

TOWARDS THE DIGITAL TRANSITION IN DATA COLLECTION: THE CASE OF THE HOUSEHOLD BUDGET SURVEY¹

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Abstract. The Household Budget Survey (HBS) is a key tool for collecting data on Italian households' consumption habits. Traditionally based on a paper "Diary" and CAPI (Computer Assisted Personal Interviewing) interviews, the survey is now undergoing a digital transition. Istat is exploring the adoption of a mobile app with real-time validation and user-friendly features, aiming to reduce respondent fatigue and improve data quality. This study focuses on feedback from the 2023 HBS survey to assess perceptions of burden, preferences for digital tools, and the need for assistance during Diary completion. The analysis explores differences by age, education, and occupational status. Results highlight that older and less educated respondents experience greater difficulties and show lower digital readiness, while younger and more educated individuals are more open to digital modes. These findings support a digital transformation strategy that includes inclusive design and tailored support to bridge technological and socio-cultural gaps.

1. Introduction

The Household Budget Survey (HBS) is a key tool for collecting data on Italian households' consumption habits. Traditionally based on a paper "Diary" and CAPI (Computer Assisted Personal Interviewing) interviews, the survey is now undergoing a digital transition. Istat, the Italian National Institute of Statistics, is exploring the adoption of a mobile app with real-time validation and user-friendly features, aiming to reduce respondent fatigue and improve data quality.

This study explores respondents' experiences during the completion of the Diary in the 2023 wave of this survey, with a focus on perceived burden, digital preferences, and the need for support in recording daily expenditures. While the HBS has traditionally relied on paper-based methods, Istat is currently evaluating a digital alternative through the development of a mobile application.

The analysis aims to identify respondent needs and attitudes across three key socio-demographic variables: age, educational attainment, and occupational status.

¹ This paper is the result of the coordinated work of all the authors. However, paragraph 3 is attributed to Elena Cezza, paragraph 2 to Gabriella D'Ambrosio, paragraphs 1 and 6 to Loredana De Gaetano, and paragraph 4 to Edoardo Raimondi. Finally, paragraph 5 is attributed to all the authors.

These dimensions are particularly relevant for understanding variations in familiarity with digital tools and the degree of autonomy in survey participation.

Although the digital Diary had not yet been implemented at the time of data collection, questions related to respondent preferences provide valuable insights for the design of future digital tools. The analysis was conducted on the total number of families (over 26,300,000) from the 2023 HBS survey edition. Sample weights were used to account for the structure of the reference population, rather than relying solely on the responding sample.

2. Perceived fatigue in the HBS Diary: who finds the survey burdensome?

The analysis concerning the compilation of the Diary of the HBS highlighted some key aspects that influence the perception and experience of filling it in, especially considering the socio-demographic characteristics of the respondents. Indeed, regarding the burden associated with completing the Diary, the results show that filling in the Diary is perceived as a demanding activity.

Overall, the results show that filling in the Diary is perceived as a tiring activity: indeed, 55.9% of the respondents (value obtained by adding the modality “quite tiring” and “very tiring”) stated that they found the entire process of recording expenses wearisome. In relation to age, as shown in Table 1, this perception of fatigue remained largely consistent across all age groups in both years, with similar levels of difficulty reported. However, it is possible to note that 55.7% of people aged 65+ (value obtained by adding the modality “quite tiring” and “very tiring”) stated that filling in the Diary was very demanding compared to people aged 18-34 (52.3%) who reported lower percentages of tiredness, thus emphasizing a generational difference in the perception of the burden and commitment required for the participation in this specific statistical survey.

