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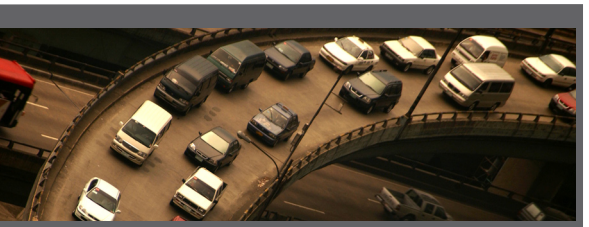
Pedestrian and Bicycling Survey (PABS)

User's Manual

MTI Report 10-03 - User's Manual



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Pedestrian and Bicycling Survey (PABS)

User's Manual

Kevin J. Krizek
Ann Forsyth
Asha Weinstein Agrawal

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http://www.designforhealth.net/resources/PABS.html

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PABS User's Manual

Contents

Executive Summary

Are you interested in finding out how much walking and cycling is happening in your neighborhood or city? This manual presents a survey designed to find out who is doing how much walking and cycling in your area: the PABS (Pedestrian and Bicycling Survey) method. The PABS is a random-sample, mail-out questionnaire that collects data about the general public's bicycling and walking behaviors.

The manual contains several sections:

- Section 1 help you decide if conducting a survey will provide valuable information to help in future bicycle and pedestrian planning.
- Section 2 explain different ways of doing surveys, including using the internet and intercepting people on sidewalks and bike trails, and shows how the PABS compares to these other options. A key advantage of the PABS over some of these other methods is that it is an inexpensive method to collect data that can be generalized to the whole population in a community.
- Section 3 provides a step-by-step guide to executing the survey. It suggests responsibilities for the work, how to sample people and then recruit them, likely costs, and the detailed logistics of refining, printing, and mailing a survey. This section draws on examples from a field test of the survey in San José, California.
- Section 4 explains how to transfer accurately questionnaire responses to a computer program, and also provides tips on typical ways of analyzing the information.
- Section 5 suggests some options for reporting the results of the survey so that the data you collect will be useful for planners, policy makers, and the interested public.

The manual also provides some helpful charts and tables:

- At the front is a checklist for completing the survey linked to the steps in section 3.
- At the back are:

  The survey questionnaire itself in both English and Spanish.

  - Some more specific information about surveys in general and about other surveys dealing with cyclists and pedestrians.
  - More details about the cost of using the PABS method, a proposed timeline, details about how to randomly sample addresses, and potential graphics.

There are many terrific books and manuals on survey research, and the last section of this manual suggests a few good ones. The manual itself, however, is specifically designed for those wanting to use the PABS approach.

The manual has a companion research report that will be useful for those readers who wish to know more technical details about how the PABS approach was developed: *Measuring Walking and Cycling Using the PABS (Pedestrian and Bicycling Survey) Approach*.[1]

[1] Ann Forsyth, Kevin Krizek, and Asha Weinstein Agrawal, *Measuring Walking and Cycling Using the PABS (Pedestrian and Bicycling Survey) Approach: A Low-Cost Survey Method for Local Communities*, Draft Report (San José, CA: Mineta Transportation Institute, October 2010).

Survey Steps Checklist

See Chapter 5 for detailed instructions for each step.

1. ❑ Determine whether or not the PABS method will collect needed and useful data for your community
2. ❑ Decide who will manage the survey administration
3. ❑ Decide if you want to use the survey as is or refine it and pilot your changes
4. ❑ Decide how many surveys to send out
5. ❑ Choose a date to send out the survey
6. ❑ Decide how many times you will contact each household
7. ❑ Obtain mailing addresses
8. ❑ Plan how to protect respondent privacy
9. ❑ Draw a random sample from the mailing addresses
10. ❑ (Optional) Plan a campaign to raise awareness about the survey
11. ❑ (Optional) Prepare and mail the advance post-card
12. ❑ Prepare and mail the survey
    a. ❑ Prepare outer envelopes
    b. ❑ Prepare a cover letter
    c. ❑ Prepare copies of the survey questionnaire
    d. ❑ Prepare reply envelopes (either self-addressed business reply envelopes, or self-addressed envelopes with first-class stamps)
    e. ❑ Assemble all items
    f. ❑ Mail!
13. ❑ (Optional) Prepare and mail two follow-up postcards
14. ❑ (Optional) Prepare and mail survey a second time
15. ❑ Enter survey data into a computer database
16. ❑ Analyze the data and prepare a summary report
17. ❑ Supplement the PABS with qualitative information
18. ❑ Share your results with your own community and the wider network of pedestrian-bicycle advocates

1. You Are Thinking About a Survey? The Pedestrian and Bicycling Survey (PABS)

Communities worldwide are seeking to promote walking and cycling as an important strategy to tackle greenhouse gas emissions, traffic congestion, and public health concerns. A key component of successful planning for increased walking and cycling is to collect data on use of these modes so that planners can track the success of their efforts. However, most communities currently lack a feasible mechanism to collect this information at regular intervals. In response to that need, this manual presents a simple, inexpensive survey method to measure local walking and cycling levels, the Pedestrian and Bicycling Survey (PABS). As the U.S. Department of Transportation declared in a 2010 policy statement:

The best way to improve transportation networks for any mode is to collect and analyze trip data to optimize investments. Walking and bicycling trip data for many communities are lacking. This data gap can be overcome by establishing routine collection of nonmotorized trip information. Communities that routinely collect walking and bicycling data are able to track trends and prioritize investments to ensure the success of new facilities. These data are also valuable in linking walking and bicycling with transit.[2]

The Pedestrian and Bicycle Survey (PABS) is a method to collect data about bicycling and walking in your community. In particular, PABS was designed to provide small, mid-sized, and large communities with a survey method that:

- Is economical and simple to administer.
- Captures information important for local planning and evaluation including travel volume or quantity, trip purpose, and important socioeconomic and demographic information.
- Produces information about behaviors such as bicycling and walking that are engaged in by a relatively large number of people in any given week or year but that make up a small proportion of total trips.
- Has been tested for reliability—that is, when asked about characteristics or behaviors that don't change much from week to week, people will give similar answers if they fill out the survey at different times.
- Uses a sampling approach that will generate results that describe the behavior of the full population in the community—i.e., results that are "generalizable" the whole population.

To make survey implementation easy for local staff, this detailed manual lays out start-to-finish directions, from how to obtain an appropriate sample of households to basic methods for

[2] U.S. Department of Transportation, Federal Highway Administration, "United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation: Regulations and Recommendations," U.S. Department of Transportation, March 11, 2010. http://www.fhwa.dot.gov/environment/bikeped/policy_accom.htm (accessed June 20, 2010).

analyzing and interpreting the results. The manual is oriented toward practitioners working at the municipal level.

The authors refer those interested in more detail how the survey was developed, including the reliability testing of the questionnaire, to the companion report *Measuring Walking and Cycling Using the PABS (Pedestrian and Bicycling Survey) Approach*.[3]

1.1 Deciding if and how you want to conduct a survey

How do you know that the PABS would be useful and appropriate for your community? Answering "yes" to any of the questions below suggests that the PABS or something similar could be of value to your community.

- Are issues of walking and bicycling, and/or pedestrian-friendly design increasingly on the radar for your community?
- Has your community been involved in recent efforts to spur increased walking and cycling, either within neighborhoods or across the community?
- Is there talk of preparing or updating a pedestrian or bicycle master plan? (Or has one been recently performed?)
- Would your community or organization like a better measure of the current rates of walking and cycling among your residents?
- Is a major walking or cycling initiative or infrastructure project in the works—would your organization or municipality want to know if it made a difference at a community-wide level?
- Is your community going to apply for a grant where presenting data on community-wide walking and cycling would help your project score well, thus increasing chances for success in acquiring a grant?
- Is your organization or municipality concerned about pedestrian and cycling crash incidents but needs to know specifics on how much non-motorized travel is occurring (exposure) so you can conduct a pedestrian or bicycle crash analysis?

However, a survey like the PABS is only one potential approach. Table 1 shows the range of ways of collecting information about walking and cycling, highlighting advantages and disadvantages of each. While each method has strengths, the mail-out mail-back format used by the PABS is inexpensive and information can be generalized to the wider population. As is described below, and in more detail in the companion report, a mail-out survey with responses mailed back or using an optional Internet format may increase responses in a modest way, though evidence is quite mixed and it also increases the cost. However, both are recommended, considering the balance of current evidence.

[3] Ann Forsyth, Kevin Krizek, and Asha Weinstein Agrawal, *Measuring Walking and Cycling Using the PABS (Pedestrian and Bicycling Survey) Approach: A Low-Cost Survey Method for Local Communities*, Draft Report (San José, CA: Mineta Transportation Institute, October 2010).

Table 1: Data Collection Approaches for Documenting Walking and Cycling Activity—Advantages and Disadvantages

Approach	Advantages	Disadvantages
Questionnaire Forms / Self-Response		
Mail out/mail back	Inexpensive.	Need mailing list. Response rates can be low.
Mail out survey/mail-back or internet option for response	Flexible—people who like paper can use it and those who want the internet can use that. Some find is increases response rates modestly compared to a survey with only a mail-back option but evidence on this is mixed.	Adds complexity for both survey team and respondents.
Drop off/mail back	Surveyor can check addresses; may meet respondents and encourage response.	Dropping off is labor intensive; only viable for small areas or when using cluster sampling approaches.
Mail out postcard/internet response only	Inexpensive.	Requires multiple steps; difficult for those without ready access to internet.
Internet-only (the sample receives an email invitation to take a web-based survey)	Very inexpensive, assuming the sample of Internet addresses are not costly to obtain	To date, it is virtually impossible to obtain Internet addresses for a random sample of people in a city or county.
Diaries		
Diary (mail out/mail back or mail out/phone interview)	People record trips as they occur increasing accuracy.	Time consuming; may need multiple follow ups and incentives, particularly for multi-day diaries.
Interviews		
Door to door survey (in person)	Forms filled in completely—little missing data.	Expensive; people may not answer door.
Telephone (Computer Assisted Telephone Interviewing)	Forms filled in completely—little missing data.	Telephone listings by address are increasingly hard to find; not everyone has a telephone; no-call lists; expensive.
Instruments and Observations		
Observation of behavior	Captures behavior in certain places at certain times well.	Not easy to generalize beyond the time and place.
Counters such as infrared sensors	Captures level of use across time in different places.	Data may be hard to interpret. Not easy to generalize beyond the time and place.
Trackers e.g. global positioning system (GPS) units	Traces location of movement well.	Lacks information on mode and purpose.

Source: Adapted from Forsyth et al (2010)
Note: Other methods can be used for more qualitative information. Good approaches include focus groups and workshops.

1.2 Examining existing sources of information

Before embarking on a PABS or any other survey, your organization or community may first want to consider other sources of data that may be adequate for your needs—after all, the cheapest and easiest type of survey is one you don't have to do at all!

The most commonly used sources of local data on the quantity and purpose of bicycling and walking in the U.S. are:

- The U.S. Census or the American Community Survey.
- Regional travel surveys.
- Ad-hoc community surveys targeting specific groups such as downtown workers or people attending a specific school.
- Intercept surveys where people who are walking and cycling in particular places are stopped and interviewed.

These approaches are described in more detail in Appendix A. All provide very useful data for certain purposes, but they also have drawbacks for communities wanting detailed information on community-wide levels of cycling and walking. Key disadvantages are that the ACS and U.S. Census query only the commute to work in terms of travel; regional travel surveys are infrequent and may not have data for small areas; and ad hoc surveys (for example, sample cyclists in the downtown area only) or intercept surveys fail to provide information about the whole population in the community. All are useful methods, but the PABS fills an important gap. Most communities will find that to get a thorough snapshot of cycling and walking behavior community-wide, it's necessary to use the PABS or some other similar type of survey.

1.3 What components of a survey do you need to think about?

A survey is a method that examines part of the population to collect facts or opinions. It is used to approximate or indicate what collection and analysis of data from every single person in the population might reveal.[4] In this case, the PABS seeks to learn about levels of walking and cycling among a community's residents.

[4] W. Paul Vogt, *Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences* (Thousand Oaks, CA: Sage Publications, 1993), Floyd J. Fowler, *Survey Research Methods*, 2nd ed. (London: Sage Publications, 1993); The Health Communication Unit, *Conducting Survey Research, Version 2.0,* (Center for Health Promotion, University of Toronto, 1999); Kate Kelley et al. "Good Pactice in the conduct and reporting of survey research," International Journal for Quality in Health Care 15, 3 (2003).

