# Chasing a Dragonfly on the Lawn

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**Abstract:** In this paper the authors aim to discuss a series of surveys conducted over the past two years through web-survey, through which issues related to eating disorders have been scrutinized with the objective of giving a portrait as to the several aspects concerning those who live in a state of distress by cause of chronic diseases. The methodology employed makes use of statistical techniques widely recognized in the scientific field. The main purpose is to understand if the new techniques of study born to the web 2.0 are valid as classical techniques, with particular attention to the break-off phenomenon (total and partial dropouts) as well as the response and cooperation rates, in order to understand how these may still be valid in contexts web 2.0. The results are encouraging, the rates examined and the percentage emerged from error sampling makes us think that we snatched the dragonfly on the grass.

**Keywords:** Web-Survey, Web 2.0, Break-off Phenomenon, Cooperation Rates, Total and Partial Dropouts

## 1. Introduction

It is quite unreasonable to discuss web surveys without investigating the means by which such contributions are conveyed through the web. Nowadays, the spread of the Internet as well as the diffusion of online platforms have encouraged even those who are less familiar with statistics and methodologies in Social Research to conduct survey projects. However, such opportunity entails two aspects: on the one hand it enables anybody to study his personal subject of interest in more depth at bargain rates (1). On the other hand, an inaccurate consideration at the sampling stage might bring about a troubling increase in superficial and scientifically inadequate studies.

Banking on the assumption that statistics play a central role in the circular process of research (2) (3), it might be risky to carry out analysis through online surveys, which might be set up inadequately. Accordingly, this might lead even the most professional researchers, who are not accustomed to formulas and analysis, to erroneously misinterpret the data (4).

It is also true that thanks to a simple 'click' it is now possible to overcome several issues related to the collection and the analysis of data in addition to a tremendous cost and time reduction (5). As a matter of fact, while once there was the need to grasp more or less complex statistical programs, which enabled the analysis of data, and prior to that the same operations were carried out by counting and applying formulas on paper, today it is possible to download simple reports where trends regarding the variables are analyzed almost in real time (6).

Among the official sources, ISTAT (2013) was the first to show interest in the network. Not only has it recently conducted a survey on how Italians make use of the web and social media, but for some time, it has also availed itself of technology platforms as a means of consulting the statistical documents online, where it is possible to download most of the data tables in different charts and electronic formats to process data according to specific and individual cases of study. The innovative aspect, which marks the introduction of the web into the Istat censuses, operates at two different levels: the first relates to the data collection; the second to the data processing (7). With reference to the former aspect, after the last two censuses namely General Population and Housing Census and General Agricultural Census, we citizens were invited to complete an online survey through the use of a platform. In this case, ISTAT preferred to adopt a mixed-mode research methodology (8), thanks to the use of a data collector besides the online compilation. The latter aspect, instead, concerns the analysis of data and the possibility to manage independently tables and charts online as it is now possible to

obtain and download such electronic data in real time[1].

## 2. Probability Versus non Probability Sampling

Before getting into the matter of the present contribution and introduce some of the considerations arisen over the past two years of in-depth studies, it is proper to make some clarifications with respect to the concept of "probability" in relation to the sampling process.

The definition adopted by us, which is commonly employed in the branches of science by all those disciplines that consider 'sampling'[2] as an important step for their studies, is as follows: "a sample is said probabilistic if, and only if, all considered units are chosen from the sampling frame randomly". One of the aims of the present contribution is to investigate whether it is possible or not, to adopt this definition even for studies conducted through web-survey.

However, it is not sufficient to examine the concept of probability without taking into account the notion of 'random sampling' (9); a clear and typical example is undoubtedly the lottery, where, by definition, each unit of the population has an equal chance of being selected. A debate on representativeness, intended as considering a part to represent the whole, has come up around this definition: a synecdoche that has interested, for years, those studies conducted with statistical inference.

It is one thing if we consider sampling as a simple extraction from an urn but it is a different matter if we follow the same procedure by interviewing people that, unlike the dice boxes of the lottery, may refuse to contribute in their task. Besides, it should be pointed out that a 'random sampling' with individuals is statistically representative only if the population is well known in its entirety and a list has been provided. Last but not least, it turns out that the relations between variables, which conforming to the object of study should be acknowledged by the reference population, are likely to complicate the statistical inference procedures, since data appear rather difficult to be traced (10).

