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Current experience with mixed mode including web mode in opinion surveys in official statistics

A survey as a method of data collection is used in many and different areas. Due to the increasing diversity of data collection methods, SURS is confronted with the problem of which method to choose in order to gain the best data. On the other hand, because of the flood of marketing surveys, a feeling is being spread among the people that surveys are irrelevant or they represent some burden for the respondents. In this case, collateral damage is produced for organizations professionally engaged in conducting surveys, including the national statistical offices (NSI).

The Statistical Office of the Republic of Slovenia (SURS) conducts numerous surveys of business entities; they are carried out through postal questionnaires, telephone (CATI) and web data collection methods. SURS conducts surveys of persons and households which are also the subject of this article. For surveys of persons and households SURS primarily uses the telephone and field data collection methods in longitudinal surveys; however, a mixed mode of data collection is also used. SURS is facing an increasing unit non-response rate and an increasing coverage error, because people do not want to participate or their telephone numbers are not listed, which will be shown in the following chapters.

One approach to solving the problem of rising non-response rates and coverage errors is to use combined methods of surveying (mixed mode). Such an approach combines the advantages of the different methods and at the same time reduces the disadvantages of these methods. We can decide to use mixed mode methods in all phases of the survey process. However, researchers' unreasonably deciding to use mixed modes also gives rise to negative effects on the quality of data and survey costs.

In 2014, SURS carried out a pilot consumer opinion survey, where we implemented the second method of data collection (web). We wanted to reduce the non-response rate and the coverage error. This paper presents the research design of this and its results. We also present the results of the first few months of 2016 when we started using the combined method in this survey.

Key words: web survey, mixed mode, CATI, consumer survey, official statistics, non-response, coverage

Data collection at SURS

SURS conducts a number of surveys which are subject to annual or medium-term programme of statistical surveys. Accordingly, with a number of surveys SURS also collects data with different data collection modes. The selection of the mode mostly depends on the target population and regulated methodology. Participation for the company is obligatory and defined in law, while participation in surveys of persons and households is voluntarily.

SURS strives to minimize the burden on respondents and obtain all the information that can be obtained from various administrative sources. Until recently, the most common method for surveys of enterprises has been a postal questionnaire completed by companies and sent back to SURS. In addition to the method in surveys of enterprises, SURS also practices telephone mode of data collection, while more and more questionnaires are also available via the web or the e-STAT online application, which requires that enterprises obtain a digital certificate before the survey. For surveys of enterprises SURS also uses mixed methods of data collection; for example, web survey with telephone follow-up. By using various combinations of mixed methods SURS increases response rates.

As in the surveys of enterprises, in the surveys of persons and households SURS strives to provide as much as possible data from administrative databases. In the surveys of persons and households the most common method of data collection is the telephone mode, which is carried out in the CATI studio located at SURS. For some surveys, in addition to the telephone data collection method the field data collection method (CAPI) is also used, where fieldwork interviewers visit persons and households all over Slovenia. Due to cost reduction, for longitudinal surveys SURS mainly uses mixed methods of data collection in a way that the first contact with a person or household uses the field data collection method, where the telephone number of the person or household is acquired to enable them to participate in the following periods so that SURS can call via the CATI studio.

For surveys of persons and households SURS also uses mixed methods of data collection. For the Adult Education Survey, which was until this year carried out by phone and a field data collection method, we decided, based on the pilot survey, that we will add this year a new method of data collection - an online questionnaire. So we will use three methods of data collection - TDM (tailored design method). In the past we have also carried out various

projects in cooperation with the academic community, where in the survey on tourism travels of domestic population we used the online questionnaire. We found that this survey is not suitable for the transition to the online questionnaire. We have also come to similar conclusions for the survey on the careers of doctorate holders. We noted a lower response rate than we expected. In the Consumer Opinion Survey, which is the subject of this paper, we decided on the basis of a pilot survey to use the sequential mode of data collection.

Consumer Opinion Survey and issues concerning the surveys of persons and households

The Consumer Opinion Survey in Slovenia has been carried out since 1996 with a harmonized questionnaire[1]; methodology and periodicity used in EU Member States for several decades are now implemented on the basis of the National Statistics Act and the current Annual Programme of Statistical Surveys. The legal basis for the survey is the "Joint Harmonised EU Programme of Business and Consumer Surveys"[2]. Protection of the respondents' personal data is guaranteed by the Personal Data Protection Act and the National Statistics Act. Therefore, all data are directly comparable and are included in the calculation of European indicators (EU-28 and EMU). The main purpose of the qualitative survey is to obtain monthly information about consumer opinion on the current, past and future situation in their households and in general in Slovenia. The results of the survey are the basis for calculating the consumer confidence indicator and the business climate indicator. With the Consumer Opinion Survey we are establishing the opinion of consumers about their possibility for purchase, willingness for purchase, saving, the economic situation in Slovenia, price changes, etc. The survey is based on a psychological theory developed by the Hungarian psychologist Georg Katona.

