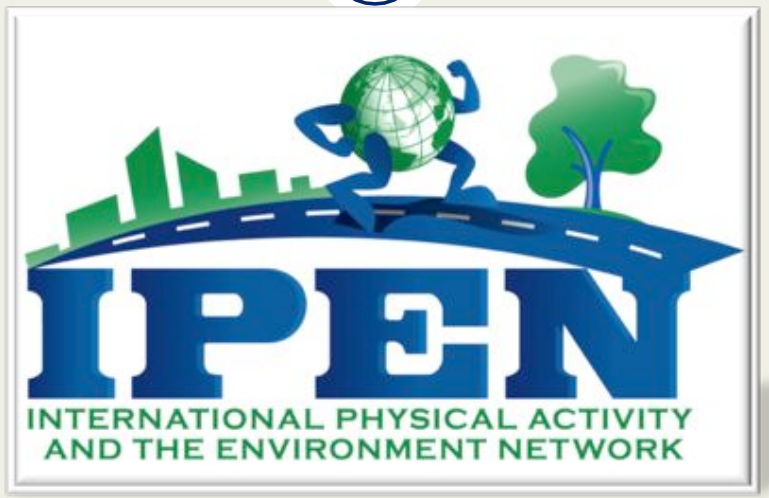
Neighborhood Selection IPEN Adolescent



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Study sequence flowchart

1. Prepare

- Obtain GIS data
- Neighborhood selection
- Survey translations/ approvals
- Accelerometers & training
- Years 1-2 funding

2. Collect

- Recruitment & monitoring
- Survey checking
- Accelerometer compliance screening
- Years 1-2 funding

3. Manage

- File & variable names
- Survey cleaning
- GIS templates
- CC comparability assessments
- Years 2-3 funding

4. Process

- GIS buffers (countries)
- Surveys (CC)
- Accelerometers (CC)
- Years 2-3 funding

5. Papers

- Select topics
- Proposals for review with Publications Committee
- Analysis
- Manuscripts
- Year 4 funding

6. Policy!

- Communicate results to local, national & international policy makers
- Create summary briefs
- Start making contacts
- Year 4+ funding

