Accessibility of Health Care Facilities to Public-Transit Dependent Individuals in the Portland Metro Area

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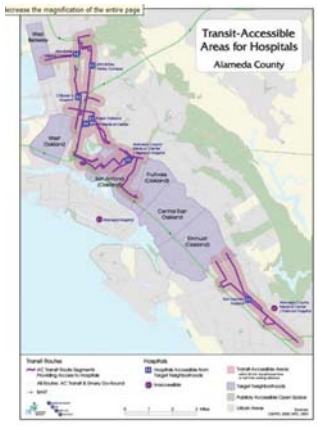
Problem Statement

- Lack of adequate public transit creates a barrier to health care access for transit-dependent populations
- Especially large obstacle for those seeking preventative care and care for chronic conditions

(Roadblocks to Health, 2002)

Other Studies

- *Roadblocks to Health*
- Bay Area study the accessibility of health care for populations in disadvantaged neighborhoods



Research Question

- Does TriMet public transit offer individuals without access to a car adequate transportation to health care facilities?

Parameters

- Transit-dependent population defined as those who reported having no access to a vehicle (Census 2000)
- 30 minutes of travel time or more can pose a barrier to those seeking health services (THCC)
- Where residents of 25% or more of housing units per census block lack access to vehicles is a high need area for public transit

Study Area and Data Layers

- Study Area: Trimet Service Area
- Data
  - Transportation network
    - Bus routes/stops (RLIS 2000)
    - MAX routes/stops (RLIS 2000)
    - Streets (RLIS 2000)
    - Schedules (Trimet)
  - Health facilities
    - Major hospitals (RLIS 2000)
    - County Health Services

Study Area and Data Layers

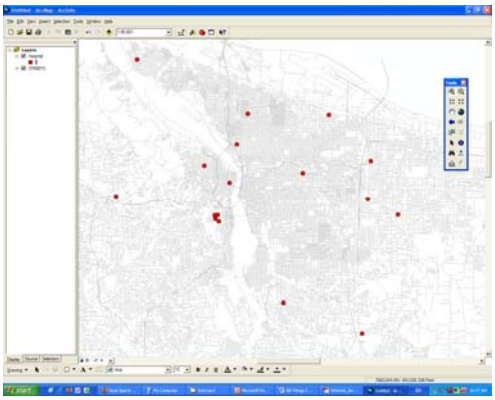
- Vehicle ownership
  - Vehicle access by housing unit (Census 2000)
- Taxlots (RLIS 2000)
- Parks (RLIS 2000)

Methods

1. Data Collection and Processing
2. Building Multimodal Network
3. Network Validation
4. Analyze Network Output

Data Collection and Processing

- Geocode additional health facilities to hospital shapefile layer (27 total)



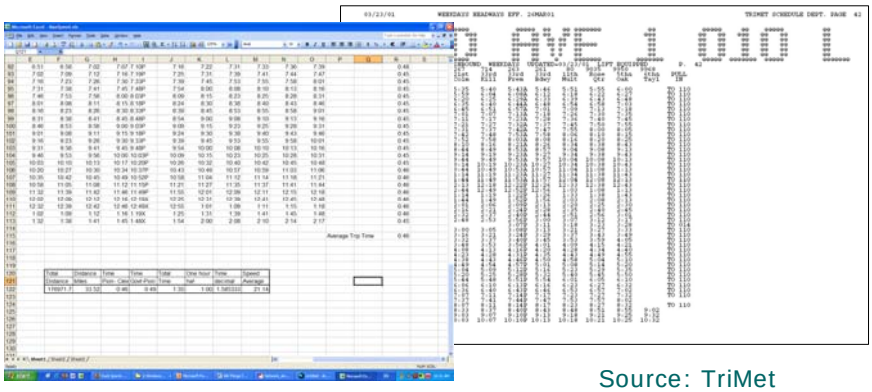
Data Collection and Processing

US Census Data-
(No Vehicles Per Housing Unit Sample)

- Too coarse of resolution at block group level
- Use housing units/ blockgroup totals to redistribute the vehicle data to the block level through a spatial join (reaggregate)