A survey involves several components; some important ones are:

- The **survey instrument:** This is the device that is used to record the behavior of interest (the **form** that is actually completed by a respondent). A well-designed survey means you can get information about important topics in a way that is accurate.
- The **respondents:** These are the people who complete the survey. They often are a sample or subset of the population at large from whom data are collected. The nature and size of the sample have important implications for the overall generalizability of the sample to the larger population that it is meant to represent. This is discussed further in Section 2.
- The **sampling frame:** This term refers to the larger population from which the sample of respondents will be drawn.[5] The sampling frame reflects who you want to be able to say something about?

The following pages explain the content of the PABS instrument and its approach to sampling (creating a sampling frame and finding respondents).

1.4 What type of information does the PABS instrument collect?

The PABS approach answers some questions particularly well, especially questions about the **general behavior and characteristics of particular people**. This is different to some other data collection techniques such as travel diaries, that collect information on specific **trips**, or intercept surveys of people using **particular paths and places** (see Appendices A and B). More specifically the PABS method collects data on:

- Whether respondents have **walked or cycled within the last 7 days, last month, or last year** (Question 3). This question therefore determines who uses those modes *at all*. Just about everyone walks somewhere in a year and many people cycle.
- On **how many days they made walk or bicycle trips for different purposes in the past 7 days** (Questions 4 through 11). These questions provide information about the frequency with which people walk and bicycle. The questions ask about the number of days on which such trips were made, rather than the number of individual trips, to make the survey easier for people to complete. (The easier the survey, the more likely people are to complete it, and also the more accurate their answer may be.)
- On **how many days a week they commute by foot or bicycle, on average** (Question16). This question provides data on "average" behavior that might be missed by questions focusing on the previous 7 days. Commute data is also of particular interest to most transportation planners; although these trips comprise between 15 and 20 percent of all daily trips. Nonetheless, work trips represent the richest source generally available in the U.S., so it is a readily available data point for comparison.

[5] Vogt, *Dictionary of Statistics*.

- Typical **socio-demographic information**, information on **key factors that might limit active travel**, such as physical disabilities or weather, and information on whether the respondent has regular **access to a bicycle or motor vehicle**.

2. Samples and Surveys

2.1 Sampling: populations and sampling approach

Probability versus nonprobability samples

As is explained in more detail in Appendix B, there are two main types of sampling frames—probability and nonprobability. With probability samples—that is random samples—it is a fairly straightforward task to generalize results from the sample to the wider population; it is not as straightforward with nonprobability samples.[6]

Surveys of cyclists and pedestrians often use **non-probability based samples** (like snowball or convenience techniques) because both are easier to administer and have higher likelihood of attracting respondents. Some issues to be aware of with non-probability based sampling include:

- The sample might have a lack of representativeness—and it is often impossible to discern whether or not this is the case.
- It might be difficult to obtain information about a particular population. For example, an intercept survey won't learn anything about people not using a facility (see Appendix B).
- Respondents might be a self-selected sample—for example, surveyors might be reaching only avid cyclists or other unusual groups.

BOTTOM LINE: To easily generalize about the wider population, it is necessary to use a probability sample. Appendix B provides more detail.

Survey types—the Internet survey question

There are many different ways of collecting information about travel—from counting people passing a point to having them fill in a diary. Some of these are outlined in Table 1 and include questionnaires, diaries, interviews, instruments, and observations. The approach used in the PABS method, a mail-out mail-back survey, was chosen because it is relatively inexpensive, can reach people in dispersed locations, and if effectively administered, can generate adequate response rates.

Many people wonder these days if an Internet survey is a good idea. There are two main types of Internet surveys:

- **Internet options for probability-based samples.** Just about everyone in a municipality has a home but not everyone in a municipality has an internet connection. Mail surveys can reach everyone—important in a probability sample. However, providing an Internet option—for example, a web address and log-in code—can allow people who like to use the Internet to fill in surveys to do so. Research on this area is reviewed in the

[6] Fowler, *Survey Research*.

companion report. At present research findings are mixed—some finding it actually reduces response rates—consequently, the survey's authors leave it as an open question as to whether such an option should be provided.

- **Internet surveys that use snowball or convenience samples** to try to maximize the number of people reached. Examples include surveys of cyclists sent to advocacy groups via email lists or surveys placed on organization web sites and advertised in local media. These can provide helpful information but because they don't use a probability sample they can't be generalized to the wider population. It is possible to see how closely their demographics match those of the wider public in broad terms, using census data or similar, but this is limited (which is why your organization or community is performing the survey). This kind of survey is best used as a supplement to a probability sample survey such as the PABS. In section 3.3 we discuss other kinds of nonprobability data collection methods useful as supplements.

Only in cases where everyone has Internet access (for example, a survey of university employees) would it be possible to do a probability sampling approach with an Internet-only survey (a third type). However, this is not yet feasible in the municipal or neighborhood context.

2.2 Matching survey type with sampling approach

In the end, any survey needs to match:

(1) The "**mode" of administration** (for example, a mail or telephone survey versus an interview-oriented survey) with

(2) A **sampling approach** (for example, probability vs. nonprobability).

There are many different possible combinations of the above—for example, a random sample administered via mail out/mail back, a convenience sample of cyclists with GPS units attached to them, an Internet survey collected via snowball sampling techniques, or an intercept survey getting a certain quota of users.

BOTTOM LINE: After considering various options, we felt the most straightforward strategy to execute and understand was a mail-out mail-back survey using a clustered sampling frame. **However, in smaller areas a simple random sample would be possible. An Internet option for answering the survey is also possible, but it is not clear that it will increase response rates.**

For a longer discussion of the internet response option, see the companion report.

2.3 How many people to survey?

How many completed surveys are needed? It is actually fairly straightforward to determine using some well-known statistical formulas. The formulas are based on the following pieces of known information:

- **Population size**: Most survey data is intended to represent a particular population. Specifically, who is the population that you intend to generalize about?

- **Acceptable "certainty"**: How "certain" do you want to be about the study's findings and what margin of error is your organization or municipality willing to tolerate? The **confidence interval** is the plus-or-minus figure usually reported in poll results. For example, if you use a confidence interval of +/-4 percent and 47 percent of your sample picks an answer, you can be "sure" that if you had asked the question of the entire relevant population, between 43% (47minus 4) and 51% (47 plus 4) would have picked that answer. The **confidence level** tells you how sure you can be. It is expressed as a percentage and represents how often the true percentage of the population that would pick an answer lies within the confidence interval. The 95% confidence level means you can be 95% certain. **Putting the confidence level and the confidence interval together allows an analyst to say they are 95% sure that the true percentage of the population is between 43% and 51%.**[7]

- **Expected response rates**: This is probably the most difficult issue to consider. Response rates to surveys—of all kinds—are plummeting dramatically.[8] People's reluctance to complete surveys, increasing use of cell phones (which may or may not be linked to an address—a good foundation for probability based samples), and concerns over privacy all play a role. For a mail-out and mail-back survey, it is not uncommon to receive less than 25 percent of those surveys initially mailed out. Later in this manual, the survey's authors describe some strategies for increasing the response rate.

- **The proportion of sample with a particular characteristic (incidence rate)**: How prevalent is the behavior in which your organization or municipality is interested? Most statistics that are presented (such as those mentioned above) are based on two assumptions: (1) the sample was random and (2) the responses to the survey have roughly a 50-50 split for most of the questions (for example, 50 percent will favor a position, 50 percent will oppose). Aiming to learn about rare events undermines these assumptions. For example, if the survey wants to know more about women who cycle after sundown, the incident rate is typically extremely low; this suggests that your endeavor will require a larger sample size to reliably detect information about this relatively rare behavior.

Common folklore suggests that larger sample sizes are always preferred. However, larger sample sizes are likely not cost efficient. Depending on the preferred confidence intervals and levels, one only needs to collect a certain number of responses; efforts to collect more than that number can be redundant and costly. Arriving at a "magic number" of responses comes down

[7] Ibid.

[8] Kasper M. Hansen, "The effects of incentives, interview length, and interviewer characteristics on response rates in a CATI-study," *International Journal of Public Opinion Research* 19, no. 1 (2006), and A. Rogers et al., "Contacting controls: Are we working harder for similar response rates, and does it make a difference?" *American Journal of Epidemiology* 160, no. 1 (2004), and J. Michael Oakes et al., "Recruiting a Participants for Neighborhood Effects Research: Strategies and Outcomes of the Twin Cities Walking Study," *Environment and Behavior* 41, no. 6 (2009).

to straightforward statistics. Fortunately, there are a variety of on-line “calculators” to aid in this process (such as the one mentioned in the note to Table 2).

Given that communities thinking about implementing a pedestrian and bicycle survey might range from 20,000 residents to 5 million, it is helpful to offer a few examples. Table 2 suggests the number of complete surveys needed, assuming a 95 percent confidence level and an incidence rate around 50-50. Select the approximate population of your city and then choose your margin of error for such incidence rates.

Table 2: Sample Sizes for Areas with Different Populations

	Sample Size Needed (95% confidence level)			
Population	**Margin of error + / - 3%**	**+/- 4%**	**+ / - 5%**	**+ / - 10%**
2,000	696	462	323	92
5,000	880	536	357	95
10,000	965	566	370	96
20,000	1,014	583	377	96
50,000	1,045	593	382	96
100,000	1,058	597	383	96
500,000	1,065	600	384	96
1,000,000	1,066	600	384	96
5,000,000	1,067	600	384	96

Note: The above values were obtained by inputting values to the on-line “calculator” available at http://www.surveysystem.com/sscalc.htm. Any similarly oriented calculator would yield the same results, since the calculators are all based on standard statistical formulas.

However, along with total population size, the analyst choosing a sample size needs to be aware that the confidence interval also depends on how prevalent the behaviors being studied are in the population. The term “incidence rate” is used to describe this prevalence, or the proportion of the population will choose a particular response to a question. For example, if the survey asks whether or not people bicycled last week and get 50 percent of people saying yes, then the incidence rate for cycling is 50 percent.

As previously mentioned, the behaviors under discussion—in particular cycling--likely have incidence rates well below 50% for any particular day or week. Table 2 is based on behaviors that would be prevalent for large portions of the sample. Behaviors with lower incidence rates have smaller confidence intervals, which is an additional consideration.[9] Table 3 presents a

[9] Fowler, *Survey Research*, 30–31.

generalized table of sampling errors for samples of various sizes and for various proportions assuming a simple random sample.

In general, as incidence goes down the confidence interval shrinks. For example, if your organization or municipality decided to interview 500 people and ask if they walk a dog, and the incidence of the behavior was 50 percent, then the confidence interval would be 50+/- 4 percent. That is, you would be 95 percent sure that between 46 percent and 54 percent of the population walked a dog in a specified period. However, if the incidence of dog walking was 10 percent, then the confidence interval is +/- 3 percent, or you would be 95 percent confident that 7 percent to
13 percent of people walked a dog. This is a fairly narrow margin of error in absolute terms but big in relative terms (13 percent is 86 percent more than 7 percent). Consequently, this means that Table 3 is as important as Table 2 in figuring out how many people to survey.

Table 3: Confidence Intervals for Variability Attributable to Sampling (assuming a 95 Percent Confidence Level)*

	Percentage of Sample with Characteristic				
Sample size	**5/95**	**10/90**	**20/80**	**30/70**	**50/50**
35	7	10	14	15	17
50	6	8	11	13	14
75	5	7	9	11	12
100	4	6	8	9	10
200	3	4	6	6	7
300	3	3	5	5	6
500	2	3	4	4	4
1,000	1	2	3	3	3
1,500	1	2	2	2	2

Source: Fowler, 1993, 31.

Given these considerations, there is unfortunately no foolproof strategy to determine the bottom line for a needed sample size. Such matters usually come down to a combination of:

(1) Suggested thresholds (based on the calculators previously discussed)

(2) The confidence interval and confidence level that are likely to be acceptable, related to the expected incidence of behaviors

(3) Available resources

As a very rough rule of thumb, many communities will think that 500 or 600 returned surveys is

a good number, although some may be happy with fewer and some want more.

A separate but linked question is figuring out the number of people who will need to be contacted in order obtain the necessary number of responses (in other words, reach the desired sample size). This is a function of the strength of the recruitment plans (see below), and available time. More detail about how to make these decisions is included in Section 3, but briefly, with a 30 percent response rate your organization or municipality would need 2,000 surveys sent out to get 600 responses (600/2,000 = 30 percent). Thus, with a higher response rate you can send out fewer surveys but if it is lower you need to send out more.