Table 1 – *Difficulty in filling in the Diary by age of respondents – year 2023 (%)*.

| Filling in the Diary has been: | 18-34 years | 35-64 years | 65+ years | Total |
|--------------------------------|-------------|-------------|-----------|-------|
| Very and quite tiring | 52.3 | 56.5 | 55.7 | 55.9 |
| Not very or not at all tiring | 47.7 | 43.5 | 44.3 | 44.1 |

Source: Authors' elaboration on Istat data

Focusing on the educational level of the respondents, the data show similar levels of reported fatigue, with no marked differences between groups. Even though educational background appears to have a limited impact on the perceived difficulty

of compiling the Diary, nevertheless people with advanced education (degree or post-degree) perceive filling in the paper Diary as less burdensome. In detail, 55.2% (value obtained by adding the modality “very tiring” and “quite tiring”) of those with a high educational qualification (degree and post-degree) reported that they did not find the process tiring, compared to 58.1% of those with only an elementary school diploma or no educational qualification (Table 2).

Table 2 – Difficulty in filling in the Diary by educational level of respondents – year 2023 (%).

| Filling in the Diary has been: | Elementary school/No educational qualification | Lower secondary school | Upper secondary school | Graduated and post-graduated | Total |
|--------------------------------|--|------------------------|------------------------|------------------------------|-------|
| Very and quite tiring | 58.1 | 56.9 | 54.2 | 55.2 | 55.9 |
| Not very and not at all tiring | 41.9 | 43.1 | 45.8 | 44.8 | 44.1 |

Source: Authors' elaboration on Istat data

Lastly, examining the difficulty in filling in the Diary considering the occupational status of respondents, the perceived effort of completing the task is consistent across all occupational categories (Table 3). In detail, manual workers and retired report a slightly above-average sense of fatigue (55.8%), while self-employed individuals and entrepreneurs also show slightly higher levels of fatigue (56.7% and 55.5%, respectively), possibly due to more complex work routines or less free time. Only those seeking employment report a higher level of fatigue (60.0%), which may reflect emotional or motivational challenges related to their job-seeking status.

Table 3 – Difficulty in filling in the Diary by occupational status of respondents – year 2023 (%).

| Filling in the Diary has been: | Employee (a) | Manual worker (b) | Entrepreneur (c) | Self-employed (d) | Retired | Seeking employment | Other (e) | Total |
|--------------------------------|--------------|-------------------|------------------|-------------------|---------|--------------------|-----------|-------|
| Very and quite tiring | 55.3 | 55.8 | 55.5 | 56.7 | 55.8 | 60.0 | 55.9 | 55.9 |
| Not very and not at all tiring | 44.7 | 44.2 | 44.5 | 43.3 | 44.2 | 40.0 | 44.1 | 44.1 |

(a) Employee: executive, middle manager, and clerical worker

(b) Employee: manual worker and equivalent

(c) Self-employed: entrepreneur and freelance professional

(d) Self-employed: other self-employed

(e) In another condition (e.g. recipients of non-work-related pensions, financially independent individuals not seeking work, or those legally unable to work)

Source: Authors' elaboration on Istat data

3. Need for support in the HBS Diary: who struggles to participate?

The analysis also examined the proportion of respondents who reported having required support from someone outside their household, as an indirect indicator of the difficulty encountered in completing the Diary.

In relation to age, the data show a higher reliance on external support among older respondents: among working-age respondents, 6.6% of those aged 18-34 and 7.1% of those aged 35-64 requested assistance, while this share increases to 17.9% for individuals aged 65 and over (Table 4). These findings suggest a generational gap in terms of autonomy in fulfilling the required task.

Table 4 – Person responsible for recording expenses in the Diary by age of respondents – year 2023 (%).

| Who recorded the expenses in the Diary: | 18-34 years | 35-64 years | 65+ years | Total |
|---|-------------|-------------|-----------|-------|
| The only/A single household member | 80.4 | 77.5 | 66.9 | 72.8 |
| More household members | 8.4 | 8.6 | 5.4 | 7.2 |
| A person external to the household | 6.6 | 7.1 | 17.9 | 12.3 |
| Other | 4.6 | 6.8 | 9.8 | 7.7 |

Source: Authors' elaboration on Istat data

The data also reveal a clear inverse relationship between educational attainment and the need for external support in recording household expenses. Among highly educated respondents, only 3.9% reported relying on someone outside the household, compared to 27.0% among those with lower levels of education (Table 5).