Under these circumstances, it is quite evident that carrying out the inference procedure on the outcomes obtained may result rather difficult. As a matter of fact there are some objective issues to take into account from the very first stages of the research, when methods and techniques aimed at scrutinizing the considered case of study are still under definition. In that respect it would be advantageous to broaden the approach adopted and try to understand what limits but also opportunities the network may bring.

On account of this, our objective is that to investigate the break off phenomenon and draw attention to the response and cooperation rates emerged from our survey.

## 3. The Online Platform: A Green Lawn

The concept of 'sampling' intends to raise awareness of strengths and weaknesses as regards the online platforms. Moreover it considers how much these latter ones are versatile in their use (4). On an extreme level, we might dare to say that the versatility of such platforms enables us to conduct and/or distinguish between probability and non probability sampling through web-surveys.

It is often easy to confuse their function by thinking of the only diffusion through the social-media; indeed, Facebook, Twitter and blogs are not the only way to administer an online survey[3]: the modality adopted to extend a survey online will impede at first glance a series of possibilities which will enable us to draw the sample of those willing to contribute to the study. Naturally, the process by which it is common to make a web-survey in context 2.0. is quite different from CAWI, from those questionnaires sent by e-mail in different electronic formats (pdf, word, Excel). What is more, the e-mail is just one among many instruments used to contact and inform people of the link referring to the website, wherein it is possible to participate in the survey.

Thanks to some options, accessing to the link may be restricted to a certain number of people through the use of a password communicated to all who will take part of the sample. Accesses through the link can be also monitored in real time. Besides, there would be the possibility to get to know additional information through the tracking number of the user's computer (IP): this kind of information will appear directly to the researcher among the recorded data and will further limit access from the same computer to a second survey[4]

On the basis of what has been presented so far, this is likely to be the most efficient option among the several possibilities regarding web-survey using online platforms. The first step is supposed to include a list of names and e-mail addresses to let the researcher carry out his sample according to the object of study, in compliance with the principle of fundamentum divisionis, that is the mutual exclusivity of the classes and completeness of the same in case of specific classifications, as it is customary for stratified, cluster or multistage sampling models. Furthermore, the survey will be publicized by sending an email to provide the website link and the password.

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[1] In this respect references can be found on the online data warehouse at the following link: http://dati.istat.it/

[2] Fabbris [1989], Corbetta [1999], De Carlo e Robusto [1996], Wonnacott e Wonnacott [1969], Henry [1990], to name a few, without claiming to be in any way exhaustive.

[3] Web surveys (CAWI – computer – assisted – web interviewed) date back to the late seventies (20).

[4] Many of these decisions are related to the internal configuration of the platform, which varies according to the objectives which led the creator of the site to enter the market. In this regard it is remarkable that the increasing use of such platforms occurs in the relevant market research. However, according to the European Society for Opinion and Marketing Research (ESOMAR), which is one of the most renowned companies conducting social and market research at European level, there might be the risk of misusing such tool. As a consequence, if each passage of the survey is not well carried out, the privacy of individuals will be infringed. This was debated within the code of ethics drawn up by the International Chamber of Commerce.

Accordingly it will be requested not to disclose the request of compilation to anyone. In such a case, a person outside the sample will not access through the link unless he is not invited from the mail recipient. After all, similar issues may even occur when dealing with postal surveys [5] . The studies presented in the next section follow the above mentioned procedure. It is important to state that surveys can be administered through several other tools. As mentioned at the beginning of the paragraph, with the introduction of social networks, not only is it possible to disseminate quickly a survey using a simple copy and paste function but there is now the opportunity to set up surveys using online platforms. It follows that it will not be possible to know the sampling frame a priori just as it is not possible to know in advance "the people who are going to see a museum". Besides, it is essential to note that a web survey is not necessarily linked with non probability sampling procedures: the statistical inference changes depending on the mode of operation carried out by the researcher. Yet, the sample representativeness index tends to decrease in all those cases when the researcher interferes and forces somehow the sampling procedures agreed in advance, passing from probability sampling to non probability sampling.

