

## ***Changes in Travel Behavior for New Residents of New Development in Beijing, China, and Surrounding Areas***

Christopher Cherry, Doctoral Student, Department of Civil and Environmental Engineering, University of California, Berkeley.

Jennifer Day, Doctoral Student, Department of City and Regional Planning, University of California, Berkeley.

### **Introduction and Overall Objectives**

China is currently experiencing the largest peacetime migration of people in recorded history. Roughly 60 percent of the country resides in the rural countryside, where work opportunities and quality of life are limited compared with the urbanized areas, and every year, millions of people leave their homes in the countryside to search for opportunity in China's cities.

In urban areas, whose urban cores have been traditionally populated by rich and poor alike. Suburban development, as it is known in the United States, is rare, as families tend to reside in the dense inner cities close to their work. But China's cities are getting more crowded, due to both population increases and migration into the cities from the rural areas. This, combined with increases in private housing development and car ownership, has elicited a response from the market that draws heavily from the American suburbanization experience, previously unheard-of in China: car-oriented, lower-density, and even single-family housing appearing on the urban fringes of some cities, served minimally by transit.

In cities like Beijing, this kind of development could lead to dire consequences. In the urban fringes, plenty of open space exists for lower-density development to be built, and the government is loosening its restrictions related to development and private property. Additionally, the current policies encourage car ownership for those who can afford it, and the growing economy is steadily increasing the numbers who have the available income for a personal automobile. The introduction of American-style suburbanized development, if allowed to continue, could lead to significant modal shift away from transit and non-motorized modes and into cars or taxis, longer average trip lengths, increased energy consumption, and increased pollution in an already heavily polluted city. The objective of this study is to examine this shift, and to provide recommendations to mitigate the consequences of such new development. Specifically, the research will investigate the following issues:

1. Demographics of "new movers," i.e. – those who have moved to lower-density fringe developments in the past one year

This refers to the demographic characteristics of new movers – e.g. – income, auto ownership rates, household size, etc.

2. The changes in locational choice characteristics for these new movers

This refers to the changes in residential type, and will involve examination of residential neighborhood density, number of persons living in the household, proximity of shopping and amenities, and other locational characteristics of the previous and current housing situation.

3. The changes in travel behaviour for these new movers

This refers to the concomitant changes in travel behaviour (both commute and non-commute) for people from before they moved to these lower-density developments to after. Changes include changes in trip

distance, travel mode, trip frequency, and etc.

4. Identify challenges associated with conducting household style surveys in China. These include legal and institutional challenges and cultural challenges. This could inform future survey collection efforts.

## **Methodologies**

Survey data will be collected in order to study the aforementioned issues. A copy of the survey to be administered is presented in Appendix A of this proposal. Specific questions to be answered include:

- 1) From what kinds of neighborhoods did these new movers come? Dense inner-city areas, other cities, etc. What was the draw away from these neighborhoods? What were the factors that drew them to the new developments?
- 2) Are new movers' demographic characteristics and travel patterns different than residents of Beijing who reside in more traditional, dense, inner-city neighborhoods?
- 3) What are the implications of such future developments?
- 4) Even though much of the development is close to a new light rail line, how many people use the system?
- 5) What are the household car ownership rates?
- 6) What is the vehicle kilometer traveled per capita (work trips)?
- 7) Does this increase the spatial mismatch of jobs and housing or do people work in the area?
- 8) What are the major factors influencing travel behavior? Does parking availability or cost influence travel behavior?

## **Survey Plan**

### *Action Plan*

Step 1: Identify development(s) on urban periphery that lend themselves to study. Beijing is currently initiating a strategy to create large scale residential development on the urban periphery to reduce the load on the infrastructure of the urban core. The city has invested in a new rail line to the north of the city that has led this residential development. A new large residential district has been identified near the train line as the study area.

Step 2: Identify feasible survey administration procedures. Permission to administer the survey must be obtained by building management, and perhaps also district political managers. It is currently unknown whether the managers will allow door-to-door or mailbox surveying, or whether some other capture method must be employed. The options identified to date are as follows, with drawbacks in parentheses:

1. Door to door (resource intensive and slow, but higher response rate)
2. Leave on door and mail back (resource intensive (postage), low response rate)
3. Leave on door and have drop box in each building (questionable response rate)
4. Intercept at entrance of building (each building entrance only serves 10-14 units)
5. Intercept at district entrance (each district has 2-3 gates, which serve 800-1500 units)

At current, the favored strategy is an intercept survey at district entrances in the afternoon peak hours (4-7 o'clock pm). It is assumed that people will be more amenable to responding if they are returning rather than going out, and that more people are likely to be returning home from work at this hour. Surveyors will be stationed at each gate of four different districts. Because of potential problems associated with intercepting drivers, surveyors will also be inside the complex intercepting drivers and administering the

survey after they have parked. This introduces bias in the survey results because car drivers will not be sampled at the same rate. To correct for this, the proportion of cars, bikes, and foot traffic will be recorded and the surveys will be weighted accordingly. A small gift will be offered to each survey participant as a token of appreciation.