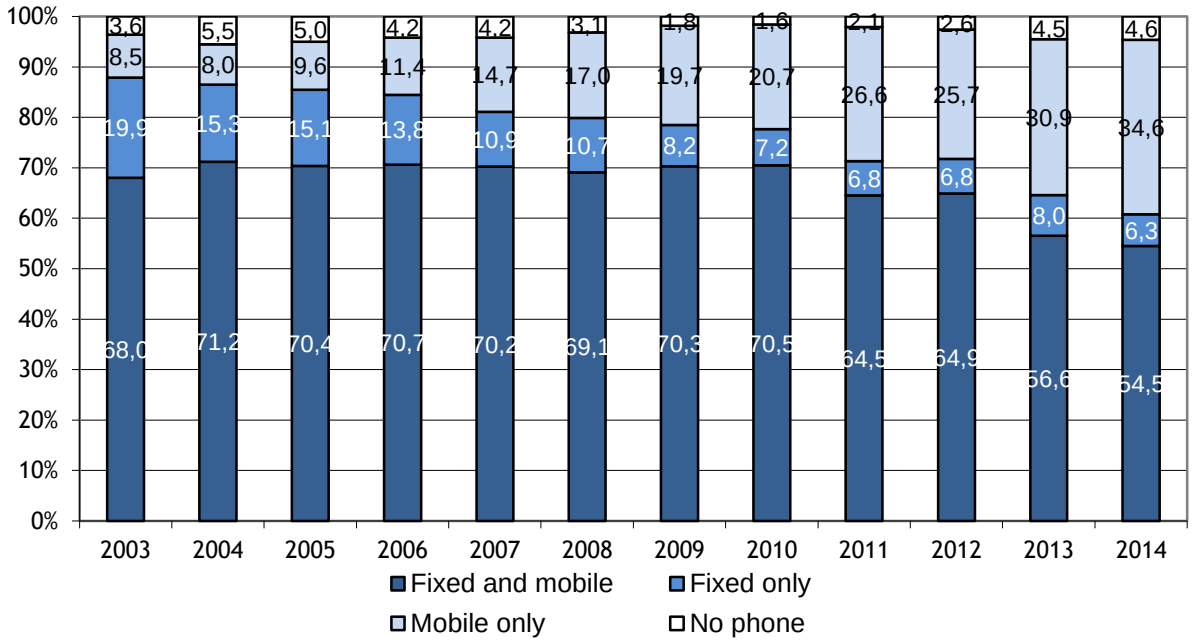
Since the beginning of 2012 the basis for the sampling frame has been the Central Population Register (CRP). Because the survey was conducted only by telephone, the name and the address of the selected sample of persons is linked with a phone directory. We interviewed the member of the household at the selected telephone number, selected by the "first birthday method". The observation unit is a resident of Slovenia aged 16 years or over. Only selected persons answer the questions. The sample covered 1,500 units with telephone numbers. The sample from the CRP is stratified. The strata are defined by the statistical region and by type

[1] http://www.stat.si/StatWeb/Common/PrikaziDokument.ashx?IdDatoteke=8759 (Only in Slovene)
[2] http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52006XC1012%2801%29

of settlement. Thus Slovenia is divided into 47 strata. The sample distribution is proportional in view of the number of persons aged 16+ in an individual stratum. In the distribution also the response rate in an individual stratum at previous data collections is taken into account. The selection of respondents within the stratum is systematic; there is a random sample.

The interviewing is performed by telephone, thus the name and address of the selected persons are matched to the directory of mobile and fixed phone numbers. In 2014 this was done successfully in 49% of the cases.

Figure 1: Labour Force Survey - Equipment of households with phones 2003-2014.



The telephone data collection is carried out through the CATI studio at SURS. Due to the obligation on timely reporting to the European Commission in Brussels the data are collected in 10 days. During this time, the interviewers try to get as many answers of selected persons as possible. The telephone questionnaire takes approximately 5 minutes to complete. Last year, the average response rate was 48.2%; if estimated on a sample of 3,000 persons (for 1,500 persons the phone numbers could not be determined), the average rate was around 21%. The response rates have been decreasing over the years. Telephone surveys cover a smaller proportion of younger, more educated and urban population. One of the reasons for this trend is also equipment of people with the fixed telephone. Figure 1 shows that the proportion of

people equipped with a fixed and a mobile phone has been declining through the years, while the proportion of people who have only a mobile phone has been increasing. People rarely decide to list their mobile number in the phone book, so currently only around 10% of numbers can be found in the phone book. All this points to increasing the coverage error in all the surveys based only on the one data collection method, i.e. telephone data collection.

Pilot study and results of the regular survey

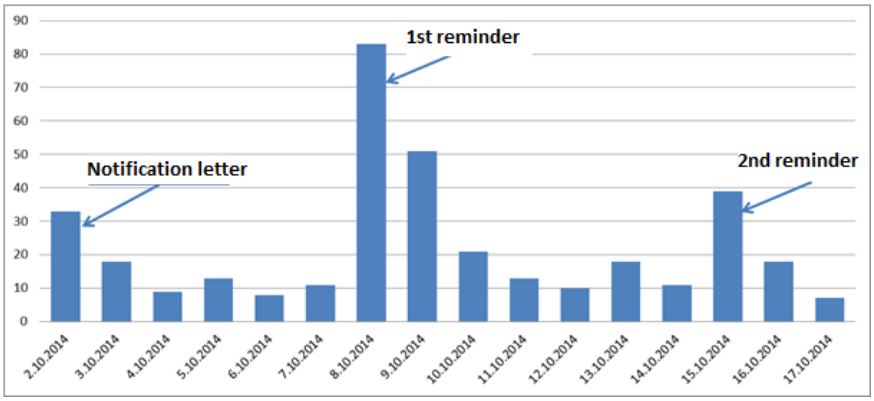
Due to the reasons outlined above, in 2014 SURS decided to carry out a pilot project whose main purpose was to find out whether the online mode of data collection would be a complementary way of CATI mode. In addition, the project intended to test the processes and determine standardized procedures at SURS for potential implementation of web data collection method in the surveys of persons and households.

The pilot was divided into two main parts. The first part of the pilot survey was held in October and the second part in November 2014. The main purpose of the October pilot was to determine whether the use of online questionnaires is suitable for interviewing persons and households: will we cover with the web questionnaire the segments of the population that are otherwise difficult to cover? Moreover, we tested the technical and software implementation of an online questionnaire. In designing the online questionnaire SURS because of comparable results and potentially smaller measurement errors created a uni-mode questionnaire. SURS adjusted specific words of the telephone questionnaire to the online questionnaire in a way suitable for the self-administered questionnaire. The invitation for participation was sent to 1,500 units, to which the telephone number could not be determined by the integration with the phone book. The questionnaire was active for 3 weeks. Furthermore, with the invitation letter we sent them two written reminders, thus testing the effect of reminders. Also, we have two different versions of the questionnaire where the formation of responses "I do not know" and "I do not want to answer" was tested, which in the survey present non-response.

The response rate to the online questionnaire was approximately 23%. The biggest impact (even greater than the notification letter) had the first reminder, which is also shown in Figure 2, as the response rate after receiving the first reminder grew the most. From the figure it can also be seen that most of the responses to the online questionnaire occur within the first three

days after receiving the invitation letter or the reminder. Most respondents responded to the online questionnaire in the afternoon and in the evening.

Figure 2: Frequency of response by date.