2.4. Why use this survey?

Good and useful surveys require significant effort and are not needed all the time. There are some situations where investing $5,000 into a survey will either enable communities to tap into new sources of funds, or save them from mis-spending them. However, for some kinds of questions the survey approach may be so expensive as to be not worth it—for example, if you are trying to measure the change in cycling within a city due to a trail extension, even if cycling doubles from 1 percent to 2 percent, it may be almost impossible to measure that because any realistic sample would have a margin of error larger than the effects the survey is trying to measure. For instance, a detailed example (described more fully in Krizek, et al., 2009) offers the following illustration:

> Assume that 1000 individuals in a community complete the U.S. average of four trips per day, yielding information on about 4000 trips. Assume the communities have cycling rates above the national average, say at 1% of all trips (p=0:01)—this would result in a mere 40 of the 4000 trips for cycling (and most of these forty trips would likely be from the same people). Now suppose that data from the post-intervention survey show the mode split of cycling doubles to 2%, or eighty cycling trips in the community. A statistical analysis at the 95% significance level would be able to confirm an increase in cycling (that is, such a change is outside the bounds of the confidence interval). If, however, the change in use was smaller than an increase to 2% (i.e., anything less than doubling), a statistical analysis would not be able to able to confidently detect such a change, assuming this sample size. Put another way, the chance of detecting a doubling of the rate of cycling among the general population from 1% to 2% of all trips (p=0.02) is about 92%; however, an increase to a more likely outcome of 1.2% (p=0.012) will confidently be detected only about 44% of the time.[10]

BOTTOM LINE: For those wanting to find out about daily travel in general the PABS is useful. Unless you have a very large number of responses, or live in a community well known for many cycling trips each week, you will not be able to use it to detect many changes in behaviors such as cycling for particular purposes in a given week.

[10] Kevin Krizek, Susan Handy, and Ann Forsyth, "Explaining Changes in Walking and Bicycling Behavior: Challenges for Transportation Research," *Environment and Planning B* 36 (2009): 736.

3. Steps in Administering the Survey

Note that the steps in Section 3 match the survey checklist earlier in the report.

Step 1: Determine whether or not the PABS method will collect needed and useful data for your community

Using the information above, decide if a PABS survey will provide data valuable for your community's planning and policy evaluation needs.

Step 2: Decide who will administer the survey

An important early decision is to identify who will be responsible for administering the survey. There is no straightforward response to this; in part, it depends on the institutional setting and available resources. To aid you in considering different scenarios the authors have generated Table 4 and then describe various options. In addition, Appendix C presents a flow chart for other possible considerations in choosing an administrative option.

- **Option A: Outsource all tasks to a survey consulting firm**. This is the most costly alternative but will likely get the steps done with the least amount of hassle.
- **Option B: Complete all work in-house**. This option has in-house staff members completing all tasks. With appropriate staff resources or volunteer effort, effective management, and orientation to detail, all the necessary steps can be easily completed within a planning, public works, or recreation department.
- **Option C (recommended): Complete most work in-house, but hire help or get volunteers for those key tasks that are time-consuming and don't require specialized skills**. Highly time-consuming tasks for which help can be hired relatively inexpensively include using a professional mailing service to handle copying, and stuffing and addressing envelopes; using volunteers to hand address enveloped with blue ink; and hiring someone to complete data entry.

Table 4: Levels of Skill and Difficulty for Various Survey Administration Tasks

Steps that likely require ***considerable intellectual attention and guidance***	*Steps that require guidance but could be* ***managed with minimal supervision***	*Steps that need to be done, but are relatively* ***tedious, repetitive or straightforward***
• Deciding who is the desired sample • Estimating the desired sample size • Soliciting endorsement from the mayor or other key local officials • Making sense of data analysis	• Entering data • Data analysis • Pilot testing • Getting addresses	• Addressing envelopes • Stuffing envelopes • Mailing surveys • Monitoring response rates

Step 3: Decide if you want to use the survey as is or refine it and pilot your changes. This includes deciding if you want an Internet option

There are at least two principal reasons for pilot testing. The first is to ensure the wording, sequencing, and meaning of the questions in the survey instrument make sense. While the survey instrument that is provided in Appendices D and E has already withstood this step, should you be modifying or adding any questions, then it is strongly advised to pilot test on a group that mirrors your population as closely as possible.

The second reason is to check the protocol and process to be used. As is apparent there are many steps involved in the process, many of which rely on one another. Ensuring that all "systems work" prior to having all "systems go" is strongly advised. In most cases this involves initiating a process for a small portion (perhaps 5 percent to 10 percent or so) of the intended sample. However, this is additional work.

In addition, the PABS was initially designed as a set of modules—basically the questions under each major heading were seen as a group. As the survey developed it became more continuous. However it is possible to shorten the survey—eliminating whole sections or specific questions. Such shortening would need to be piloted.

Finally, if an Internet option is chosen, that would need to be created on the web and then piloted.

Step 4: Decide how many surveys to send out

There are three activities:

- **Selecting the number of completed response you need given acceptable margins of error:** In Section 2.3, the survey's authors describe the general principles behind selecting a sample size. At this point, you can then use a number of online calculators that have sample size calculators to do so (for example, www.custominsight.com/articles/random-sample-calculator.asp)
- **Estimating the rate of response:** Not everyone will respond. If the survey needs to include 600 random, completed surveys and the response rate is 10 percent, you will need to send out 6,000 surveys; if the response rate is 50 percent, you will only need to send out 1,200. Given the cost issues below, it is a good idea to do everything you can to get a high response rate (see Step 7).
- **Considering costs:** Certain survey costs are fixed (for example, publicizing the survey or analysing the data) and others depend on the number of surveys (for example, printing and mailing costs). Appendix F provides some cost scenarios.
    - The PABS has a number of variable costs that change in relation to how many surveys are sent out.
        - Envelopes, printing, enveloped stuffing, and first class stamps printed on the envelope cost approximately $1.00 per survey.
        - Business reply paid postage cost over 60 cents per completed survey (including a 10 cent fee from the post office).

- As a working approximation, PABS' authors propose allocating $1.75 per survey sent out, including return postage usage from completed forms, to be a reasonable estimate.
- This does not, however, account for hand addressing. In short, every 1,000 surveys sent out adds substantial cost.

- An internet option for the mail-back survey, if chosen, is largely a fixed cost that does not depend on the number of completed responses.
  - While there are many useful web-based services and most have a free version, in order to download data in easy-to-use formats it is generally necessary to pay for a subscription.
  - Staff time will be needed to set up the survey, figure out how and whether to track individuals (perhaps one required question could be a code from the survey form), and pilot or test it.
  - Added staff time will also be needed to combine the two datasets—the one from the mail-back forms and the one from the Internet.

Step 5: Choose a date to send out the survey

Some surveys focus on use patterns during specific times of year (for example, the use of a popular trail in the height of summer). To detect typical levels of walking and cycling, as in this survey, it is best to send it out when people's travel is most ordinary (avoiding major holiday seasons, or extreme weather periods). Whether or not school is in session is another consideration since the need to get children to and from school has a major impact on travel behavior. Overall, travel surveyors have usually decided that the most reliable times to pursue travel surveys are in spring or fall months, during the school session. The authors recommend that PABS users do the same.

Step 6: Decide how many times you will contact each household

Widely regarded as a "staple" in the field of survey research, the Tailored Design approach (also known as the Dillman method)[11] contends that effective survey implementation consists of five elements—each to be shaped in ways that complement the others—which have individually been shown to significantly improve response to mail surveys in most situations. These five elements include: (1) a respondent friendly questionnaire, (2) up to five contacts with the questionnaire recipient, (3) inclusion of stamped return envelopes, (4) personalized correspondence, and (5) a token financial incentive that is sent with the survey request.

Chapter 4 in Dillman (2007) proceeds to describe in detail the characteristics of each step, some of which are included in this section. It is recognized that resource, time, and other constraints often preclude the entire suite. Therefore, it is important to recognize that some survey researchers contact households many times by phone and mail; others send out just one

[11] Don A. Dillman, *Mail and Internet Surveys: the Tailored Design Method*, 2nd ed. (New York: John Wiley & Sons, 2007).

survey. In many respects, it is a calculation involving costs, valuing privacy (and minimizing harassment concerns), and doing what is necessary to obtain "enough" responses. In locally administered surveys such as the PABS the authors distinguish between three levels of contact:

- Low = just mail the survey (simplest and cheapest but will have the lowest response rate and may have more problems with non-response bias)
- Medium (recommended) = advance notice post-card, followed by the survey mailing, followed by follow-up postcard
- Deluxe: Advance post-card, survey, two follow-up postcards, 2nd survey (closest to the full Dillman method)

This also reflects research on increasing response rates. In 2002, Edwards and colleagues reviewed 292 randomized controlled trials of different strategies for increasing response rates in postal questionnaires, involving more than two hundred thousand participants.[12] After examining dozens of approaches they found the following increased response rates, some doubling them. Those related to the number of contacts, the topic of this manual, include:

- Contacting participants before sending the survey (as in the medium and deluxe methods)
- Follow up contact (in medium and deluxe methods)
- Providing respondents with a second copy of the survey (as in the deluxe method)

Other items dealt with in different sections of this manual include:

Shorter questionnaires (some in the medical field are very long) typically results in doubling the response rate)

- Personalized questionnaires and letters
- Colored ink for addressing and signing
- Stamped return envelopes
- Sent by first class post
- Questionnaire originating at a university versus a commercial source. The authors think that having the survey sent by a local government is even better to increase response rates!
- Some other strategies are ones that have not been recommended due to cost, but they would be worth investigating if they can be funded—monetary incentives double response rates on average, though other research shows response rates varying with amounts[13]

[12] P. Edwards., I. Roberts, M. Clarke, C. DiGuiseppi, S. Pratap, R. Wentz., and I Kwan, "Increasing Response Rates to Postal Questionnaires: A Systematic Review," *British Medical Journal* 324 (2003): 1.
[13] Adam S. Willcox; Giuliano, William M.; Israel, Glenn D.. "Effects of Token Financial Incentives on Response Rates and Item Nonresponse for Mail Surveys" *Human Dimensions of Wildlife: An International Journa*l 15, no. 4 (2010): pages 288-295.

- Questionnaires sent by a form of recorded delivery (more than doubles response rate)

In addition, questions designed to be interesting to the respondent and not asking for sensitive information were more likely to receive responses, though compared with the medical surveys reviewed by Edwards and colleagues, the PABS likely fares well on these points. Overall the number of contacts matters.

The authors found that each time a survey is sent to, for example, 2,000 people, the costs are in the vicinity of $3,500 if using business reply envelopes for the responses. (When business reply envelopes are provided, the overall cost will depend on the response rate, since this postage is only charged on returned surveys). Sending a postcard will be less expensive but even at $0.80 per card, each wave would be in the vicinity of $1,600 for printing and mailing.

Thus, the authors recommend a "middle ground" approach, with one survey sent out along with two postcards as a good balance between improving response rates and minimizing costs. However, each community will need to weigh the costs and benefits. The authors cover the issue of increasing response rates in more detail in Step 7.

Step 7: Plan a campaign and strategy to raise awareness about the survey

There is reason to believe that the following strategies will help increase response rates. How much each individual strategy might increase the response rate has been studied for some of these but not all (see review in the companion report). However, doing more (rather than fewer) of the following steps would help:[14]

- **Undertake a strong news publicity campaign**: This might include articles in local newspapers, radio, and television to raise awareness about the survey and its importance to the community.
- **Send the survey with a persuasive cover letter from the mayor referring to the publicity**. Sending the survey with a cover letter from the mayor will show recipients that the city administration takes the survey seriously and that the data collected will be used to inform real policy decisions. Recipients are thus more likely to feel it is worth their time to respond.

Step 8: Plan how to protect respondent privacy

The data from any survey involving people's behavior is often considered to be confidential. This survey is no exception. All universities, for example, have extremely rigid requirements about such in terms of maintaining the original surveys—and any identifying information in the data analysis itself—highly secure. While communities employing this survey may not be obligated to fulfill such requirements, doing so is still strongly advised. In particular, this means one important action for two sets of information: storing the completed surveys and the address used to send the surveys in a secure and private place to which only key members of the research team have access.

