The feasibility of using Global Positioning System (GPS) Data in assessing mobility within an informal settlement, Rio das Pedras, Brazil.

**Overview**

Understanding and measuring mobility has important implications for disease surveillance, structural urban planning, understanding movement patterns and social network patterns of populations.

One objective of the RdP project is to assess the feasibility of data collection approaches on individual mobility and the microbiome. A sample of 87 individuals participated in one week of GPS tracking, water sampling and oral swabs. 100% of all participants returned the tracker to the study organizers. 77% of the points captured by the tracker fell in RdP while 23% fell outside of the favela in other parts of Rio de Janeiro.

This paper will evaluate the feasibility of using a GPS tracker in an informal community settlement such as RdP by doing the following:

1. Describe and characterize overall measures of mobility
2. Determine barriers to measuring and estimating mobility
3. Evaluate the usefulness of GPS data in measuring mobility by evaluating how closely the data approximates the true mobility patterns of participants.

**Possible measures of mobility using RdP data**

* Distance and temporality of travel outside of the home (kilometers) ***{Near\_home\_dist}***
* Travel inside and outside of the favela (measured by counts of GPS point data and percentage of GPS points) ***{in\_rdp; time\_inrdp; time\_ourdp; pct\_ay\_inrdp; pct\_day\_ourdp}***
* Activity areas and spatial patterns of participants as measured by area traveled using convex hull size (sq. kilometers)
* Characteristics of mobility using individual-level correlate (age, employment status, activity status etc.)

**Limitations of GPS data**

* Spatial error (point data inaccuracy) due to satellite signal
* GPS data errors (noise) inside buildings

**Other measures of mobility**

1. Area measures of activity spaces using Standard Deviation Ellipse, Convex Polygon and Daily Path Area[[1]](#endnote-1)
2. Aggregating GPS data between spatial and temporal windows using I-cluster and Human Movement Kernels[[2]](#endnote-2)

1. Jana A Hirsch, Meghan Winters, Philippa Clarke, Heather McKay;Hirsch et al.; Generating GPS activity spaces that shed light

   upon the mobility habits of older adults:a descriptive analysis International Journal of Health Geographics 2014, 13:51 [↑](#endnote-ref-1)
2. Vasquez-Prokopec G.M, Bisanzio D., Stoddard S.T., Paz-Soldan V., et al.; Using GPS Technology to Quantify Human Mobility, Dynamic Contacts and Infectious Disease Dynamics in a Resource-Poor Urban Environment; PLOS ONE April 2003, V8,Issue4,e58802. [↑](#endnote-ref-2)