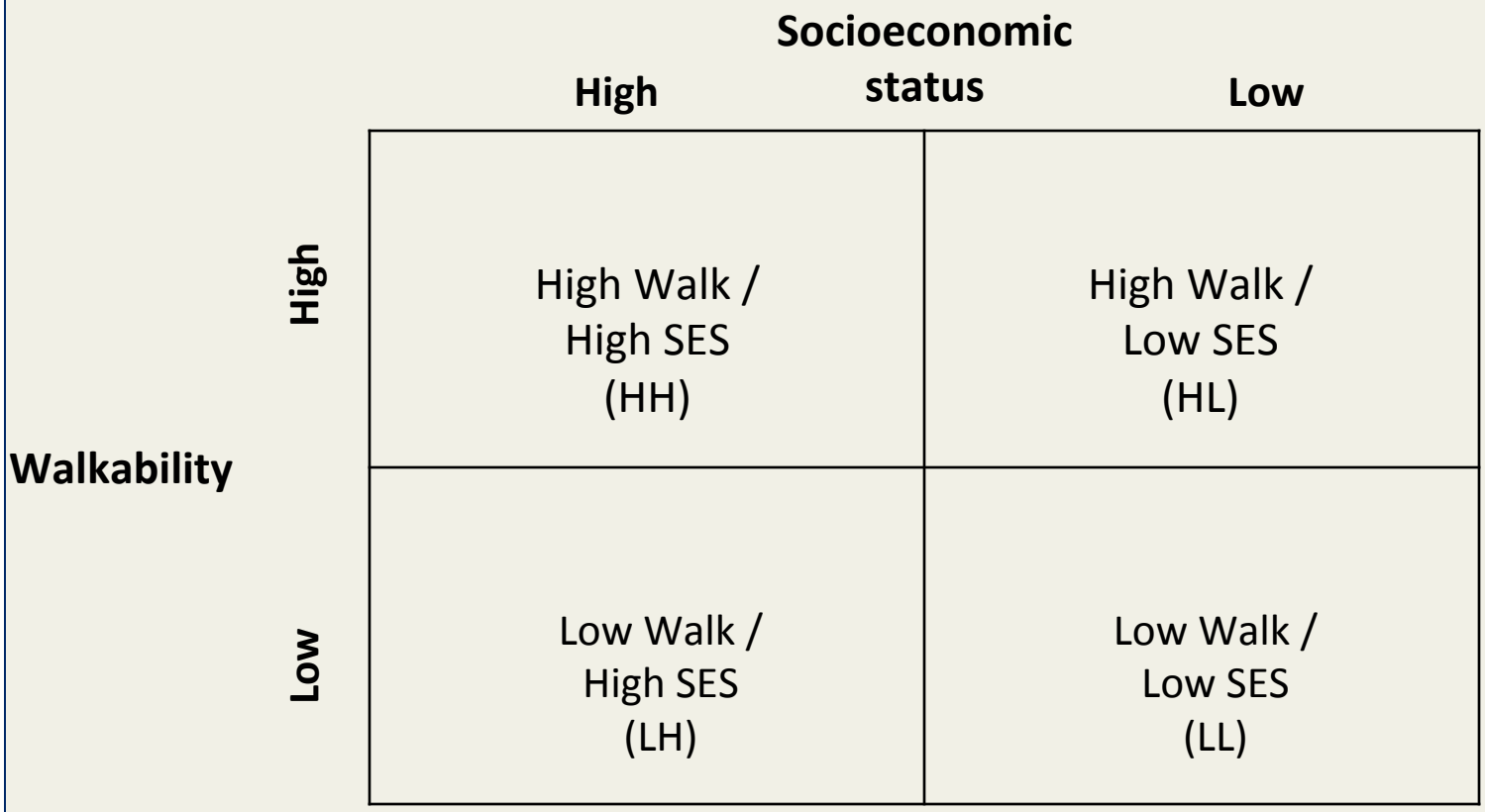
Agenda

- Neighborhood Section
  - Study design overview
  - GIS for neighborhood selection
  - Recruitment
  - Balancing
  - FAQ
- Individual-level GIS buffers
  - Next session

Neighborhood Selection Overview

- Walkability x Income (2 x 2) design
- 2x2 design maximizes within country variability
- International comparisons maximize between group variability
- Resources
  - See website
    - www.ipenproject.org/methods
  - Walkability paper (Frank et al. 2010)
  - IPEN Adult templates
    - Adolescent neighborhood selection version coming