Data Collection and Processing

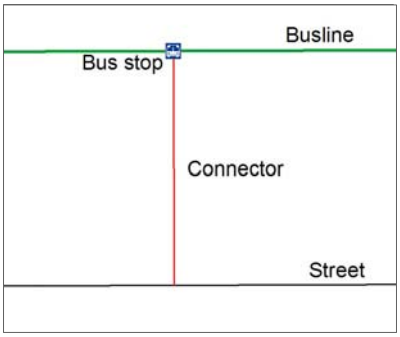
- Bus: 16.71 mph and 7.5 minute wait
- MAX: 21.17 mph and 7.5 minute wait
- Walk: 3.28 mph



Source: TriMet

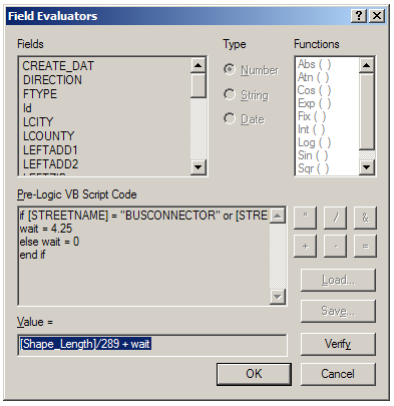
Building Multimodal Network

- Edit transit layers
  - Remove highways and unused bus lines
- Create Connectivity
  - Snap bus stops to bus lines
  - Streets to bus stops (connector lines)
  - Planarize to create endpoints



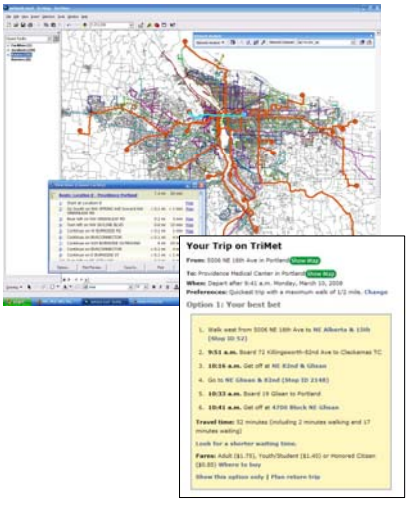
Building Multimodal Network

- Network Dataset Properties
  - Connectivity
  - Impedance



Network Validation

- Generate random points
- Used Closest Facility function to determine travel time from points
- Compared to TriMet Trip Planner



Network Validation

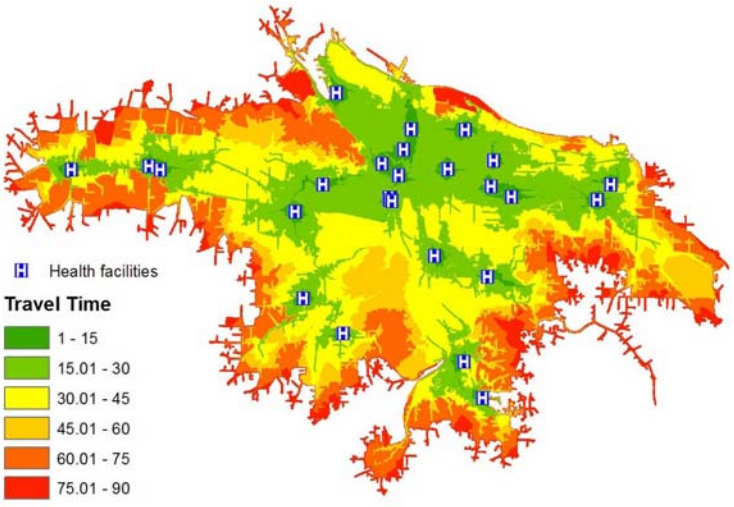
- Adjust travel speed and wait times
- Repeat validation process
- Final speed & wait times
  - Bus: 14.53 mph and 8.5 minute wait
  - MAX: 18.42 mph and 8.5 minute wait
  - Walk: 3.28 mph

	AVERAGE			
	Network Time	Trimet Time	Difference	STDEV
Network1	71.9	88.8	-16.9	21.7
Network2	93.4	89.0	4.4	17.8