In this regard, it is worth reminding that the inference concept is based on two basic requirements: Representativeness and Randomness, both called into question by Marradi (1997) who stated that randomness does not contribute to draw the representativeness of a sample and vice versa. Accordingly, the concept of inference, as we are used to study, will automatically lapse. In this respect, the central limit theorem [6] is undoubtedly of considerable importance: "the sample size is directly proportional to the level of confidence desired for the estimate and the variability of the phenomenon under scrutiny, and inversely proportional to the error the researcher is willing to accept. This means that the size of the population is not particularly important to determine the size of the sample. To provide an example, a sample of 1,000 cases may be sufficient to achieve estimates of the same level of precision for populations of 10,000 or 100,000 elements. However, if the aim is to get estimates of precision of two percentage points, 2,500 cases may be sufficient for any population size, even at global level." (11).

Although such considerations are the result of concepts derived from classical research, we assume they might be favourable to the web 2.0 concept, where the number of compilations is substantial, to the extent that over 1,000 statistical questionnaires may be compiled in a few days thanks to effective communication channels. Among the surveys under consideration, for instance, the sample size lies roughly between 1,000 and 3,000 cases for a population of 62,000.

# 4. Break-off and Rates: The Dragonfly on the Lawn

After having defined the importance of platforms to set web-surveys and their related methods of administration, we now enter into the merits of the findings collected from the studies conducted over the last two years.

Particular attention was given to a study on food transgressions of people suffering from eating disorders associated with chronic diseases occurred in the last two years: both studies provide a sample which estimates about 3,000 individuals for a total population of 62,000 people with diagnosed diseases.

This will be followed by an analysis concerning the distribution of the collected answers, in line with the good practices defined in the document presented by the America Association for Public Opinion Research (AAPOR), which not only states the methods by which partial and complete interviews are used to be distinguished, but it also provides five calculation methods aiming at the analysis of contact, response and cooperation rates as well as the break-off phenomenon. Such standard definitions are particularly suited for person to person interviews, postal surveys (named person), and for all those surveys which can provide the names of their own respondents. Along with this statement, we decided to consider the above mentioned rates because, as it was previously mentioned, we had the great opportunity to obtain a list of names from our survey. Based on this methodology, the aim of our analysis is to investigate how much such measures can work effectively in the era of Web 2.0.

However, it is not common to discuss the response rate without giving a brief introduction on the semi-structured questionnaire, containing skip logic questions [7] with a predominance of close-ended questions and a 10% of open questions. These were definitely of great help to make considerations about the personal medical treatment as well as the difficulties encountered by naming each patient's pathology. The variables are mainly categorical and ordinal. Some are cardinal for a total of approximately 50 variables.

Here we provide some general information with respect to the characteristics of the sample analysed for the second survey completed in February, 2013. Within the defined framework it can be concluded that the average age of those interviewed is 32 years, the oldest being 80.

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[5]  It is also possible to provide a series of precautions to ensure the researcher that the questionnaire is completed by the person selected from the sample. These important tricks may be of different kinds. First of all, it is recommended to reply to the e-mail by which the link was given and provide the user with the credentials to log on to the site. Moreover, it might be useful to supplement a further authentication to the platform.

[6]  The central limit theorem states that given a sufficiently large sample size from a population with a finite level of variance, the mean of all samples from the same population will be approximately equal to the mean of the population (with mean μ and variance $\sigma/\sqrt{n}$), where $n$ is the number of samples

[7]  In this regard, filling an online form has simplified and minimized the margins of compilation error.

Thirty-eight-year-old people occur more frequently (73 people), thus confirming the fact that the age group ranging from 38 to 57 years is the most represented (37.1%) along with the 19-to 37-year age range (38,9%), while 41% of the entire sample showed as having a medium-high level of education.

It is quite evident that women in Italy are mainly affected by such diseases and dietary restrictions: the data presented to Parliament, dating back to 2013, show that 71% of women were diagnosed compared to 29% of men. This trend differs by only 8 percent compared to what emerges from our study indicating 79% of women compared to 21% of men. Half of the participants is married and/or cohabiting, 38% of whom has at least one child. Over half of the participants are employed (57,4%) and lastly, 34% receive a net monthly salary between 1,000 and 2,000 Euro.