[14] Thomas W. Mangione, *Mail Surveys: Improving the Quality* (Thousand Oaks, CA: Sage Publications, 1995).

Step 9: Obtain mailing addresses

These instructions assume that the survey uses a probability sample. There are three main options for cities aiming to create a complete address list from which to sample—the parcel database, a door-to-door survey and commercial mailing lists based on post office files. There are other lists such as the one created by the U.S. Census, but such lists are typically not available to local governments.

- In a city one might use a parcel database for the sample frame. This would be inexpensive. However, it has a key limitation in that multiunit apartments are typically not differentiated—they are on one parcel with one tax bill. In a location with only single family dwellings and ownership condominiums this would not pose a problem but elsewhere it is a concern.
- If the area is small, people could go door to door to compile a list.
- The other option is to use a version of the address list compiled by the post office for delivery or some other similar list. Such lists are available from commercial vendors and include apartments. They do come at a cost but are available broadly.

In order to create a model that any city could use PABS' authors decided to use commercial mailing lists. They uncovered two main vendors of such lists—AccuData and MelissaData. Table 5 compares these two sources.

Table 5: Comparison of Mailing Address List Vendors

	AccuData	MelissaData
Main web site	http://www.accudata.com/	http://www.melissadata.com/
Data web site	https://www.acculeads.com/cow1.max	http://www.melissadata.com/lookups/
Generic contact	800 732 3440	800-melissa
Relevant file	Residential Business Occupants	Occupant Saturation
Web link about data	http://www.accudata.com/images/dataCards/ResOcc/AmericanResOcc.pdf	http://www.melissadata.com/var/productsheets/Occupant_Saturation.pdf
Pricing	With sales person the minimum is $300; online the minimum is $100 (https://www.acculeads.com/cow1.max#); $15 per 1,000 for the simple saturation; names add $10 per 1,000.	$9.50 per 1,000 for the simple saturation list and minimum $25 order. Lists with personal names available at an additional cost of $6.50 per 1,000.

Source: Forsyth, Krizek, and Agrawal, PABS.

The address lists are developed for bulk mail. Because such mail is designed to be delivered to every address on a carrier route, the U.S. Postal Service overlooks some slight errors (for example, S. Main instead of Main South). The address suppliers do not guarantee that it will be delivered using first class mail.

For small areas it may be cost effective to obtain all addresses for that area and randomly sample. For larger study areas, as is described above, a clustered approach is more efficient and saves money. This approach enables the survey team to develop a complete list of neighborhoods (or in this case, postal carrier routes), randomly sample a subset, and then buy this more limited number of "neighborhoods" rather than every address in the study area.

Carrier routes are a small unit related to postal delivery and typically comprise a few blocks that are near each other but not necessarily adjacent. The carrier routes PABS' authors ultimately bought had an average of 460 addresses each. Table 6 provides some example data from carrier routes. In this case, the authors obtained only residential addresses but these routes also contain a mix of single houses and apartments or condominiums, and varying proportions of addresses with a contact name. In general there are more contact names for single-family units—likely because there are typically fewer recent movers in such units.

Table 6: Example Data Summary for Residential Addresses

Report Breakdown By: Zip 5 and Carrier Route—Description

Zip 5 and Carrier Route	Description	# Records	City Addresses	Multi-Family Units	Single Family Units	Business	Contact Name
12345C008	ANYWHERE, CA	341	341	281	60	0	174
12345C002	ANYWHERE, CA	407	407	0	407	0	371
12356C027	ANYWHERE, CA	32	32	32	0	0	9
12356C034	ANYWHERE, CA	348	348	71	277	0	258
12367C042	ANYWHERE, CA	29	29	4	25	0	21
12378C056	ANYWHERE, CA	238	238	237	1	0	66
12389C012	ANYWHERE, CA	523	523	76	447	0	366

Source: Modified from Melissadata summary

PABS' authors purchased carrier routes and randomly sampled in an integrated process described in the next section.

Later steps describe how to sample within the household (have the adult, 18 years or older, with the most recent birthday fill in the form).

Step 10: Draw a random sample from the mailing addresses

Table 7 below outlines how we drew a random sample in the San José field test. The generic action is listed in the left column and specifics about how that worked in San José is described in the right.

Table 7: Details of Obtaining Stratified Random Sample from Mailing Address Lists

Step	Details for San José Case
Step One Overview: Obtain a list of all carrier routes in San José, select those with residential addresses and then randomly sample 65 routes for a total of 30,129 addresses.	
•	Compile a list of all the postal carrier routes in the city by identifying zip codes and then actual carrier routes. The authors obtained the list from http;//www.melissadata.com/lookups/cartzip.asp
•	Eliminate post office box-only routes.
•	Eliminate the zip codes with under 12% of addresses that are in the study area (the city).
•	Sort for and delete the routes without dwellings.
•	Randomly select carrier routes and purchase them.
Step Two Overview: Randomly select 2,000 addresses from within the complete set purchased.	
•	Randomly select desired number of addresses across the entire set of carrier routes. More detail about how to do this is in Appendix H.
•	Check that all addresses are in the study area (the city).

Source: Adapted from Forsyth et al (2010), Table 5. More detail is provided in Appendix H.

Step 11: Prepare and mail the advance post-card (optional)

As mentioned in the previous section, choosing how many times to contact each respondent is a key concern in survey administration. While a recommended optional step, research comparing response rates indicates that an initial contact (prior to sending out the survey) helps. This contact would simply describe what will happen, what it is all about, the utility of the study, and a thank you.

Again, some suggest[15] that a postcard containing this information is too whimsical and therefore prefer that this initial contact should be a letter (the argument is that it takes more than 20 seconds to get an event into long term memory). In the interest of cost and efficiency, PABS' authors suggest a postcard should suffice.

Step 12: Prepare and mail the survey

Even if you are using the survey exactly as it appears in this manual there are a number of additional decisions and actions to take in preparing and mailing the survey. There are several

[15] Dillman, *Mail and Internet Surveys*.

helpful resources on this topic (for example, Dillman's *Mail and Internet Surveys* from 2007 contains over 500 pages of detail, many on issues mentioned below).

As a practical example Table 8 outlines the basic elements of this process for the PABS, lists key questions, and provides an example of how the authors did this in the San José test.

Table 8: Mailing Surveys: Elements and Decisions

Element	Decisions	San José Case
The outer envelope	Color, size, logo, postage (first class stamp vs. bulk mail), hand vs. machine addressed	The outer envelope was a white, size 10 envelope printed with the San José State University logo and return address in the upper left-hand corner. Each envelope had a first-class stamp. Researchers tracked delivery rates using machine versus hand addressed envelopes and cover letters. Consequently, PABS' authors recommend addressing by hand in blue ink.
The cover letter	Tone, reason for responding, who in household should answer (so it is random)	The text of the cover letter was chosen to emphasize to residents the value of the survey project, in order to increase the response rate. The letter also asked readers to have the survey filled out by the adult in the household with the most recent birthday. It was signed by hand with blue ink.
The survey questionnaire	Double or single-sided, color, font size and shape	The questionnaire was printed double-sided on an 11 x 17 sheet of yellow paper folded to make an 8.5 x 11 "booklet." To make the questionnaire easy to read, it used Garamond (a serif font) in a relatively large face (13 pt).
The return envelope	How to make returning the survey easy	The envelope was a pre-printed, size 9, "business-reply" envelope that required no postage to be added by the respondent.

Overall the following steps are worth talking:

- **Send the cover let on letterhead from the city**—showing that the city values this information.
- **Mail the survey out in envelopes from the city.** This technique makes it more likely that people will open the envelope, because the letter will appear to be something important (and not junk mail).
- **Address the envelope by hand in blue ink.** In a test of PABS, with only one survey mailing sent out from the San José State University, the response rate from hand

addressed surveys was approximately 50 percent higher than from surveys sent in machine addressed envelopes (although this difference was not statistically significant).

- **Address the envelope to the recipient using his/her name**. In the same test PABS' authors found that addressing the envelope to the person (for example "Jane Smith or resident") rather than to "resident" also increased response rates, though by a much smaller amount.[16]

Step 13: Prepare and mail one or two follow-up postcards (optional)

Please refer to the section about survey administration while still being attentive to issues of timing in relation to holidays and weather. One follow-up would be needed for the "medium" level of contact, two for the "deluxe." Typically such reminders are sent at one or two-week intervals.

Step 14: Prepare and mail survey a second time (optional)

If after waiting approximately four to six weeks and sending a reminder post card you still do not have enough responses, you can resend the survey. If you have maintained anonymity you will need to send it to every household again, and some may do it twice. If you have tracked responses, you can be more targeted but may need to deal with some privacy issues.

The actual logistical process is in Step 12. The letter should be modified to indicate it is a second copy of the survey.

Step 15: Enter survey data

As the completed surveys come back in the mail, give every survey a number so you can return to it later to proofread or check answers.

Prepare a computer spreadsheet with row for each survey and a column for every question. For questions where people can choose "all that apply," the spreadsheet needs a column for each possible answer within that question.

One person is quite capable of doing the data entry. However, having two people do data entry—one to read and the other to type—can be faster.

In general, type in the survey responses exactly as they have been entered. The following are a few exceptions to that rule:

- If people respond to a question asking about a year by writing only the last two digits of the year, it is acceptable to add in the 19, given only adults are answering this survey. For example, if someone writes "71," enter the response as 1971.
- Where people leave a question blank, use a numeric code that means "blank." (Surveyors often use "999" to represent "blank" answers.)
- If people write in "NA, or not applicable, " use the code that represents "blank."

[16] Forsyth, Krizek, and Agrawal, *PABS*, Table 6.

- If an answer given is impossible—for example, if someone answers a question about how many days s/he walked in the last week with “52”—then code the response for that question as missing (blank).
- If the question that asks about the number of adults in the household has a response of “0,” even though it is obvious that there is at least one adult filling in the survey, code the data as missing rather than entering “0.”

Proofreading after data entry is strongly recommended. Two people can help here as well—one to read out answers from the surveys, and the other to check the accuracy of the computer file. If using a web option, data entered into the Internet version will also need to be checked and combined with the mail-back data. Missing data will need to be coded.

Step 16: Analyze the data and prepare a summary report

Data analysis includes a few steps:

- As a preliminary check, compare the basic demographics of your sample with those for the area as available in census or other similar surveys. Where the demographics are similar you are in luck; where they are not you need to decide if they vary in important ways. Variations will make your interpretation more cautious.
- If you have two versions—web and mail-back—compare the basic demographics of each of these groups.
- Section 4 provides more detail about general data analysis.

Step 17: Supplement the PABS with qualitative information

Even with a terrific response rate you may still have relatively few examples of some kinds of activities such as cycling trips to transit. In these cases it is useful to supplement the PABS information with information from other sources. These other sources are often the only information a community collects—the PABS can place them in the context of the wider population.

- Information on particular places: You could observe or intercept people using trails or walking in the downtown.
- Opinions from particular groups: Using surveys made available in the local newspaper, online, at businesses and community facilities, you can solicit opinions. For example, you may email members of a bicycling advocacy group to ask what improvements people would like to see in the local area.
- Workshops and meetings: Having a structured meeting to identify strengths and challenges in the local environment, or to gain feedback about proposed changes, can inform policy.
- Educational programs for youth: Youth in school and after-school programs are a great resource for input about walking and cycling. They could be involved in surveys, mapping, observations, or photography.

Step 18: Share your results with your own community and the wider network of pedestrian-bicycle advocates

See Section 5.

4. Suggestions for Analyzing the PABS Data

4.1 Basic analysis approaches

In terms of analysis, there will be three basic types of information that you can obtain from this survey:

- **Descriptive statistics for the entire population**: This includes such elements as the averages (means), medians (middle scores), and frequencies of different kind of behavior.
- **Descriptive statistics for subpopulations** such as pedestrians or women. This is often referred to as cross-tabulation analysis. The extent to which cross-tabulation analysis can be done depends on how finely one chooses to analyze the data but different categories, so as to avoid the statistical problem of having too few cases in each cell (category of analysis). For example, it is expected that it should not be a problem to example differences in rates of walking for males versus females or rates of cycling/walking for general neighborhoods. But trying to learn a good deal about rates of walking/cycling for women over 40 will likely yield substantially smaller numbers that would jeopardize the integrity of the statistical analysis.
- More in-depth and possibly **multivariate analyses**. Such processes generally will not be necessary. Communities wishing to undertake them will want to have the analysis done by someone with a fair amount of expertise in statistical analysis of survey data.

