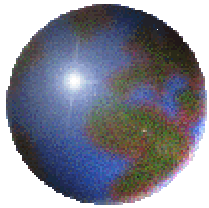


# **Transport and social exclusion; definition, status and measurement methods**



**1. Social dimension of sustainable mobility**

**2. Definition of social exclusion**

**2.1 General definition**

**2.2 Activity-based measurement of social exclusion problem**

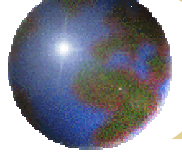
**2.3 Social exclusion as an index of mobility difficulties**

**3. Status of social exclusion in Japan**

**4. Potential Measures to reduce social exclusion**

**Noboru HARATA**

University of Tokyo, Professor



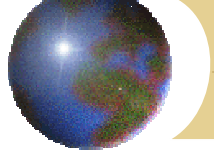
# *1. Social dimension of sustainable mobility*

**Sustainable Mobility is achieved by  
Maximizing Mobility with Sustainability**

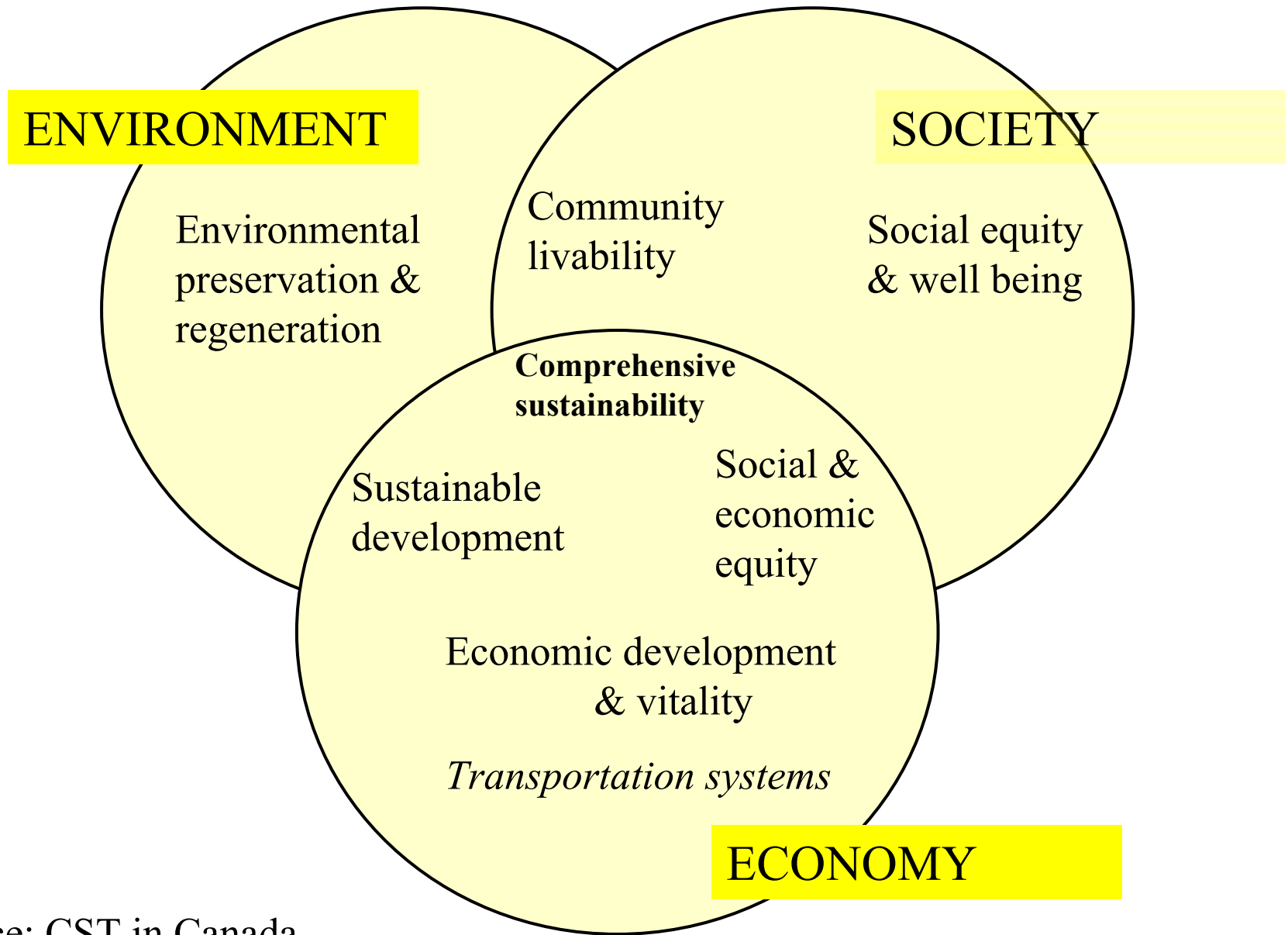
## **Sustainability**

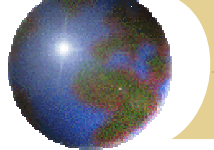
*Meeting the needs of the present without  
compromising the ability of future generations  
to meet their own needs*

(WCED, 1987)



# ***Sustainable Mobility and 3E objectives***





## 2. *Definition of social exclusion*

### 2.1 General Descriptions

#### Social exclusion with transport and the location of services

People are preventing from participating in work or learning, or accessing healthcare, food shopping and other local activities

- **Work:** Two out of five jobseekers say lack of transport is a barrier to getting a job.
- **Learning:** Nearly half of 16–18-year-old students say they find their transport costs hard to meet.
- **Health:** Over a 12-month period, 1.4 million people miss, turn down or choose not to seek medical help because of transport problems.
- **Food shopping:** 16 per cent of people without cars find access to supermarkets hard compared with 6 per cent of people with cars.
- **Social activities:** 18 per cent of non-car owners find seeing friends and family difficult because of transport problems, compared with 8 per cent of people with access to a car.