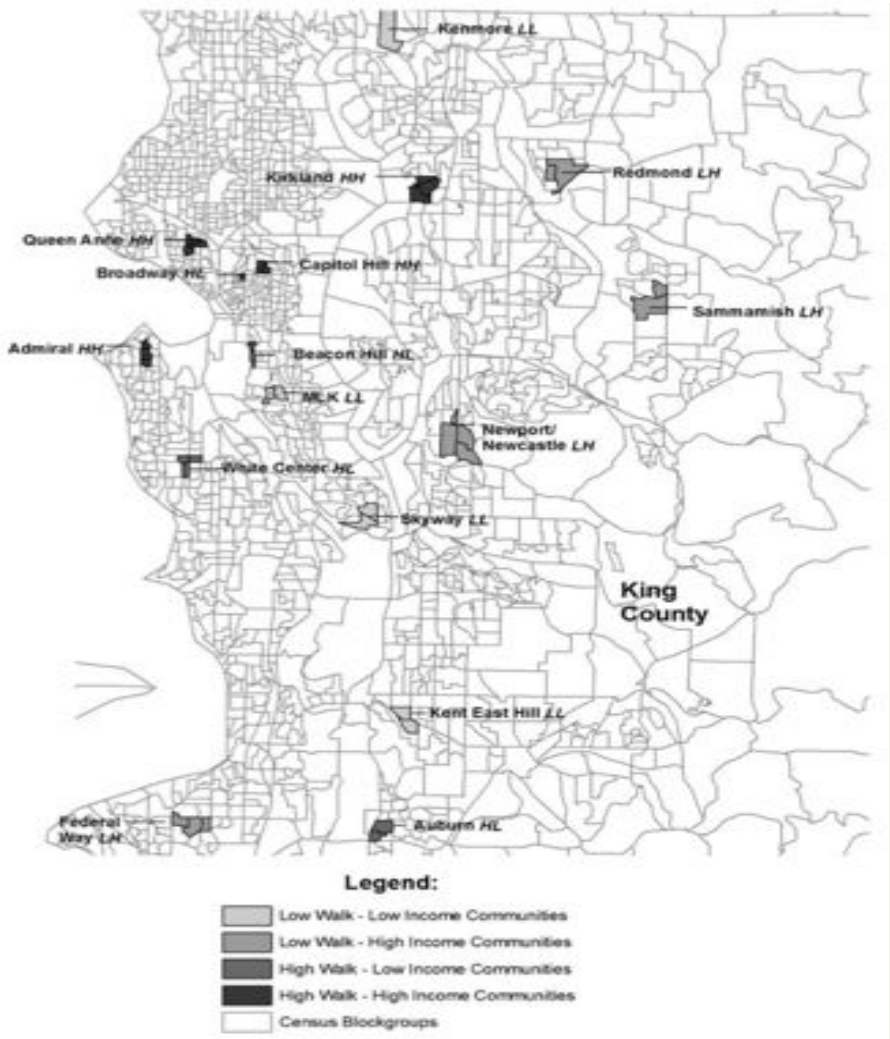
Walkability x Income (2 x 2) design



** These 4 cells are known as walkability x income quadrants

Definitions

- Several “neighborhoods” are selected from the 4 quadrants
- The term **neighborhood** has been used in different ways over time
- In original NQLS design, clusters of contiguous admin/population units represented “neighborhoods.” See image on right
- In TEAN & for IPEN Adolescent, we recommend countries <u>do not</u> use clusters of contiguous admin units to form n’hoods. Instead **individual admin/ population units** can represent “n’hoods”
- Exception: if you already started with clusters of contiguous admin units, that’s okay.



Map of 16 King County n’hoods in NQLS (Frank et al. 2010)

Step 1: **Administrative/Population Units**

General Rule: Identify the *smallest* unit with needed GIS and neighborhood-level income data. Size of admin units can vary across countries.

Examples from IPEN Adult:

- Australia: Census Collection Districts
- Belgium: Statistical Sectors
- Czech Republic: Urban Districts
- Denmark: Smallest Statistical Sectors
- Hong Kong: Tertiary Planning Units
- Mexico: Census Tracts
- New Zealand: Mesh Blocks
- United Kingdom: Output Areas

- These admin/population units will used as **buffers** when calculating walkability and SES for neighborhood selection

Step 2: **Discover GIS data**

- Need to discover GIS data for entire region
  - Road network for intersection density
  - Land use for LU mix (e.g. residential, commercial/retail)
  - Number of housing/dwelling units for residential density
  - Retail floor areas
  - Other data will be used later

- Need to calculate walkability and SES for all admin/ population units in region (see IPEN templates)

