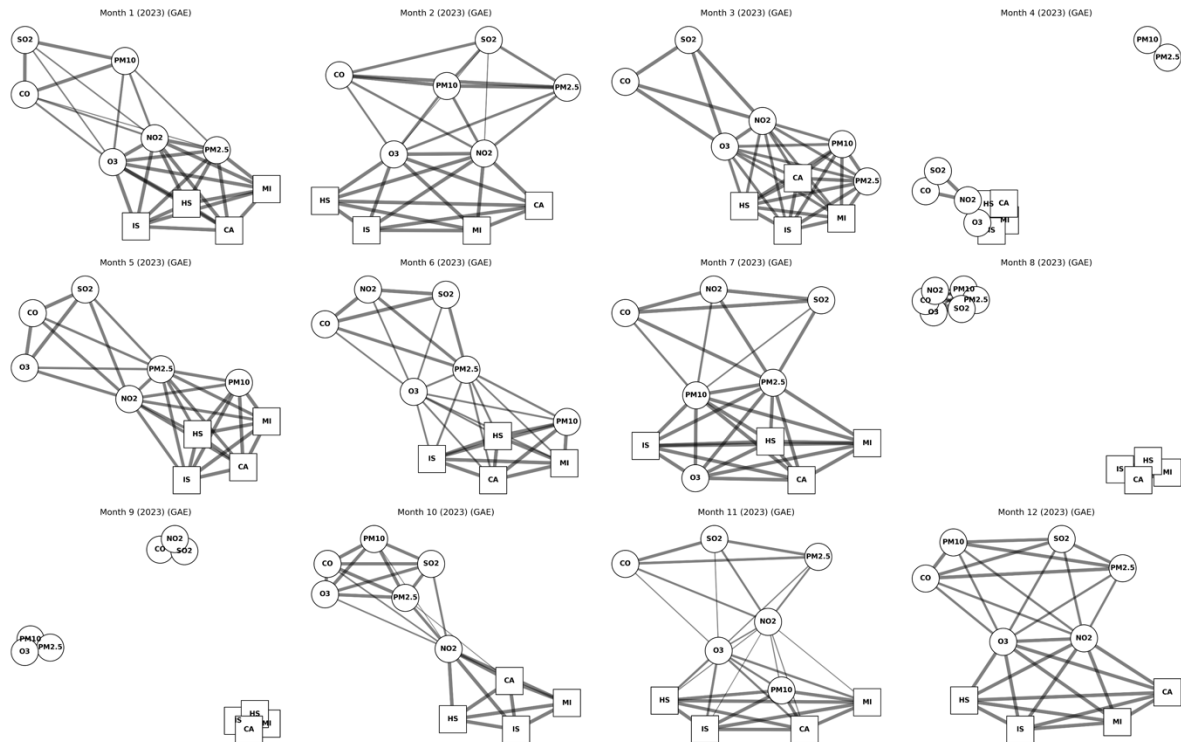


Supplement 5. Monthly Graph Autoencoder (GAE) Networks Depicting Pollutant–Disease Associations in 2023



This figure presents monthly network visualizations generated by the Graph Autoencoder (GAE) model for each month of 2023.

Graph Construction:

Nodes: Circles represent air pollutants (SO₂, NO₂, O₃, CO, PM₁₀, PM_{2.5}). Squares represent disease categories: cardiac arrest (CA), myocardial infarction (MI), ischemic stroke (IS), and hemorrhagic stroke (HS).

Edges: Black lines indicate the predicted structural similarity (adj_pred) between nodes. Thicker edges represent stronger predicted connections.

Interpretation:

Each panel (Month 1–12) corresponds to a specific month in 2023.

Compared to 2022 (Supplementary Figure 2), the 2023 networks generally exhibit higher connectivity in spring and autumn, with more robust associations between pollutants and diseases.

Summer months (June–August) again show fragmentation and fewer strong edges, reflecting seasonal attenuation of network density.

NO₂ and O₃ frequently appear as central nodes with high connectivity to disease nodes, highlighting their potential role in shaping seasonal disease patterns.

The persistence of dense connections in winter and spring supports the hypothesis of elevated pollutant-related health risks during colder periods.

These monthly network snapshots provide a detailed view of how structural relationships between air pollutants and cardiovascular/cerebrovascular diseases evolved over time.