INSTITUTO NACIONAL DE ESTADISTICA

Survey on Equipment and Use of Information and Communication Technologies in Households. Year 2013 (ICT-H. 2013)

Methodological report

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1 Presentation of the survey

The general objective of the Survey on the Equipment and Use of Communication and Information Technologies in Households (ICT-H) is to obtain data on the development of what is known as the *Information Society.*

The survey has the following specific objectives:

1. To ascertain the information and communication technologies equipment in Spanish households (ICT products: television, landline and mobile phone, computer equipment.).
2. To ascertain the use that the Spanish population makes of Internet and e-commerce.
3. To serve as a base to establish comparisons between Spain and other countries and meet the requirements of international institutions.
4. To obtain information that is comparable between Autonomous Communities.

1.1 General description of the survey

In 2004 the survey started to be conducted continuously, as a 'Rotating Panel', in other words, the same dwellings (panel) are investigated over various years, with a quarter of the sample being renewed (i.e. rotating) every year.

The sample was obtained from the continuous municipal register of inhabitants. It comprised 2,578 census sections distributed by Autonomous Community. Eight main dwellings were selected within each section, and 6 reserve dwellings were also selected in case incidents were to arise regarding the main dwellings.

In 2005, first wave, the corresponding quarter of the sample of dwellings was renewed. As regards the rest of the sections, the main and reserve dwellings that filled in the 2004 questionnaire were maintained (they were all considered main dwellings in 2005), as were the reserves that were not used before to replace main dwellings (they were still considered reserves in 2005).

The sample for the ICT-H 2005 survey was selected from 28,224 dwellings, 23,682 of which were main dwellings and the rest reserve dwellings that are used if something happens to the main dwelling. From this year, all first interview sections will have eight reserves, rather than the six for previous surveys, in order to reduce the loss of "effective" sample which occurs over time.

The same procedure was used in all subsequent waves (second wave of 2005, first wave of 2006, second wave of 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013). In this latest survey, the size of the sample was 20,484 main households (13,094 CATI and 7,390 CAPI), there also having been used 2,940 reserves to ensure the optimal population coverage by Autonomous Community, whereby the number of dwellings visited was 23,424. The total number of sample sections in 2013 was 2,513, since there are sections with dwellings in CATI, and at the same time in CAPI.

TIC-H 2013: Number of CAPI and CATI visited dwellings and sections, by province

		CATI		CAPI	
		Dwellings	Sections	Dwellings	Sections
01	**Araba/Álava**	117	16	48	11
02	**Albacete**	156	22	84	17
03	**Alicante/Alacant**	297	50	311	45
04	**Almería**	114	17	55	13
05	**Ávila**	52	8	43	6
06	**Badajoz**	431	59	264	45
07	**Balears, Illes**	536	80	578	75
08	**Barcelona**	947	131	695	108
09	**Burgos**	109	16	82	13
10	**Cáceres**	275	37	228	29
11	**Cádiz**	206	29	161	24
12	**Castellón/Castelló**	105	16	98	16
13	**Ciudad Real**	195	26	111	20
14	**Córdoba**	137	20	92	17
15	**Coruña, A**	339	49	251	48
16	**Cuenca**	89	12	51	11
17	**Girona**	127	18	94	16
18	**Granada**	151	21	93	16
19	**Guadalajara**	65	9	60	10
20	**Guipuzkoa**	246	34	178	27
21	**Huelva**	87	14	60	15
22	**Huesca**	75	12	81	15
23	**Jaén**	115	16	86	15
24	**León**	172	24	127	19
25	**Lléida**	74	10	39	7
26	**Rioja, La**	527	72	382	63
27	**Lugo**	101	15	85	14
28	**Madrid**	1024	145	934	141
29	**Málaga**	227	37	229	36
30	**Murcia**	621	87	420	81
31	**Navarra**	631	87	449	68
32	**Ourense**	88	14	84	16
33	**Asturias**	622	90	503	82
34	**Palencia**	69	9	17	5
35	**Palmas, Las**	384	53	274	41
36	**Pontevedra**	245	37	228	38
37	**Salamanca**	105	15	67	10
38	**Sta. Cruz Tenerife**	294	44	290	45
39	**Cantabria**	554	76	406	70
40	**Segovia**	54	7	17	2
41	**Sevilla**	315	45	217	40
42	**Soria**	27	5	43	5
43	**Tarragona**	97	15	96	16
44	**Teruel**	63	10	66	11
45	**Toledo**	216	30	150	25
46	**Valencia/Valéncia**	485	72	458	75
47	**Valladolid**	149	20	94	15
48	**Bizkaia**	396	56	332	56
49	**Zamora**	52	7	67	9
50	**Zaragoza**	417	63	308	55
51	**Ceuta**	69	10	67	11
52	**Melilla**	45	9	77	10
		13,094	**1,876**	**10,330**	**1,678**
		Total Dwellings	**23,424**	Total Sections	**2,513**