We decided to focus more specifically on the details related to the specificities of the sample, coming to the conclusion that, although the reference theories reveal that samples which make use of the network may run into issues caused by the digital divide (12), we ascertained the absence of particular problems precluding the study of specific age groups.

Going into detail of the analysis, we first make clear the level of completion of our survey, for which we adopted the standards proposed by Frankel (1983) (13) and shared by AAPOR (14) (15). In this respect, they consider "break-off" those interviews with less than 50% of responses. Interviews providing between 50% and 80% of answers are said partial whereas those whose response rate stabilizes over 80% are said complete. The variables which are considered crucial to the objective of the survey are 22 out of 50.

The following table highlights the specificities occurred between the two surveys; the first three entries report the classification by AAPOR, adoptable without limitations for web-surveys, whilst the "dropout" and "other" entries need some clarifications since they are directly linked to the web.

The "dropouts" entry has been regarded as the equivalent of NR, meaning "Non Respondents", since for a web survey there is no way of knowing, except in an approximate way, the precise number of people who have not been contacted. However, thanks to the 'big data" provided by the platform, after having traced all IP addresses, it was possible to identify those who opened the web page to complete the survey. Precisely, after having carefully read the presentation page of the study for at least one minute, these people finally decided not to proceed with the completion of the online questionnaire, thus closing the page. As a consequence, they have been considered the equivalent of "non respondents" with reference to AAPOR criteria. Finally, the "other" entry includes those who accessed the main page, where all the information about the aim of the survey are provided. Subsequently, they opened the page to complete the survey but for reasons related to restrictions on their own computer or server, they were not able to fill out any item.

From the comparison among the interviews being conducted to carry out the two surveys, our first observation should be, albeit from a different point of view, towards the

*digital divide* phenomenon. With reference to the complete interviews, indeed, there is a significant unfavourable deviation of 6.4 % between the second and the first survey. It can be assumed, considered that the percentage of the partial interviews rose by 5,3% and that the dropouts rose from 2,9% to 4,2%, that there are many who have not even adhered to the previous survey. In such a case, they would have had fewer difficulties in completing the questionnaire. This has been proved further by the entry "other", which also increased by 0.5%.

*Table 1. Interviews level of completion – I and II survey.*

| Interviews | First survey | | Second survey | |
|---|---|---|---|---|
| | V.A. | % | V.A. | % |
| Complete Interviews (I) | 2034 | 67,8 | 1753 | 61,4 |
| Partial Interviews (P) | 715 | 23,4 | 819 | 28,7 |
| Break-off (R) | 145 | 4,8 | 130 | 4,6 |
| NR- Dropouts (NR) | 88 | 2,9 | 119 | 4,2 |
| Other (O) | 19 | 0,6 | 32 | 1,1 |
| TOTAL | 3001 | 100,0 | 2853 | 100,0 |

Besides the variances occurred between the first and the second survey, it is exceptionally interesting to compare these percentages by taking into account what has been discussed by Bichi (16). This text enabled us to obtain a first approach to the document proposed by AAPOR, with regard to the interviews carried out through classical methods, hence without any intervention from the web, where it must be acknowledged that in May 2006, as published on the website of Agcom, on a total of 49 surveys conducted, 15,62% of interviews were successfully concluded, whereas the average of non responses was 73,3%. These data seem to be very different from what comes to light from our studies. We might dare to say reversed, if compared to the trends of 'Paper-and-Pencil' (P&P) surveys, even though among the 49 surveys, 3 of them nearly achieved the percentage resulted from our study. However, it can be assumed that, as in our case, the people interviewed were particularly motivated to complete the questionnaire. In this regard, we make a further step and try to verify if the involvement of such a large number of respondents is directly connected to this specific survey or if, in terms of compilation, there might be the possibility to obtain further comparable trends in other different cases.

The following analysis shows the results of two studies. The first one is related to the community life, the second one to the use of applications aiming at a better knowledge of food. As a result, the percentages of complete and partial interviews, as well as break-off were found to be similar[8].