4.2 Recognizing limitations

As is the case with any survey, there are a number of issues to keep in mind when considering the results. The following considerations are relevant to most surveys of cycling and walking, as well as to the PABS survey:

- The data will depict how much walking/biking the residents do overall, which won't be exactly the same as how much they do in their residential area.
- People responding to the survey may not be perfectly representative of the population of interest: For example, older people tend to answer surveys more than those who are younger.
- Walking and bicycling trips are often considered to be a virtuous behavior—when they remember such travel, people feel good about doing it and tend to overestimate such in their recall. Thus, it might the case that the numbers could be a bit inflated.
- Travel survey experts believe that people often forget about walking and cycling trips they've made. For example, people may forget about a 10-minute walk to a transit stop or a two-minute trip down the block to a convenience store.

BOTTOM LINE: PABS, like any survey, can produce good estimates of community-wide behavior, but the data should be taken as such—good estimates—rather than as

the absolute truth.

5. Suggestions for Sharing the PABS Results

Once you have completed the survey it is important to share the results with those who can use them—including citizens, advocacy groups, members of the planning commissions, and elected officials. It is also important to present the results in terms that different audiences will find easy to understand and helpful. This means choosing the right format (for example, a one-page handout of text vs. a PowerPoint presentation vs. a long report) and also presenting those specific findings that the audience will find most useful. Table 9 provides a list of potential constituents and the formats that may be appropriate for communicating with them. Also, in Appendix I the authors provide a few examples showing different ways that data from this survey could be presented as charts.

Table 9: Survey Constituencies and Formats

Constituency	Format
Transportation planners	- The results for each question asked
	- Tables of descriptive statistics
	- The complete data set in a computer spreadsheet
Elected officials	- A one or two page handout that summarizes the most important findings, perhaps combining text with two or three charts or tables
Advocates	- A two or three page handout summarizing the most important findings that includes multiple charts and/or tables, along with text
	- Tables of descriptive statistics
General public	- A one page handout that summarizes the most important findings in text form
	- A web link to a longer summary of the data and tables of descriptive statistics

BOTTOM LINE: Once you do the survey you need to get the word out in multiple forms. In survey reporting one size does not fit all—provide information relevant to your audience.

APPENDICES

Appendix A: Existing Sources of Information on Walking and Cycling Behavior

In the U.S. there are several sources of detailed national information on walking and cycling including the periodic National Household Travel Survey and the public health-oriented Behavioral Risk Factor Surveillance System. However, these surveys do not provide information for small areas such as neighborhoods or even cities. Other sources of more local data do exist, however.

In the United States the single most common approach to assessing local walking and cycling is to rely on reported measures from the **U.S. Census or the American Community Survey (ACS)**.

- A strength of the Census and ACS is that they are conducted in a highly professional and systematic manner, following the best practices for surveys, and thus produce very reliable data that can be generalized to the community level.
- However, the Census and ACS also provide only one, very limited piece of data on walking and bicycling—the share of the working population in the community who report that they typically walk or cycle as their main commute mode. The ACS question on walking and cycling is worded as follows:

  > "**How did this person usually get to work LAST WEEK?** If this person usually used more than one method of transportation during the trip, mark (X) the box of the one used for most of the distance"[17]

  "Walked" and "Bicycle" are two of 12 response options that respondents can choose.

  A limitation of the Census/ACS data is that the question asks about the mode "used for most of the distance" of the commute trip. Many people combine walking and cycling with other modes, especially with public transit, but the ACS question will miss this walking or cycling that happens as just part of an overall commute trip. A second limitation of the Census/ACS data is that it misses people who may walk or cycle one or two days a week, since these are not the modes those people "usually" use.

  Another limitation of the Census/ACS data is that it only focuses on commute trips. According to data from the 2006–2008 American Community Survey, 2.8 percent of people in the United States walk to work. However, according to the 2001 National Household Travel Survey only 15 percent of daily trips are commuting trips;[18] thus, the ACS question only finds out about one small portion of overall walking and cycling behavior.

  In the longer term it would be helpful for the ACS to ask more travel questions. However, such changes would likely take a very long time to implement—hence the need for a survey like the PABS.

[17] U.S Census Bureau, *The American Community Survey Question Booklet*, (U.S Census Bureau, 2008), http://www.census.gov/acs/www/Downloads/SQuest08.pdf (accessed June 15, 2010).

[18] Bureau of Transportation Statistics, Research and Innovative Technology Administration, "National Household Transportation Survey Daily Travel Quick Facts," http://www.bts.gov/programs/national_household_travel_survey/daily_travel.html (accessed June 15, 2010).

Regional travel surveys provide a second source of data on biking and walking, at least for those communities in large urban areas that regularly conduct these studies.

- A strength of regional travel surveys is that they collect data on trips made for all purposes, not just commute trips. To do so, regional travel surveys make use of so-called "trip diaries" that ask respondents to report on every single trip they made in the last one, two, or three days.
- Another strength of these surveys is that, like the Census and ACS, they are conducted by professional survey experts, and the results tend to be very reliable.

However, there are drawbacks, to these regional surveys as well.

- Often the surveys are conducted only every ten years or so, so the available data may be quite old.
- They are extremely expensive to administer.
- Some regional-level travel surveys include data on only a very few walking or cycling trips.
- Sometimes the sample size is too small to provide good community-level data, especially for small communities where only a few people may have been surveyed.

Yet other sources of data may be "**ad-hoc" community surveys** that are conducted for a specific purpose. Examples might be a survey of pedestrians and cyclists in the downtown conducted by the chamber of commerce, or a survey of people who belong to a local cycling club.

- An advantage of using data from these types of surveys can be that they collect data on topics of particular interest to the local community.
- However, a frequent limitation of community surveys can be that they usually don't collect data that represents typical behavior among everyone living in the whole community. (Or, to use the technical statistical term, the results can't be "generalized" to the whole community.) This limitation can occur for various reasons. For one, the survey may collect data only from certain types of people (perhaps children attending a particular school).
- Also community surveys commonly have either: (a) relatively small sample sizes, thereby affecting the margin of error which may be quite large, or (b) use "convenience," "snowball," and other "non-probability" sampling approaches, thereby limiting the generalizability (see Appendix B).

An important variation of local community surveys are **intercept surveys**. These collect data from people using a particular facility, like a bike path.

- A strength of these surveys is that they provide important information about people out using trails and paths, or who pass by busy locations at important times.
- It is also possible to collect the data in ways that allow one to generalize the survey results to everyone who uses the trail. For example, by randomly selecting a passer-by and then interview every 4th person passing, a researcher could generalize to the other three-quarters of those passing by on that trail at the same time. The National Bicycle and Pedestrian Documentation Project has prepared a popular method for conducting bicycle and pedestrian intercept surveys.[19]

[19] Alta Planning and Design et al.,_"National Bicycle and Pedestrian Documentation Project," Alta Planning and Design, and ITE Pedestrian and Bicycle Council, 2010. http://bikepeddocumentation.org/ (accessed June 20, 2010).

- A limitation of intercept surveys is that many people who walk and cycle are not surveyed using such techniques, such as people who don't use the trails or paths and people who use them but at a different time of the day, week, or year. Thus, these methods don't allow a survey researcher to make claims about the wider community.

Appendix B: Probability Versus Nonprobability Samples

Generally speaking, sampling frames fall into two camps:

- **Probability** samples indicate that you know the likelihood a respondent will be asked to fill out the survey; this means that samples are selected in accord with probability theory, typically involving some random selection mechanism.

  Probability samples are usually one of three types:

  - **Simple random samples** are systems where every individual or other unit of analysis has an equal chance of being selected.
  - **Stratified random samples** occur where a random sample is drawn from particular strata (categories), such as high versus low poverty neighborhoods or groups such as pedestrians and motorists. A stratified random sample might use census block groups and stratify them by poverty (for example, high, medium, and low), then randomly sample x people from each of the three strata. The focus in this example is on poverty in communities, and neighborhoods provide a means of dividing the city into high and low poverty areas. A key challenge with stratified random samples is coming up with the list for every individual or unit of analysis in a strata. For example, it may be impossible to obtain a list of all cyclists, a strata very relevant to surveys of active travel.[20]
  - **Cluster random samples** divide the entire population into groups, or clusters, and then selects a random sample of these clusters. In a one-stage cluster, all observations in the selected clusters are included in the sample; in a two stage cluster sample people, households, or some other unit of analysis are randomly sampled within each cluster as well. An example of a two-stage cluster sample would be to first select a sub-set of schools in a community, and then randomly select some number of students from each school. Cluster sampling is typically used when the researchers cannot obtain a complete list of members from a population they wish to study, but they can obtain a complete list of groups or ”clusters” of the population. It is also used when a random sample would produce a list of subjects so widely scattered that surveying them would prove too expensive.

- With **non-probability samples** you do not necessarily know where respondents come from or the degree to which they mirror the larger population.[21] These include methods such as snowball samples (respondents identify other potential respondents), intercept samples (people on a route are intercepted and surveyed), or convenience samples (people who are at hand complete the survey).

The distinction between probability and non-probability sampling has implications for trying to apply the results of a survey to larger or more general populations (see discussion in the main text and examples in Lohr 1999).[22] Statisticians generally have higher confidence in probability-

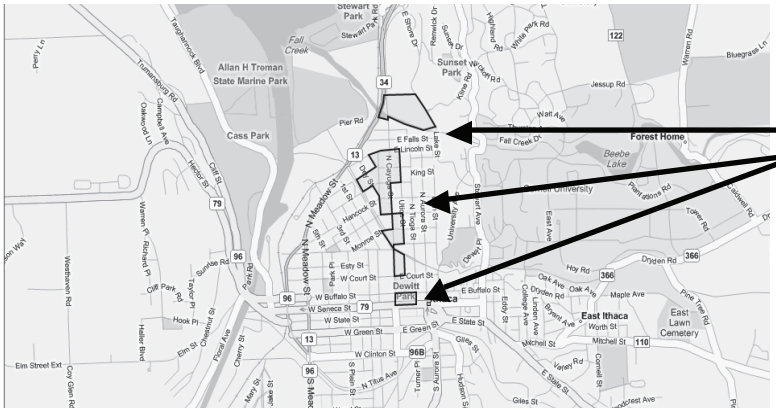
[20] Forsyth, Krizek, and Agrawal, *PABS*.

[21] Vogt, *Dictionary of Statistics*.

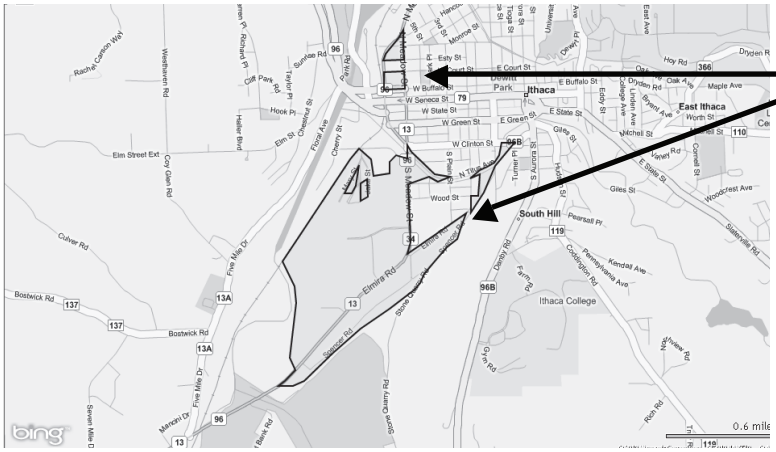
[22] Sharon L. Lohr, *Sampling: Design and Analysis* (Pacific Grove, CA: Duxbury Press, 1999).

based samples; they can comment on the degree to which the sample mirrors the population at large. By contrast, for non-probability samples, even with large sample sizes, it is very difficult to estimate if respondents are typical of the complete population that one is trying to represent (because to do so you would need a great deal of information about both the respondents and the larger population to compare how similar they are). But the reason for doing a survey is typically that such information is not available.