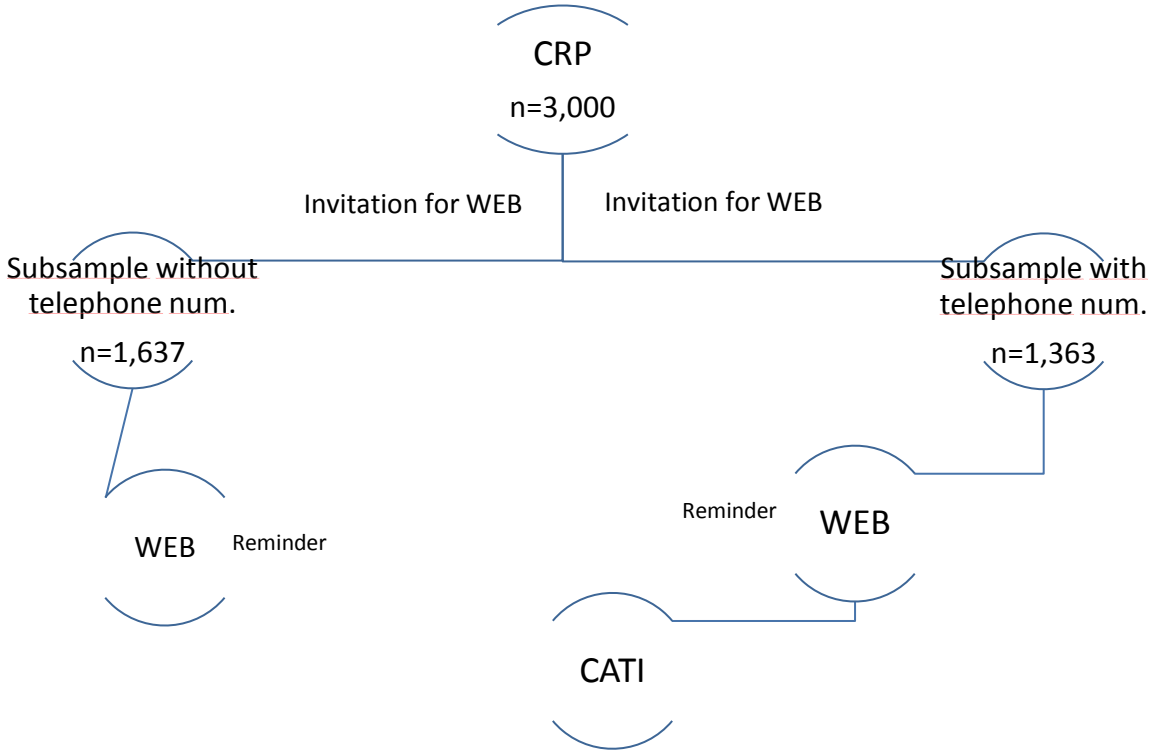


As part of the pilot survey, in October we also analysed the formation of responses "I do not know" and "I do not want to answer". For this purpose, we created two online questionnaires. In the first the respondents had a choice of answers among the other possible answers. With the second option the answers appeared if a person wanted to skip a question. The average response rate "I do not know" or "I do not want to answer" was for the questionnaire in which respondents did not see these answers in advance about 1%, while for the questionnaire where respondents were asked and able to select these answers together with other answers it was 3.6%. Based on this information, SURS decided that in November the option where the answers "I do not know" or "I do not want to answer" appear after the respondent wishes to skip a question would be used. Consequently, with this approach we improved data quality and reduced the variable non-response rates.

With the use of a web questionnaire, we obtained answers from the part of the population which is difficult to obtain with a telephone questionnaire (see % integration and Appendix 1). The web questionnaire was answered by a higher proportion of younger (16-49), better educated, employed, students and people from the larger towns. Because with the web questionnaire we received answers from units that are difficult to cover with traditional methods of data collection (via phone), we therefore reduced the coverage error. In this paper we will present data obtained and shares within individual sociodemographic characteristics in the pilot and regular Consumer Opinion Survey.

In November, SURS carried out the second part of the pilot parallel with the regular telephone survey (from 3 to 16 November 2014). The regular telephone survey was conducted on a sample of 1,500 people and the pilot on the initial sample of 3,000 people. To all units SURS sent an invitation to fulfil the WEB questionnaire by the deadline, which was longer for those for whom SURS could not determine the telephone number. After five days SURS sent a reminder to units for which the telephone number could be determined, while the reminder for those for whom the telephone number could not be determined was sent in the next week. In the next week SURS began with CATI for individuals who did not respond to the online survey and for whom the telephone number could be determined (see Figure 3).

Figure 3: Survey design.



Because of the sequential use of mixed method of data collection, for calculating the response rates we used the cooperation rate (see Figure 4). The cooperation rate for the online survey was 21%, which means that the web questionnaire was answered by 620 respondents. For 55.48% of them we were unable to determine the telephone number. After the second week of data collection we started with telephone data collection from persons who had not responded to the web questionnaire and for whom we were able to determine the telephone number. The cooperation rate in CATI was 13%, while the response rate, if we look at only the part of the

population that has a specific phone number, was 34.8%. The overall response rate was throughout the pilot survey 33%. In the regular survey (only CATI) the response rate was 47% and if also people for whom already in the beginning we were not able to determine the telephone number are considered it was 22%. For the final assessment of the suitability and effectiveness of the pilot survey it is necessary to look more specifically at the results by segments of the population from which SURS got the answers when respondents are offered the possibility of a web questionnaire.

Figure 4: Cooperation rates by mode in the pilot and response rates in the regular survey.