The dwellings in sections undertaking the first interview and dwellings without a telephone were interviewed via personal interview with tablet (CAPI).

All other dwellings were interviewed by telephone, recording the survey on an electronic questionnaire from CATI centres.

The field work was conducted all over Spain. The collection period, from the CAPI centres, was from 18 February to 10 May 2013, while from the CATI centres, it was from 28 January to 10 May 2013.

The population object of investigation (objective population) are persons who live in main family dwellings. Although persons of all ages form part of the objective population, not all persons are investigated exhaustively, as they are only eligible for an exhaustive investigation of persons 16 and over at the time of the interview, of whom one is selected.

For the questionnaire, the table "Household members" is filled in first of all to decide which persons are household members and which are surveyable (household members aged 16 and over). In order to provide this data, an informant is required who is a member of the household and is aged 18 or over).

The selection of the person to survey is made electronically by means of a random procedure.

Blocks II and III deal with the equipment of the household as to ICT products: television, computer, telephone, etc, and whether or not the household has Internet access.

Block IV is filled in if there are children aged 10-15 in the household. There is a series of questions referred to all of them related to the use of computers, the Internet and mobile phones.

Blocks II to IV may be filled in by the initial informant or the selected person.

Blocks V to IX deal with the use of computers, the Internet, Public Administration, e-commerce, computer knowledge and the X asks about some socio-economic data on the selected person. Only the selected persons may respond.

1.2 Organisation of field work

Data was collated in two ways:

- Personal interview with laptop computer or tablet (CAPI): The interviewer does not use paper questionnaires, rather s/he has a laptop computer onto which the questionnaire has been uploaded, so that interviews may be carried out with this laptop computer.

By using this method, households from sections with a new sample and households already included in the 2012 sample for whom there is no contact telephone, are interviewed.

- Telephone interview in a CATI centre: households from the 2012 sample are interviewed by phone from a CATI centre as long as they have a telephone number. The interviewer does not use paper questionnaires but rather records responses from the informant on the electronic questionnaire directly.

The CATI centres are located in the Delegations of Madrid, Barcelona, Cádiz, Coruña, Sevilla, Valencia and Bizkaia and each one of them calls the following provinces:

Province where the CATI centre is located	Provinces from where information is collected
Madrid	Albacete, Avila, Burgos, Ciudad Real, Cuenca, Guadalajara, Rioja, Madrid, Palencia, Salamanca, Segovia, Soria, Toledo, Valladolid and Zamora
Barcelona	Baleares, Barcelona, Girona, Lleida and Tarragona
Coruña	Coruña, León, Lugo, Ourense, Asturias and Pontevedra
Cádiz	Almería, Cádiz, Granada, Jaén, Málaga, Las Palmas, Tenerife and Ceuta and Melilla
Sevilla	Badajoz, Cácares, Córdoba, Huelva and Sevilla,
Vizcaya	Araba/Alava, Gipuzkoa, Navarra, Cantabria and Bizkaia
Valencia	Alicante, Castellón, Huesca, Murcia, Teruel, Valencia and Zaragoza

In CATI centres, personnel worked in two shifts from Monday to Friday. The first shift covered the interval from 9 am to 3 pm and the second from 3 pm to 9 pm.

Each sample section is allocated a week of initial work, plus 3 weeks more in order to make up any absent or inaccessible dwellings. The survey letters of introduction are sent the week prior to the first week of section work.