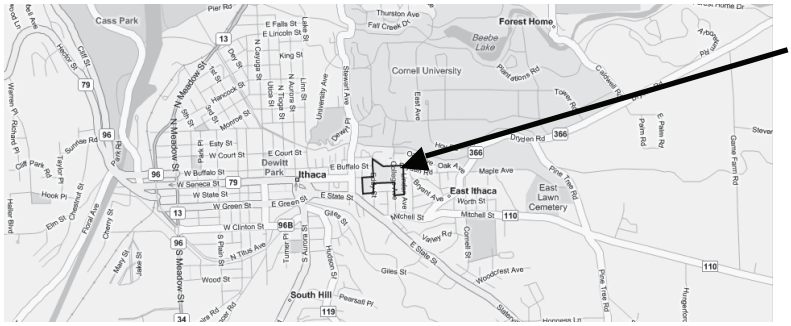
Appendix C: Considerations for Different Survey Administration Options



Nineteenth and early twentieth century downtown area. Note that this route has several non-contiguous parts that are all part of the same route.



A more suburban carrier route that includes a “big box” retail area. Again, this route has several separate parts.



A neighborhood of mid-rise apartments that has a small carrier route due to its high density.

Appendix D: The Survey Questionnaire in English

How Do You Get Around Town?

This survey asks you questions about how you get around for your daily travel, with a focus on how often you bicycle and walk. Even if you never walk or bicycle, we are still very interested in your responses. Thank you for taking the time to complete this survey!

Questions about your recent travel

1. What is today's date? _____/_____
   Month Day

2. Were you out of town during the last 7 days?

   ☐8 No OR ☐9 Yes (If yes, how many days? _____)

3. Check one box for each line below to tell us THE MOST RECENT TIME you used each type of travel. Note that some trips you make may fit into multiple categories below. For example, if you walked to the store yesterday to get exercise AND to buy bread, then you would check "Last 7 Days" for both row "g" and row "h."

Type of Travel	Last 7 Days	Last Month	Last 3 Months	Last Year	Not Used in the Last Year
a) Passenger or driver in a vehicle (for example, a car, truck, motorcycle, or taxi)	☐1	☐2	☐3	☐4	☐5
b) Public transit (for example, bus, train, or ferry)	☐1	☐2	☐3	☐4	☐5
c) Bicycle to or from public transit	☐1	☐2	☐3	☐4	☐5
d) Bicycle to a destination OTHER THAN public transit (for example, to a job, store, park, or friend's house)	☐1	☐2	☐3	☐4	☐5
e) Bicycle for recreation or exercise (do not include riding a stationary bicycle)	☐1	☐2	☐3	☐4	☐5
f) Walk to or from public transit	☐1	☐2	☐3	☐4	☐5
g) Walk to a destination OTHER THAN public transit (for example, to a job, store, park, or friend's house)	☐1	☐2	☐3	☐4	☐5
h) Walk for recreation, exercise, or to walk the dog	☐1	☐2	☐3	☐4	☐5

Questions about HOW OFTEN you BICYCLED in the last 7 days

In the last 7 days (up to yesterday), on how many days did you:

4. Bicycle to OR from public transit (for example, to a bus or train stop) Number of days ___

5. Bicycle to OR from work or school Number of days ___

6. Bicycle to get somewhere OTHER than work, school, or public transit. (For example, to go shopping, see a friend, or eat a meal. Do NOT include trips with no destination, such as a bike ride solely for exercise.) Number of days ___

7. Ride a bicycle for exercise or recreation, without having a destination for the trip Number of days ___

Questions about HOW OFTEN you WALKED in the last 7 days

In the last 7 days (up to yesterday), on how many days did you:

8. Walk to OR from public transit (for example, to a bus or train stop) Number of days ___

9. Walk to OR from work or school Number of days ___

10. Walk to get somewhere OTHER than work, school, or public transit. (For example, to go shopping, see a friend, or eat a meal. Do NOT include trips with no destination, such as a walk solely for exercise.) Number of days ___

11. Walk for exercise or recreation, without having a destination for the trip Number of days ___

Questions about your general travel

	Yes	No	Prefer not to say
12. Do you currently have any physical or other health condition that limits the amount of walking you can do?	☐1	☐2	☐3
13. Do you currently have any physical or other health condition that limits the amount of bicycling you can do?	☐1	☐2	☐3

14. In the last 7 days, did you have access to a working BICYCLE?

☐1	☐2	☐3	☐4	☐5
Always	Most of the time	Sometimes	Rarely	Never

15. In the last 7 days, did you have access to a working MOTOR VEHICLE like a car, truck, or motorcycle that you can use either as a driver or passenger? (Exclude taxis.)

☐1	☐2	☐3	☐4	☐5
Always	Most of the time	Sometimes	Rarely	Never

16. DURING A TYPICAL WEEK, how many days does your commute to work or school include any of the following forms of transportation? If you don't commute, mark each one as "0."

a) Number of days walking: ___ (count walking to or from a parked car or transit stop IF the walk was at least 10 minutes)

b) Number of days bicycling: ___

c) Number of days taking public transit (for example, a bus, train, or ferry): ___

d) Number of days driving myself: ___

e) Number of days riding as a passenger with someone else: ___

17. If you ever bicycle, how many months in a year do you TYPICALLY NOT make trips by bicycle because of your local climate (bad weather)?

Number of months: _____ OR ☐77 I never bicycle OR ☐99 I don't know

18. If you ever walk, how many months in a year do you TYPICALLY NOT make trips by walking because of your local climate (bad weather)?

Number of months: _____ OR ☐77 I never walk OR ☐99 I don't know

Some questions about you and your household

19. In what year were you born?
Year: _____

20. What two streets intersect closest to your home?

_____ and _____
(First street name) (Second street name)

21. How many years OR months have you lived in this neighborhood?
Years_____ OR Months _____

22. What zip code do you live in? _____

23. What is your legal gender?

☐1 Male ☐2 Female ☐3 Prefer not to say

24. What is your race or ethnicity? (Check all that apply.)

☐1 African American or Black
☐2 American Indian or Alaskan Native
☐3 Asian
☐4 Hispanic or Latino
☐5 Native Hawaiian or other Pacific Islander
☐6 White
☐7 Don't know
☐8Other (please explain:_____)

25. Which categories best describe you? (Check all that apply.)

☐1 Working for pay OUTSIDE the home
☐2 Working for pay INSIDE the home
☐3 Looking for work
☐4 Other, please explain: _____
☐5 A homemaker
☐6 Going to school
☐7 Retired

Some final questions ask about your household. By "household" we mean all the people who currently live with you in your home. Please do not include renters or tenants. If you live in a dormitory, in a boarding house, or with roommates, just answer the following questions for yourself AND CHECK HERE ☐ .

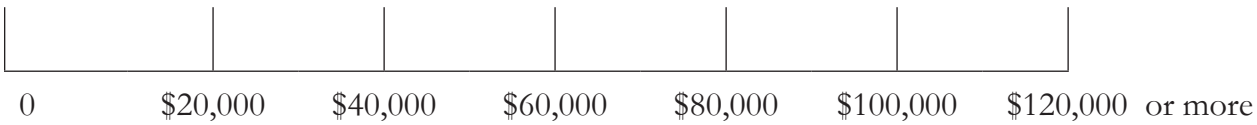
26. How many people live in your household, including you?

Number of people under 16: ___ Number of people 16 years and older: ___

27. How many working motor vehicles are there in your household? (For example, cars, trucks, or motorcycles.)

☐	☐	☐	☐	☐
0	1	2	3	4 or more

28. To understand travel choices, and for statistical purposes, we need an idea of your total household income. Please mark an "X" on the scale below to indicate the APPROXIMATE TOTAL ANNUAL COMBINED income of all the working adults in your household.



Thank you!

Appendix E: The Survey Questionnaire in Spanish

¿Como se transporta por la cuidad?

Esta encuesta le hace preguntas sobre cómo viaja diariamente por la cuidad, específicamente la frecuencia en que camina o utiliza la bicicleta. Aun si nunca camina o utiliza la bicicleta, estamos muy interesados en conocer su respuesta. ¡Gracias por tomar el tiempo para completar esta encuesta!

Preguntas sobre sus viajes recientes

1. ¿Cuál es la fecha de hoy? _____/_____
   Mes Día

2. ¿Estuvo fuera de la cuidad en los últimos 7 días?

☐8 No O ☐9 Sí (¿Si sí, cuantos días? _____)

3. Marque una casilla en cada línea abajo para decirnos LA VEZ MAS RECIENTE que utilizó este tipo de transporte. Note que algunos de los viajes que haga serian apropiados en varias categorías indicadas abajo. Por ejemplo, si ayer caminó a la tienda para hacer ejercicio Y comprar pan, usted marcaría "Últimos 7 días" en la línea "g" y la línea "h."

Tipo de transporte	Últimos 7 días	Último Mes	Últimos 3 meses	Último Año	No utilizado en último año
a) Pasajero(a) o conductor(a) en un vehiculo (por ejemplo un carro, camioneta, motocicleta o taxi)	☐1	☐2	☐3	☐4	☐5
b) Transporte público (por ejemplo autobús, tren, o ferry)	☐1	☐2	☐3	☐4	☐5
c) Bicicleta para ir o regresar de transporte público	☐1	☐2	☐3	☐4	☐5
d) Bicicleta para llegar a destino QUE NO SEA transporte público (por ejemplo a su trabajo, a la tienda, a un parque o a casa de un amigo(a))	☐1	☐2	☐3	☐4	☐5
e) Bicicleta por diversión o ejercicio (no incluya el uso de bicicleta de ejercicios)	☐1	☐2	☐3	☐4	☐5
f) Caminar para ir o regresar de transporte público	☐1	☐2	☐3	☐4	☐5
g) Caminar para llegar a destino QUE NO SEA transporte publico	☐1	☐2	☐3	☐4	☐5
h) Caminar por diversión, hacer ejercicios, o pasear al perro.	☐1	☐2	☐3	☐4	☐5

Preguntas sobre CUANTAS VECES utilizó LA BICILETA en los últimos 7 días

En los últimos 7 días (incluyendo ayer), cuantos días utilizó:

4. La bicicleta para ir O regresar del transporte público (por ejemplo del autobús o estación del tren) Numero de días ___
5. La bicicleta para ir O regresar del trabajo o escuela Numero de días ___
6. La bicicleta para llegar a un lugar APARTE DE su trabajo, escuela, o transporte público (por ejemplo ir a las tiendas, visitar a un amigo(a), o comer. NO INCLUYA las veces que la utilizó sin un destino en particular, como para hacer ejercicios) Numero de días ___
7. La bicicleta para hacer ejercicios o de recreación, sin un destino particular. Numero de días ___

Preguntas sobre CUANTAS VECES usted CAMINABA por las ultimas 7 días

En los últimos 7 días (incluyendo ayer), cuantos días:

8. Caminó para ir o regresar del transporte público (por ejemplo del autobús o estación de tren) Numero de días ___
9. Caminó para ir O regresar del trabajo o escuela Numero de días ___
10. Caminó para llegar a un lugar APARTE DE su trabajo, escuela, o transporte público (por ejemplo ir a las tiendas, visitar con un amigo(a), o comer. NO INCLUYE las veces que caminaba sin ir un destino particular, como para hacer ejercicios) Numero de días ___
11. Caminó para hacer ejercicios o por diversión, sin destino particular Numero de días ___

Preguntas sobre sus viajes en general

	Si	No	Prefiero no responder
12. ¿Por ahora tiene alguna condición física u otro tipo de condición de salud que limita su capacidad de caminar?	☐1	☐2	☐3
13. ¿Por ahora tiene alguna condición física u otro tipo de condición de salud que limita su capacidad de utilizar la bicicleta?	☐1	☐2	☐3

14. ¿En los ultimas 7 días, tuvo acceso a una BICICLETA que funciona?

☐1	☐2	☐3	☐4	☐5
Siempre	Mayor parte del tiempo	A veces	Rara vez	Nunca

15. ¿En los últimos 7 días, tuvo acceso a un vehículo, como un carro, una camioneta, o una motocicleta que pueda manejar o ser pasajero(a)? (Excluyendo los taxis)

☐1	☐2	☐3	☐4	☐5
Siempre	Mayor parte del tiempo	A veces	Rara vez	Nunca

16. ¿DURANTE UNA SEMANA TÍPICA, cuantos días incluye algunas de las formas de transporte mencionadas abajo en sus viajes diarios al trabajo o la escuela? Si no viaja diariamente, marque cada una como "0."

a) Numero de días que camina: ___ (cuente también caminando hacia o regresando de un carro estacionado, si la caminada fue por lo menos de 10 minutos.)

b) Numero de días que utiliza la bicicleta:___

c) Numero de días que usa transporte público (por ejemplo el autobús, el tren, o un ferry):___

d) Numero de días que manejo yo mismo: ___

e) Numero de días que soy pasajero(a) con alguien mas:___

17. ¿Si alguna vez utiliza la bicicleta, en general por cuantos meses durante un año NO HACE viajes en bicicleta por el mal clima?
Numero de meses: _____ O ☐77 Nunca uso la bicicleta O ☐99 No se

18. ¿Si alguna vez camina, en general por cuantos meses durante un año NO HACE viajes a pie por el mal clima?
Numero de meses: _____ O ☐77 Nunca camino O ☐99 No se

Algunas preguntas sobre usted y su casa

19. ¿En que año nació?

