Innovative Bayesian and Machine Learning Models in Parasitology Education

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This study explores the integration of Bayesian inference, machine learning (ML), and app development as tools for enhancing parasitology education and diagnostic performance in low-resource settings. Using data from a Zimbabwean parasitology survey, the diagnostic accuracy of Kato-Katz (KK) and Formol Ether Concentration Techniques (FECT) was evaluated. Bayesian latent class modeling estimated sensitivity and specificity of the two tests in the absence of a gold standard. In parallel, ten ML classifiers were trained and benchmarked using ROC, AUC, and F1 metrics. Random Forest emerged as the top-performing model, which was subsequently integrated into a prototype app using Streamlit. Code for R, Python, and Stata was provided to ensure pedagogical reproducibility. The study demonstrates how real-world diagnostic data can be used to engage students in modeling, algorithmic thinking, and app development. The findings reinforce the need for interdisciplinary, applied training in public health data science. This case study provides a scalable instructional model for competency-based learning, especially in neglected tropical diseases (NTDs) contexts where conventional diagnostics fall short and digital tools can offer practical solutions.

Long-term Trends in Post-COVID-19 Symptoms: Stratified Survival Analysis by Infection Period and Age

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Background : We previously reported the long-term course of persistent symptoms following COVID-19 among 2,421 patients diagnosed during the 1st to 7th waves (2020–2022) in collaboration with a medical institution in Hiroshima Prefecture. However, follow-up for Omicron cases, which became dominant after 2022, was limited to under one year, and their long-term outcomes remain unclear. Moreover, characteristics of symptoms associated with Omicron subvariants have not been fully examined. This study aimed to assess symptom persistence and investigate features of post-acute symptoms in Omicron subvariant cases.

Methods : We targeted 438 individuals with persistent symptoms from a 2022 survey and 782 patients diagnosed with Omicron subvariant infection in early 2024. Participants completed a mailed, self-administered questionnaire on symptoms after infection. Symptom duration was analyzed using Turnbull's survival analysis, stratified by age group (adults, children) and infection period (wild-type, Alpha, Delta, Omicron-2022, Omicron-2024).

Results : We obtained 228 responses from the follow-up group and 268 from the new cohort, yielding a final analytic sample of 2,689 when added to the original dataset. Among adults (n = 1,524; mean age 51.7, SD 16.4; 52.8% female), symptom prevalence plateaued after 13 months and was estimated at 13.7% at 48 months. Prevalence peaked during the Delta wave, declined in the Omicron period, and continued to decrease in 2024 Omicron subvariant cases. Among children (n = 1,165; mean age 6.7, SD 4.5; 44.3% female), prevalence was much lower—2.8% at 12 months and 2.2% at the end of the 36–48-month interval.

Conclusion : This study enabled long-term evaluation of post-COVID-19 symptom persistence. Symptom prevalence declined after the Omicron wave and remained low among 2024 Omicron subvariant cases.

COVID-19 and influenza vaccination intention and their associated factor during 2024-2025 season

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In Japan, starting with the 2024-2025 season, COVID-19 vaccination program has been transitioned to a routine vaccination, similar to seasonal influenza. This policy change may affect vaccination intentions among older adults. However, the intention of older adults to receive vaccinations after they became routine vaccination is unclear. This study aimed to clarify the intentions for COVID-19 and influenza vaccination and their associated factors among older adults.

This cross-sectional study analyzed data from an online survey. Respondents aged ≧ 65 answered the intentions of COVID-19 and influenza vaccines in 2024-2025 season. Logistic regression analysis was performed to identify the factors associated with vaccine intentions. Dependent variables were the intentions to receive the COVID-19 and influenza vaccines. Independent variables included sex, age, marital status, presence of children, household income, medical history, past vaccination history, vaccination readiness, social norm, K6 and UCLA loneliness scale.

Analysis included 715 adults (mean±SD: 71.51±5.1). The intention to receive the COVID-19 and influenza vaccines was 37.2% and 49.0%, respectively. In logistic regression analysis, intention for COVID-19 vaccine was significantly associated with prior COVID-19 vaccine history (odds ratio [OR]:7.43), prior influenza vaccine history (OR:3.13), and vaccination readiness (OR: 2.90). Intention for influenza vaccine was significantly associated with household income (OR:1.93), prior influenza vaccine history (OR:106.7), and vaccination readiness (OR:2.37).