Analyze Network Output

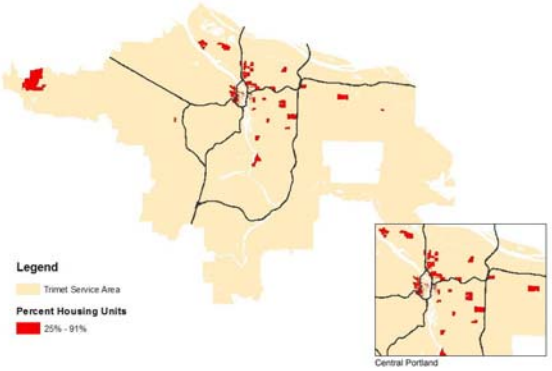
- Service Area Function to determine travel time to health facilities
- Rasterized results

Analyze Network Output



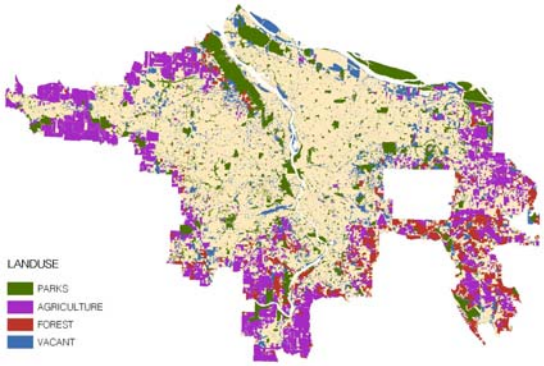
Analyze Network Output

	Blocks	Housing units w/out vehicles	Total housing units	% Housing units w/out vehicles
Trimet Service Area	22956	51986	562960	7%
High Need Blocks	1066	15592	39293	36.90%



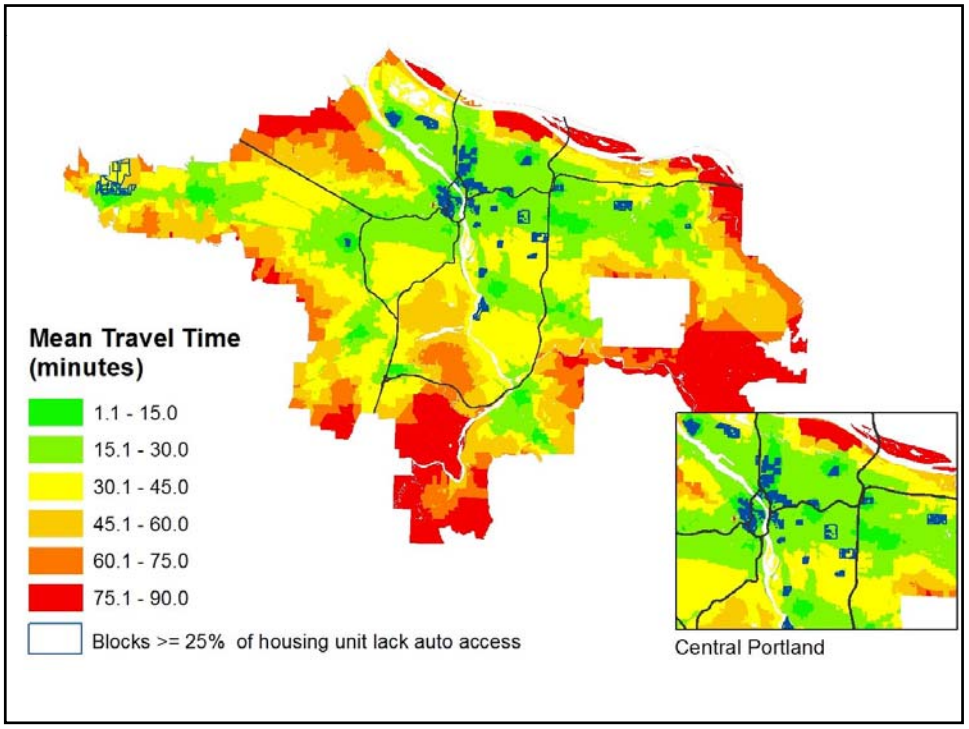
Analyze Network Output

- Binary Dasymetric Mapping
  - Removed uninhabited areas from census blocks based on taxlot data