As regards personnel contracted for the survey, it is worth noting that there were 14 Interviewer Inspectors and 45 Interviewers for 13,094 CAPI main households; 24 Interviewer Inspectors in the field and 128 Interviewers in the field, for 7.390 CAPI main households.

1.3 Incidents concerning dwellings and groups and their treatment

The **dwelling keys** considered are:

- Unlocatable dwelling (IL)

In CAPI this incidence occurs when the dwelling is not located by an error in the entry address. The dwelling may not be located on the address that appears on the list of dwellings selected either because the address is incorrect, is duplicated with another dwelling included in the sample or because the dwelling does not currently exist.

This incidence does not exist in CATI.

- Dwelling used for other purposes (OF)

The household selected is dedicated entirely to purposes which are different from family residence. For example: convent, old people's home, garage, office, etc.

- Inaccessible dwelling (IN)

In CAPI this is the dwelling which cannot be accessed to carry out the interview due to geographical climatological (floods, snowfall, etc.) changes (when there are no routes to arrive there) or any other type of changes.

In CATI this incidence is automatically assigned when the telephone recorded for a dwelling does not correspond to the address in which the interview may be conducted and it is not possible to locate a correct telephone.

- Empty dwelling (V)

The dwelling selected is not a main dwelling, it may be a temporary dwelling (inhabited or uninhabited at the time of the interview) or inhabited for any reason, such as death or change of residence of persons who live there.

- Previously selected dwelling (SA)

This is the dwelling which, having been selected previously (less than five years ago) in the sample of any other INE population and household survey, and having taken part therein, is selected again

- Surveyable dwelling (E)

The **group keys** considered are:

- Total refusal (NT)

This is considered when it has not been possible to conduct the interview and the cause is the subsequent outright refusal of the initial informant after having started to collaborate.

- Refusal from the selected person (NS)

This case is considered as long as the initial informant answers the general household questions but **the selected person refuses to give information** either via an outright refusal as occurs subsequently after initially having started to collaborate.

- Total absence (AT)

This incidence occurs when, after successive visits (in CAPI) or successive calls (in CATI), it is not possible to contact anybody in the dwelling or when it is possible to contact somebody who does not live in the dwelling and who gives information that its occupants are absent.

- Absence of the selected person (AS)

This is used after successive visits to the dwelling have not resulted in interview because the person selected is absent and cannot be contacted.

- Incapacity to respond (IC)

This incidence occurs when it is not possible to carry out the interview due to incapacity to respond whether due to age, disability, illness, lack of knowledge of the language or any other circumstances either from household members as a whole preventing initial contact as well as the selected persons.

In the case of the selected person's incapacity to respond it is admissible for the interviewer to use a third person as an intermediary to obtain the information.

- Surveyed group (E)

When none of the previous incidences occurs and the questionnaire filled in fulfils the requirements to be considered *complete.*

A questionnaire is **complete** if all corresponding questions according to the movement of the electronic questionnaire have been answered.

Moreover, for dwellings collected by means of telephone interview in CATI centres the results of all of them are collected and each one of the calls made.

The possible call results are:

- Not contacted (NC): when nobody answers the telephone or answer phone.

Without a telephone (ST): the telephone does not exist or is a fax or the interviewer verifies that the address to which this telephone corresponds is not the address to be interviewed.

-Engaged (C): the engaged tone.

Contact postponed (AP): the dwelling is contacted but before starting the interview the informant asks to be called at another time to conduct it or there is no valid informant in the dwelling at this time and the call is postponed.

- Partial interview because a new appointment is established (EPC): these are calls in which the questionnaires have been started to be filled in but the informant requests that the interview continue at another time.

- Partial interview interrupted for other reasons (EPO): these are calls in which the interview is interrupted due to the line being cut, problems with the system, etc.

- Interview completed (EF): these are calls in which the survey is completed, either because the questionnaire has been filled out completely, or because there is an incidence in the dwelling which makes it impossible to carry out the questionnaire. Households where the questionnaire is not carried out are regarded as empty (V), used for other purposes (OF), or without a telephone (IN) and also those that are surveyable, but whose human group refuses to take part (NT, NS), is absent (AT, AS) or is unable to respond (IC).

2. Sample design

2.1 Type of sampling

The sample design has been made in the whole country by means of a stratified tri-stage sample.