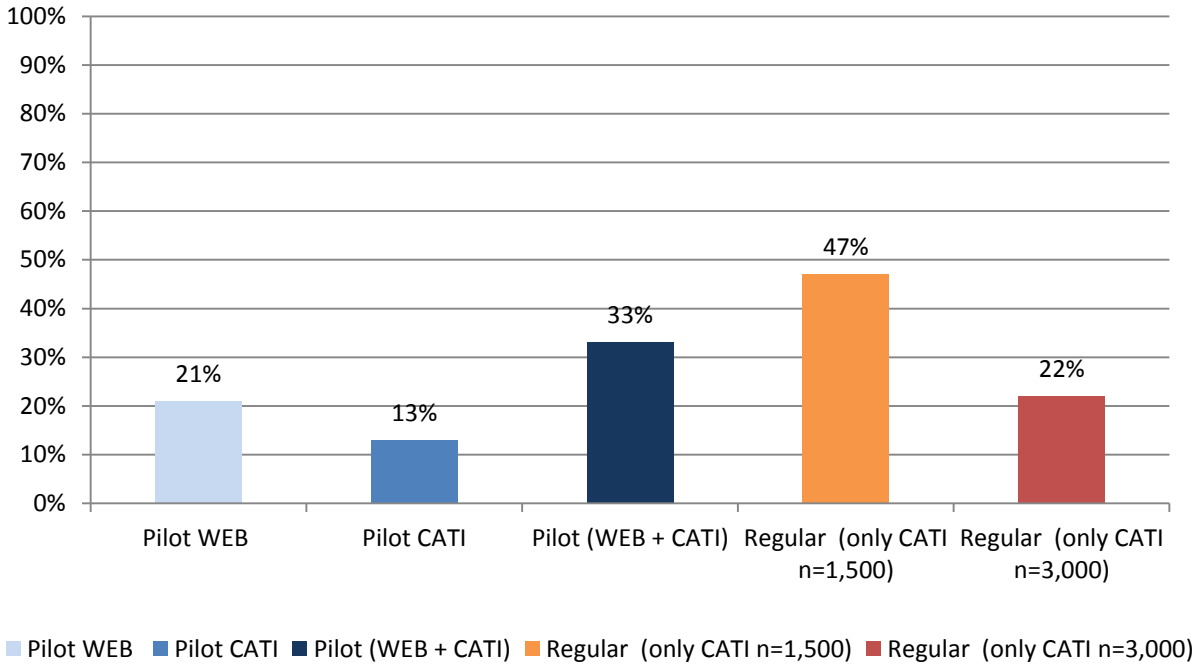
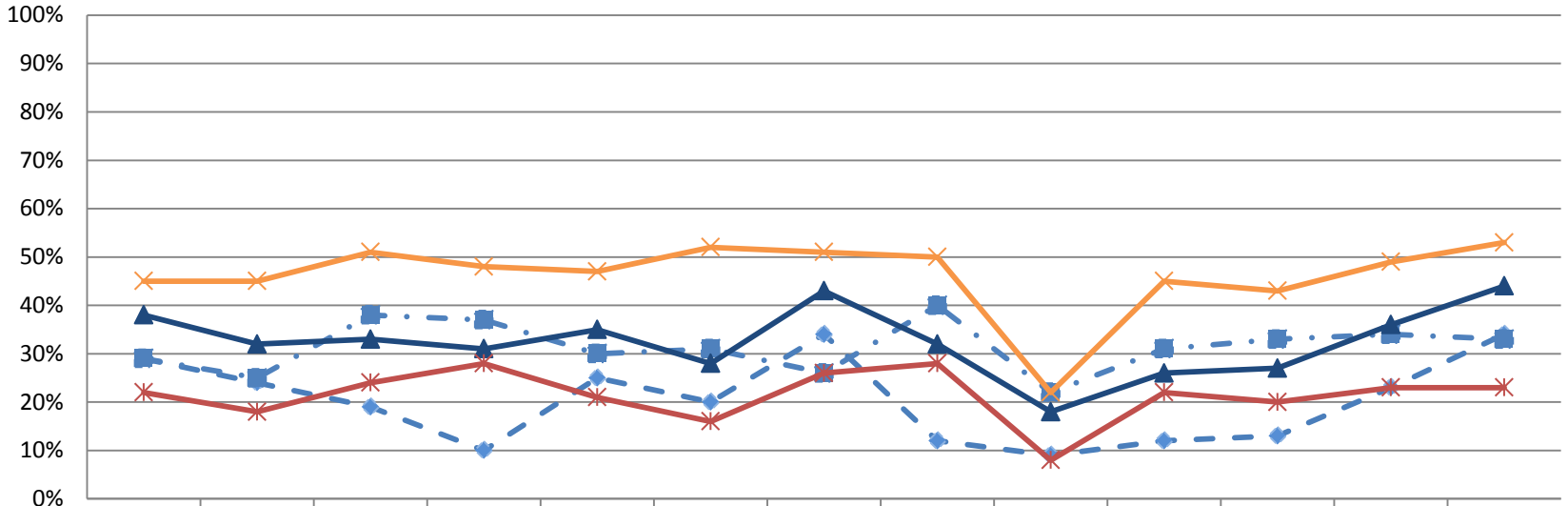


Figure 5: Response rates by sociodemographic domains (age, status and education) in the pilot and the regular survey.