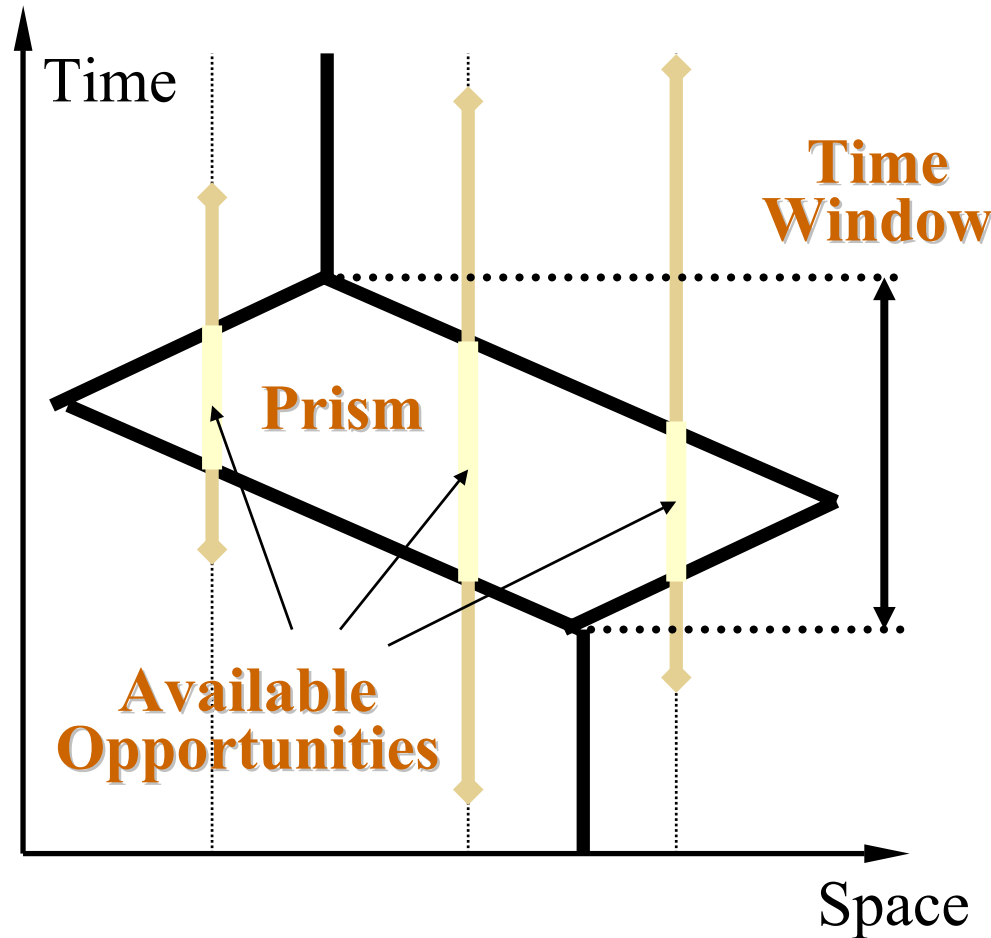
**Source; Making the Connections: Final Report on Transport and Social Exclusion**

## 2.2 Activity-based measurement of social exclusion problem

### *Space-Time Prism with transport network and the locations of services*

#### *Major Constraints on Daily Activities*

- Activity Schedule
  - Space-Time Constraints of Activities
- Transportation Network
  - Road Network
  - Public Transportation
- Opportunity
  - Location
  - Business Hours





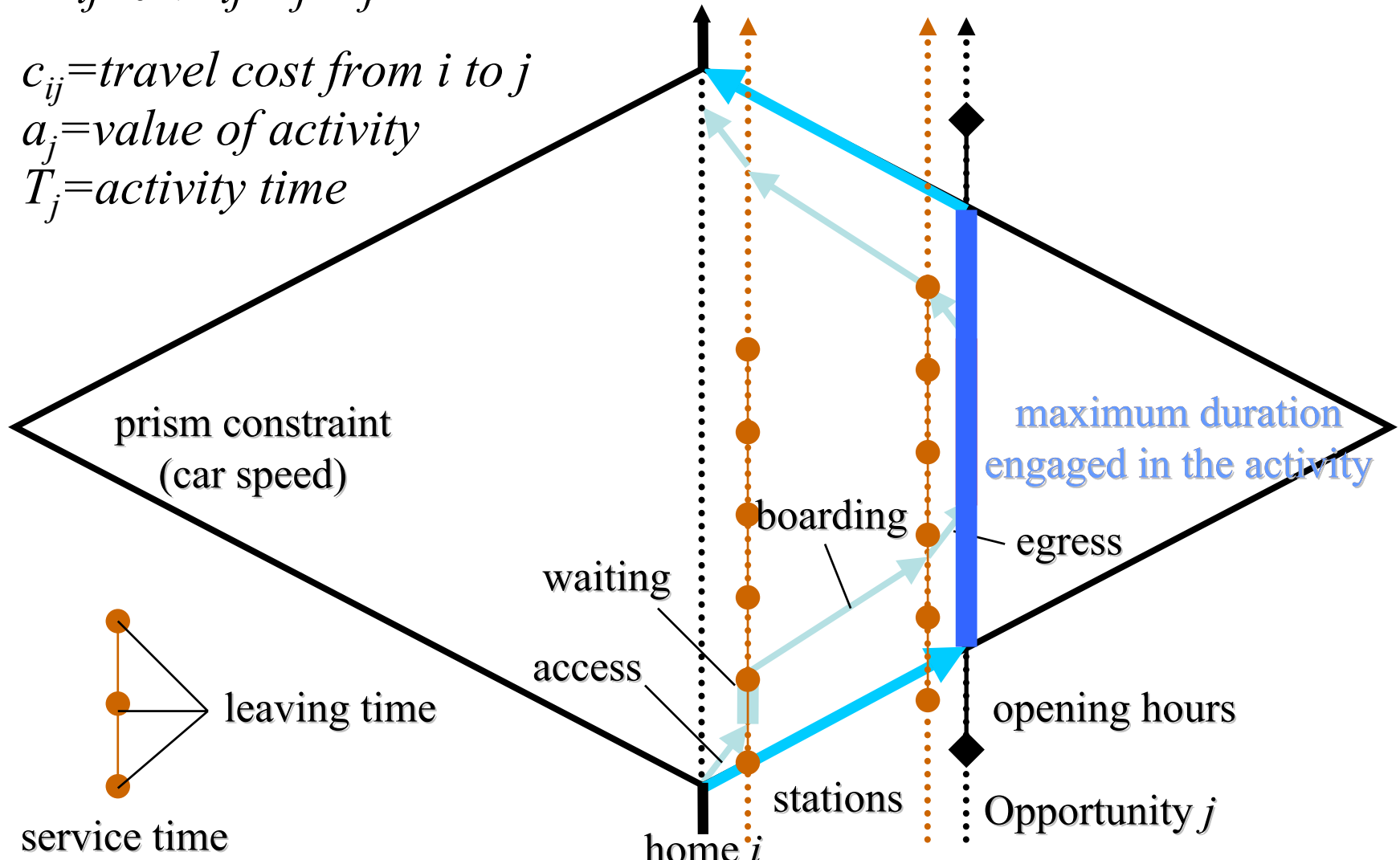
# Space-Time Accessibility by *Car* and *Bus*

