MULTI-MODAL TRANSPORTATION CHOICES AND HEALTH: AN EXPLORATORY ANALYSIS USING DATA FUSION TECHNIQUES

[1]Sivaramakrishnan Srinivasan and [2]Miguel Lugo, [1]University of Florida, siva@ce.ufl.edu [2]RS&H, Miguel.Lugo@rsandh.com

Objective

In this study, we demonstrated the feasibility of using data fusion in the context of large-scale travel and health surveys, and subsequently used the new comprehensive dataset generated to model the relationship between health and multi-modal (walking, biking, transit, and vehicle usage) long-term (weekly/monthly/yearly) travel choices.

Environmental Justice: Transportation Choices and Health

Inclusion of health outcomes in transportation planning promotes environmental justice principles and practices.

Understanding the relationship between a person's well-being and available transportation infrastructure can further support and guide projects that impact the natural and human environments of all people, including low-income and minority communities.

This research includes **walking**, **biking**, **transit** (if service available), and **car** modes (if access available).

The health assessment includes **Body Mass Index** (BMI) and **Self-Assessed Physical Health Score** (SAPS).

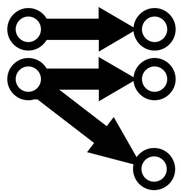
BMI

These values were measured individually and once.

SAPHS

Poor Excellent

Data Fusion



Compares "Receiver" dataset with records of a "Donor" dataset to identify the record from the "Donor" that best matches each record in the "Receiver" on a set of pre-defined attributes.

The **receiver** dataset is the **2009 National Household Travel Survey**. The unknown attributes in the "Receiver" that are matched from the "**Donor**" in this study are the **health measures** of the **2006-2008 American Time Use Survey Eating and Health Module**.

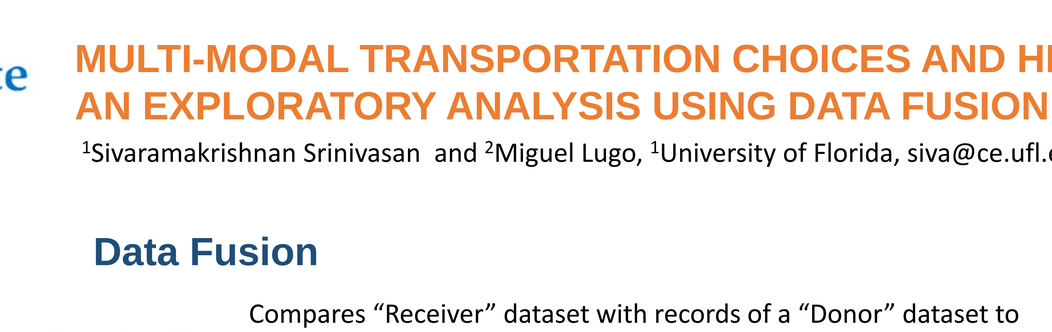
The data fusion of the NHTS and the ATUS-EH was performed using the **Link Plus** software. Desired **attributes** used for **blocking** or **matching** include Sex, Age, Employment Status, Education, Student Status, Census Region, Housing Tenure, Income and Size.

Validation: Using the ATUS (known health), random subsets were matched using previous attributes. Different scenarios showed that **averaging** the individual values assigned across **multiple runs** was consistent with observed distributions.

Five assignment runs were performed where **36,000 donor records** could potentially be matched with **11,362 receivers**.

Models

Aggregate mode participation by breakdown of levels of obesity/health.



A disaggregate analysis of BMI was carried using **a linear regression** model. SAPHS is modeled using **ordered-probit** (0 = "poor", 1="fair", 2 = "good", 3 = "very good", and 4 = "excellent") recognizing the nature of these data. Each mode was modeled individually (bicycle, walking, public transit, vehicle) for a total of eight models.

Results & Conclusion

The extent of use of bike mode has no statistically significant impact on either BMI or SAPHS.

Low levels of biking reported in the NHTS.

Second quartile of walking (4-5 trips last week) have a lower BMI and feel better.

Those who walk more than 6 trips / week are in poorer health (both BMI and SAPHS) than those who walk 4-5 trips.

Perhaps these people are having to walk despite their poor health.

Transit use mirrors walking results.

Transit users (2-3 trips/month) have a lower BMI compared to others.

More than 2-3 trips transit trips/month are generally happier with their health than those with fewer than 2 transit trips / month.

Those who drive between 5,000-15,000 miles a year have lower BMI than those who drive more than 15,000 miles.

Trend is consistent with the expected relation of passive and deteriorated health.

Users with < 5,000 miles are not in a better health condition (BMI) compared to those that drive more.

Poor health conditions may be limiting the person's driving in the first place.

Model indicates that people are happier with their health with increasing levels of driving.