The first-stage units are the census sections. The second-stage units are main family dwellings. During the third stage, a person is selected in each dwelling who is aged 15 or over. Furthermore, all minors aged between 10 and 15 are also investigated in each dwelling.

The framework used for the sample selection at the beginning of the survey is an area framework formed by the relation of existing census sections on January 1st 2001. Nevertheless, variations that occur over time are incorporated periodically to the sample selection.

Second stage units use the list of main family dwellings in each of the sections selected for the sample obtained from the most up-to-date continuous municipal register of inhabitants available.

Sections are grouped in strata in each Autonomous Community, in accordance with the size of the municipality they belong to.

The following strata have been considered:

Stratum 0: Municipalities with 500,000 inhabitants and over.

Stratum 1: Municipalities that are the province capitals with less than 500,000 inhabitants.

Stratum 2: Municipalities between 100,000 and less than 500,000 inhabitants, that are not province capitals.

Stratum 3: Municipalities between 50,000 and less than100,000 inhabitants, that are not province capitals.

Stratum 4: Municipalities between 20,000 and less than 50,000 inhabitants, that are not province capitals.

Stratum 5: Municipalities between 10,000 and less than 20,000 inhabitants.

Stratum 6: Municipalities with less than 10,000 inhabitants

For each Autonomous Community an independent sample is designed from that represented due to one of the survey objectives being to facilitate data with this level of breakdown.

2.2 Size of the sample.- Allocation.

In order to fulfil the goals of the survey, i.e. to provide estimates with a specific degree of reliability on a national level and by Autonomous Community, the investigation uses a sample size of around 2500 census sections, with 8 dwellings selected in each census section. The current sample has 2513 census sections.

In order to obtain a minimum sample size that allows reliable estimates on an Autonomous Community level, the sample was distributed among them by using a commitment allocation, either uniform or proportional to the size of the Community.

The distribution of the number of sections selected by Autonomous Community is:

Autonomous Community	Number of census sections
Andalucía	258
Aragón	116
Asturias, Principado de	120
Baleares, Iles	110
Canarias	132
Cantabria	104
Castilla y León	145
Castilla - La Mancha	132
Cataluña	228
Comunitat Valenciana	183
Extremadura	130
Galicia	153
Madrid, Comunidad de	201
Murcia, Región de	118
Navarra, Comunidad Foral de	116
País Vasco	141
Rioja, La	99
Ceuta and Melilla	27
TOTAL	2,513

Between strata, allocation is proportional strictly to the size of these.

2.3. Sample selection

In order to conduct the survey, the selection of first stage units in each stratum was carried out with probability proportional to the size of each section. In the second stage, dwellings have been selected with equal probability, by means of a systematic sample with random start among the dwellings of the section. This procedure provides self weighted samples of dwellings in each stratum.

During a third stage, and within each dwelling, a person is chosen with equal probability among those 16 and over.

2.4. Renewal of the sample

The investigation is a continuous survey that is carried out every year. In order to, on the one hand, incorporate the variations that occur in the census sections, and, on the other hand, avoid weariness on the part of families interviewed, as well as giving a likelihood of selection to other families, the sections and dwellings sample is partially renewed. For this purpose, the *rotating panels* scheme is introduced.

Rotating panels are groups of sample sections, which are used to gradually incorporate the modifications into the sample. The number of sample sections per stratum in each Autonomous Community is distributed among the *rotating panels* so they are representative. The survey is a *rotating panel* with four rotating shifts.

2.4.1. Renewal of the sample of sections. Update of probabilities of selection.

Taking information from the electoral files, Population Censuses or the Continuous Register, section probabilities are updated.

Changes taking place as a result of the update are incorporated on an ongoing into the sample by rotation shift.

In the year 2013 changes were made in rotation shift 4, which is the one that had to renew the dwellings sample.

The procedure used for updating is the one proposed by L. Kish and A. Scott (JASA 1971).

2.4.2 Renewal of the sample of dwellings.

According to the aforementioned, in order to avoid weariness on the part of families interviewed, as well as giving a likelihood of selection to other families, new ones arriving from the census section, the sample of dwellings is partly renewed by rotation shifts.