Step 3: Contact district manager(s) to get their approval

Step 4: Based on constraints of development and district manager, choose survey strategy

Step 5: Recruit additional surveyors if needed

Step 6: Finalize survey translation, format and official cover letter

Step 7: Distribute and collect surveys

Step 8: Enter data in a database for later analysis

### *Sample Size*

The goal for the pilot survey is to determine the survey distribution needed to gather a 300-survey sample. Ideally, 1000 surveys would ultimately be collected.

### **Challenges**

Collecting data of this kind presents a few formidable challenges. First, residential surveys are very rare in China, and the difficulty associated with obtaining permission from both development managers and district politicians is yet unknown. Second, the Chinese population tends to be very private, and may not be amenable to disclosing personal and household information, even if it is given anonymously. The pilot survey is intended to give some information regarding response rates and optimal survey strategies to obtain the highest possible response rate.

### **International Collaborative Features**

This research naturally implies collaboration of expertise from both Chinese and American institutions. The in-depth knowledge of each country's planning practices, agency functions and responsibilities, policy conditions, political obstacles, and language requires the work of experienced researchers and practitioners from China. The comparison of practices, techniques, successes, failures, and future direction requires a dialogue among experts (and students) from both countries – particularly if the United States is to be presented as a paragon of the failure of suburban development, and as a model for the mistakes China should attempt to avoid making. Currently, faculty and students from two premier universities in China, Tsinghua University and Beijing Jiaotong University, are committed to dedicating staff and graduate student time to the proposed research.

### **Broader Impacts of the Proposed Activity**

As economic growth in developing nations, such as China, continues to create growth in demand for transportation resources, planning for the sustainability, efficiency, and compatibility of these transportation systems will continue to demand attention and innovation. Likewise, projections of demand for transportation in the United States point to similar needs.

In this era of scarcity and the resultant need for efficiency, the developing and developed worlds have a great deal to learn from one another. Foreign insight in the planning of China's rapidly-changing urban landscape, and the concomitant transportation needs, offers foresight -- a chance to avoid the mistakes that the United States is now trying to repair in its own planning practices.

Similarly, the developing nations of the world have insight to offer transportation planners in the United States. Knowledge of what is occurring in China could force developed countries to look critically at their own land-use and energy practices, and perhaps modify policy accordingly.

### **Intellectual Merits of the Research**

Transportation planning research is an intellectual pursuit rooted in practice; therefore, many of the intellectual merits of the proposed research come from improving planning practice, and were discussed in the previous section. For instance, the application of empirical planning knowledge from one country to another provides intellectual merit and, simultaneously, impacts the state-of-the-practice more broadly.

In addition to the practical merits, this research does offer some purely intellectual additions to the planning knowledge base. China offers a control situation for themes discussed by American planning theorists. Namely, what is the relationship between planning and politics, and how much power should planners wield? To what extent should planning impose regulations upon developers and participants, and to what extents should participation in good planning be incentivized (e.g. – lower developing costs for sustainable water planning and parking planning). This is extremely valuable to planning theory and the development of good practice.

### **Educational Merits of the Research**

The University of California, Berkeley, Tsinghua University, and Beijing Jioatong University (BJTU) are working to establish formal educational and research partnerships. This would be the first project conducted under these partnerships, and the project teams from each institution would include staff researchers, university faculty, and students. Berkeley currently has at least two doctoral students interested in pursuing dissertation research in China, and both Tsinghua and BJTU have multiple students interested in similar arrangements.

More generally, collaborative projects between the universities would offer students opportunities to conduct team-based research in another country where, due to language barriers, individually-managed projects could prove prohibitively difficult. Also, these types of projects teach students to conduct research in a collaborative, multicultural setting. As planning practices become increasingly global, and planning concerns continue to transcend political borders, this type of training will be critical for the next generation of planners and planning researchers.