Assessing the Macro-Environment

Measuring variation the 3Ds …

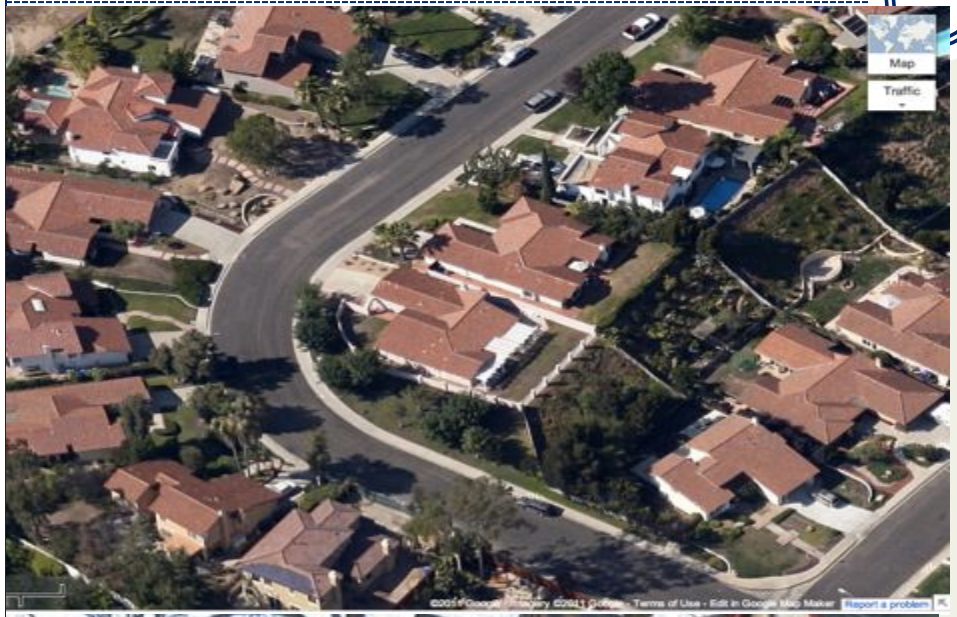
Density

Diversity

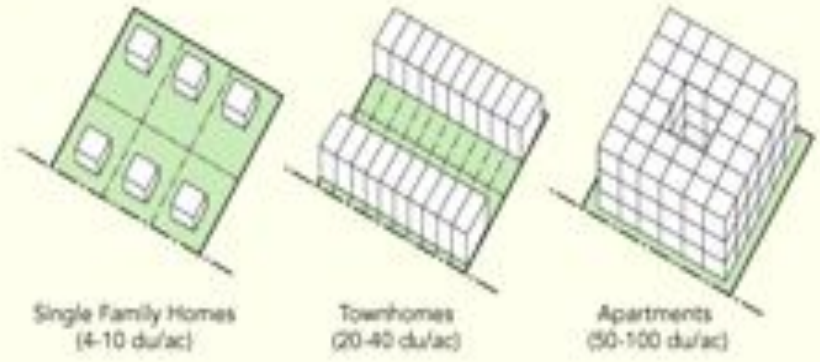
Design

Cervero and Kockelman 1997

Residential Density

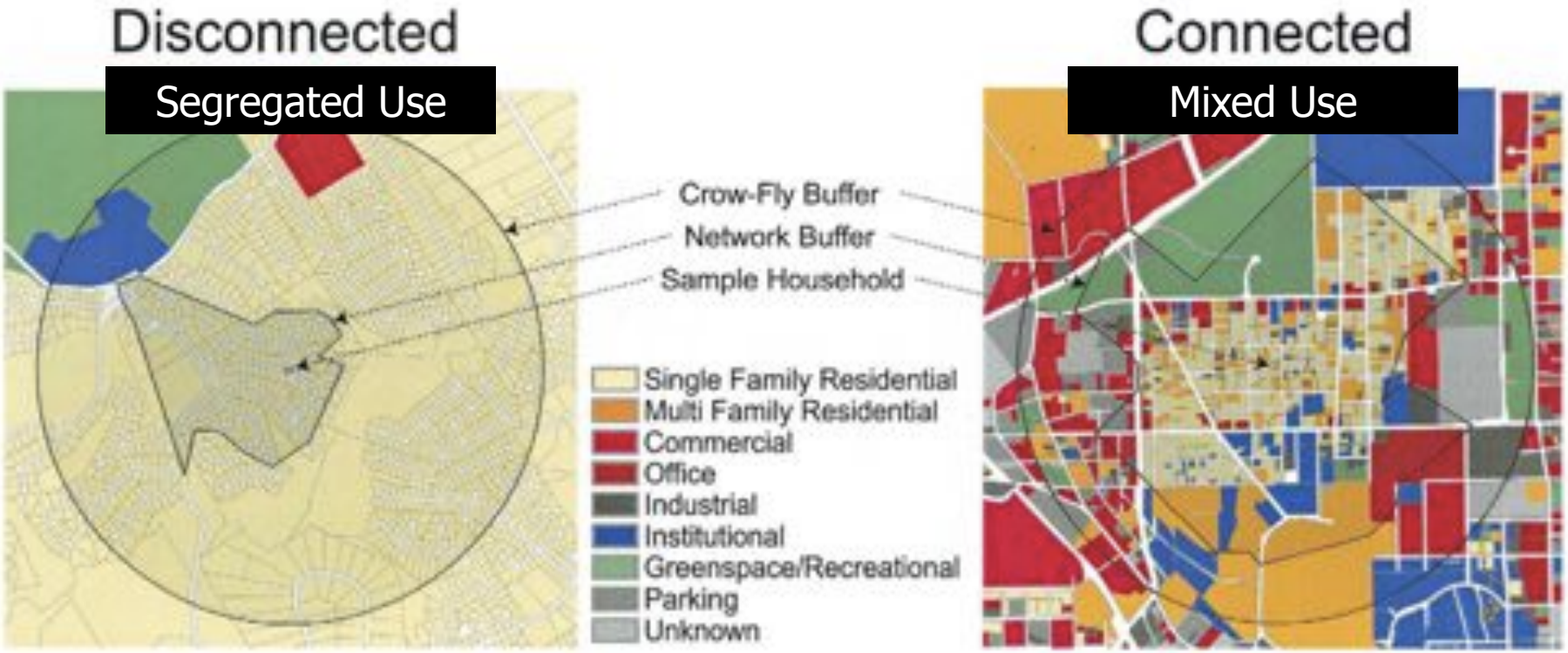


- Higher densities are needed to provide the "mass" needed to support shops/services, transit, & recreation facilities.