Table 5 – Person responsible for recording expenses in the Diary by educational level of respondents – year 2023 (%).

| Who recorded the expenses in the Diary: | Elementary school/No educational qualification | Lower secondary school | Upper secondary school | Graduated and post-graduated | Total |
|---|--|------------------------|------------------------|------------------------------|-------|
| The only/A single household member | 57.3 | 73.0 | 78.2 | 81.2 | 72.8 |
| More household members | 3.8 | 7.0 | 8.3 | 9.3 | 7.2 |
| A person external to the household | 27.0 | 11.6 | 7.1 | 3.9 | 12.3 |
| Other | 11.9 | 8.4 | 6.4 | 5.6 | 7.7 |

Source: Authors' elaboration on Istat data

This pattern indicates that lower educational attainment may represent a vulnerability factor, associated with greater difficulty in independently completing the Diary.

Regarding the employment status, as shown in Table 6, reliance on external support in completing the Diary is highest among retirees (15.7%) and individuals in other non-working conditions (18.4%). Intermediate levels are observed among the unemployed (8.7%) and some self-employed workers (8.5%), while the lowest percentages are reported among managers, professionals, and entrepreneurs (4.8%), as well as clerical staff (4.4%). This pattern may reflect differing levels of confidence or familiarity with administrative and organizational tasks across occupational groups.

Table 6 – Person responsible for recording expenses in the Diary by occupational status of respondents – year 2023 (%).

| Who recorded the expenses in the Diary: | Employee (a) | Manual worker (b) | Entrepreneur (c) | Self-employed (d) | Retired | Seeking employment | Other (e) | Total |
|---|--------------|-------------------|------------------|-------------------|---------|--------------------|-----------|-------|
| The only/A single household member | 80.3 | 75.1 | 79.7 | 75.5 | 68.9 | 80.7 | 68.4 | 72.8 |
| More household members | 9.9 | 7.7 | 9.6 | 9.2 | 5.9 | 5.4 | 4.4 | 7.2 |
| A person external to the household | 4.4 | 9.2 | 4.8 | 8.5 | 15.7 | 8.7 | 18.4 | 12.3 |
| Other | 5.4 | 8.0 | 5.9 | 6.8 | 9.5 | 5.2 | 8.8 | 7.7 |

(a) Employee: executive, middle manager, and clerical worker

(b) Employee: manual worker and equivalent

(c) Self-employed: entrepreneur and freelance professional

(d) Self-employed: other self-employed

(e) In another condition (e.g. recipients of non-work-related pensions, financially independent individuals not seeking work, or those legally unable to work)

Source: Authors' elaboration on Istat data

4. Digital preferences in the HBS Diary: who embraces the shift?

Subsequently, attention was directed to the question “Would you have preferred to complete the Diary online?”, which explicitly investigates the propensity toward a digital mode of completion. The results reveal age-related differences in digital preferences, consistent with the generational patterns identified in earlier sections of this study. Among respondents aged 18-34, 25.0% expressed a preference for online

completion of the Diary. This preference declined markedly with age, dropping to 14.7% among those aged 35-64 and reaching only 5.8% among respondents aged 65 and over (Table 7). This pattern aligns with the earlier finding that older respondents experience greater fatigue and require more external support, suggesting that digital solutions may be particularly beneficial for younger demographics who are already more comfortable with technology.

The low propensity to adopt digital formats among older respondents appears to be partly attributable to access constraints. Indeed, 14.6% of respondents aged 65 and over reported not having an Internet connection, which represents a fundamental barrier to digital participation. This technological divide reveals how access constraints can significantly influence survey methodology preferences across different population segments.

