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Linking Exposure and Health in Environmental Public Health Tracking

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The mission of the National Environmental Public Health Tracking Program (Tracking) at Centers for Disease Control and Prevention (CDC) is to provide information from a nationwide network of integrated health, environmental hazard, and exposure data that drives actions to improve the health of communities. This special issue contains a series of articles that either analyze the association between environmental exposure and health or address different issues encountered in conducting these linkage studies.

This issue begins with an overview paper by Strosnider et al., which summarizes the mission and history of the Tracking Program at CDC. It reviews the challenges currently faced by the Tracking Program and provides an overview of the recent collaborations with academic partners to address them, some of which are featured in this special issue.

Three articles explore the linkage between environmental pollution and health outcomes—two of them focus on air pollution; the other on agricultural land use as a proxy for pesticides exposure. Talbott et al. examine the impact of fine particulate matter ($PM_{2.5}$) on cardiovascular disease hospitalizations for seven states within the CDC Tracking Program (Florida, Massachusetts, New Hampshire, New Jersey, New Mexico, New York, and Washington). Harris et al. analyze the association of $PM_{2.5}$ with full-term births with low birth weight also using data from seven Tracking states (Connecticut, Maine, Minnesota, New Jersey, New York, Utah, and Wisconsin). Almberg et al. study the potential associations between county level data on the densities of particular crops and low birth weight and preterm births, using data from Missouri.

These linkage studies use data from several different sources—data currently directly available through the Tracking Program (e.g., $PM_{2.5}$ and ozone concentration, number of births at county-level by maternal age group), health data at the individual level collected from states (e.g., hospital discharge data, birth certificate data), and data from other publicly available data sources (e.g., land use data, census data). These data from different sources

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were not designed specifically for conducting environmental surveillance or epidemiology studies, but rather were collected for various reasons, and are therefore not standardized and of varying quality. As a result, some adjustments are often necessary when merging data from different sources.

The next three articles describe adjustment methods related to one type of data issue, i.e., missing variables in environmental epidemiology. Two focus on suspected confounders; the other focuses on assessing exposure. Shin et al. describe a new method to adjust for missing suspected confounders in survival models. They use ancillary data sources to inform on the correlation between observed and missing risk factors and adjust for the relationship between the missing confounders and survival based on previously published studies. Hinojosa et al. develop small-area predictions for smoking and obesity prevalence—two important risk factors when investigating the relationship between air pollution or other environmental exposure and health outcomes—in the United States at the zip code and census tract levels. Jones et al. evaluate the performance of multiple imputation to fill in water quality values between measurements in community water systems using data from the Atrazine Monitoring Program in five Midwestern states.

The common theme across these articles is their relevance to the challenges currently faced by the environmental surveillance system in the United States. For example, the Tracking Network could be enhanced on the basis of findings from these studies, e.g., through collecting or standardizing the most needed data. State and local grantees could conduct additional linkage studies by applying similar or further improving epidemiological or statistical methods used by academic partners by utilizing additional data available within their states. These findings could help improve data collection as well as better target actions to improve public health.

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