Therefore, new dwellings in all sections belonging to a specific shift are selected.

The dwellings from the sections in rotation shift 4 were renewed during 2013.

2.5. Estimators

The following types of estimators have been considered to estimate the survey characteristics:

- Estimator for data on households
- estimator for data on persons aged 16 and over.
- estimator for data on persons aged 10 to 15.

Ratio estimators will be used in all cases, calibrated according to information from external sources.

A). Estimator for data on households

So as to obtain characteristics regarding households, the survey uses an estimator obtained by means of the following steps:

A1) Expansion estimator based on the design factor with correction for non-response on a stratum level.

In each stratum h, the estimator for the total of a characteristic X is obtained by means of the following expression:

$$\hat{X}_h = \sum_{i=1}^{n_h} \sum_{j=1}^{v_{ih(e)}} \frac{V_h}{v_{h(e)}} x_{hij}$$

where:

V_h : Dwellings from stratum h.

$v_{h(e)}$: Size of the effective sample of dwellings from stratum h.

x_{hij} : i Value of the characteristic that is under study in dwelling j of section i.

n_h : Number of sections of the sample from stratum h.

$v_{ih(e)}$: Effective number of dwellings in section i from stratum h.

A2) Separate ratio estimator, to adjust to the population in each stratum h.

$$\hat{X}_h^R = \frac{\sum_{i=1}^{n_h} \sum_{j=1}^{v_{ih(e)}} x_{hij}}{\sum_{i=1}^{n_h} \sum_{j=1}^{v_{in((e)}} p_{hij}} P_h$$

where:

p_{hij}: Total sample persons (aged 16 and over) from dwelling j, section i.

P_h: Population in stratum h.

A3) The final estimator is obtained by applying reweighting techniques to the previous estimator, using CALMAR software.

As an auxiliary variable, we have used the estimate of the total main dwellings by size (5 sizes) for each Autonomous Community, referred to 15 March 2013 (until now, the distribution of dwellings used came from the Economically Active Population Survey).

From now on, this information is an outside source and comes from the upgraded estimate of the total dwellings, whose basis is the information of the last population and dwellings census and the *Population Figures*.

B). Estimator for data on persons aged 16 and over

The final estimator is obtained from the individual questionnaire, whose responses come from a person selected among household members aged 16 and over. The estimator is similar to that used in the case of the household but bearing in mind the existence of a factor that incorporates the probability of selection of the person inside the dwelling.

B1) Estimator based on the design factor with correction for non-response.

$$\hat{X}_h = \sum_{i=1}^{n_h} \sum_{j=1}^{v_{h(e)}} \frac{V_h p_{hij}}{v_{h(e)}} x_{hij}$$

B2) Separate ratio estimator, to adjust to the population in each stratum.

$$\hat{X}_h^R = \frac{\sum_{i=1}^{n_h} \sum_{j=1}^{v_{ih(e)}} p_{hij} x_{hij}}{\sum_{i=1}^{n_h} \sum_{j=1}^{v_{ih(e)}} p_{hij}} P_h$$

B3) Implementation of calibration techniques by using the population as auxiliary variable, by age and sex groups and nationality groups, on an Autonomous Community level. In order to do so the macro CALMAR is used.

The population used in the survey has been an estimate of the population residing in main family dwellings on 15 March 2013, deduced from the *Population Figures*.

C). Estimator for data on persons aged 10 to 15 years

The sampling information relating to all household members between the ages of 10 and 15 is supplied by the person aged 16 or over selected in each household.

The estimator used to obtain the information related to these persons is analogous to that described in section A, with the exception of the auxiliary variables, used in calibration (section A.3), which are the estimates of resident population in main family dwellings for 10 to 15 years, by sex, in each Autonomous Community, deduced from the *Population Figures.*

2.6. Sampling errors

The indirect Jackknife method is used for the calculation of sample errors of the main characteristics investigated.[1]

This method is based on the formation of subsamples in which each one of them is obtained by eliminating a primary unit from the total sample. The estimate of the variance of the estimator has the following expression.

$$\hat{Var}(\hat{X}) = \sum_{h} \frac{(n_h - 1)}{n_h} \sum_{j \in h} \left(\hat{X}_{(hj)} - \hat{X}\right)^2$$

where:

$\hat{X}_{(hj)}$ is the estimate of X when primary unit j from stratum h is removed from the sample.

