Increasing non-response rate have been identified to be one of the most severe risks in travel surveys. In many countries traditional mail and telephone surveys suffer from low response rates. Internet survey can be seen as a means to reduce the non-response rates among the most typical non-response groups in telephone surveys: respondent’s telephone number cannot be found or respondent is not reached by phone. In addition, Internet survey offers many options to improve the response rate and quality of data.

This paper analyzes regional travel diary data collected with mixed modes - Internet survey, telephone interviews and mail survey. The regional travel survey data was collected in Oulu Region in Finland in 2009.

Internet and mail surveys represent active survey modes as participation requires respondent’s initiative. Telephone interview is a passive survey mode, as the respondent does not have to take any other initiative to participate than accept the call. The results show that respondents making no trips on their research day are less likely to choose active survey modes and prefer passive mode in the form of telephone interview.

Offering Internet survey as an alternative to telephone interviews increased the response rate especially among respondents aged 25–55. Internet and mail survey respondents had reported more trips than telephone respondents in all age groups. As the modes of survey attract different types of individuals, the characteristics of non-response vary according to the survey mode. The quality of data in Internet survey was high compared to other survey modes.

Oulu Region is located in the central northern part of Finland on the shore of Baltic Sea 600 km north of Helsinki. Oulu region has 220,000 inhabitants and 96,000 workplaces and is the fourth largest urban region in Finland. The largest areas of business are electronics and education. Average temperature in July is 18°C and in January -10°C. Although winter is cold in Oulu region, the modal share of bicycle is more than 20%.

The objective of this paper is to analyze response rate in both sequential and choice-based survey mode using regional travel survey data collected by Internet, telephone and mail survey. The regional travel survey of Oulu was conducted in October and December 2009.

The population of the survey consisted of over 5 years old individuals living in Oulu region, with a total of 220,000 inhabitants. The travel survey included a one-day travel diary, in which each participant reported all trips made during one pre-selected weekday between October and December. The sample size was 8,220 and altogether 5,018 respondents participated in the survey.

The amount of daily trips made by residents of the Oulu region during weekdays - in total 580,000 trips and 6.0 million km per weekday.
**THE ROLE OF INTERNET SURVEY IN TRAVEL DIARY SURVEYS**

**MIXED MODES OF SURVEY - PHONE, INTERNET AND MAIL**

Respondents were divided into two groups according to the availability of a phone number. For those respondents whose phone number was found the survey was carried out as sequential mixed-mode survey.

1. At first the respondents were sent a letter of invitation requesting the respondent’s participation in the Internet survey. The letter informed respondents that they would be contacted for interview by phone if they did not participate via Internet within two days from the pre-selected research day.

2. If the respondent did not participate in the Internet and was not reached by phone, a few weeks later a reminder was sent together with a mail survey. Respondents could choose whether to participate in the Internet or return the mail survey.

3. Those respondents for whom no telephone number was found were sent a letter requesting them to complete the enclosed mail survey or to participate in the Internet survey. The largest groups for whom no number was found were those aged 18–24 and 25–34.

The overall response rate in Oulu regional travel survey was 61%. Altogether 27% of the respondents responded through Internet survey, 64% through telephone interview and 9% through mail survey.

**INTERNET SURVEY ATTRACTS ESPECIALLY PARENTS AND WORKING-AGED RESPONDENTS**

Offering Internet survey alongside telephone interviews increased the response rate especially among respondents aged 25–55.

The highest rates of internet response (17-25%) were found in the age group of 30-54 years. Even in the age group of 55-64 years the Internet response rate was 15-18%. Women were in all age groups more eager to respond in Internet survey than men.

Among those over 64 years old the Internet response rate was only 5-8%. Elderly Internet respondents were found to live in households with at least one car and have a driving license more often than other respondents in the same age group. Young adults’ Internet response rate was low, especially among men.
RESPONDENTS MAKING NO TRIps ON THEIR RESEARCH DAY ARE UNLIKELY TO PARTICIPATE IN SELF-REPORT SURVEY MODES

The average number of trips varied between Internet and telephone respondents as well as between mail and telephone respondents. Internet respondents reported an average of 4.2 trips per respondent whereas the average trip number for a telephone respondent was 2.1 and for mail respondent 4.1.

