at onset or missing data (considered no onset). Maximum follow-up was 9 years. The Kaplan-Meier method and log-rank test assessed differences in disease incidence between groups, while Cox proportional hazards analysis calculated hazard ratios for the low group (significance level: 5%).

**Results :** Participant numbers were 2,997 (hypertension), 3,313 (diabetes), 2,211 (dyslipidemia), and 2,771 (hyperuricemia). New-onset cases were 863, 208, 1,159, and 708, respectively. The low adiponectin group showed significantly higher incidence for all diseases ( $P < 0.001$ ). Hazard ratios for the low group vs. high group were 1.456 (hypertension), 2.911 (diabetes), 1.576 (dyslipidemia), and 1.800 (hyperuricemia), all significantly elevated.

**Conclusion :** Low serum adiponectin levels were significantly associated with higher incidence of lifestyle-related diseases, with the low group showing approximately twice as many new-onset cases over 9 years, suggesting adiponectin's potential as a predictor of these diseases.

## Weekend Sleep Extension in Schoolchildren: The Role of Parental Awareness and Socioeconomic Status

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**Background :** Sleep debt in children is increasingly recognized as a public health concern, with impacts on cognitive development, emotional regulation, and physical health.

**Objective:** To examine the relationship between lifestyle factors and sleep patterns in primary school children, focusing on weekday-weekend sleep duration differences.

**Methods :** In October 2019, a self-administered questionnaire on sleep and media use was distributed to parents of children attending public primary schools in 16 wards of Nagoya City. Of 8,172 responses (response rate: 91.9%), 6,893 records with complete sleep data were analyzed. Wards were classified into high, medium, and low public assistance rate groups using official statistics. Stepwise logistic regression (likelihood ratio method, 5% significance level) identified factors associated with sleeping  $\geq 2$  hours longer on weekends.

**Results :** Overall, 7.3% of children (boys: 4.7%, girls: 9.9%) slept  $\geq 2$  hours longer on weekends. Significant predictors included higher grade level (OR = 2.421), female gender (OR = 2.286), eating dinner separately from family (OR = 1.615), and living in wards with high public assistance rates (OR = 1.294). Parental awareness of sleep deprivation was associated with reduced likelihood of extended weekend sleep (OR = 0.430). Device ownership, school avoidance, enjoyment of school life, and peer relationships were not statistically significant.

**Discussion :** Weekday-weekend sleep discrepancies in primary school children were influenced by individual (grade, gender), familial (meal routines, parental awareness), and socioeconomic factors. Strong parental awareness appeared protective, highlighting the importance of family-based sleep education. Support may be needed to promote regular sleep habits in socioeconomically disadvantaged communities.