Año: _____

20. ¿Cuales son las calles que cruzan cerca de su casa?

_____ y _____
(Nombre de la primera calle) (Nombre de la segunda calle)

21. ¿Por cuantos años O meses ha vivido en este vecindario?

Años_____ O Meses ____

22. ¿A que código postal vive? _____

23. ¿Cuál es su género?

☐1 Masculino ☐2 Femenino ☐3 Prefiero no contestar

24. ¿Que es su raza o origen étnico? (Marque todas las que correspondan)

☐1 Afroamericano o Negro
☐2 Indio americano o nativo de Alaska
☐3 Asiático
☐4 Hispano o Latino
☐5 Hawaiano nativo o isleño del Pacifico
☐6 Blanco
☐7 No lo se
☐8Otro (por favor explique:_____)

25. ¿Cuales son las categorías que mejor lo/la describen? (Marque todas las que correspondan)

☐1 Trabajo por pago FUERA de casa
☐2 Trabajo por pago DENTRO de casa
☐3 Busco trabajo
☐4 Otro, por favor explique: _____
☐5 Ama de casa
☐6 Asisto a la escuela
☐7 Retirado(a)

Algunas últimas preguntas sobre su hogar. En este caso, "hogar" se refiere a todas las personas que actualmente viven con usted en su casa. Por favor, no incluya a inquilinos o arrendatarios. Si vive en un dormitorio, en una casa de huéspedes, o con compañeros de cuarto, solo responda por si mismo a las siguientes preguntas Y MARQUE ESTA CASILLA ☐.

26. ¿Cuantas personas viven en su hogar, incluyendo a usted?

Numero de personas que son menores de 16 años: ___
Número de personas que tienen 16 años o más: ___

27. ¿Cuantos vehículos que funcionan tiene en su casa? (por ejemplo carros, camionetas, o motocicletas.)

☐	☐	☐	☐	☐
0	1	2	3	4 o mas

28. Para entender sus elecciones de transporte, y con fines estadísticos, necesitamos tener una idea de los ingresos totales de su hogar. Por favor, marque una "X" en la escala abajo para indicar el TOTAL APROXIMADO INGRESO ANUAL COMBINADO de todos los adultos que trabajan y viven en su hogar.

0 $20,000 $40,000 $60,000 $80,000 $100,000 $120,000 o mas.

¡GRACIAS!

Appendix F: Estimated Costs

Table F1: Example Costs for Copying and Mailing a Postcard and Letter

Components	Postcards	Letters
Postage	**$0.28**	**$0.44**
Printing, folding, stuffing	**$0.15**	**$0.75**
Postage reply (30% response rate)		**$0.16**
Hand addressing (at 45 per hour and $15 per hour)	**$0.34**	**$0.34**
Subtotal	**$0.77**	**$1.69**
Total (rounded up)	**$0.80**	**$1.75**

Note: Does not include addresses ($15/thousand and 10% sample, reused if allowed by the licensing

Table F2: Cost Scenarios Given WEstimates Amounts and Varying Response Rates (Using Costs from Table F1)

Responses	Postcard (per mailing)	Letter per mailing)	Minimal mailing (only survey)	Moderate (2 postcards and survey)	Deluxe (3 postcards and 2 surveys)
To get 1000 responses at a 50% response rate (i.e. sending out to 2,000 addresses)	$1,600	$3,500	$3,500	$6,700	$11,800
To get 1000 responses at a 25% response rate (4,000 addresses)	$3,200	$7,000	$7,000	$13,400	$23,600
To get 1000 responses at a 15% response rate (10,000 addresses)	$8,000	$11,667	$11,667	$27,667	$47,334

Note: These tables use the rough figures that do not account for the effect of varying response rates on business reply post; they also do not include the cost of mailing lists. However, 500 responses may well be enough, substantially reducing the cost.

Appendix G: Estimated Timeline to Administer the PABS

Step/Month	1	2	3	4	5	6
1. Determine that a survey is warranted, its purpose, and scope	■					
2. Decide who will manage the survey administration	■					
3. Decide if you want to use the entire survey and/or add questions and pilot any changes	■					
4. Decide how many surveys to send out		■				
5. Choose a date to send out the survey		■				
6. Decide on the number of contacts with each household		■				
7. Obtain mailing addresses			■			
8. Plan how to protect respondent privacy			■			
9. Draw a random sample			■			
10. (Optional) Plan a campaign to raise awareness about the survey		■	■			
11. (Optional) Prepare and mail the advance post-card		■	■			
12. Prepare and mail the survey				■		
13. (Optional) Prepare and mail 2 follow-up postcards				■		
14. (Optional) Prepare and mail survey a second time				■		
15. Enter survey data					■	
16. Analyze the data and prepare a summary report					■	■
17. Supplement the PABS with qualitative information					■	■
18. Share your results with your own community and the wider network of pedestrian/bicycle advocates						■

Appendix H: Details of Obtaining a Cluster Sample from Mailing Address Lists

Step	Details for San José Case
Step One Overview: Obtain a list of all carrier routes in San José, select those with residential addresses and then randomly sample 65 routes for a total of 30,129 addresses.	
Compile a list of all the postal carrier routes in the city by identifying zip codes and then actual carrier routes.	There were 1,176 postal carrier routes, which contained 347,328 single family addresses and 57,329 apartments. PABS' authors obtained the list from http://www.melissadata.com/lookups/cartzip.asp.
Eliminate post office box-only routes.	There were 17,862 such PO addresses. We assumed that most were for businesses or were secondary addresses for privacy. That reduced the number of carrier routes to 829.
Eliminate the zip codes with under 12% of addresses were in the study are (the city).	A map of San José zip codes was visually inspected to double check that zip codes eliminated by PABS researchers as having a small number of San José addresses did indeed contain mostly addresses outside the city. There were five zip codes with less than 2% of addresses in the city, and one with 12%. One zip code where 57% were of addresses in the city was retained; 10 had 80% to 97% in the city, and the remainder were 98% or more. This brought the number of carrier routes down to 619 with 270,902 residences and 38,424 apartments.
Sort for and delete the routes without dwellings.	There are a number of carrier routes only serving businesses and PABS researchers deleted these—a total of 13. This left a total of 606 carrier routes.
Randomly select carrier routes and purchase them.	To randomly select carrier routes PABS' researchers listed them in one column of a Microsoft Excel spreadsheet and in a second column used Excel's random number generating feature to generate a list of random numbers. They used the "paste special" feature to transform these to values that would not recalculate and sorted the two columns by the random number value. Researchers selected carrier routes corresponding to the 65 lowest routes. They chose 65 routes as a relatively large number that was still cost-effective given they were paying for each address (which even at about one cent per address did add up). Addresses were purchased from MelissaData. This was a total of 30,129 dwelling addresses
Step Two Overview: Randomly select 2,000 addresses from within the complete set purchased.	
Randomly select desired number of addresses across the entire set of carrier routes.	To do this PABS researchers listed addresses in one column of a spreadsheet and in a second column used Excel's random number generating feature to generate a list of random numbers. They used the "paste special" feature to transform these to values that would not recalculate and sorted the two columns by the random number value. Researchers selected addresses corresponding with the lowest 2,000 numbers.

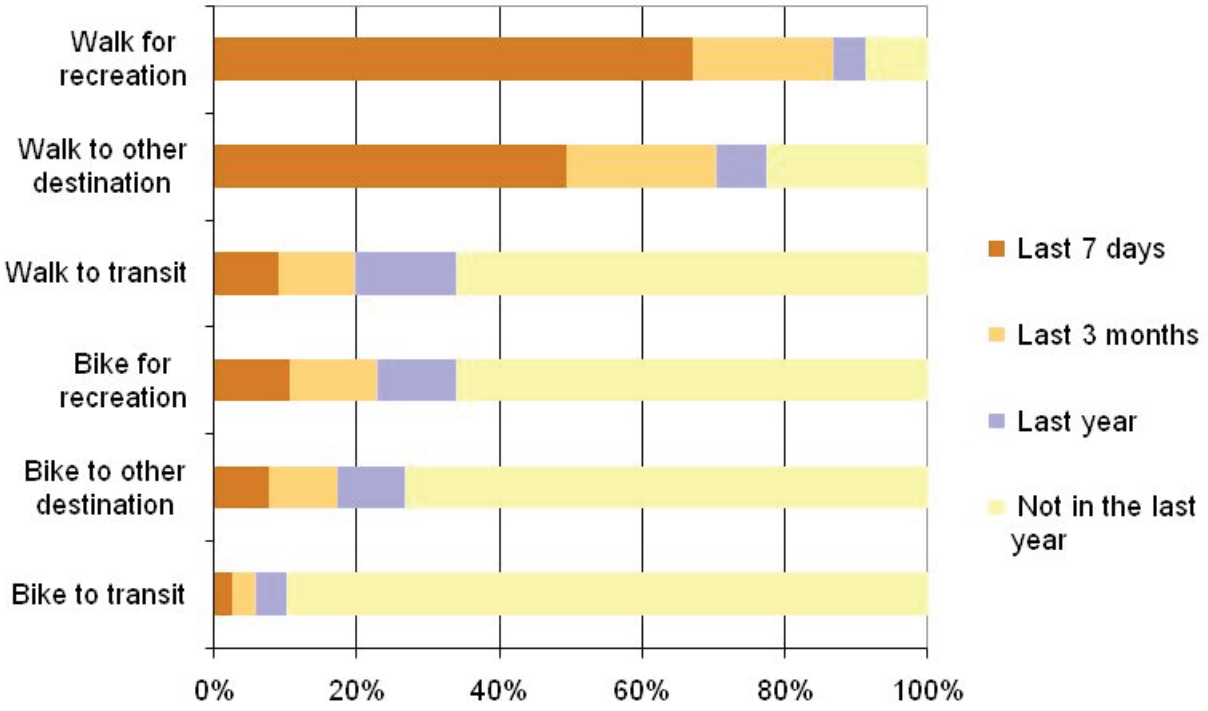
Step	Details for San José Case
Check that all addresses are in the study area (the city).	PABS researchers visually scanned the 2,000 addressed to ensure all were in San José. They were, but if they had not been researchers would have removed them and replaced them with the next addresses in the sequence.

Source: Adapted from Forsyth, Krizek, and Agrawal, PABS*, Table 5.*

Appendix I: Sample Graphics to Prepare from Analysis

The following figures are provided to suggest types analysis and presentations that could be prepared from data collected via the PABS. These figures are merely presented as good examples that *could* be performed; they are not intended to be exhaustive list of all options for presenting the data.