**Appendix A: Chinese Survey Form**

**通勤调查**

地点 \_\_\_\_\_ 日期: \_\_\_\_/\_\_\_\_/2005

1. 您家里有几位家庭成员?  
 ≥18岁 \_\_\_\_\_, <18岁 \_\_\_\_\_
2. 您家中有几位成年人是全日制工作? \_\_\_\_\_
3. 以下交通工具您的家庭拥有数量是:  
 小汽车 \_\_\_\_\_, 电动自行车 \_\_\_\_\_,  
 摩托车 \_\_\_\_\_, 燃油自行车 \_\_\_\_\_,  
 自行车 \_\_\_\_\_
4. 家庭住址: \_\_\_\_\_区, \_\_\_\_\_单元, \_\_\_\_\_号
5. 您在此小区居住了多久? \_\_\_\_\_年, \_\_\_\_\_月
6. 您在哪儿上班/上学? (指出临近的最大路口即可)  
 \_\_\_\_\_
7. 您的工作时间一般是什么?  
 从 \_\_\_\_\_点, 到 \_\_\_\_\_点
8. 您每星期休息日一般是哪几天?  
<sub>1</sub> 星期一                      <sub>5</sub> 星期五  
<sub>2</sub> 星期二                      <sub>6</sub> 星期六  
<sub>3</sub> 星期三                      <sub>7</sub> 星期日  
<sub>4</sub> 星期四
9. 您目前最常使用的上班/上学交通方式是:  
<sub>1</sub> 步行                              <sub>3</sub> 公交车  
<sub>2</sub> 自行车                          <sub>6</sub> 单位班车  
<sub>4</sub> 电动自行车                      <sub>7</sub> 出租车  
<sub>4</sub> 摩托车                          <sub>8</sub> 私家车  
<sub>9</sub> 其他 \_\_\_\_\_
10. 您每次上班/上学一般花费多少时间?  
 \_\_\_\_\_小时, \_\_\_\_\_分钟
11. 您每次上班/上学一般花费多少钱?  
 汽油 \_\_\_\_\_, 公车/出租车费用 \_\_\_\_\_,  
 停车 \_\_\_\_\_, 其他费用 \_\_\_\_\_
12. 您的工作单位是否提供免费停车位? 如果不提供, 需要花费多少? <sub>1</sub>是 <sub>2</sub>否 \_\_\_\_\_
13. 您还可以选择的其他交通工具有哪些?  
<sub>1</sub> 步行                              <sub>4</sub> 公交车  
<sub>2</sub> 自行车                          <sub>6</sub> 单位班车  
<sub>3</sub> 电动自行车                      <sub>7</sub> 出租车  
<sub>4</sub> 摩托车                          <sub>8</sub> 私家车  
<sub>9</sub> 其他 \_\_\_\_\_

14. 您昨天各使用如下的交通方式多少次?  
 步行 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 自行车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 电动自行车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 摩托车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 公交 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 单位车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 出租车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 私家车 \_\_\_\_\_次, 目的 \_\_\_\_\_  
 其他 \_\_\_\_\_次, \_\_\_\_\_目的 \_\_\_\_\_
15. 您为何搬到此处居住?  
<sub>1</sub> 房价合适                              <sub>7</sub> 空气清新  
<sub>2</sub> 接近高速公路                      <sub>8</sub> 安静  
<sub>3</sub> 不堵车                                  <sub>9</sub> 随家里搬过来的  
<sub>4</sub> 接近轻轨                              <sub>10</sub> 入学方便  
<sub>5</sub> 接近购物娱乐区  
<sub>6</sub> 上学/上班方便  
<sub>11</sub> 其他 \_\_\_\_\_
16. 2004年, 您家庭的年收入大约是多少?  
<sub>1</sub> ≤14,999                              <sub>4</sub> ≤74,999  
<sub>2</sub> ≤24,999                              <sub>5</sub> ≤99,999  
<sub>3</sub> ≤44,999                              <sub>6</sub> ≥100,000