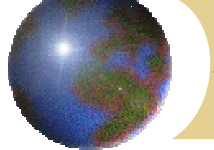
$$A_{ij} = f(c_{ij}, a_j, T_j)$$

$c_{ij}$  = travel cost from  $i$  to  $j$

$a_j$  = value of activity

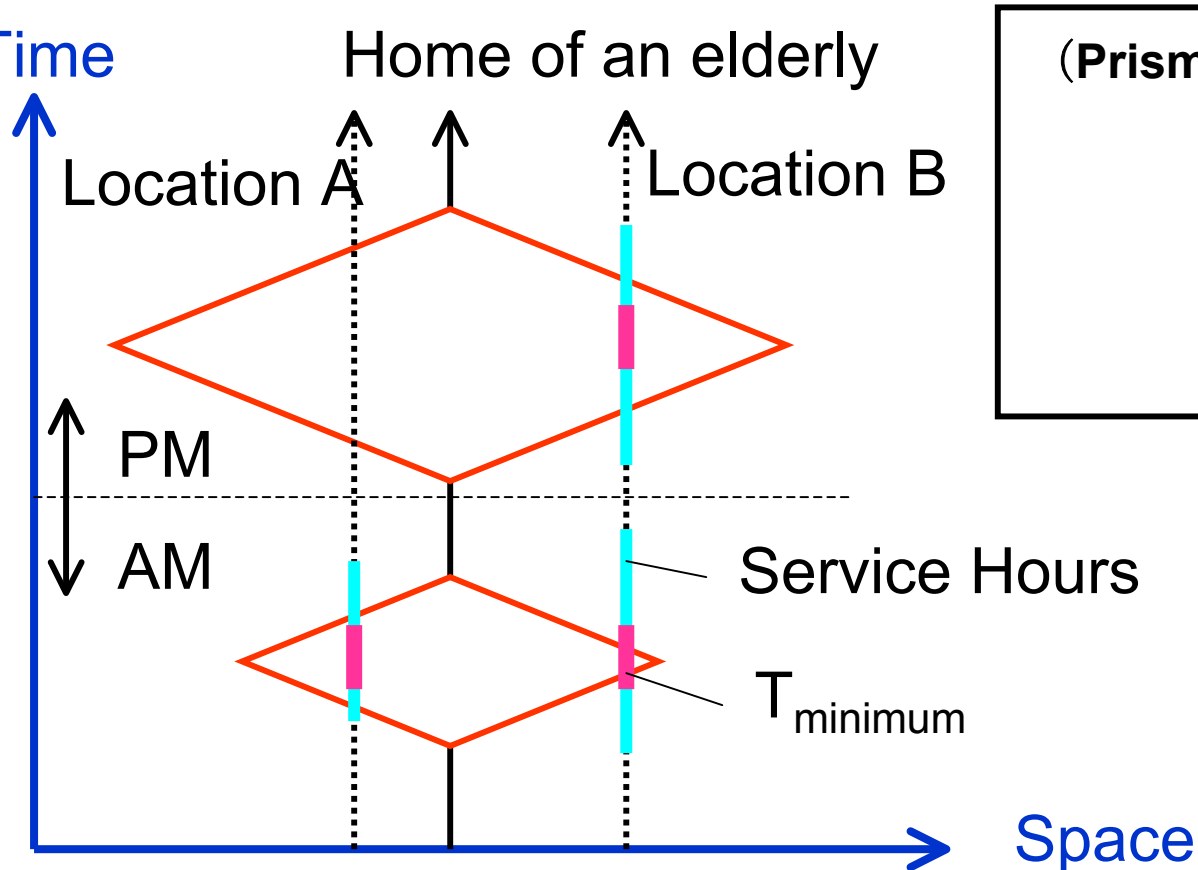
$T_j$  = activity time





# Quantitative Definition of Social Exclusion

- Feasibility of going to a specific location to do a specific activity and coming back home



(Prism window  $\cap$  Service Hours)

$\nabla$   
 $T_{\text{minimum}}$   
Feasible

## Feasibility

Location A & AM	○
Location A & PM	×
Location B & AM	×
Location B & PM	○

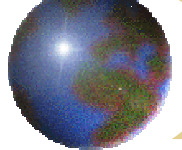
## 2.3 Social exclusion as an index of mobility difficulties

How many people can be included *for the specific activity* ?

Do the following steps      for every sample  
   for available mode of travel  
   for available facilities

1. Select sample households
  - ✚ Time windows and available modes
2. Select a specific activity
  - ✚ Location and Activity Duration time
3. Calculate maximum duration time
4. Compare them with pre-determined activity duration time

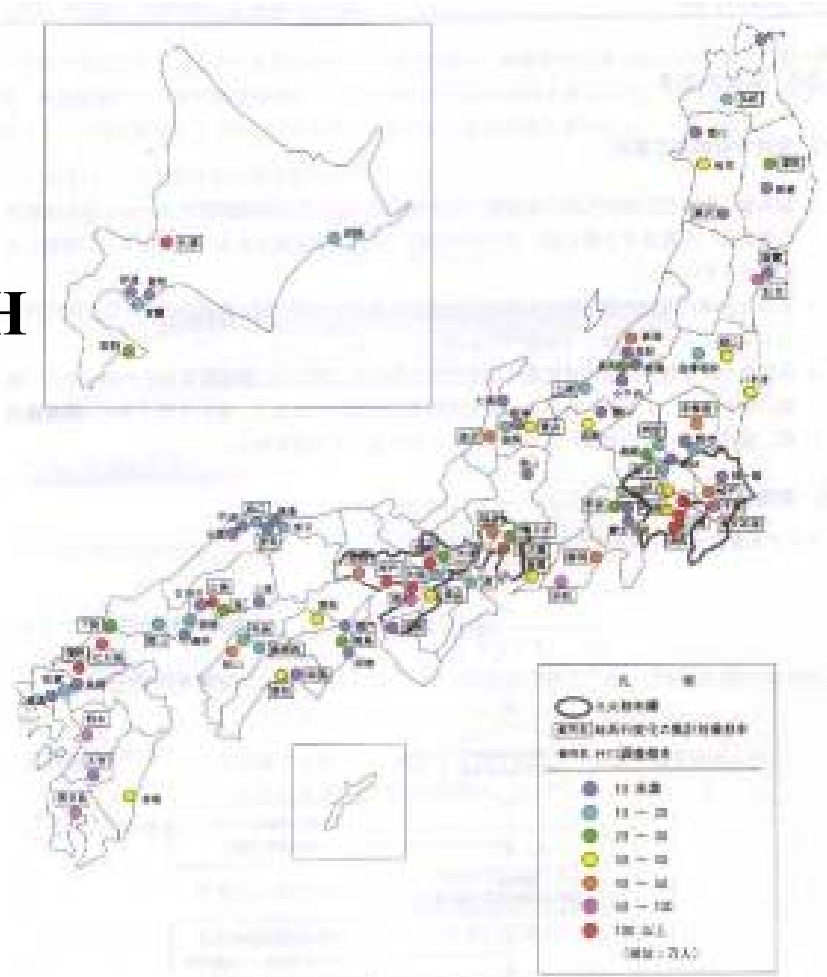




### 3. Status of social exclusion in Japan

#### 3.1 Mobility Status

- **Nation-wide person trip survey**
    - 500 households per city
    - One day trip record of HH members both of weekday and weekend
  - **1999 survey**
    - 98 cities in UPA and UCA
  - **1992 survey**
    - 78 cities in UPA
- UPA: Urbanization Promotion Area**  
**UCA: Urbanization Control Area**