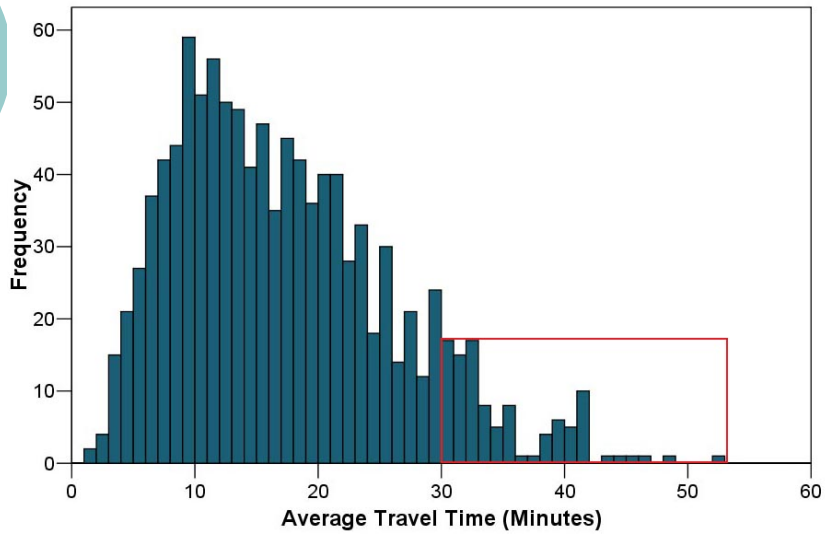


Analyze Network Output

- Calculated zonal statistics of the rasterized service area using dasymetrically modified census blocks

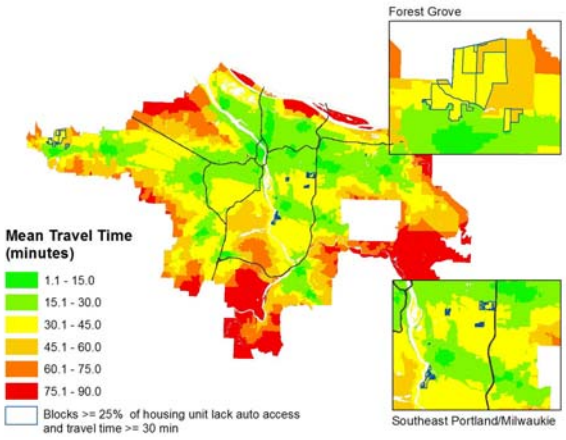

Mean Travel Time (minutes)
1.1 - 15.0
15.1 - 30.0
30.1 - 45.0
45.1 - 60.0
60.1 - 75.0
75.1 - 90.0
Blocks >= 25% of housing unit lack auto access
Central Portland

Results


Frequency
0
10
20
30
40
50
60
Average Travel Time (Minutes)

Results

- 103 census blocks classified as high need have average travel times that exceed 30 minutes



Discussion

- Assumptions of transit times
  - Speed, wait time, transit schedules
- Number of health facilities
- Census data sampling
- Unpredictable network solver behavior
- Definition of high need transit dependent blocks

Conclusion

- Does TriMet public transit offer individuals without access to a car adequate transportation to health care facilities?
  - 90% of high need areas have travel times less than 30 minutes
  - Mean travel time for the remaining 10% of high need areas is 35 minutes

Sources Cited

- Willis, A.; Gjersoe, C.; Havard, J.; Kerridge, Kukla R. Human movement behaviour in urban spaces: implications for the design and modelling of effective pedestrian environments. *Environment and Planning B: Planning and Design.* 2004,31, 805 - 828
- www.trimet.org
- *Roadblocks to Health: Transportation Barriers to Healthy Communities;* Jeff Hobson and Julie Quiroz-Martínez
- Washington County Health Dept. http://www.co.washington.or.us/deptmts/hhs/comm_hlh/diseze/direcshn.htm
- Multnomah County Health Dept. http://www.mchealth.org/services/map.shtml
- Clackamas County Health Dept. http://www.co.clackamas.or.us/community_health/contact.htm
- US Census Bureau www.census.gov

Special Thanks

- Hawth's Tools
- Rex Fisher from TriMet

Questions or Comments?