A GIS Assessment of Illegal Mining Impacts on Blackfly Breeding in Ghana and Its SDG Implications

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The Ofin River basin is a critical breeding ground for *Simulium* blackflies, vectors of *Onchocerca*, yet recent observations have noted a sharp decline in monitored populations. With illegal artisanal mining (galamsey) intensifying in and around the basin, this study investigated the ecological consequences of such activities on blackfly breeding in three affected communities (Adwuman, Buabenso, and Kyekyewere). Satellite imagery from 2008, 2017, and 2022/23 were analysed using Principal Raster Components(PRC) and the Normalized Difference Vegetation Index (NDVI) to assess ecological change. Water quality was evaluated using field and laboratory analyses. The PRC detected land cover change over the years. Forest cover declined by 10.72, 7.41, and 8.80 percentage points in Adwuman, Buabenso, and Kyekyewere, respectively, while light vegetation increased by 15.71, 15.00, and 18.93 points. Water coverage expanded by 10.81, 6.12, and 5.26 percentage points across communities, reflecting hydrological alteration likely linked to mining activities. Buabenso had a pH of 6.98, conductivity of 146.75 µS/cm, turbidity of 3525 NTU, colour at 3812.5 Hz and TSS of 3857.5 mg/L. Adwuman's pH was 6.98 but had slightly lower conductivity (145.5 µS/cm), turbidity (3392.5 NTU), colour (3375 Hz) and TSS (3630 mg/L). Kyekyewere recorded the lowest pH (6.95) and conductivity (145.25 µS/cm), but the highest turbidity (3725 NTU), colour (4175 Hz) and TSS (4342.5 mg/L). NDVI revealed widespread declines in vegetation health and density, especially around mining zones. This suggests illegal mining has driven sediment overload, deforestation and riparian fragmentation, rendering conditions unsuitable for blackfly larval development. The ecological disruption also threatens food security and clean water access, undermining progress toward SDGs 2, 3, 6, and 15. Sustainable River management and ecosystem restoration are urgently needed to protect both public health and biodiversity.

Assessing the association between ambient air pollution, meteorological factors, and psoriasis

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Background : Psoriasis is a chronic, immune-mediated skin disease with a relapsing-remitting course. Despite treatment advances, options like topical agents and phototherapy mainly provide symptom relief. Recent studies suggest air pollution may influence psoriasis onset or worsening, but findings on meteorological factors are inconsistent. The objective of this study is to investigate the relationship between air pollution, meteorological factors, and the occurrence of psoriasis.

Study Design : This study utilized data from the National Health Insurance Research Database from 2005 to 2019 to identify psoriasis cases. Air pollution exposure data came from 1-km resolution satellite and land use estimates. Meteorological data were obtained from the Taiwan Climate Change Projection Information Platform (TCCIP) and the European Centre for Medium-Range Weather Forecasts (ECMWF). A time-stratified case-crossover design studied environmental factors linked to psoriasis, using conditional logistic regression to estimate pollution and meteorological impacts. Distributed lag non-linear models examined lag effects and exposure–response relationships.

Results : Our study involved 222,651 psoriasis patients, with a mean age of 47.1 years, and 59.5% were male. The environmental lag effect results demonstrated that exposure to particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and ultraviolet (UV) reached its peak on Lag 0, subsequently declining over the following days. The exposure–response analysis indicated that air pollutants had positive associations with psoriasis, whereas average daily temperature (ADT) acted as a protective factor. UV was identified as protective at low levels but could pose risks at higher intensities.

Conclusion : Our study shows that environmental factors including $PM_{2.5}$, SO_2, and UV could influence psoriasis occurrence. These findings have important implications for early prevention and public health policies.

Ambient Temperature and Kawasaki Disease in Seoul: Using Case-Crossover and Time-Series Analyses

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Background : Kawasaki disease (KD) is an acute vasculitis of childhood and the leading cause of acquired heart disease in developed countries. Although environmental triggers have long been suspected, the impact of ambient temperature on KD incidence remains unclear, particularly in Korea.

Methods : We analyzed nationwide health insurance claims data for children aged 0–9 years residing in Seoul between 2012 and 2019. KD cases were defined by the ICD-10 code M30.3 with intravenous immunoglobulin administration. Daily mean temperatures were obtained from the Korea Meteorological Administration. Associations between temperature and KD incidence were examined using a time-stratified case-crossover design and quasi-Poisson time-series regression, both within a distributed lag non-linear model (DLNM) framework with lags up to 21 days. In the time-series analysis, long-term and seasonal trends were adjusted with a natural cubic spline of calendar time. Reduced-basis models summarized cumulative effects over lag intervals.

