Survey on Equipment and Use of Information and Communication Technologies in Households (ICT-H. 2008)

Methodological report

INSTITUTO NACIONAL DE ESTADISTICA

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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 the first wave of 2005 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 are maintained (they are all considered main dwellings in 2005), as are the reserves that were not used before to replace main dwellings (they are still considered reserves in 2005).

The sample for the ICT-H 2005 survey was made up of 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 in all subsequent waves (second wave of 2005, first wave of 2006, second wave of 2006, 2007 and 2008). In this latest survey, the sample was composed of 32,085 dwellings, 25,757 of which were main dwellings and the rest reserve dwellings.

TIC-H 2008

Nº de viviendas y de secciones CAPI y CATI por provincias

Provincia		Viviendas CATI	Secciones CATI	Viviendas CAPI	Secciones CAPI
01	Älava	113	15	87	11
02	Albacete	163	22	112	16
03	Alicante/ Alacant	369	50	335	40
04	Almería	339	48	307	43
05	Avila	42	8	83	10
06	Badajoz	375	51	320	40
07	Balears (Illes)	492	68	459	57
08	Barcelona	1129	151	883	105
09	Burgos	137	19	115	16
10	Cáceres	219	33	217	34
11	Cádiz	394	66	490	77
12	Castellón/Castello	133	18	128	17
13	Ciudad Real	171	25	190	25
14	Córdoba	361	48	281	38
15	Coruña (A)	336	49	312	52
16	Cuenca	84	12	69	9
17	Girona	131	18	112	13
18	Granada	348	48	317	41
19	Guadalajara	66	10	78	9
20	Guipúzcoa	269	35	190	22
21	Huelva	279	39	258	39
22	Huesca	128	17	104	13
23	Jaén	353	48	287	39
24	León	190	26	165	20
25	Lleida	86	11	50	5
26	Rioja (La)	377	54	369	44
27	Lugo	110	16	100	14
28	Madrid	1107	153	1072	146
29	Málaga	471	69	454	68
30	Murcia	563	75	442	52
31	Navarra	1395	180	1017	97
32	Ourense	103	15	97	14
33	Asturias	1336	175	992	110
34	Palencia	67	9	53	8
35	Palmas (Las)	373	49	270	38
36	Pontevedra	264	37	240	35
37	Salamanca	112	19	143	23
38	S. Cruz Tenerife	293	41	293	43
39	Cantabria	886	120	750	104
40	Segovia	59	8	49	8
41	Sevilla	511	75	532	79
42	Soria	32	5	48	5
43	Tarragona	132	18	132	17
44	Teruel	80	12	77	11
45	Toledo	220	31	209	27
46	Valencia	595	79	544	76
47	Valladolid	184	24	168	16
48	Vizcaya	438	57	344	38
49	Zamora	79	11	59	9
50	Zaragoza	500	67	408	53
51	Ceuta	61	10	92	14
52	Melilla	69	10	58	10
Total general		**17.124**	**2.354**	**14.961**	**1.950**

Total viviendas **32.085**

Total secciones **3.140**

NOTA. Se debe tener en cuenta que hay secciones que están tanto en CAPI como en CATI

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 25 February until 6 June 2008.

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). This data must be provided by an informant 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 for 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 VIII deal with the use of computers, the Internet and e-commerce and IX includes 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 2007 sample for whom there is no contact telephone, are interviewed.

- Telephone interview in a CATI centre: households from the 2006 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 Vizcaya 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, Badajoz, Burgos, Cáceres, Cantabria, Ciudad Real, Cuenca, Guadalajara, Rioja, Madrid, Palencia, Salamanca, Segovia, Soria, Toledo, Valladolid y Zamora
Barcelona	Baleares, Barcelona, Girona, Lleida y Tarragona
Coruña	Coruña, León, Lugo, Orense, Asturias y Pontevedra
Cádiz	Cádiz, Córdoba, Granada, Jaén, Las Palmas y Tenerife
Sevilla	Almería, Huelva, Málaga, Sevilla, Ceuta y Melilla
Vizcaya	Alava, Guipúzcoa, Navarra y Vizcaya
Valencia	Alicante, Castellón, Huesca, Murcia, Teruel, Valencia y 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 17,124 CAPI main households; 27 Interviewer Inspectors and 107 Interviewers for 8,633 CAPI main households.