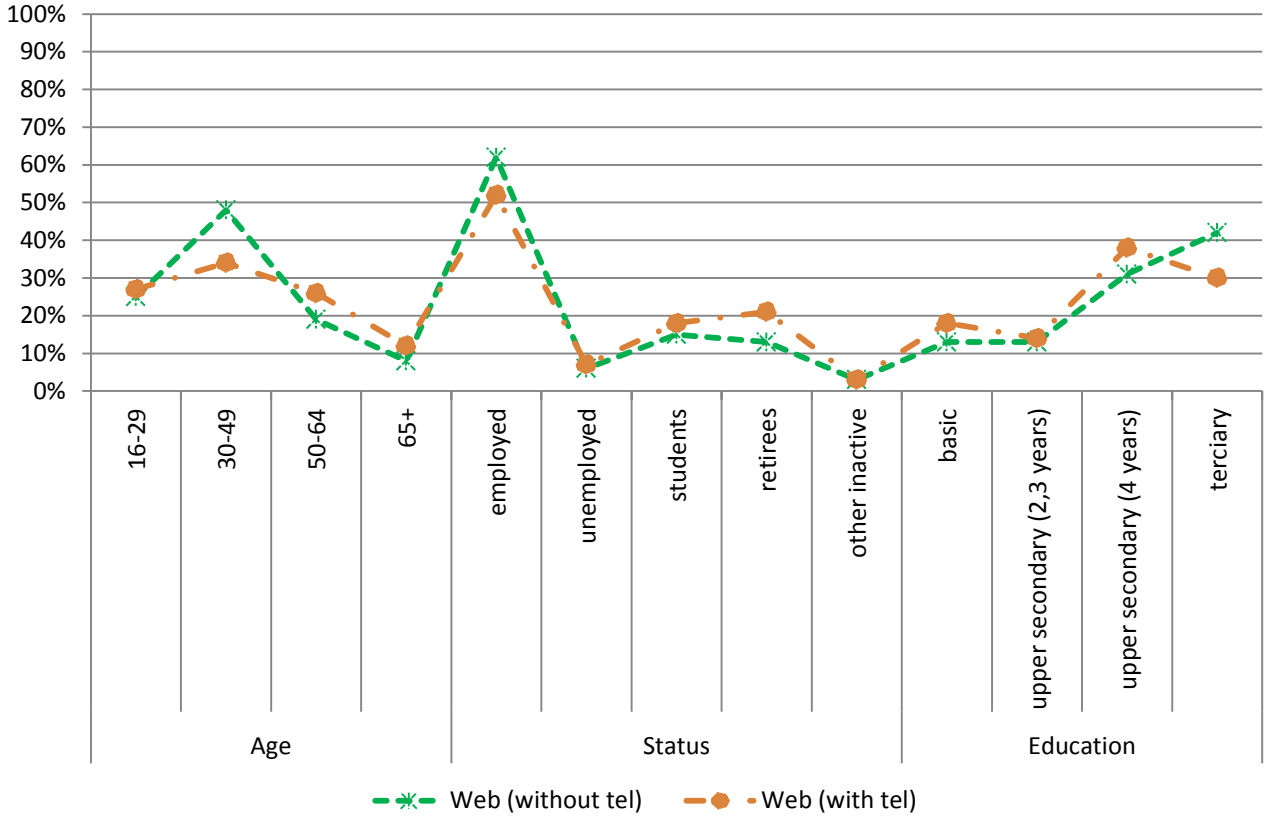
	16-29	30-49	50-64	65+	employed	unemployed	students	retirees	other inactive	basic	upper secondary (2,3 years)	upper secondary (4 years)	terciary
	Age				Status					Education			
Pilot WEB	29%	24%	19%	10%	25%	20%	34%	12%	9%	12%	13%	23%	34%
Pilot CATI	29%	25%	38%	37%	30%	31%	26%	40%	22%	31%	33%	34%	33%
Pilot (WEB + CATI)	38%	32%	33%	31%	35%	28%	43%	32%	18%	26%	27%	36%	44%
Regular (n=1,500)	45%	45%	51%	48%	47%	52%	51%	50%	22%	45%	43%	49%	53%
Regular (n=3,000)	22%	18%	24%	28%	21%	16%	26%	28%	8%	22%	20%	23%	23%

If we look at the response rate within each sociodemographic domain (see Figure 5), it can be observed that the response rates differ between different modes. Students were above average participating in the web survey (34%) and seniors in the phone survey (40%). Because specific groups had different starting points (e.g. by phone SURS called the elderly and those who are less educated as well as those who did not want to participate via the web), the group (Pilot CATI) includes more persons from these categories, so it is necessary for further analysis of the response rates to look at the socio-demographic structure of responses according to different ways of collecting the data (see Appendix 2).

From the data about the response rates can be seen that both CATI and web mode complement each other as a combined data collection method to obtain better coverage of the population. In the pilot implementation of the survey we got a larger share of responses from young people, employed, students and better educated. If we focus on the differences between the modes, it can be seen that a larger proportion of differences is provided by the use and offer of a web questionnaire. The web questionnaire was answered by a higher proportion of younger people (12 and 20 percentage points more young people responded to the online survey than to CATI), while people aged over 50 were more likely to answer over the phone. 21 percentage points more employees and 10 percentage points more students responded to the online survey than to CATI, while for the unemployed these differences were somewhat lower. 16% of retired persons answered the web questionnaire, which is a surprising result for SURS. The web questionnaire was also often answered by better educated people, who also often responded to a telephone questionnaire, but do not because they don't have listed telephone numbers. No gender difference was detected, while the web questionnaire was responded often by people from the larger towns and cities. With the web questionnaire offered by SURS those segments of the population were reached that are difficult to reach in the surveys of persons and households.

To be able to more specifically determine which segment of the population is obtained by pilots, we need a closer look at the differences in the responses between people for whom SURS can determine the telephone number and those for whom it cannot. Figure 6 shows that by offering a web questionnaire SURS reached a larger share of young people for whom at the integration with the phone book SURS could not determine telephone numbers. We also reached a greater proportion of elderly people with telephone numbers. A larger share was also reached of employees and higher educated without telephone numbers.

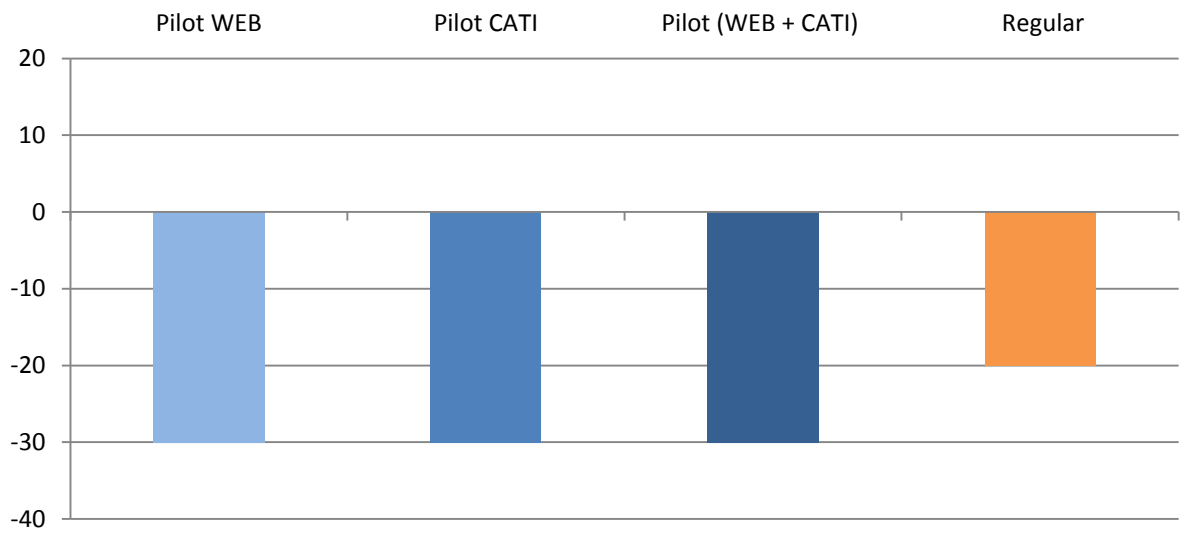
Figure 6: Web response rates by segment of population with and without defined telephone number.