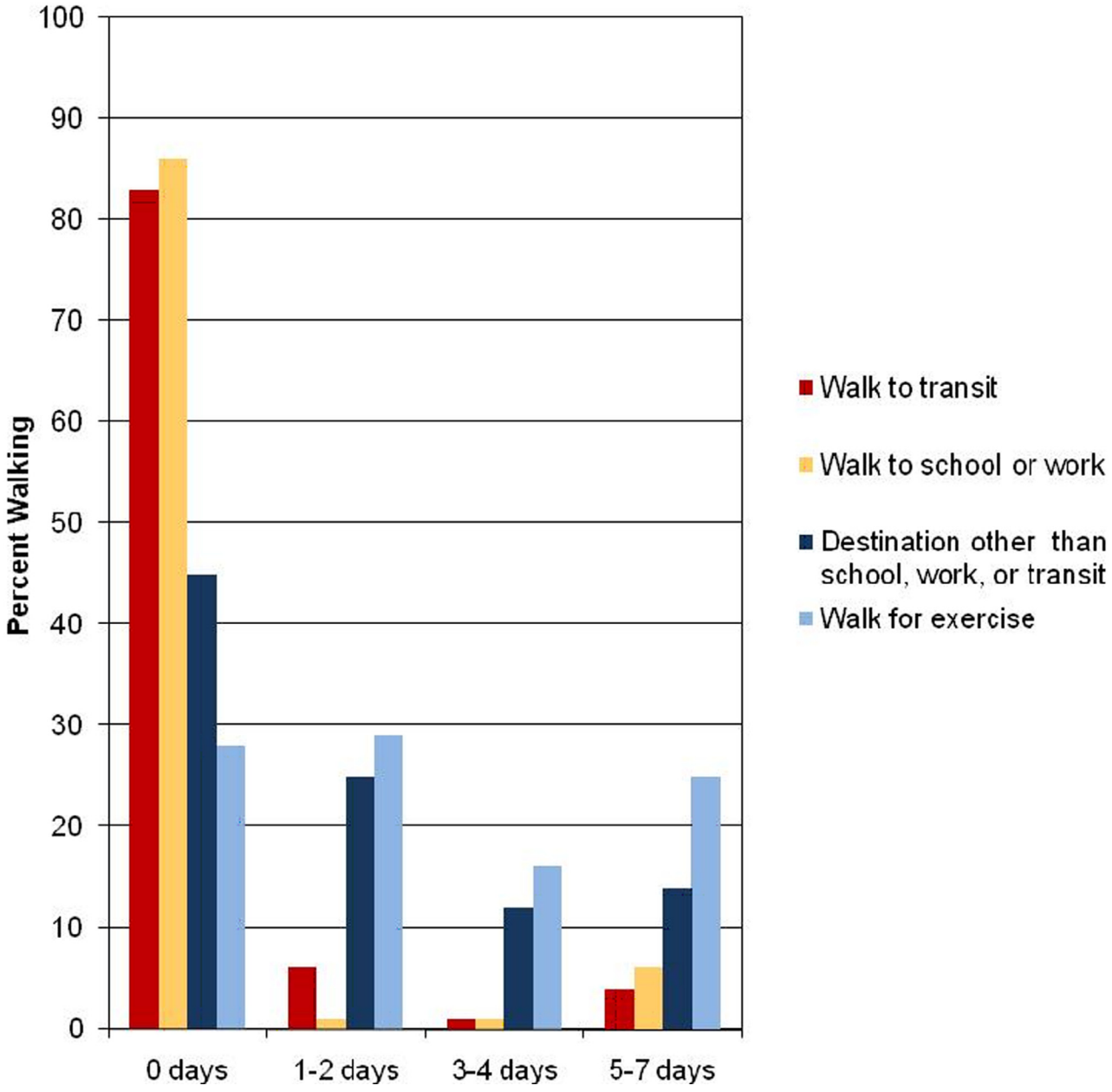
The data used to prepare these sample graphics came from the field testing in San José, California.



Example A: The Most Recent Time People Walked and Cycled

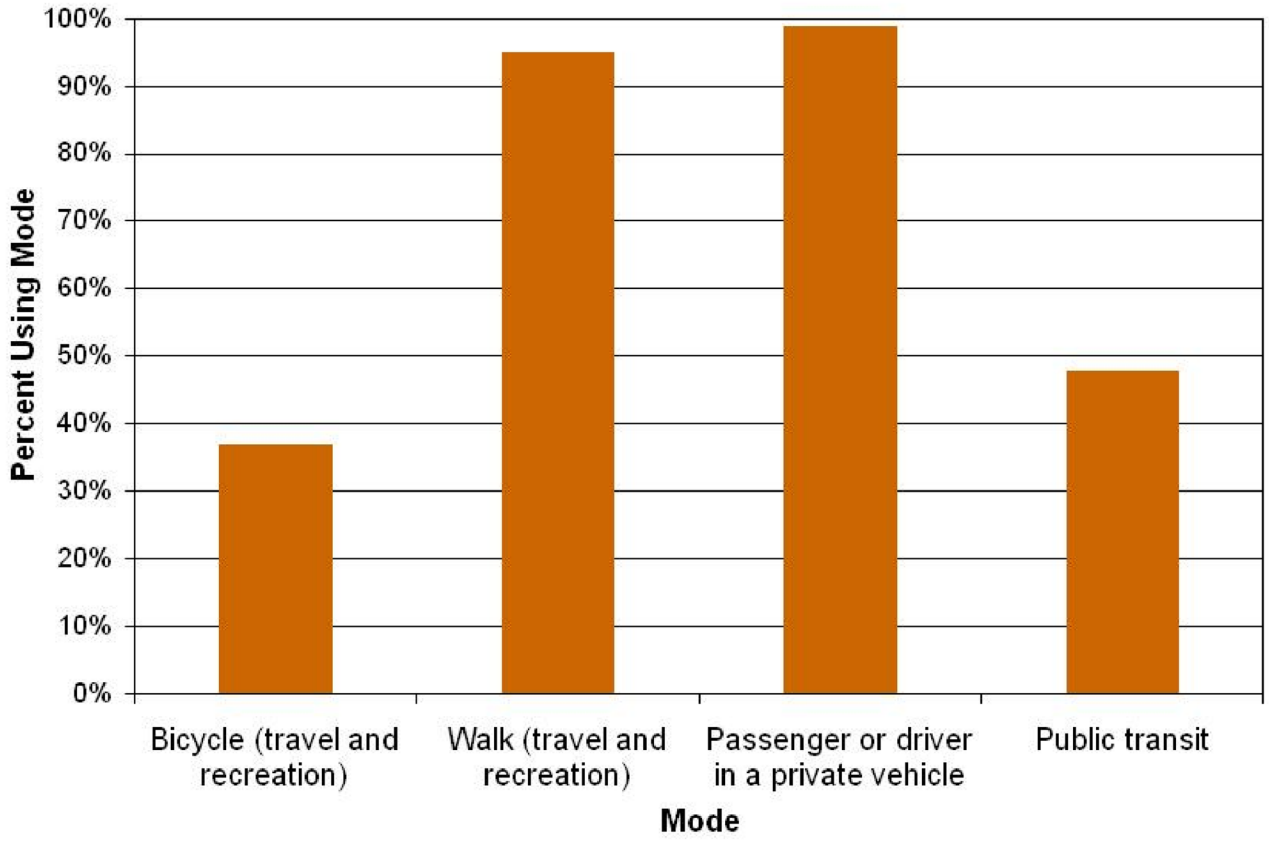
This bar chart shows the most recent time people have walked or cycled for three different types of trip purposes.

Walking is by far the most common activity in terms of active transportation.



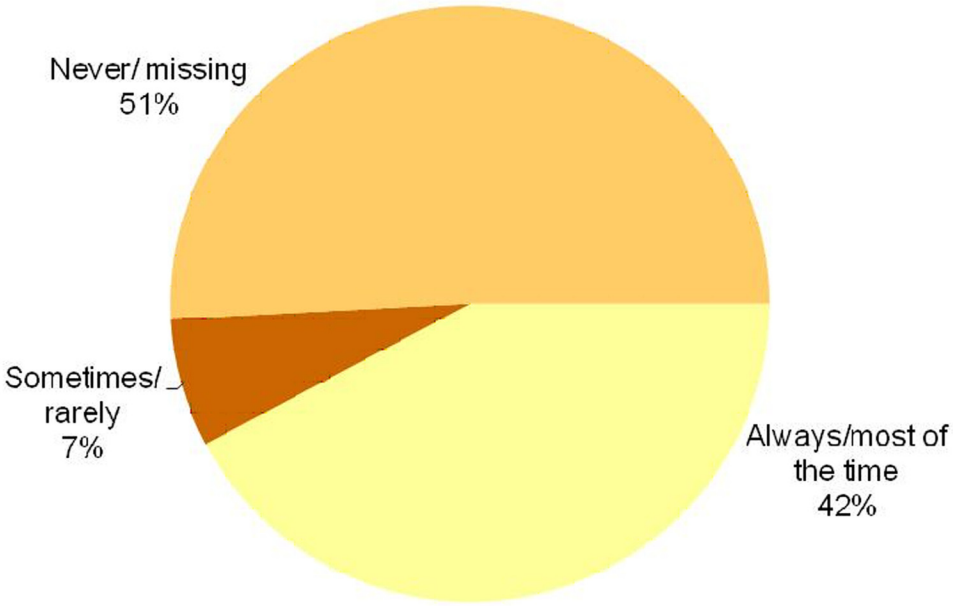
Example B: Percent of People Walking by Number of Days in the Last Week

Walking for exercise and recreation is a common activity. Over 70 percent of people had walked for recreation or exercise in the last seven days and 25 percent had done so on five or more days



Example C: Mode Used at Least Once in the Past Year

Almost two-thirds of people had not cycled in the last year, but the vast majority of people had walked



Example D: Access to a Working Bicycle

Half the respondents did not have access to a working bicycle in the last seven days

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References and Where to Find More Information

References

Adam S. Willcox; Giuliano, William M.; Israel, Glenn D.. “Effects of Token Financial Incentives on Response Rates and Item Nonresponse for Mail Surveys” Human Dimensions of Wildlife: An International Journal 15, no. 4 (2010), pages 288–295.

Alta Planning and Design, and Institute of Transportation Engineers (ITE) Pedestrian and Bicycle Council. “National Bicycle and Pedestrian Documentation Project.” Alta Planning and Design, and ITE Pedestrian and Bicycle Council. http://bikepeddocumentation.org/ (accessed June 20, 2010).

Bureau of Transportation Statistics. Research and Innovative Technology Administration. “National Household Transportation Survey Daily Travel Quick Facts.” http://www.bts.gov/programs/national_household_travel_survey/daily_travel.html (accessed June 15, 2010).

Dillman, Don A. Mail and Internet Surveys: the Tailored Design Method. 2nd ed. New York: John Wiley & Sons, 2007.

Forsyth, Ann., Kevin Krizek, and Asha Weinstein Agrawal. Measuring Walking and Cycling Using the PABS (Pedestrian and Bicycling Survey) Approach: A Low-Cost Survey Method for Local Communities. Draft Report. San José, CA: Mineta Transportation Institute, September, 2010.

Edwards, P., I. Roberts, M. Clarke, C. DiGuiseppi, S. Pratap, R. Wentz, and I. Kwan. “Increasing response rates to postal questionnaires: a systematic review. British Medical Journal 324 (2002): 1183.

Fowler, Floyd J. Survey Research Methods. 2nd ed. London: Sage Publications, 1993.

Hansen, Kasper M. “The effects of incentives, interview length, and interviewer characteristics on response rates in a CATI-study.” International Journal of Public Opinion Research 19, no. 1 (2006): 112–121.

Kelley, Kate, Belida Clark, Vivienne Brown, and John Stiza. “Good Pactice in the conduct and reporting of survey research,” International Journal for Quality in Health Care 15, 3 (2003): 261–266.

Krizek, Kevin, Susan Handy, and Ann Forsyth. “Explaining Changes in Walking and Bicycling Behavior: Challenges for Transportation Research.” Environment and Planning B 36 (2009): 725–740.

Lohr, Sharon L. Sampling: Design and Analysis. Pacific Grove, CA: Duxbury Press, 1999.

Mangione, Thomas W. Mail Surveys: Improving the Quality. Thousand Oaks, CA: Sage Publications, 1995.

Oakes J. Michael, Ann Forsyth, Mary Hearst, and Kathryn. H. Schmitz. “Recruiting a Participants for Neighborhood Effects Research: Strategies and Outcomes of the Twin Cities Walking Study.” Environment and Behavior 41, no. 6 (2009): 787–805.

Rogers, A., M.A. Murtaugh, S. Edwards, and M.L. Slattery. “Contacting controls: Are we working harder for similar response rates, and does it make a difference?” American Journal of Epidemiology 160, no. 1 (2004): 85–90.

The Health Communication Unit. Conducting Survey Research. Version 2.0. Toronto: University of Toronto Center for Health Promotion, 1999. http://www.thcu.ca/infoandresources/publications/Surveys_Master_Wkbk_V2_Formating%2008.09.03_Content%2003.31.99.pdf.

Vogt, W. Paul. Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences. Thousand Oaks, CA: Sage Publications, 1993.

U.S Census Bureau. The American Community Survey Question Booklet. U.S Census Bureau, 2008. http://www.census.gov/acs/www/Downloads/SQuest08.pdf (accessed June 15, 2010).

Other Help

Additional resources on the Internet can help further explain central concepts, for example:

http://www.robertniles.com/stats/

http://www.socialresearchmethods.net/selstat/ssstart.htm

For further support regarding statistics and analysis, local universities could possibly provide help from graduate students, faculty, or ad-hoc consulting services.

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