**关于您以前的住所**

17. 地址是: (指出临近的最大路口即可)  
 \_\_\_\_\_
18. 您在以前的住所居住时, 上班/上学地点是:  
 (指出临近的最大路口即可)  
<sub>1</sub> 与现在相同;  
<sub>2</sub> 不同, 在 \_\_\_\_\_
19. 那时, 您的工作时间一般是:  
 从 \_\_\_\_\_点, 到 \_\_\_\_\_点
20. 那时, 您最常使用的上班/上学交通方式是:  
<sub>1</sub> 步行                              <sub>3</sub> 公交车  
<sub>2</sub> 自行车                          <sub>6</sub> 单位班车  
<sub>3</sub> 电动自行车                      <sub>7</sub> 出租车  
<sub>4</sub> 摩托车                          <sub>8</sub> 私家车  
<sub>9</sub> 其他 \_\_\_\_\_
21. 那时, 您还可以选择的其他交通工具有哪些?  
<sub>1</sub> 步行                              <sub>3</sub> 公交车  
<sub>2</sub> 自行车                          <sub>6</sub> 单位班车  
<sub>3</sub> 电动自行车                      <sub>7</sub> 出租车  
<sub>4</sub> 摩托车                          <sub>8</sub> 私家车  
<sub>9</sub> 其他 \_\_\_\_\_
22. 那时, 您每次上班/上学一般花费多少时间?  
 \_\_\_\_\_小时, \_\_\_\_\_分钟

清华大学交通研究所

本次调查由清华大学交通研究所执行, 所有数据仅用于研究。如有疑问, 请与我们联系: 010-62772615。

**感谢您的合作!**

## Appendix B: English Survey Form

### COMMUNITY SURVEY

DISTRICT \_\_\_\_\_ DATE \_\_\_\_\_ 2005

Please help us plan improvements for the neighborhoods and residents around Huilongguan by completing this survey. Your responses are strictly confidential, and will be compiled with many other responses in a summary form. Your help is very much appreciated!

**1. How many people live in your household?**

Adults (over 18) \_\_\_\_\_<sub>1</sub> Children \_\_\_\_\_<sub>2</sub>

**2. How many adults in your household work full time? \_\_\_\_\_**

**3. How many of the following does your household have?**

\_\_\_\_\_<sub>1</sub> Car  
\_\_\_\_\_<sub>2</sub> Electric Bicycle/Motorcycle  
\_\_\_\_\_<sub>3</sub> Motorcycle  
\_\_\_\_\_<sub>4</sub> Gas Bicycle  
\_\_\_\_\_<sub>5</sub> Bicycle

**4. Current address?**

building \_\_\_\_\_<sub>1</sub> gate \_\_\_\_\_<sub>2</sub> unit \_\_\_\_\_<sub>3</sub>

**5. How long have you lived here? years \_\_\_\_\_<sub>1</sub> months \_\_\_\_\_<sub>2</sub>**

**6. Where do you work or go to school (nearest major intersection or district)?**

\_\_\_\_\_

**7. What are your typical work hours**

start \_\_\_\_\_<sub>1</sub> end \_\_\_\_\_<sub>2</sub>

**8. What days do you typically go to work? (Please check all that apply)**

<sub>1</sub> Monday                      <sub>5</sub> Friday  
<sub>2</sub> Tuesday                      <sub>6</sub> Saturday  
<sub>3</sub> Wednesday                      <sub>7</sub> Sunday  
<sub>4</sub> Thursday

**9. What is the primary way you get to work currently?**

<sub>1</sub> Walk                                      <sub>5</sub> Public Bus  
<sub>2</sub> Bicycle                                      <sub>6</sub> Company Bus  
<sub>3</sub> Electric Bicycle/Motorcycle                      <sub>7</sub> Taxi  
<sub>4</sub> Motorcycle                                      <sub>8</sub> Private Car  
<sub>9</sub> Other (please specify) \_\_\_\_\_

**10. How much time does your commute take?**

小时 \_\_\_\_\_<sub>1</sub> 分钟 \_\_\_\_\_<sub>2</sub>

**11. How much does it cost you to travel to work per round trip?**

Gas \_\_\_\_\_<sub>1</sub> Transit/Taxi Fare \_\_\_\_\_<sub>3</sub>  
Parking \_\_\_\_\_<sub>2</sub> Other (please specify) \_\_\_\_\_<sub>4</sub>

**12. Does your employer provide you with free parking? If not, how much does it cost? <sub>1</sub> Yes <sub>2</sub>**

No \_\_\_\_\_<sub>3</sub>

**13. What other modes are available to get to work? (Please check all that apply)**

<sub>1</sub> Walk                                      <sub>5</sub> Public Bus

- <sub>2</sub> Bicycle
- <sub>3</sub> Electric Bicycle/Motorcycle
- <sub>4</sub> Motorcycle
- <sub>6</sub> Company Bus
- <sub>7</sub> Taxi
- <sub>8</sub> Private Car
- <sub>9</sub> Other (please specify) \_\_\_\_\_