Due to the heterogeneous distribution of the responses by group, we (in the calculation of confidence indicators) calculated appropriate weights. It was necessary to calculate two weights. First, we took all the answers as a whole and weighted to represent the population. The weights are calculated to treat all persons who answered in the pilot survey (Web + Tel). Further, we calculated weights for the telephone part of the pilot survey sample to obtain the weighted results of the telephone part of the pilot survey sample compared with the regular survey. With these weights the telephone part of the sample represents the whole population, which is the same as in the regular survey.

The target variable is the consumer confidence indicator, which measures the overall social climate in the country. The indicator may be negative (−100 limit) or positive (+100 limit). Negative values mean that people are more pessimistic, while positive values mean that they are more optimistic. To determine the relation between the phone and web data collection method, the value of the indicator in the methods of data collection will be further compared.

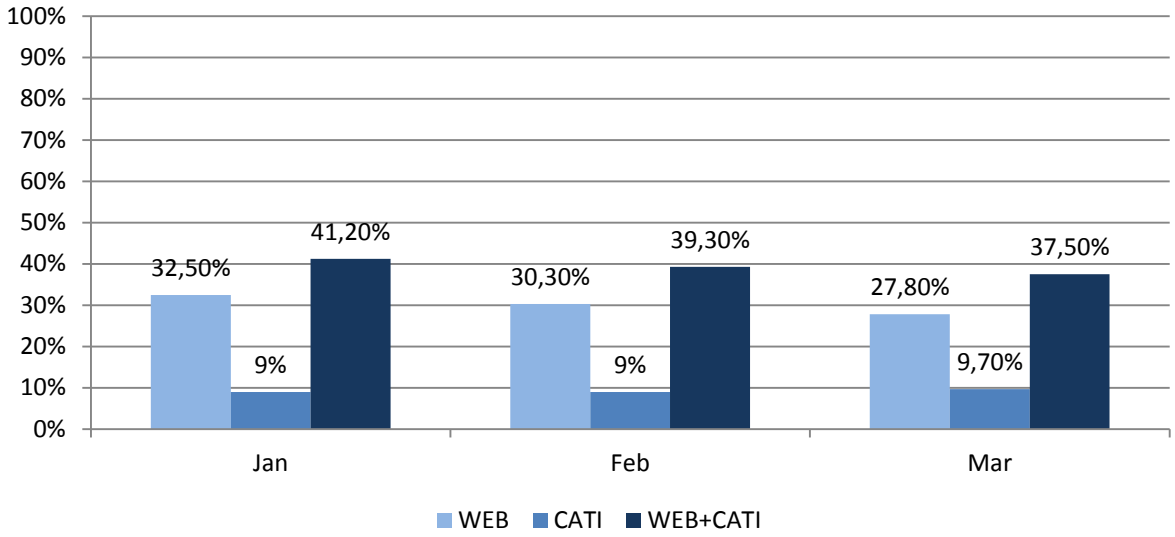
Figure 7: Values of weighted indicators by method of data collection.



The results of the pilot showed that the general opinion in Slovenia is moderately negative whatever the mode of data collection. Figure 7 shows that people in the pilot survey had a more negative opinion (-30) than people in the regular survey where SURS collected data just with the CATI method (-20). According to the results of the pilot survey, the WEB and CATI are equivalent ways as they provide the same results, although we expected that people's views through WEB would be more pessimistic than that via CATI. We also compared results between CATI versions and found that the results differ.

For the pilot survey CATI results are more negative than in the regular survey. A possible reason for this is that the telephone data collection in the pilot survey started four days later than the regular survey or, on the other hand, that this is the effect of sending notification letters and reminders. Among the answers the proportion of younger and better educated persons in higher than in the sample; they are more optimistic than older, less educated and therefore weighted results of the pilot survey are even more negative than unweighted. As in the regular survey weights give more power to groups with a more positive opinion; the impact of weighting on the indicator is positive.

Figure 8: Cooperation rates by mode of data collection in regular survey in first three months of 2016.

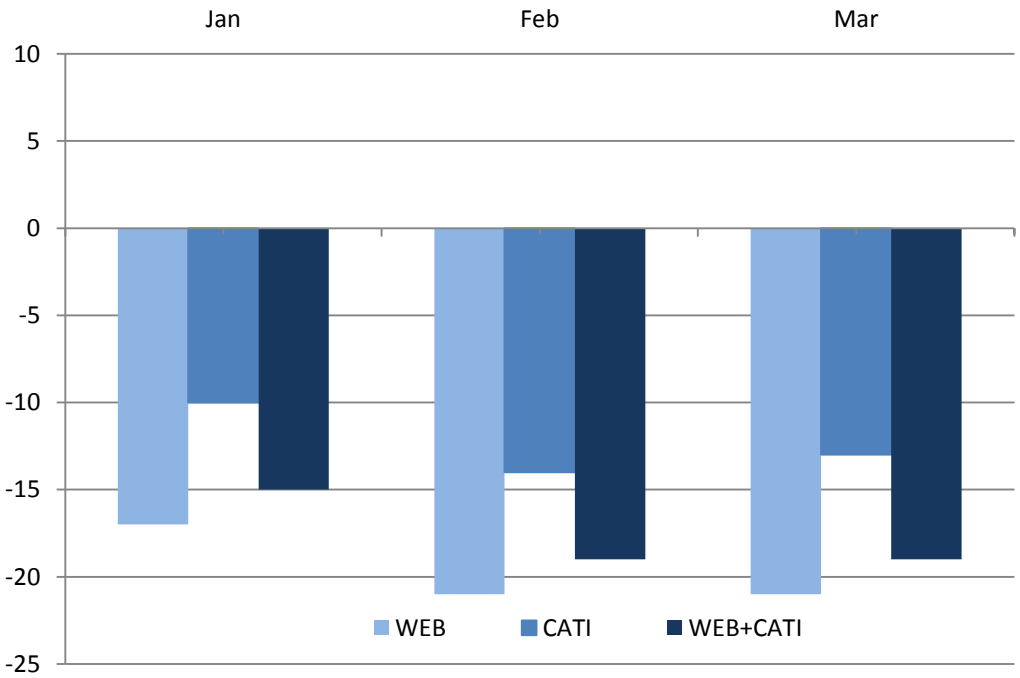


Because of the results of the pilot survey SURS decided that in 2016 the survey will move to a combined method of data collection with the same survey plan as was carried out in the pilot survey. Surprisingly, we have in the first three months reached a high level of cooperation. Figure 8 shows that the overall survey rate (cooperation rate) at the beginning of 2016 ranged between 41% and 37.5%. In the web survey, the cooperation rate was 10 percentage points higher than in the pilot survey, but just in three months it decreased by almost 5 percentage points, while the rate for the CATI mode of data collection remained at a similar level, but somewhat lower than in the pilot survey, whereas with the web questionnaire the part of the population was covered which otherwise would have to answer the phone survey. In the surveys of persons and households in Slovenia it is significant that people prefer to participate in surveys at the beginning of the year than at the end of the year. This trend has been observed for many years.