- Facilities tend to be located closer together.



Typical single family neighborhood in Los Angeles is about 5-8 houses per acre.

Land Use Diversity



Images from Lawrence Frank PhD, Professor, University of British Columbia

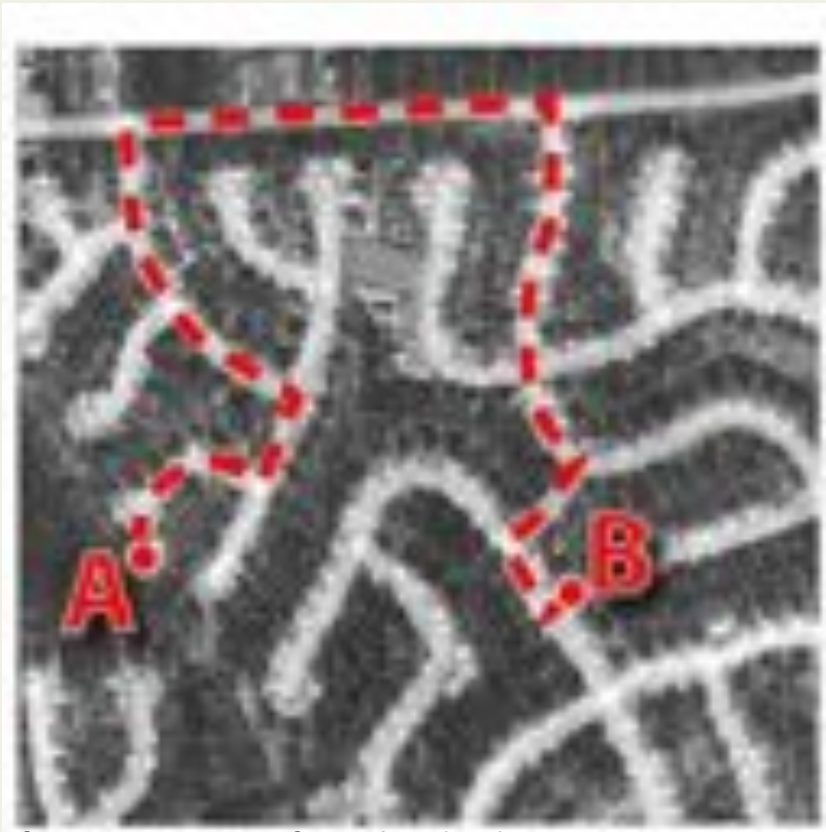
Figure 1. Disconnected and connected community environments.