Results : A total of 28,866 KD cases were identified. In the case-crossover analysis, the cumulative effect over lag 0–21 days was not significant. However, at lag 14–21 days, exposure to 29.7 ° C compared with 25 ° C increased risk (odds ratio [OR] 1.13, 95% CI: 1.03–1.23), with no significant decrease at –6.9 ° C. In the time-series analysis, risk decreased below 25 ° C and increased above 25 ° C over lag 0–21 days. Restricting to lag 14–21 days, risk above 25 ° C became more pronounced (rate ratio [RR] 1.18, 95% CI: 1.05–1.32 at 29.7 ° C; cumulative RR 1.15, 95% CI: 1.07–1.24), while no clear decrease was observed below 25 ° C. Both methods consistently demonstrated that in the cumulative effect over lag days 14–21, KD risk was significantly elevated at temperatures above 25 ° C, particularly in children aged 1–4 years.

Conclusion : High ambient temperatures were associated with a delayed increase in KD risk, underscoring the potential influence of climate change on pediatric health.

Association Between LIDAR-based Asian Dust Exposure and Emergency Medical Transport in Japan

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Background : Asian dust events have been associated with adverse health outcomes, but evidence on their short-term impact on emergency medical transport remains limited. This study aimed to investigate the relationship between LIDAR-based Asian dust exposure and emergency transportation in Japan.

Methods : We analyzed emergency transport data (2016–2021) from 13 Japanese prefectures with LIDAR monitoring. Asian dust exposure was assessed using dust extinction coefficients and divided into quartiles (Q1–Q4). Transport outcomes were grouped into cardiovascular/respiratory diseases, moderate-to-severe cases, non-urgent cases, and injuries (e.g., traffic and other accidents). Poisson regression models were used to estimate associations between dust exposure and emergency transport, adjusting for meteorological conditions, region, and other covariates. We compared the transport rates in Q4 versus Q1.

Results : Higher dust exposure (Q4 vs. Q1) was associated with increased emergency transport: +3.0% for cardiovascular/respiratory diseases (total N=2,203,901, $p < 0.001$), +3.1% among older adults ($p < 0.001$), +4.9% for moderate-to-severe cases ($p < 0.001$), and +4.6% for those in older adults ($p < 0.001$). A slight decrease was found for non-urgent cases (-0.5%, $p < 0.05$). Notably, traffic accidents increased by 2.0% ($p < 0.001$), while other accidents decreased by 0.5% ($p < 0.001$).

Conclusion : Higher exposure to Asian dust was associated with increased emergency transport, particularly in severe cases and among older adults. The novel association with traffic accidents suggests a possible link requiring further study. Findings highlight the need for early warning systems and targeted public health measures during dust events.

Impact of temperature rise from climate change on severity and gene expression in asthma

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Objective : To estimate the projected impact of temperature on asthma severity and gene expression signatures under four Shared Socioeconomic Pathways (SSPs) using the Intergovernmental Panel on Climate Change (IPCC) model in asthma patients.

Methods : This study included 12,820 asthma patients from the Taiwan Biobank and administrative data in Indonesia. Radial basis function was used to estimate previous exposure to temperature, $PM_{2.5}$, and relative humidity (RH) from each subject. We utilized global climate model (GCM) outputs to predict future temperature for each subject from optimistic (SSP126) to pessimistic (SSP585) projections. Gene expression was analyzed using RNA-sequencing data, while DNA methylation age acceleration was calculated using Horvath's, Hannum's, and Pheno age acceleration.

Results : A 1° C increase in 1-year, 5-year, and 10-year average temperatures was associated with 1.004-fold (95% CI: 1.003-1.005), 1.004-fold (95% CI: 1.002-1.005), and 1.005-fold (95% CI: 1.004-1.006) increase in the OR for mild persistent asthma. We observed a non-linear association between temperature under SSP126, SSP245, SSP370, and SSP585 with moderate persistent allergic asthma, with the highest OR increases observed in 2033 at 33.4%, 27.6%, 29.1%, and 27.2%, respectively. Gene expression analysis revealed significant upregulation of *Cma1, Kit, Fdx1, Elf1a, Cdkn2aipnl, Htatsf1, Mfsd13a, Gtf2h5, Tiam2,* and *Trmt10c* in airway epithelial cells exposed to extreme heat. In severe asthma, increased expression of *Tob1, Mub2, Slc34a2, Sftpc, Nxnl, Luc7l, Lamp3, Gpr171, Cox14*, and *Cd3e* was observed. Extreme heat was associated with the Horvath's, Hannum's, and Pheno acceleration.

Conclusion : Future temperature increases are associated with greater asthma severity, distinct gene expression changes, and accelerated biological aging. Asthma patients may be more susceptible to poorer outcomes under climate change in the future.