The analysis of indicators (see Figure 9) shows that people in the web survey report more negatively than people over the phone. The difference is about 7 percentage points. Such results were expected before the implementation of the pilot survey, as it is typical that people in web surveys because of the anonymity respond more negatively than people who respond via the phone. Telephone respondents answer the interviewers' questions and it is more likely to get a measurement error due to the influence of the interviewers. Online respondents also cannot be controlled regarding the environment in which they respond to the web questionnaire (multitasking). When we are looking at the differences between the indicators in the methods of data collection, it is necessary to more precisely follow monthly differences

in indicators. If the ratio between WEB and CATI stayed the same, we can say that these differences are the effects of the method of data collection. If these differences will vary, we will need to carefully consider how we should deal with these differences.

Figure 9: Values of weighted indicators by method of data collection in 2016.



Discussion

The increasing use of information technology in the last twenty years has an important role in the development of new methods of data collection. Web surveys, which represent an important turning point in the social sciences, use computer technology to such an extent that in many cases they represent serious competition to the traditional methods of data collection. Online surveys compared to traditional data collection methods bring both advantages and disadvantages, which are often faced by researchers and which threaten the validity of many surveys. The most common errors in the web surveys are non-response error, coverage, sampling, and measurement error. In order for the researchers to optimize the positive effects of online surveys, they are increasingly choosing web surveys within combined methods. Researchers use web surveys in combined methods in different designs, in some cases as the main, in other cases as an alternative method of data collection.

As private organizations engaged in researching public opinion, national statistical offices and other institutions should also follow the development of technology for online data collection methods. Among other things, government institutions have access to administrative data sources, allowing faster and especially facilitating the collection of data. On the other hand, government institutions have restrictions regarding software, personal data protection, rationalizing costs and a number of bureaucratic procedures, which may hamper their technological development.

In SURS the implementation of the online data collection method for the surveys of persons and household was held in the case of a one and a half year project, in which SURS carried out a parallel pilot survey. With the pilot survey SURS also implemented standards for layout and access to the web questionnaire, the management of access to personal data, a system for daily monitoring of responses, an application for managing usernames and passwords to access the web questionnaire, etc. The results of the pilot and then the regular survey showed that the sequential combination mode of data collection achieves a much better coverage of the population than the CATI mode alone. These are mostly young, educated, students and pupils, employees and people from major cities. On the other hand, we also detected a difference in the ratings which depend on the manner of the so-called mode effect. In self-administrated modes people have a more negative opinion than when respondents answer the interviewers' questions. What method of data collection has better results cannot be said, because in some way both ways are correct, because they express the current opinion of the respondents, when responding to online or telephone questionnaire.

The implementation of the additional method of collecting data in the official survey has contributed several advantages. Above all, by implementing the additional method we offered respondents the opportunity to participate and express their opinions in a way that is friendlier. The results showed that the implementation of the web data collection method as an additional method complements traditional data collection methods, while only the use of WEB mode in official statistics caused considerable dilemmas and open issues: How to motivate the respondent to repeatedly participate in an online questionnaire? How to ensure that the web questionnaire is answered by really selected units? How to restrict multitasking and fulfilling of the web questionnaire? How to restrict the use of undesirable patterns of responding? How to effectively analyse and collect paradata? ...

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Appendix

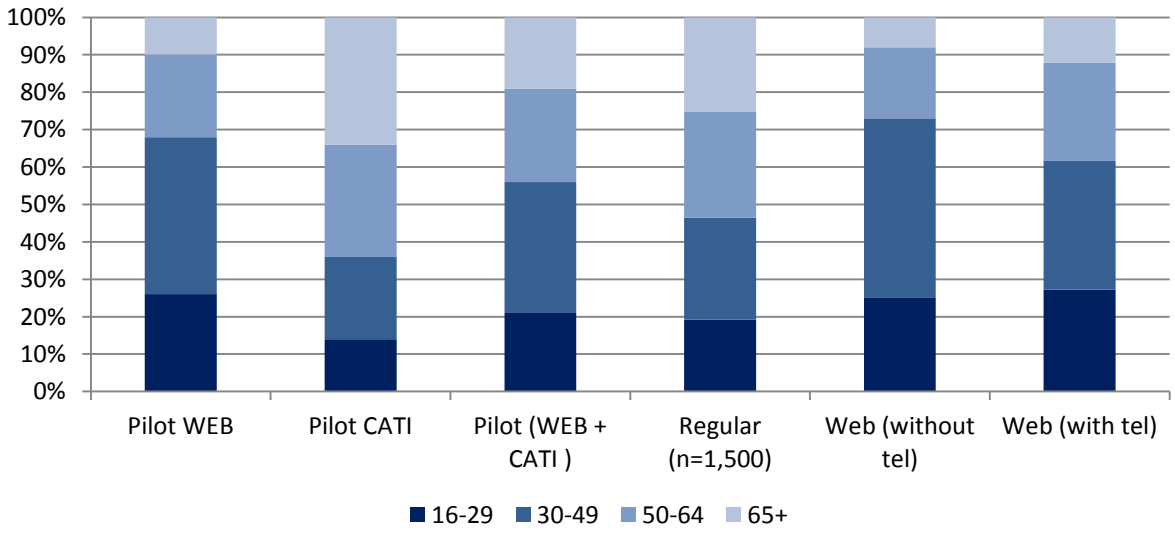
Appendix 1: Sample and structure of the sample of persons who participated in the regular telephone survey in November 2014