Greater Diversity = More Types of Destinations

Street Network Design

0.5 km

2 km



Images from Lawrence Frank PhD, Professor, University of British Columbia

A highly connected network has many possible routes between destinations and as a result a more direct path

Alternatives and Additional Variables

- Ideally, median household income and at least 2 walkability components will be available in your country/region

- *Alternatives* to median household income
  - Existing info from government or census sources
  - SES index including: income, level of education, ownership of housing, car, computer, telephone, employment status
  - Indigenous population (e.g. % Maori)
  - Index of Multiple Deprivation

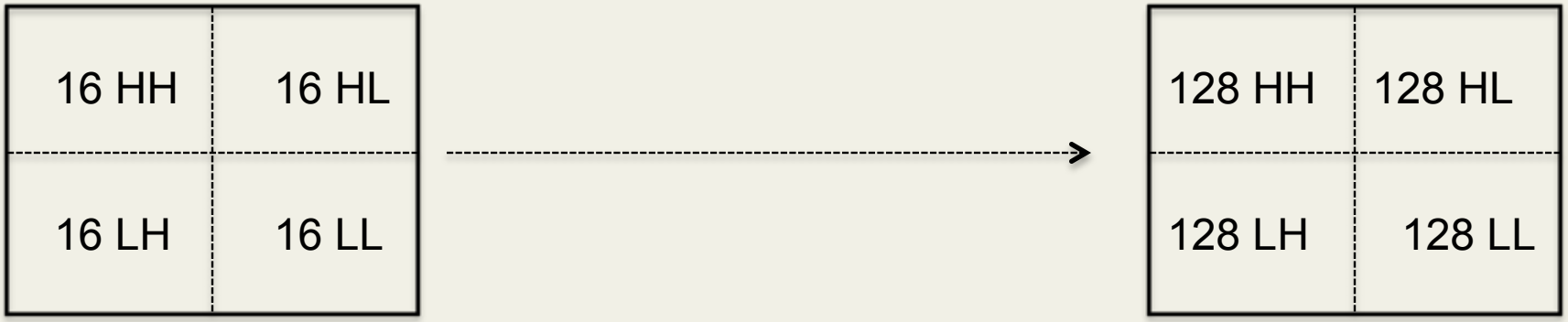
- *Additions* to walkability components
  - access to regular bus or rapid transit, parks, retail parcel density, slope

Deciles and Quadrants

- Calculate walkability from admin unit values using data from across the region (See Frank et al. *Br J Sports Med* 2010)
  - *Walkability = [(2 x z-intersection density) + (z-net residential density) + (z-retail floor area ratio) + (z-land use mix)].*
- Create deciles of walkability from admin unit values from across the region
- Create deciles of SES from admin unit values from across the region
- Create high and low walkability and high and low SES.
  - Conduct independently for walkability and SES
  - Ideally, SES Low = 2nd, 3rd, 4th deciles and High = 7th, 8th, 9th deciles
  - Ideally, Walkability Low = 1st,2nd, 3rd, 4th deciles and High = 7th, 8th, 9th, 10th deciles
  - Alternative: median split if not enough admin units available per quadrant
- Cross high & low walkability with high & low SES to identify admin units in each of the 4 quadrants

Option 1: Recruiting from Community

N= ~500 Students, no schools



Admin units per quadrant

8 adolescents per admin unit and 128 per quadrant

**Adolescents sampled equally across quadrants over time

Recruiting from Schools

- Several countries will be recruiting from secondary schools

- We recommend calculating neighborhood walkability/SES quadrants for the entire region and then select schools within the quadrants

Option 2: Recruiting from Schools

N= ~500 Students, 32 schools total

8 HH	8 HL
8 LH	8 LL

1 school per admin and 8 per quadrant

Identify where students' homes are located and determine their quadrant. In each school, you want to sample students from all 4 quadrants