1.3 Incidents concerning dwellings and groups and their treatment

The **dwelling keys** considered are:

- Unlocatable dwelling (UD)

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 (OP)

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 (E)

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.

- Surveyable dwelling (S)

The **group keys** considered are:

- Total refusal (TR)

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 (RS)

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 (TA)

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 (IR)

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 (S)

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 (WT): 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 (EN): the engaged tone.

Contact postponed (CP): 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 (IC): 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 (E), used for other purposes (OP), or without a telephone (WT) and also those surveyed whereby their human groups 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 is an area framework formed by the relation of existing census sections on January 1st 2001. 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 more than 500,000 inhabitants

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

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

Stratum 3: Municipalities between 50,000 and 100,000 inhabitants, that are not province capitals

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

Stratum 5: Municipalities between 10,000 and 20,000 inhabitants

Stratum 6: Municipalities with less than 10,000 inhabitants

For the purpose of reaching the objectives of each Autonomous Community, an agreement has been signed with some of them, and sub-strata have been defined. In the case of Navarra, substrata are based on the rural or urban type of municipality and on the geographical location within the country (Urban Pamplona, Rural Pamplona, Urban North, Rural North, Urban Middle, Rural Middle, Urban South and Rural South). As regards Asturias, for the same reason, other substrata have been defined based on the regions to which the municipality belongs (Navia, Narcea, Avilés, Oviedo, Gijón, Caudal, Nalón and Oriente).

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 3,140 census sections, with 8 dwellings selected in each census section.

In order to obtain a minimum sample size that allows reliable estimates on an Autonomous Community level, the sample is distributed among them by using a commitment allocation, either uniform or proportional to the size of the Community such that the number of sections by stratum in each Autonomous Community is a multiple of four.

The sample initially designed by INE has increased in some Autonomous Communities in accordance with the agreements signed with them. In previous years, the samples for Asturias (2005), Andalucía (2006) and Navarra (2006) and Cantabria (2007).

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

Autonomous Community	Number of census sections
Andalucía	588
Aragón	128
Asturias (Principado de)	232
Baleares (Islas)	92
Canarias	120
Cantabria	160
Castilla y León	172
Castilla - La Mancha	132
Cataluña	264
Comunidad Valenciana	196
Extremadura	112
Galicia	156
Madrid (Comunidad de)	204
Murcia (Región de)	100
Navarra (Comunidad Foral de)	240
País Vasco	144
Rioja (La)	72
Ceuta y Melilla (Ciudades Aut.)	28
TOTAL	3,140

Between strata, allocation is proportional to the size of these, always maintaining that the number of sections per stratum in each Autonomous Community is a multiple of four.

2.3. Sample selection

In order to conduct the ICT-H-07, the selection of first stage units in each stratum has been carried out with probability proportional to the size of each section. In the second stage, dwellings have been selected by means of a systematic sample with random start and equal probabilities of selection for each dwelling in 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

In order to avoid tiring out respondent families, and to give other families that are new to the census section the chance of being selected, the sample of dwellings is renewed partially using the rotation shifts scheme.

Therefore, the survey is a rotating panel with four rotation shifts organised in such a way that, every year, dwellings in the sections belonging to a specific shift are renewed. The fact that the number of sections by Autonomous Community in the sample is a multiple of four, facilitates the appropriate distribution of sections among the four rotation shifts.

Although the sample of first units remains fixed, variations in the sectioning have been incorporated by using probability procedures consistent with the design of the sample.

The dwellings from the sections in rotation shift 3 were renewed during 2008.

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:

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

where:

V_h : Dwellings from stratum h.

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

n_h : Number of sample sections in stratum h.

x_{hij} : value of the of study in dwelling j, section i.

c_i : Update coefficient. Value that depends on section i. This represents the growth of the same from the selection of the simple of first units to the moment of conducting the survey.
(See note).

Note on the calculation of coefficient c_i

The probability of selection of a household is the following:

$P(V_{ish}) = K_h \cdot \frac{V_s}{V_h} \cdot \frac{m}{V_s} = K_h \cdot \frac{m}{V_h}$ (are self-weighted samples on a stratum level)

where:

K_h = no. of sample sections in stratum h.

m = no. of dwellings in the sample in each section=8

V_h = dwellings in stratum h.