**14. Yesterday, how many trips did you take by each of the following modes?**

- \_\_\_\_\_ <sub>1</sub> Walk  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>2</sub> Bicycle  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>3</sub> Electric Bicycle/Motorcycle  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>4</sub> Motorcycle  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>5</sub> Public Bus  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>6</sub> Company Bus  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>7</sub> Taxi  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>8</sub> Private Car  
Purposes \_\_\_\_\_
- \_\_\_\_\_ <sub>9</sub> Other (please specify) \_\_\_\_\_  
Purposes \_\_\_\_\_

**15. Why did you move to this location? (Please check all that apply)**

- <sub>1</sub> Affordable
- <sub>2</sub> Access to Expressway
- <sub>3</sub> Little Congestion
- <sub>4</sub> Access to Public Transit
- <sub>5</sub> Close to Shopping/Restaurants
- <sub>6</sub> Convenient Access to Work/School
- <sub>7</sub> Clean Air
- <sub>8</sub> Peaceful and Quiet
- <sub>9</sub> Moved with my Family
- <sub>10</sub> Convenient access to Schools
- <sub>13</sub> Other (Please specify) \_\_\_\_\_

**16. What was your household annual income (year 2004)?**

- <sub>1</sub> Less than \$15,000
- <sub>2</sub> \$15,000 to \$24,999
- <sub>3</sub> \$25,000 to \$44,999
- <sub>4</sub> \$45,000 to \$74,999
- <sub>5</sub> \$75,000 to \$99,999
- <sub>6</sub> \$100,000 or more

Think back to where you lived before this

**17. What was the address? nearest major intersection or district**

\_\_\_\_\_

**18. Where did you work or go to school when you lived at this previous residence? Nearest major intersection or district**

- <sub>1</sub> Same as question 6
- <sub>2</sub> Other \_\_\_\_\_

**19. What were your typical work hours**

start \_\_\_\_\_ <sub>1</sub> end \_\_\_\_\_ <sub>2</sub>

**20. What was the primary way you went to work?**

- |                                                                    |                                                   |
|--------------------------------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> <sub>1</sub> Walk                         | <input type="checkbox"/> <sub>5</sub> Public Bus  |
| <input type="checkbox"/> <sub>2</sub> Bicycle                      | <input type="checkbox"/> <sub>6</sub> Company Bus |
| <input type="checkbox"/> <sub>3</sub> Electric Bicycle/Motorcycle  | <input type="checkbox"/> <sub>7</sub> Taxi        |
| <input type="checkbox"/> <sub>4</sub> Motorcycle                   | <input type="checkbox"/> <sub>8</sub> Private Car |
| <input type="checkbox"/> <sub>9</sub> Other (please specify) _____ |                                                   |

**21. What other modes are available to get to work? (Please check all that apply)**

- |                                                                   |                                                   |
|-------------------------------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> <sub>1</sub> Walk                        | <input type="checkbox"/> <sub>5</sub> Public Bus  |
| <input type="checkbox"/> <sub>2</sub> Bicycle                     | <input type="checkbox"/> <sub>6</sub> Company Bus |
| <input type="checkbox"/> <sub>3</sub> Electric Bicycle/Motorcycle | <input type="checkbox"/> <sub>7</sub> Taxi        |
| <input type="checkbox"/> <sub>4</sub> Motorcycle                  | <input type="checkbox"/> <sub>8</sub> Private Car |

**22. How much time did your commute take?**

hours \_\_\_\_\_<sub>1</sub> minutes \_\_\_\_\_<sub>2</sub>

**THANKS!**

**PLEASE RETURN THIS FORM TO THE SURVEYOR**

**Appendix C: Proposed Budget for survey**

**Pilot Survey Budget**

Cherry, Day

Item	Rate		Number	Total RMB	Total USD
	(RMB)	Unit			
Survey and Letter Copies	0.3	per page	600	180	22.22
Gift per respondent	5	per person	300	1500	185.19
Data Entry	0.5	per survey	300	150	18.52
Transport to Site	6	per person	15	90	11.11
Surveyor Salaries	3	per survey	300	900	111.11
Office Supplies	80	Each	1	80	9.88
Contingency	100	Each	1	100	12.35
<b>TOTAL</b>				<b>3000</b>	<b>370.37</b>

Note: The current exchange rate is 8.10 RMB per 1 USD