128 HH (16 per school)	128 HL (16 per school)
128 LH (16 per school)	128 LL (16 per school)

Students per quadrant

**School and students sampled equally across quadrants over time

Option 3: Recruiting from Schools

N= ~500 Students, Limited to 8 schools total

2 HH	2 HL
2 LH	2 LL

2 Schools
per quadrant
(1 per admin unit)

Identify where students' homes are located and determine their quadrant. In each school, you want to sample students from all 4 quadrants

128 HH (~ 64 per school)	128 HL (~64 per school)
128 LH (~64 per school)	128 LL (~64 per school)

Students
per quadrant

**Ideally you want more schools and fewer students per school

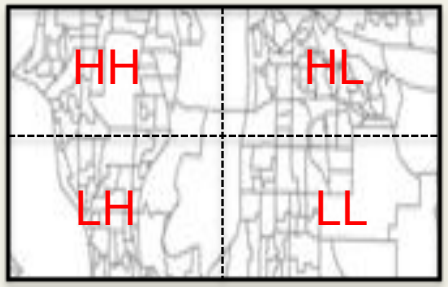
Recruiting from Schools

- Make sure we keep track of which school the child attends and quadrant a child lives in!!
- If recruiting from one school at a time, make sure you have a process planned if most of the adolescents in a school live only in 1 or 2 quadrants
- Need to consider how you will balance recruitment to control for possible sampling biases

Balanced Design Considerations

- Participants can be nested within schools, within admin units, within quadrants

- Balancing across **space**, **time**, and **person** controls for confounders and biases that may influence results (e.g. secular events, seasonality, demographic differences)



Balancing across Space

- Hierarchy of importance:
  - Critical to recruit same # of **students** across **quadrants**
  - Would be good to recruit similar # of **students** across **schools**
  - Would be good to recruit similar # of **schools** across **quadrants**
  - Important to sample from at least 30 **admin units** across the **region**.
  - If plan to sample from 30-40 admin units total in region, then important to sample a similar # of **admin units** across **quadrants**
  - If plan to sample a large number of total admin units (>40) from region, then less important to recruit similar # of admin units. Only a rule of thumb.
  - Not important to have a similar # of **adolescents** across **admin units,** but no more than 40 adolescents in any 1 admin unit.

Balancing over Time

- It is critical to sample adolescents (and schools) equally over time
- Do **not** start with the easiest or nearest quadrant, and then move to the next one, and next one, etc.
- Do measure from all 4 quadrants at the same time and keep the numbers balanced each month
- Do measure when school is in session
- Do **not** measure during extended school vacations/holidays or MAJOR holidays periods (e.g. Christmas, New Years)

Balancing on Person

- Very important to recruit similar numbers of **boys and girls** across quadrants, schools, and over time
- Important but not critical to balance on **age** because study restricted to adolescents (12 – 18 years)
  - not good to only have severely unbalance distribution (e.g. mostly 17 yr olds & only a few 15 yr olds)
  - Be careful if recruiting by grade level
- Not critical to balance on other demographic factors, unless needed in your country (e.g. race in U.S.)

Additional Thoughts on Balancing

- Working with schools sequentially may result in challenges to balancing across quadrants
- If students from a single school are disproportionately distributed across quadrants (e.g. few students in High Walk/Low Income but many in the other quadrants), then
  - might be a good idea to maximize recruitment of HL students (ie, recruit as many as possible) and set that number as the quota for the other quadrants.
- Plan ahead by taking into account expected # of participants in various quadrants from future schools
  - if expect a quadrant will be hard to recruit from, then try to recruit more students from that quadrant early on (ie, oversample)
- For countries using clustered contiguous admin/population units to represent "neighborhoods,"
  - Balance # of clustered contiguous n'hoods across quadrants.
  - Not as important to balance number of admin units across quadrants if using this approach.

Recruiting from Schools Cont.