In the 2024-2025 season, less than 50% of participants intended to receive vaccinations for COVID-19 and influenza. The strongest predictor of vaccination intention was a history of prior vaccination. These suggest that to improve future vaccine uptake, public health strategies should specifically target individuals who were not vaccinated in previous seasons.

Association between seaweed consumption and thyroid cancer risk: the Japan Cohort Consortium

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Background : High consumption of seaweed, a type of edible algae commonly consumed in Japan, has been suggested to increase the risk of thyroid cancer due to its high iodine content. However, previous epidemiological studies have reported inconsistent results regarding this association. To clarify the association between seaweed consumption and the incident risk of thyroid cancer, we conducted a pooled analysis of six cohort studies in Japan.

Methods : We used data from six large-scale prospective cohort studies of the Japan Cohort Consortium comprising a total of 301,452 Japanese men and women. Each study estimated hazard ratios (HRs) and 95% confidence intervals (CIs) for thyroid cancer incidence according to tertiles of seaweed consumption using Cox proportional hazards regression models. Study-specific HRs were then pooled using a random-effects model to obtain summary estimates for each consumption category.

Results : During 4,492,477 person-years of follow-up, 718 cases of thyroid cancer were identified (133 for men, 585 for women). Compared to the lowest seaweed consumption, the HRs for thyroid cancer incidence of the highest tertiles were 0.94 (95% CI: 0.56-1.60) for men and 1.33 (95% CI: 1.07-1.65) for women. After stratification by histological type, the association observed in women was slightly stronger; the HR of the highest category for papillary carcinoma for women was 1.37 (95% CI: 1.09-1.73). In subgroup analyses by menopausal status, a significant association with thyroid cancer was observed only in postmenopausal women (HR: 1.31; 95% CI: 1.00–1.71), but not in premenopausal women.

Conclusion : Based on a pooled analysis of six cohorts, seaweed consumption was positively associated with the increased risk of thyroid cancer among women in Japan. In subgroup analyses by menopausal status, a significant positive association was observed only in the postmenopausal group.

Barriers of physical activity among young adult women of a rural community in Bangladesh

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Objectives : Noncommunicable diseases (NCDs) are increasingly prevalent, with women being particularly vulnerable due to socioeconomic inequality, poverty, and unequal access to healthcare. Physical inactivity is one of the four main risk factors for NCDs and contributes significantly to their development. Women worldwide, including in Bangladesh, often have insufficient physical activity levels. Identifying the barriers to physical activity is therefore crucial.

Methods : A cross-sectional study was conducted in 2022 in the rural community of Singair Upazila, Manikganj District. A total of 359 participants were randomly selected using a pre-determined sampling frame. Data were collected through face-to-face interviews employing a systematic random sampling method and analyzed using SPSS version 26. A semi-structured questionnaire, adapted from the STEP Survey 2018 and the CDC BBAQ questionnaire, was used to identify barriers to physical activity.

Result : The mean (±SD) age of the respondents was 29.4 (±5.6) years. Most were married (91.4%), homemakers (89.4%), and literate (96.4%, with education levels ranging from primary to secondary and above). The study found that 85.8% (95% Confidence Interval: 82.2–89.4) of young adult women did not engage in regular physical activity due to barriers. Among the 73.8% (69.3–78.3) of respondents who reported barriers, the most significant contributing factors were lack of resources (87.7%; 84–91.4), lack of willpower (80.2%; 75.7–84.7), social influences (74.4%; 69.8–79.6), lack of time (68.5%; 63.3–73.7), and lack of energy (69.8%; 64.7–74.9).

Conclusion : The primary barriers to physical activity among young adult women in rural Bangladesh were lack of resources, willpower, social influences, time, and energy. These findings highlight the need for targeted interventions to address these barriers.

Keywords : Noncommunicable diseases, Physical activity, Barriers, young adult women, Bangladesh