$\hat{X}$ is the estimate of X obtained with the whole sample.

n_h is the number of primary units in stratum h.

The sample theory determines that in the interval comprised between:

$$\left(\hat{X} - 1{,}96\sqrt{\hat{V}(\hat{X})} \quad , \quad \hat{X} + 1{,}96\sqrt{\hat{V}(\hat{X})}\right)$$

It exists a confidence of 95%, measured in terms of probability, of finding the true value of the X parameter.

The INE website (http://www.ine.es/en/) publishes the sample errors of some of the main variables relating to dwellings, persons (16 to 74 years of age) y children (10 to 15 years of age). They are grouped in three tables located

[1] The CALJACK software, developed by P. Lavallè from Statistics Canada was used for this purpose.

after the results of the Survey, which include information on both a national level and by Autonomous Community.

Formally, these errors are the estimations of *the typical deviations* of the estimators of the characteristics in question.

3. Results of the field work

FINAL SUMMARY OF INCIDENTS

			Incidents in households													
	Total households	Total completed	E	NT	NS	AT	AS	IC	Surveyable	IN	V	OF	SA	IL	Reservations polled	Total polled
Total CATI	13,094	13,094	9.778 (*)	671	178	1,046	217	85	11,976	925	179	13	1			9,778
		100.0%	81.7%	5.6%	1.5%	8.7%	1.8%	0.7%	91.5%	7.1%	1.4%	0.1%	0.0%			74.7%
Total CAPI	7,390	7,390	4.432 (*)	845	42	485	37	64	5,909	37	1,183	62	4	195	1.610 (*)	6,042
		100.0%	75.1%	14.3%	0.7%	8.2%	0.6%	1.1%	80.0%	0.5%	16.0%	0.8%	0.1%	2.6%		81.8%
TOTAL	20,484	20,484	14.210 (*)	1,516	220	1,531	254	149	17,885	962	1,362	75	5	195	1.610 (*)	15,820
		100.0%	79.5%	8.5%	1.2%	8.6%	1.4%	0.8%	87.3%	4.7%	6.7%	0.4%	0.0%	1.0%		77.2%

Surveyable=E+NT+NS+AT+AS+IC.
(*) Six dwellings have been removed as they lacked valid information (an interviw in CATI centres, more than 4 members and 1 reserve interviewed in CAPI)
In incidents E, NT, NS, AT, AS and IC the percentages are calculated on the surveyable total. For the remainder, the percentages are calculated on the total for completed main households.

4. Dissemination of the results

The statistical tables of the results of the survey and the methodological report and other supplementary material will be published on the INE web site (www.ine.es) and, if applicable, in the corresponding electronic publication.

The data corresponding to the ICT-H has been caluculated using the population estimates derived from the Census of the year 2011. On the other hand, the results corresponding to use of ICT by persons are also calibrated by nationality, as well as the traditional calibration by sex and age. Both changes lead to a break in the series of data published thus far, which prevents establishing standardised comparisons. For this reason, it is necessary to revise ICT-H data published prior to the year 2013. This revision will consist of recalculating data, taking into account the new population estimates derived from the Population Census and the new calibration by nationality. In this first phase, the main indicators for the year 2012 have been recalculated, in order to be able to provide variations calculated in a standardised way. In a second phase during the coming months, a standardised series will be published with the revision both of the detailed results and of the microdata files.

As in previous editions and with the aim of achieving greater comparability with the data published by Eurostat, the statistical tables of the ICT-H 2013 results presented refer to dwellings inhabited by at least one person aged from 16 to 74 years and to people in this same age group.

In successive performing of the survey, n tables relating to dwellings, the main magnitudes refer to ICT equipment in the dwelling (television, computer, telephone, radio, video, etc.), as well as access and way of connecting to the Internet. As regards person, tables, among others, will be created for the use of computers, the Internet and e-mail.

These statistical variables inherent to the survey are cross-referenced with the socio-demographic variables obtained in the same, such as the size of the household and of the municipality where it is located, sex, level of training of the persons, employment situation, etc.