Steps from Suzanne Mavoa in Australia

1. Obtain the list of student addresses from the school
2. Geocode the student addresses
3. Assign the students a walkability/SES quadrant
4. Calculate the number of students in each admin unit and quadrant

5. Ideally we want to recruit 200 students from each school, equally spread across the four quadrants and with a maximum of 16 of students recruited per meshblock (meshblock = neighbourhood). Assume a 50% response rate.

6. Sequential random selection of meshblocks in each of the four quadrants until the required number of students is reached. Where the number of students in a meshblock is greater than 16, randomly select 16 students, otherwise take all the students.

Frequently Asked Questions

Frequently Asked Questions (FAQ)

- **If you have geographic data at two spatial levels (e.g. block groups and census tracts) which one should you use?**

- We recommend using smallest unit since you will have greater number of them and as a result more variance in walkability/SES.

FAQ Cont.

- **Do admin units in a quadrant need to be contiguous?**

- Admin units do not need to be contiguous.

- It is better to sample fewer students from more admin units, keeping the number of students as balanced as possible across quadrants, both by school and over time while recruiting.

FAQ Cont.

- **What should we do if we don't have Retail Floor Area Ratio (RFAR) or the data is unreliable when calculating neighborhood selection variables?**

- It is okay to excluded the Retail Floor Area Ratio (RFAR) from the walkability index. Many countries do not have this data.

FAQ Cont.

- **Can spatial data be temporally mismatched (e.g. recruitment in 2013 but GIS data from 2008)?**
- Yes, ideally find the most recent, best possible data source.
- Some urban form features (e.g. road network) do not change very quickly so should be okay. Other types change faster but may not be updated frequently.
- We are planning to add year of data to templates. Keep your GIS metadata.

FAQ Cont.

- **If working in more than 1 city should you calculate walkability index across both cities or calculate a separate index for each city?**

- Calculate separate walkability/SES quadrants for each city.

FAQ Cont.

- **Is it okay to have only 1 student in an admin unit?**
- Yes. The *design priority* is to get balanced students per quadrant.
- This criterion is more important than balance of the exact number of admin units per quadrant or the number of kids per admin unit
- EXCEPT that there should not be isolated admin units with very large numbers of kids relative to others (e.g., in a given quadrant for a particular school, don't want 45 kids in one admin unit and 1 kid in each of 10 other admin units. And no more than 40 adolescents in any single admin unit.

FAQ Cont.

- **Is it OK if there are a different number of admin units for each quadrant for a school?**

- For example, school 1 might have 100 students in 2 admin units in the HH quadrant and 100 students in 5 admin units from LH quadrant

- It's most important to balance # numbers of kids per quadrants. One suggestion is to limit recruitment at a school once you reach a specific quota. Perhaps base the quota on the rarest neighborhood type

- Ideally, good to have a similar # of admin units per quadrant. Try to balance and watch your recruitment closely to manage these numbers. This can be done by recruiting fewer people from greater number of admin units

- If use the plan of forming neighborhoods from contiguous meshblocks, then try to balance the number of "neighborhoods" across quadrants –we don't think it matters as much the number of admin units per neighborhoods are balanced, when using this approach

FAQ Cont.

- **Can admin units be reused for different schools if schools have overlapping catchment areas or when recruiting from single sex schools?**

- Yes – it's okay to have adolescents from different schools living in the same admin unit. Keep track of which school the child attends.

Additional Tools for Recruitment

- We have an excellent IPEN tracking database that we can provide you to help with balancing across quadrants, over time and person variables. It includes graphical feedback!
- Request from Kelli Cain at: kcain@ucsd.edu
- Regular recruitment reports to CC to check above. Kelli usually keeps up with your recruitment progress, so this would be a good tool to use.
- Training in presenting study to participants
  - Accelerometer expectations
  - Incentives
  - Parent/child involvement

Data Processing & Transfer

- Master ID file
  - Quadrant/admin unit/city details
  - Participants providing types of data (e.g., child survey, parent survey, accelerometer data)
- Participant IDs and Datasets
  - Country code part of participant ID
    - (make unique across cities if >1)
  - Consistent across accelerometer, child & parent survey, GIS