From the analysis of the graphics there is some evidence to demonstrate that the percentages are not significantly different. The fluctuations vary by a maximum of 8.1% between the complete interviews conducted on the study concerning eating disorders and those carried out to investigate the most

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[8]  1,432 people participated in the survey concerning the community life, while 1,850 expressed their level of satisfaction as to the applications used by diagnosed people. Both surveys did not exceed 20 questions.

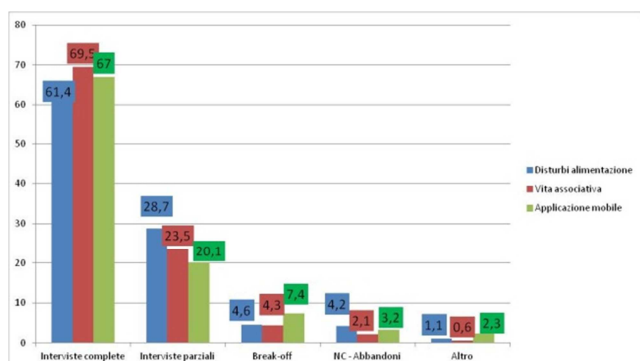commonly used Applications by diagnosed people.



**Chart 1.** *Trends in completion levels for single survey interviews – percentages.*

In fact, the analysis show the outcomes of a single list, where it is easy to suppose that participants have not only a keen interest in the survey about eating disorders but also in similar themes affecting their well-being besides their health.

A further analysis was carried out in a second moment, taking into account a totally different topic regarding the school attendance of students and parents of four secondary schools[9].

Among the several surveys carried out over the past two years, we have decided to choose the following case of study, since it was conducted in a completely different way than the previous one. Indeed, the survey, besides having been promoted by the headmaster and the teachers of the selected schools through an internal circular letter, was inserted onto the main web page of the institutes. In addition, it can be assumed that we are facing with a case of non-probability sampling by virtue of the procedure by which the sample was set and its representativeness 'ex-ante' (10).
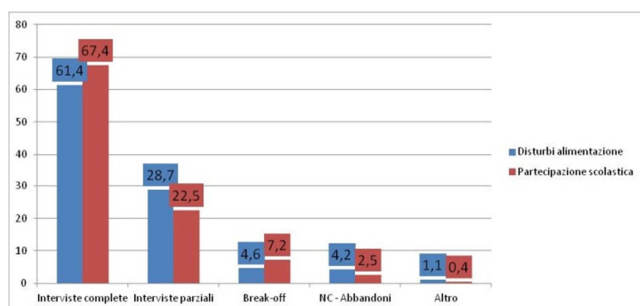


**Chart 2.** *Trends in completion levels for single survey interviews – percentages.*

The graph shows that also in this case the percentages remain quite similar. As to this second study carried out with different purposes, however, it would not make any sense to estimate response and cooperation rates. On the other hand, it seemed to be quite conceivable to estimate them with regard to the survey discussed previously about eating disorders.

The fourth report of AAPOR demonstrates four different types of rates.

For each one different calculation formulas have been provided. Naturally, it is desirable to use the most appropriate one along with the available data of the considered survey. Among the diverse possibilities we found a suitable formula for each rate, which met our specific demands [10]. As a *Minimum Response Rate* we adopted RR5 calculated with the following formula

$$RR5 = \frac{I}{(I + P) + (R + NC + O)}$$

The choice of the previous formula contributes to determine the choice of the subsequent rates. Therefore, for the cooperation rate we decided to adopt

$$COOP4 = \frac{(I + P)}{(I + P) + R}$$

As to the dropout rates we used

$$REF3 = \frac{R}{(I + P) + (R + NC + O)}$$

Last but not least, the contact rate

$$CON3 = \frac{(I + P) + R + O}{(I + P) + R + O + NC}$$

The resulting data shown in the table below are extremely important; apparently they would seem almost unreal for those used to conducting telephone or postal surveys, hence the so called P&P. But there is a very reasonable explanation as to the high response rates with respect to the targeted population. In fact, the higher the level of involvement in the subject of the study, the greater the propensity to reply to the questionnaire, especially when it comes to the health of a person or that of their family. Even the resulting rates are quite equivalent, as there are no remarkable differences between the first and the second survey.