98 cities in 1999 Survey

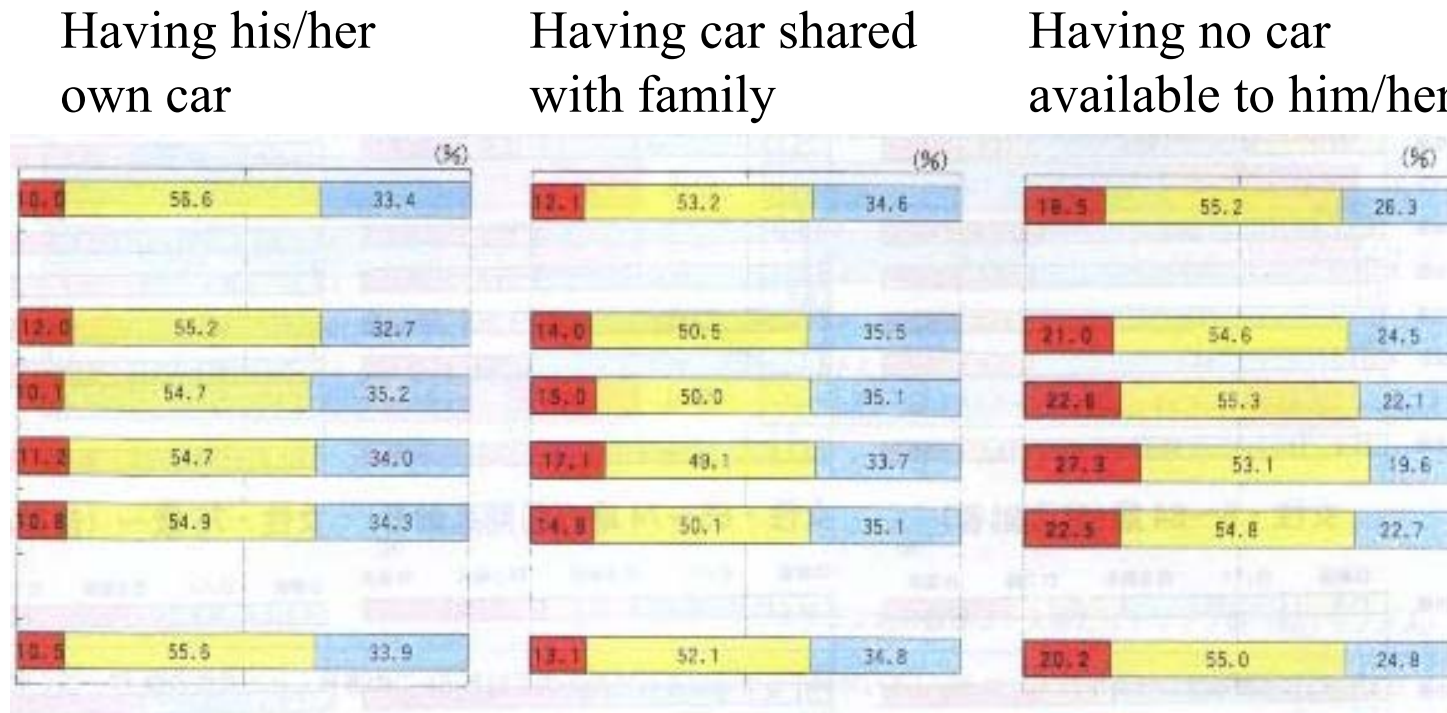


## *Trips per day and Car Availability*

Percentage of not going out is greater for those without car availability

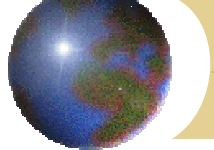
**The 3 biggest  
Metro Area  
million more  
regional hub city  
others  
LL Regional City**

**Total**



No trip   1 trip & 2 trips   More than 3 trips

**Source; 1999 Nation-wide person trip survey**



# Tokyo Metropolitan Area

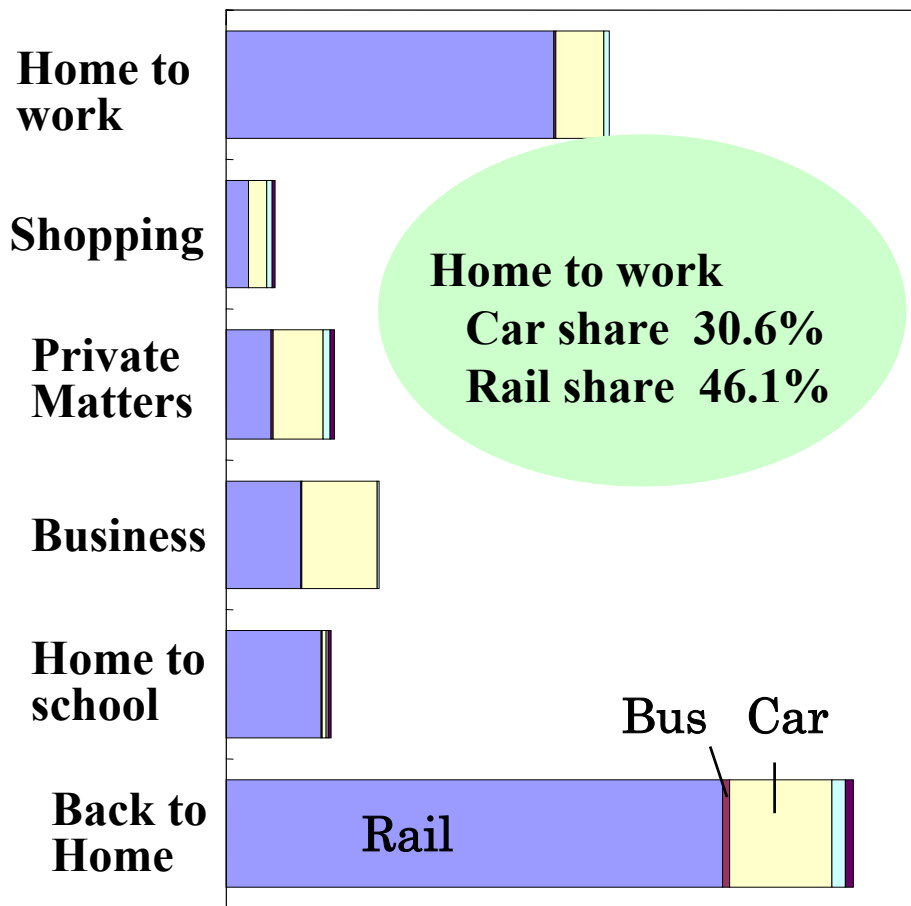
## The 4th Person Trip Survey

- 50 km radius area
- 33 million residents
- 880thousands samples
- One day trip record