Vs = dwellings in section s.

Given that the sections are updated periodically, the probability of selection of the sample dwellings corresponding to the sections of the rotation shift that is being renewed, change in the following way:

If we call the number of dwellings in the updated section $V_s^{'}$, we arrive at:

$$P(V_{ish}) = K_h \cdot \frac{V_s}{V_h} \cdot \frac{m}{V_{s'}} = K_h \cdot \frac{V_s}{V_h} \frac{m \cdot V_s^{'} / V_s}{V_s^{'}} = K_h \cdot \frac{m}{V_h}$$

As may be observed, in order for the new dwellings to have the same probability as the rest of the sample dwellings, it is necessary to introduce a coefficient, which we call the growth coefficient, and which is defined as:

$$c_i = \frac{V_s^{'}}{V_s}$$

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

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

where:

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

P_h: Population projection 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 total dwellings classified by size (5 sizes) for each Autonomous Community. This information is from the Economically Active Population Survey.

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 corresponding to the person inside the dwelling.

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

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

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

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

B3) Implementation of re-weighting techniques by age groups and sex on an Autonomous Community level (CALMAR) with populations referring to 15 May 2008, provided by the Demographic Analyses and Forecasting units.

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 persons aged 10 to 15 is analogous to that described in section A, with the exception of the auxiliary variables, used in calibration (section A.3), which are the population projections of for 10 to 15 years, by sex, in each Autonomous Community, provided by the Demographic Analyses and Forecasting units.

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.

[1] (*) CALJACK software, developed by P. Lavallé of Statistics Canada, has been used

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

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 error allows us to build a numerical interval in which a certain confidence exists, measured in terms of probability, that it contains the true value of the estimated characteristic. The most frequently used confidence interval is that comprised between the estimation, minus 1.96 times the sample error, and the estimation, plus 1.96 times the sample error. This interval has a confidence of 95%, measured in terms of probability, of finding within it the true value of that which is being estimated.

The INE website (www.ine.es) 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 after the results of the Survey, which include information on both a national level and by Autonomous Community. Formally, these errors are expressed as the estimations of *the typical deviations* of the estimators of the characteristics in question, expressed as a percentage, and called *standard errors*.

3. Organisation of field work

RESUMEN INCIDENCIAS FINAL

			Incidencias en titulares												
	Total titulares	Total finalizadas	E	NT	NS	AT	AS	IC	Encuestables	IN	V	OF	IL	Reservas encuestadas	Total encuestadas
Total CATI	17.124	17.124 100,0%	13.190 82,2%	1.109 6,9%	249 1,6%	1.126 7,0%	255 1,6%	110 0,7%	16.039 93,7%	852 5,0%	225 1,3%	8 0,0%			
Total CAPI	8.633	8.633 100,0%	5.532 76,0%	846 11,6%	63 0,9%	731 10,0%	44 0,6%	63 0,9%	7.279 84,3%	19 0,2%	1.165 13,5%	69 0,8%	101 1,2%	1.780	7.312 84,7%
TOTAL	25.757	25.757 100,0%	18.722 80,3%	1.955 8,4%	312 1,3%	1.857 8,0%	299 1,3%	173 0,7%	23.318 90,5%	871 3,4%	1.390 5,4%	77 0,3%	101 0,4%	1.780	20.502 79,6%

Se calcula el porcentaje de total finalizadas sobre el total de titulares inicial
Encuestables=E+NT+NS+AT+AS+IC
En las incidencias E, NT, NS, AT, AS e IC se calculan los porcentajes sobre el total de encuestables. En el resto se calculan los porcentajes sobre el total de viviendas titulares finalizadas
En total encuestadas (titulares+reservas), el porcentaje se calcula sobre el total de viviendas titulares iniciales.

4. Dissemination of the results

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

With the aim of achieving greater comparability with the data published by Eurostat, the statistical tables of the final ICT-H 2008results refer to dwellings inhabited by at least one person aged from 16 to 74 years and to people in this same age group. In years prior to 2006, the results referred to the total number of dwellings and people aged 15 years old and above.

In tables relating to dwellings, the main magnitudes will 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 household members, among others, tables will be created for the use of computers, the Internet and e-mail.

These statistical variables inherent to the survey will be 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.