**Table 2.** *Percentages of interview rates – I e II survey.*

|  | **First survey** | **Second survey** |
| --- | --- | --- |
| RR5 | 67,7% | 61,4% |
| COOP4 | 95,0% | 95,2% |
| REF3 | 3,8% | 4,5% |
| CON3 | 97,1% | 95,8% |

Banking on these considerations and the high percentages coming to light, we can analyse the errors within the sample, in order to better understand how much deviation occurs between real and theoretical sampling, given that most of the variables which make up our survey are not metric. In this respect, we used the formula with regard to Bernouilli's theory of finite population sampling, and we selected a level C of the

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9 1,005 students enrolled in the first, second and third year replied to the questionnaire.

10 Abbreviations correspond to those listed in table 1 and have been directly gathered from the fourth AAPOR report.

confidence interval equal to 1,96, that is 95% of probability that the value does not fall outside the interval.

$$ e = k \sqrt{\frac{\overline{pq}}{n}} \sqrt{\frac{N-n}{N-1}} $$

Letters can be replaced by the following values:

K is the level of confidence for the confidence interval, which is 1, 96;

N represents the number of observations in the population, which numbered 62,000 people;

n refers to the number of observations in the sample, that in the second survey was estimated at 2,853 people

Pq represents the percentage by which a parameter may occur as well as its opposite (or not present)[11]

The sampling error calculated is lower than we expected. It is equal to 1, 78% for all those parameters attributed to 50% of the sampled subjects.

By following the same formula of the sampling error, we try to verify if the percentage remains constant even as regards the previous study, where the only difference that was found was in the size of the sample, since the selected units numbered 3,001 instead of 2,853. The sampling error, in this case, is equivalent to 1,74% with only 0,04 deviation points between the second and the first survey.

## 5. Conclusion

In light of the above outcomes and the comparison among the different studies, we paused to reflect deeply upon the high rates occurred. This is the reason why we tried to compare the findings with similar surveys. Acknowledging the index values, such results must be interpreted in the light of certain observations which we will submit, without which the great contribution carried out by the web-surveys to the research would not emerge.

Firstly, it is important to emphasize the fact that the platforms used by us in the fieldwork are quite different from the software which is generally designed for CAWI. These platforms have the advantage of being accessible to everyone and accordingly they have been largely used through the web.

The second point concerns the researcher's ability to understand that randomness and representativeness, as mentioned in the second paragraph, are not synonyms. The first refers to the procedure concerning the extraction of the cases whereas the second to the outcomes obtained after the procedure (17). The two concepts can be further distinguished by shifting the attention to the concept of representativeness ex ante and ex post (18) (19). In this case it is much easier to recognize how difficult it is to think of a representativeness ex ante for web-surveys. Although the methodological precautions adopted have been presented in the third

paragraph, it seems much more arguable to consider the concept of representativeness as a continuum rather than a dichotomy. Given these considerations, we can assume that the obtained samples from both surveys about eating disorders due to chronic diseases reflect the so called representativeness ex-post. In fact, the access to the frequency distributions provided by some institutional sources gave us a remarkable opportunity to compare the population with the sample[12]. Indeed, the findings reflect the demographic as well as the territorial variables published by the Ministry of Public Health.

Moreover we decided to investigate the break-off phenomenon, as well as the response, cooperation and contact rates besides the so called dropouts. In this respect, it can be concluded that, due to the high percentage rates obtained, it may still be possible to consider the same calculation procedure but it would be better to avoid a comparison between online and P&P surveys.

Finally, before considering the 'ex post' study of representativeness regarding the population under scrutiny, we found it also important to calculate the sampling error of both surveys. As presented in the previous paragraph and in line with what we have discussed so far about percentage rates and sampling error, it can be admitted that not only did we chase the dragonfly on the grass, but we believe we snatched it.

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11 We emphasize that we limit ourselves to the frequency distributions and associations between variables that fact, in this particular case, we have no knowledge (10).

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