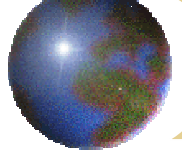


Person • km by mode of travel

60,000

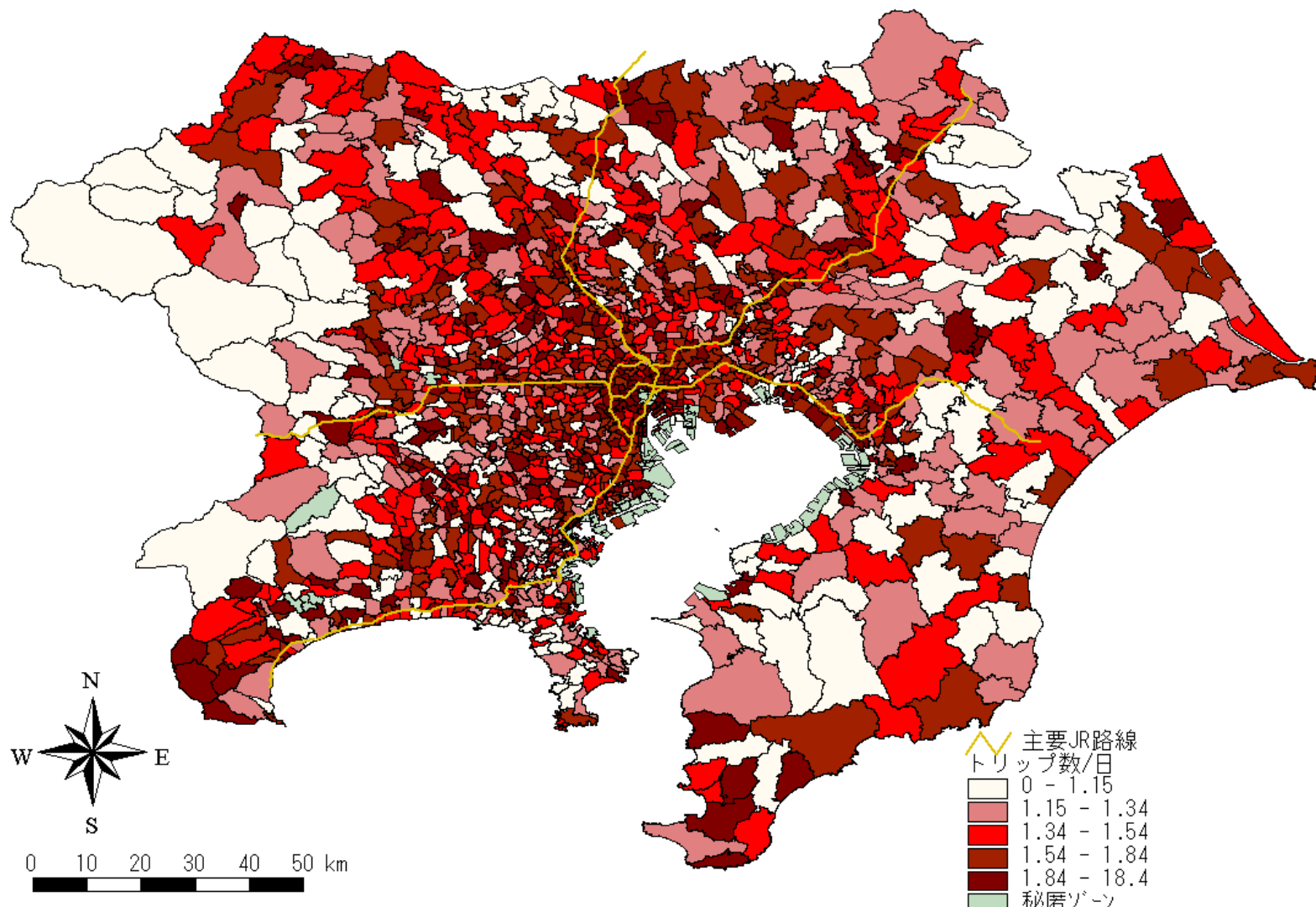


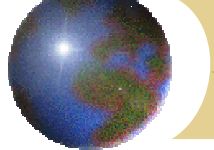
Source : The 4th PT survey



# *Mobility level of Elderly people*

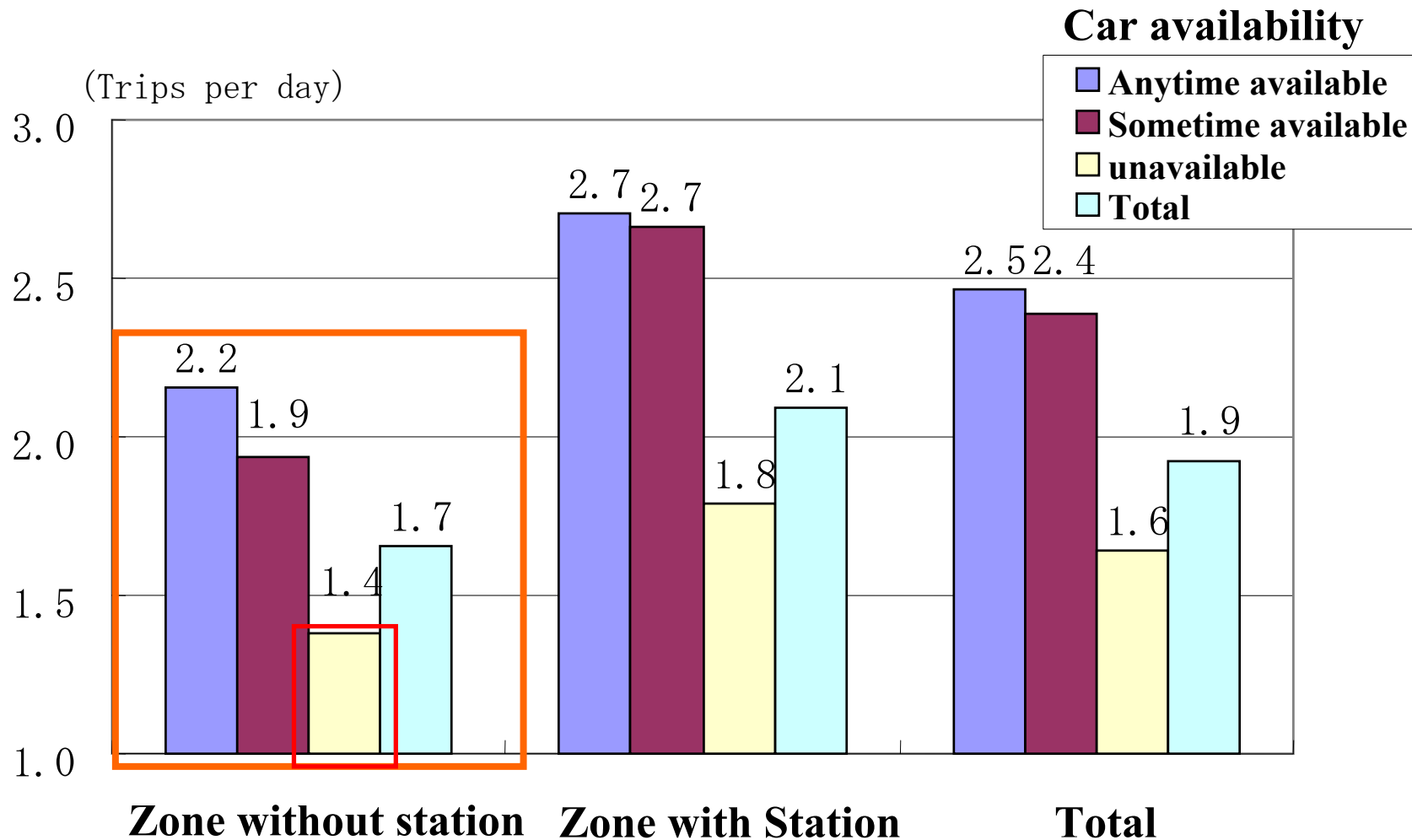
## **Trips per day of elderly who can not use car**