The difference was statistically significant difference in the number of trips between phone and self-administered survey modes. However, there was not any significant difference between mail and Internet.

Number of daily trips among respondents by survey mode.

<table>
<thead>
<tr>
<th>Mode of survey</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>3,188</td>
<td>2.11</td>
<td>2.037</td>
<td>0.036</td>
</tr>
<tr>
<td>Internet</td>
<td>1,366</td>
<td>4.20</td>
<td>2.526</td>
<td>0.068</td>
</tr>
<tr>
<td>Mail</td>
<td>466</td>
<td>4.07</td>
<td>2.192</td>
<td>0.102</td>
</tr>
<tr>
<td>Total</td>
<td>5,018</td>
<td>2.86</td>
<td>2.409</td>
<td>0.034</td>
</tr>
</tbody>
</table>

Internet respondents were found to have more active travel behavior than telephone respondents. The average number of journeys of Internet respondents was greater in every age group than telephone respondents. As different survey modes attract different types of individuals, the characteristics of non-responders and responders vary according to the survey mode.

Passive and active mobility groups

1. Passive travel behavior: 0–1 trips
   - telephone interview 35%
   - Internet survey 8%
   - mail survey 5%

2. Average travel behavior: 2–4 trips
   - telephone interview 56%
   - Internet survey 54%
   - mail survey 61%

3. Active travel behavior: five trips or more
   - telephone interview 10%
   - Internet survey 38%
   - mail survey 34%

A large number (35%) of telephone respondents had made only 0–1 trips on the research day, while only 8% of Internet respondents reported having made fewer than 2 trips. The share of respondents who had made 2–4 trips a day did not vary as much. However, a difference was found in the share of the respondents who had made at least five trips on the research day. Only approximately 10% of telephone respondents reported having made at least five trips, whereas 38% of the Internet respondents reported five trips or more.

The number of respondents making no trips during their research day was among telephone respondents 31.1%, among Internet respondents 5.3% and among mail respondents 4.1%.

The results are very similar to GPS-based studies, in which the number of daily trips has been found to be greater due to accurate reporting of short journeys, which are often neglected in telephone and mail surveys.

There are two possible explanations for differences in the number of daily trips: there may be differences in travel behavior between respondents to different survey modes, and different data collection modes may lead to differences in the number of trips reported. Internet and mail surveys differ from telephone interviews in many ways. One of the most significant differences is that as self-report modes Internet survey and mail survey are active survey modes, as they demand initiative on the part of the respondent. Telephone interview is a passive survey mode, as the respondent does not have to take any other initiative to participate than accept the call.

POTENTIAL OF INTERNET SURVEY IN DECREASING THE NON-RESPONSE RATE

Increasing non-response rates have been identified as one of the main risks in travel surveys. Traditional mail and telephone surveys suffer from low response rates. Internet survey can be seen as a mode to reduce the non-response rate among the most typical non-response groups in telephone surveys: those groups for which no phone number can be found or those respondents who cannot be contacted by phone. In addition to these groups, Internet survey offers many options to improve the response rate and quality of data.

The results show clearly that respondents making no trips on their research day are unlikely to participate in self-report survey modes, i.e. Internet or mail survey. Therefore Internet survey is most suitable applied in conjunction with telephone survey, which is the most attractive means to participate in the survey for respondents making fewer trips or being generally less motivated to participate in the survey.

According to the results respondents are recommended to be offered an option to respond over the Internet alongside telephone interviews. Traditional mail survey has also an important complementary role in reaching respondents not willing to take part in a telephone interview and with no Internet access.

By offering respondents several options to participate in surveys by sequential data collection non-response can be decreased. In mixed-mode sequential surveys Internet survey should be the primary option, telephone interview the second option and mail survey the third option.

In the Oulu regional travel many of the respondents preferred self-report mode and chose the Internet option in order to avoid the burden of a long telephone interview. Sequential data collection combining self-report modes and telephone interview entails in itself a follow-up process, as in each approach the respondent is reminded of the survey by offering an alternative way to participate.