	CRP sample	Telephone sample	% Integration (tel/crp)	responses
Total	3167	1483	1483/3167	703
Total (%)	100%	100%	47%	100%
Area				
Urban < 2 000 people	28%	30%	51%	30%
Rural < 2 000 people	24%	32%	64%	34%
City: 2 000 – 10 000 people	17%	15%	41%	15%
City: > 10 000 people	14%	11%	35%	10%
Maribor	5%	3%	26%	2%
Ljubljana	13%	9%	33%	8%
Statistical region				
Pomurska	6%	8%	61%	8%
Podravska	17%	16%	44%	16%
Koroška	3%	4%	55%	4%
Savinjska	13%	12%	46%	12%
Zasavska	2%	2%	39%	2%
Spodnjeposavska	4%	4%	52%	5%
Jugovzhodna Slovenija	7%	7%	53%	8%
Osrednjeslovenska	25%	21%	41%	21%
Gorenjska	10%	9%	46%	10%
Notranjsko-kraška	3%	3%	55%	4%
Goriška	6%	7%	55%	7%
Obalno-kraška	7%	7%	48%	5%
Age				
16–29	19%	20%	49%	19%
30–49	34%	29%	39%	27%
50–64	27%	26%	47%	29%
65+	20%	24%	58%	25%
Gender				
Male	49%	50%	48%	47%
Female	51%	50%	46%	53%
Activity				
Employed	45%	42%	44%	42%
Unemployed	7%	4%	30%	5%
Students	11%	12%	50%	13%

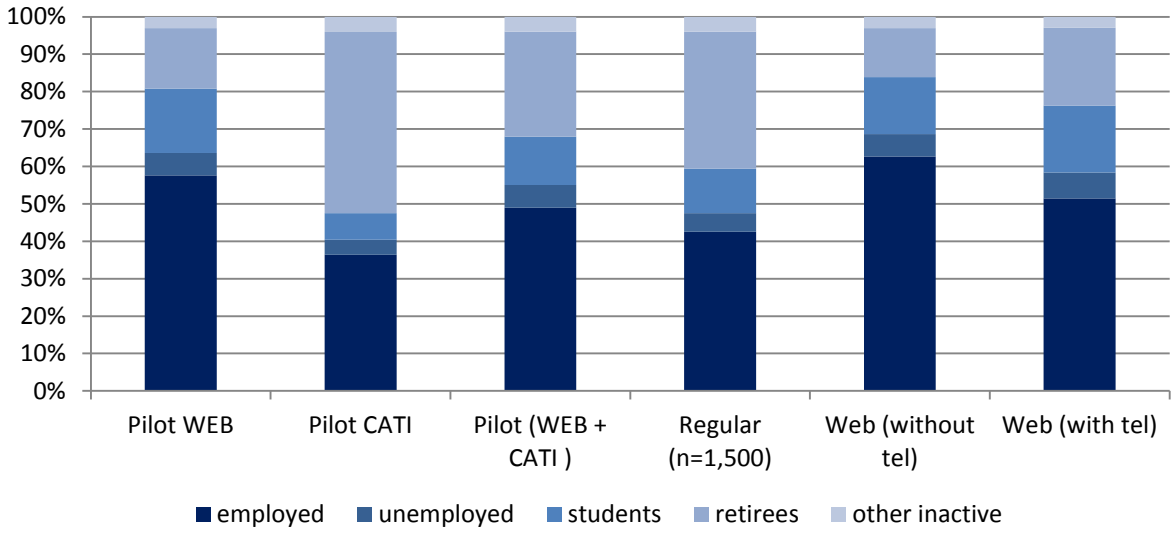
Retires	30%	36%	56%	37%
Other inactive	7%	6%	37%	3%
Adm. education				
Basic	27%	28%	49%	27%
Upper secondary (2 or 3 years)	21%	21%	47%	19%
Upper secondary (4 years)	31%	31%	47%	32%
Tertiary	20%	19%	45%	22%

Appendix 2: Demographic structure of responses by different modes of data collection in the pilot and the regular survey.

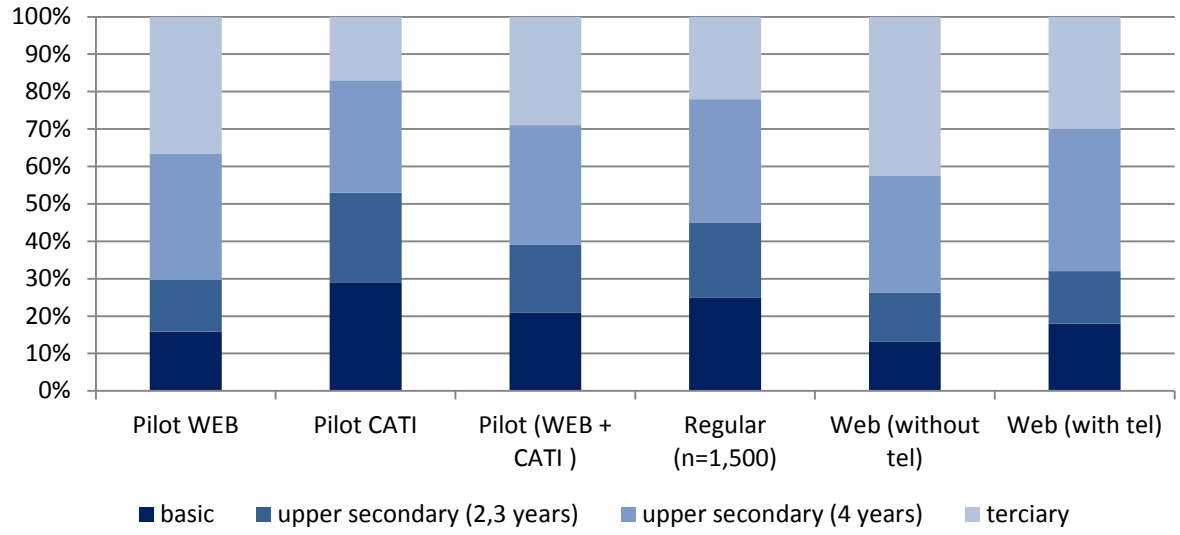
Age



Status



Education


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Pilot WEB
Pilot CATI
Pilot (WEB + CATI)
Regular (n=1,500)
Web (without tel)
Web (with tel)
basic
upper secondary (2,3 years)
upper secondary (4 years)
terciary