# *Mobility level of Elderly people*

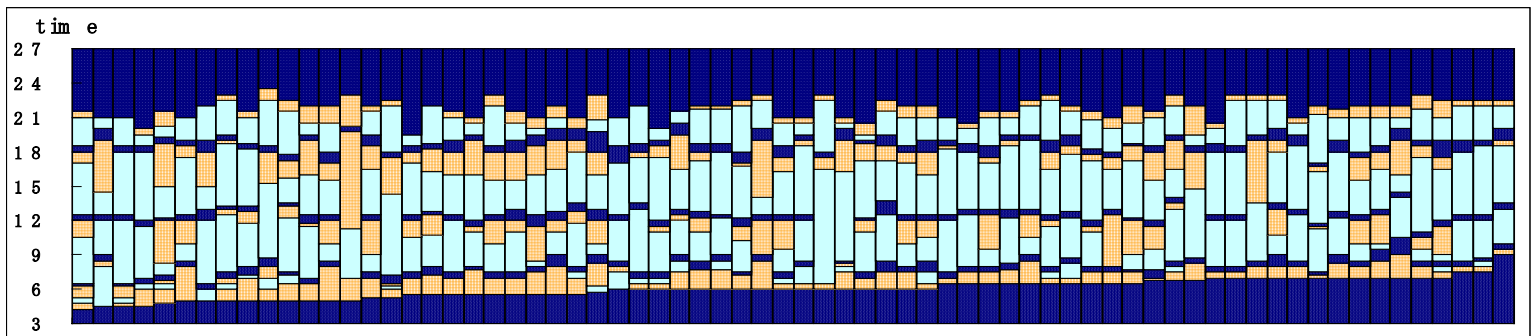
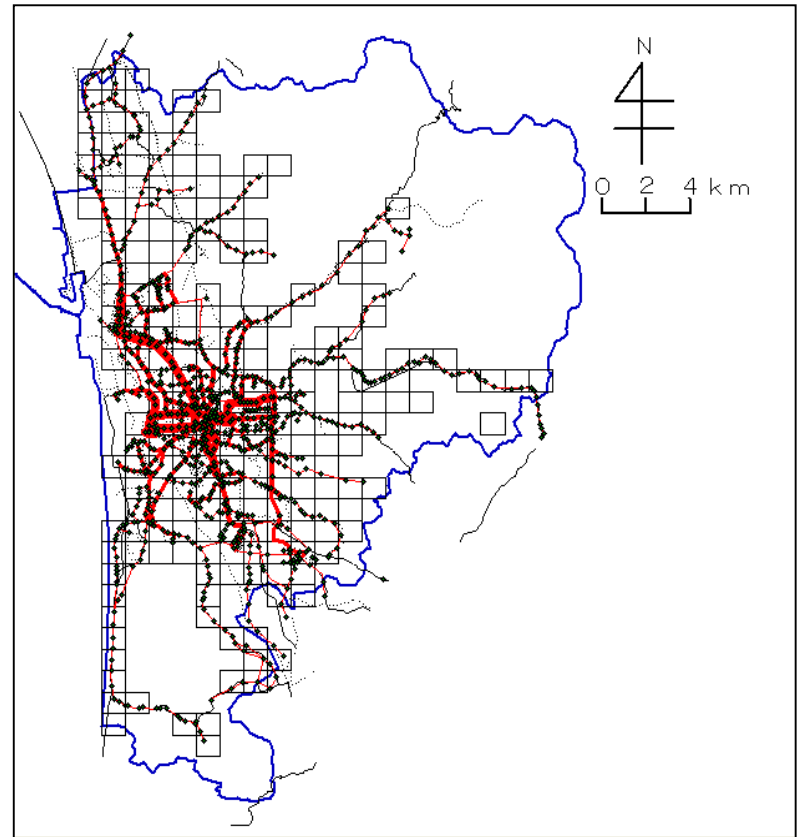
## 🚉 **Railway station and car availability**

