population density, urban/rural status, area-level socioeconomic status (Carstairs index 2001), overcrowding, and social class.

Results: There was substantial variation in diabetes incidence by district across England. Diabetes incidence rate was 10% higher in rural than urban districts ($P = 0.02$); 22% higher in districts in the lowest population density quintile compared to the highest quintile ($P = 0.01$); and 18% higher in districts in the lowest social class quintile (measured as the highest percentage of persons with a semiskilled/unskilled manual worker as household head) compared to the highest social class quintile ($P < 0.01$). Incidence did not significantly differ with respect to overcrowding or Carstairs index.

Conclusion: Incidence of childhood type 1 diabetes shows spatial variation across England. In keeping with previous studies, higher diabetes incidence was associated with rurality and lower population density. The associations between these social and demographic variables and diabetes risk, and the mechanisms by which they operate require further investigation.

O-31A5-4

On the Use of Satellite Data to Estimate Spatially Referenced Health Risk of Air Pollution

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Background/Aims: The state of the art in air quality assessment comprises information and data processing tools using only data from ground-based measurement and atmospheric modeling. Ground measurements of air pollutants are not taken from dense enough monitoring networks around the world to permit a satisfactory analysis of the actual influence of fine urban aerosol and ozone on the health of vulnerable population groups, such as the elderly, children under the age of 15, asthmatics, people with cardiovascular problems. Introduction of information derived from Earth Observation satellite data can be used to bridge the gap between models simulating the transport and chemical transformation of ambient air pollutants, and analytical observations.

Methods: A data and model fusion methodology has been developed to integrate the 3 information data sources (i.e., Earth Observation [EO], ground-based information and atmospheric modeling) to derive PM_{10}, $PM_{2.5}$ and ozone loading at the ground level. The resulting pollution maps are coupled to epidemiologically derived exposure-response functions and population data, resulting in high resolution morbidity and mortality indicator maps. Comparison of these maps with actual health outcome statistics reveals new insight into the spatial link between air pollution exposure and public health risk.

Results: The data assimilation methodology was applied in Athens, Greece and Rome, Italy, 2 of the largest capitals in Southern Europe, characterized by increased photochemical pollution and long-range transport of PM. Results showed that the proposed methodology improved significantly the spatial accuracy of health risk estimates. Given the scalar nature of the approach, refined risk estimates can be made in areas populated by susceptible sub-groups taking into account risk modifiers such as the existence of urban vegetation and socioeconomic condition.

Conclusion: Satellite-based atmosphere observation can be a key contributor to the determination of the spatial relationship between air pollution and public health risk. Efficient data and model fusion is the optimal way to achieving this.

O-31A5-5

Comparison of Remote Sensing, Land-use Regression, and Fixed-site Monitoring Approaches for Estimating Exposure to Ambient Air Pollution Within a Canadian Population-based Study of Respiratory and Cardiovascular Health

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Background/Aims: Remote sensing (RS) has emerged as a cutting edge approach for estimating ground-level concentrations of ambient air pollution. While the validity of RS has been demonstrated through comparisons to values obtained from fixed-site monitoring, no previous epidemiological studies have investigated the implications of using RS to characterize health risks. We examined respiratory and cardiovascular health outcomes associated with longer -term exposure measures of air pollution in a national population-based survey (N = 125,574), using estimates of annual average based on RS, land-use regression (LUR) models, and measured concentrations at the nearest fixed site monitor station.

Methods: RS estimates of NO_2 and $PM_{2.5}$ were derived using satellite measurements from OMI, MODIS, and MISR. Multi-city LUR estimates were based on spatial models incorporating land-use characteristics such as traffic and industrial sources. Measured concentrations at the nearest regulatory continuous monitoring site were obtained from the National Air Pollution Surveillance Network. Self-reported health outcomes including diagnosis, age of onset, symptoms, and medication use for: asthma, bronchitis, COPD, heart disease, hypertension, congestive heart failure, angina, heart attack, and diabetes were collected through the Canadian Community Health Survey, a representative sample of Canadians 12 years of age and older.

Results: RS estimates of $PM_{2.5}$ and NO_2 were highly correlated with ground-based measurements in North America ($R = 0.9$ and 0.8, respectively). Long-term exposures to ambient NO_2 and $PM_{2.5}$ were significantly associated with respiratory and cardiovascular health outcomes (OR = 1.1–1.4, $P < 0.05$) adjusting for age, sex, socioeconomic status, smoking status, and second-hand smoke. Effect estimates for RS were similar to those obtained using LUR and nearest fixed site monitor.

Conclusion: These results suggest that RS can provide useful estimates of individual long-term exposure to ambient air pollution in epidemiologic studies, particularly in remote and rural areas for which monitoring and modeled air quality data are unavailable.

PP-31-177

Spatial Disparities in Potential Access to Food Environments in Rural Texas

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Background/Aims: Spatial disparities in access to food environments have emerged as important issues in public health. Of particular interest is further methodological improvement of the measures that incorporate spatial nature of the data. Spatially correlated access measures and/or indicators of neighborhood characteristics have not been adequately addressed in previous studies of food access. In this study, we explored