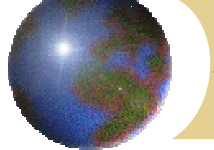


## 3.2 Social Exclusion problems in Japanese Local City

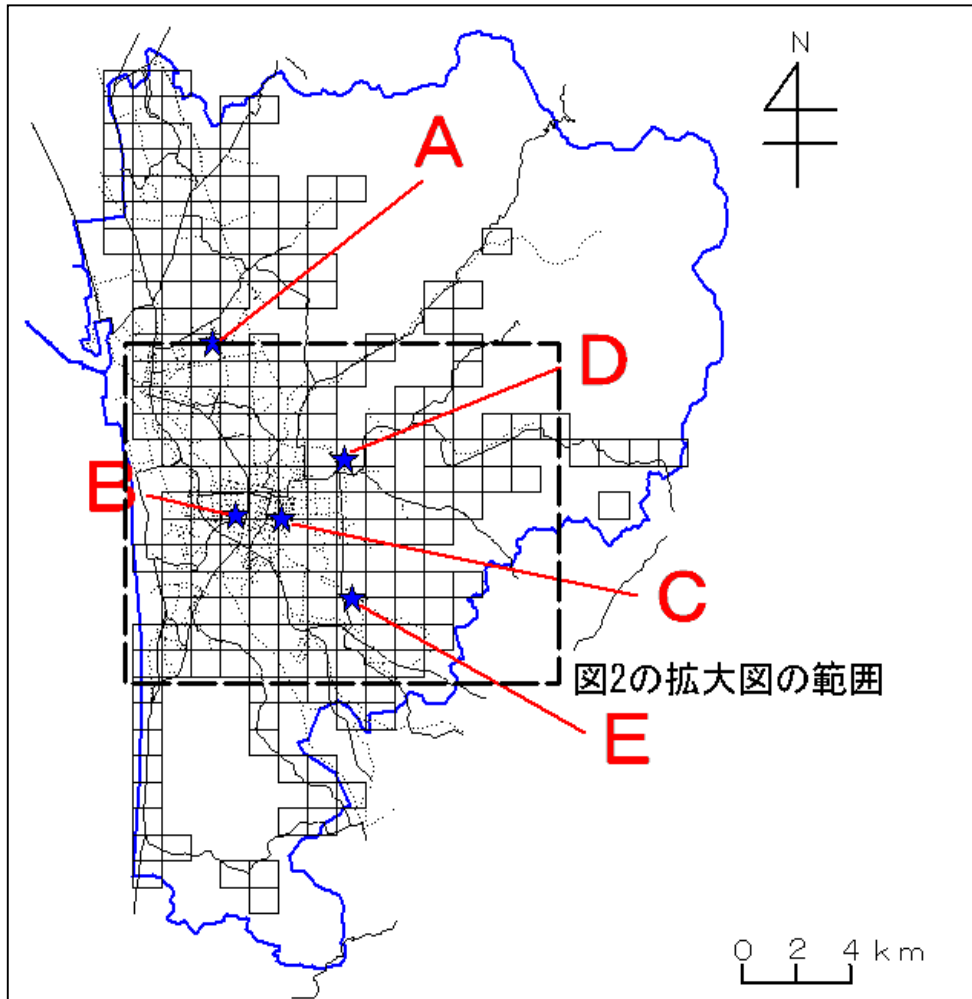
### Akita City

- Population : 317,625  
(2004 National Census)
  - % of Elderly : 17.5%
- Transport Network
  - Road Network; Black Line
  - Bus Network; Red Line
  - Bus stop; Black points
- Mesh ; 1km by 1km
- 70 pattern of Diaries





# Facilities; General Hospitals



Locations of the Five Hospitals

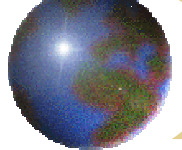
## Service hours of the five hospitals

Hospital	Service Hours
A	7 :00 ~ 11 :30
	12 :00 ~ 15 :00
B	8 :30 ~ 11 :30
C	7 :00 ~ 11 :30
	12 :00 ~ 16 :00
D	8 :30 ~ 10 :30
E	8 :00 ~ 11 :30

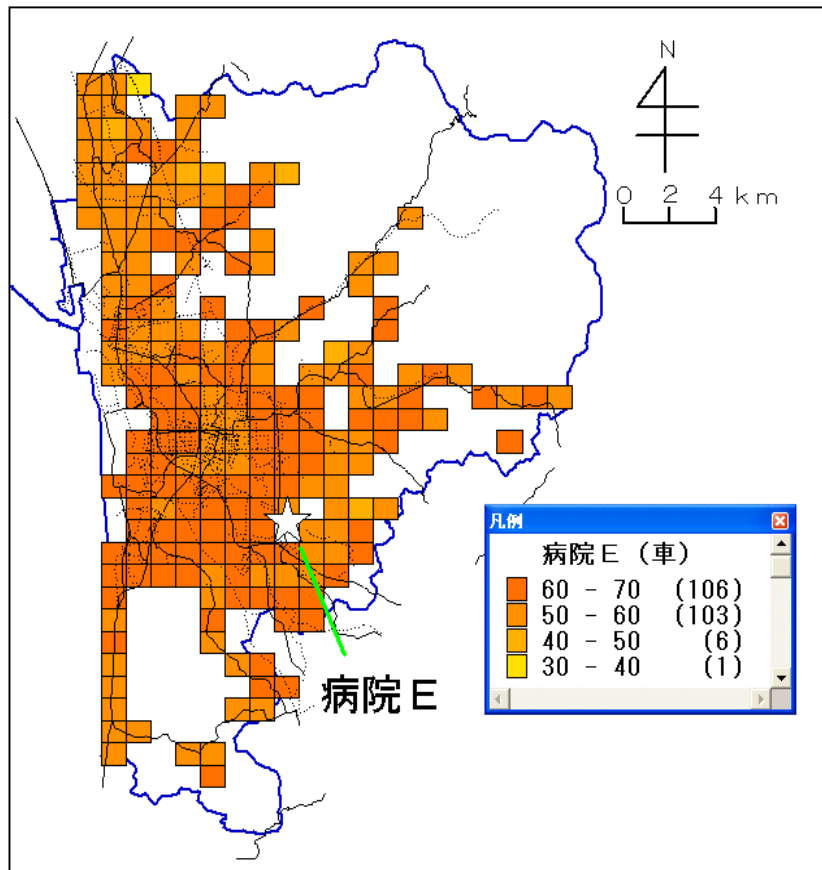
**Minimum Activity  
Duration Time  
120 minutes**

Source;  
Daily Time Use Survey by  
NHK(2000)

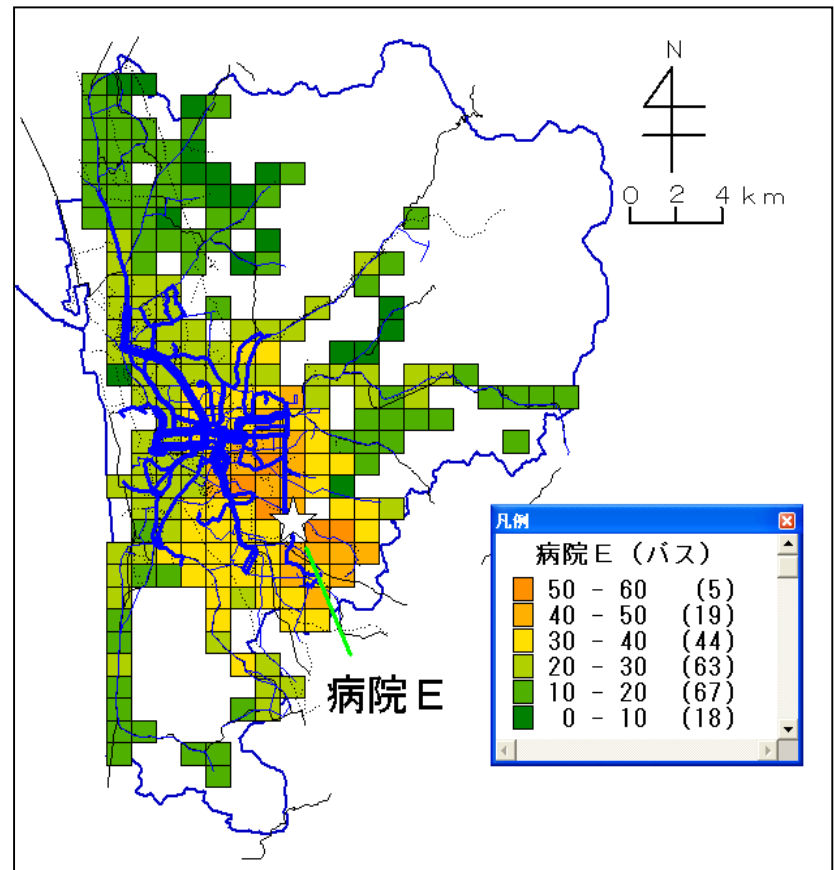




# Percentage of Feasible People by Car and Bus (Hospital E)



**Car Users**



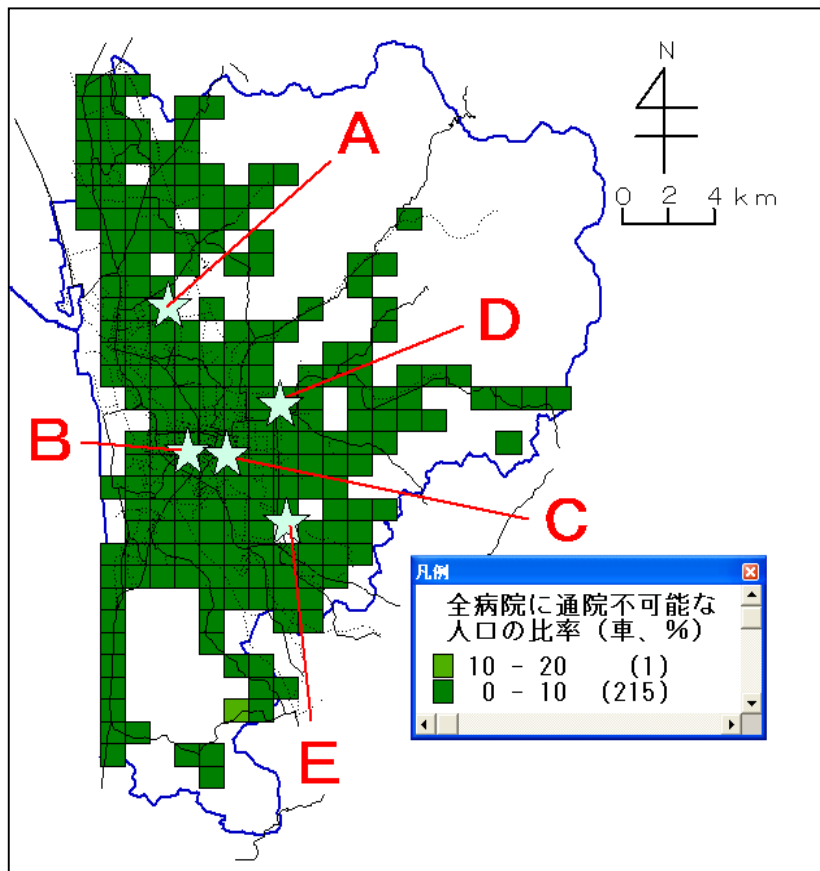
**Bus Users**



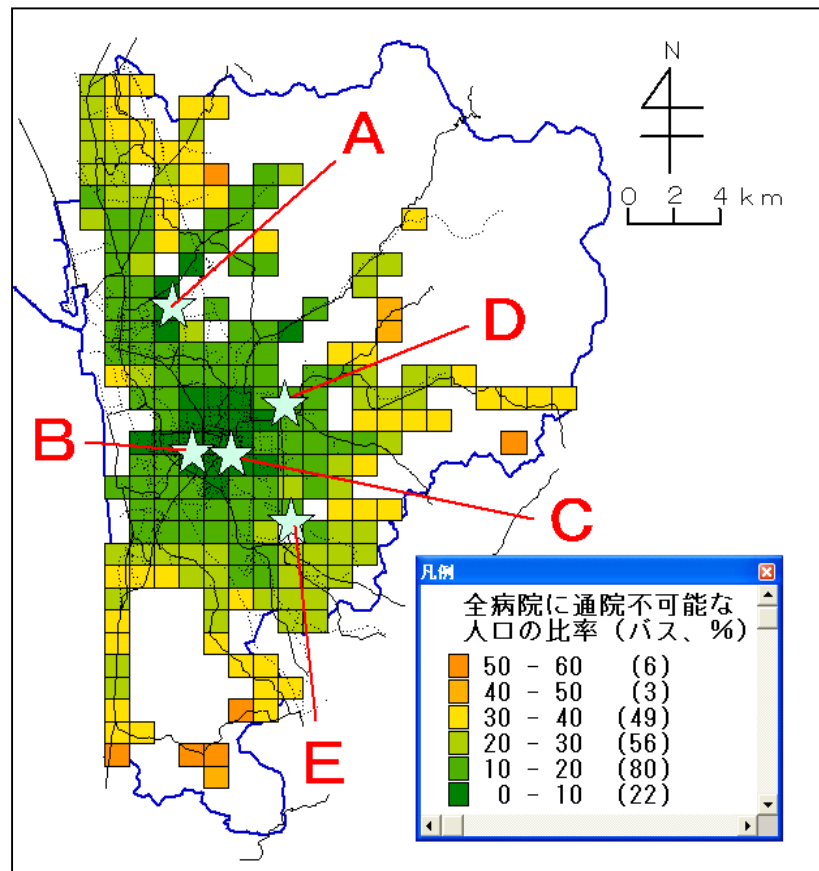


# Percentage of Infeasible People by Car and Bus (Hospital A,B,C,D,E)

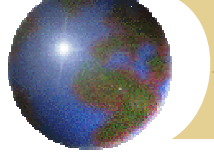
## Social Exclusion Index for the Going Hospital Activity



Car Users



Bus Users



## 5. *Potential Measures to reduce social exclusion*

### *Potential Measures are to relax Major Constraints on Daily Activities.*

- Activity Schedule
  - Space-Time Constraints of Activities
- Transportation Network
  - Road Network
  - Public Transportation
- Opportunity
  - Location
  - Business Hours
- Reschedule of Activities
  - Daily, Weekly, Monthly...
- More efficient car use
- Network improvement
  - Capacity, safety...
- More information
- New facilities
- Relocation of facilities
- Widening business hours