Table 7 – Preference regarding the Diary completion method by age of respondents – year 2023 (%).

| Would you have preferred to fill out the diary online? | 18-34 years | 35-64 years | 65+ years | Total |
|--|-------------|-------------|-----------|-------|
| Yes, we would have preferred it | 25.0 | 14.7 | 5.8 | 12.1 |
| It would have been the same | 27.4 | 28.0 | 16.7 | 23.7 |
| No, because we do not have an Internet connection | 3.2 | 3.9 | 14.6 | 7.9 |
| No, for other reasons | 44.4 | 53.4 | 62.9 | 56.3 |

Source: Authors' elaboration on Istat data

Educational attainment represents a second dimension that reinforces the patterns observed throughout this analysis. The preference for online Diary completion was strongly correlated with education level: only 3.4% of respondents with at most a primary school certificate (or no formal qualification) stated they would have preferred to fill in the Diary online, compared to 15.0% among those with a high school diploma and 25.4% among university graduates or postgraduates (Table 8). This finding is particularly relevant given that respondents with lower educational levels were also more likely to require external support for completing the paper version of the Diary, as highlighted above. The convergence of these patterns suggests that digital inequality is closely associated with cultural capital, with higher levels of education corresponding to both greater technological familiarity and increased autonomy in survey completion.

Table 8 – Preference regarding the Diary completion method by educational level of respondents – year 2023 (%).

| Would you have preferred to fill out the diary online? | Elementary school/No educational qualification | Lower secondary school | Upper secondary school | Graduated and post-graduated | Total |
|--|--|------------------------|------------------------|------------------------------|-------|
| Yes, we would have preferred it | 3.4 | 6.3 | 15.0 | 25.4 | 12.1 |
| It would have been the same | 11.2 | 21.2 | 28.1 | 30.7 | 23.7 |
| No, because we do not have an Internet connection | 20.8 | 8.4 | 4.4 | 1.9 | 7.9 |
| No, for other reasons | 64.6 | 64.1 | 52.5 | 42.0 | 56.3 |

Source: Authors' elaboration on Istat data

Professional status also reveals important differences in digital preferences, which again mirror the patterns identified in relation to workload and support needs in the survey. Among employees in executive, managerial or clerical roles, 24.3% indicated that they would prefer to complete the Diary online, compared to only 9.4% of manual and blue-collar workers (Table 9). An even higher percentage was observed among entrepreneurs (23.8%), while the preference dropped to 12.8% among other self-employed workers engaged in less skilled activities.

Table 9 – Preference regarding the Diary completion method by occupational status of respondents – year 2023 (%).

| Would you have preferred to fill out the diary online? | Employee (a) | Manual worker (b) | Entrepreneur (c) | Self-employed (d) | Retired | Seeking employment | Other (e) | Total |
|--|--------------|-------------------|------------------|-------------------|---------|--------------------|-----------|-------|
| Yes, we would have preferred it | 24.3 | 9.4 | 23.8 | 12.8 | 6.3 | 8.4 | 7.2 | 12.1 |
| It would have been the same | 32.5 | 24.6 | 29.8 | 26.1 | 17.8 | 24.2 | 18.9 | 23.7 |
| No, because we do not have an Internet connection | 1.7 | 5.3 | 1.5 | 3.3 | 13.3 | 7.4 | 12.9 | 7.9 |
| No, for other reasons | 41.5 | 60.7 | 44.9 | 57.8 | 62.6 | 60.0 | 61.0 | 56.3 |

(a) Employee: executive, middle manager, and clerical worker

(b) Employee: manual worker and equivalent

(c) Self-employed: entrepreneur and freelance professional

(d) Self-employed: other self-employed

(e) In another condition (e.g. recipients of non-work-related pensions, financially independent individuals not seeking work, or those legally unable to work)

Source: Authors' elaboration on Istat data

It is noteworthy that the preference remained relatively modest among those seeking employment (8.4%) and dropped to 6.3% among retired respondents. Respondents in other working conditions also showed a limited preference for digital completion (7.2%). These findings complement the earlier observation that retirees and individuals in other working conditions were most likely to require external support, suggesting that digital solutions alone may not address the underlying challenges faced by these groups.

Overall, the data confirm the presence of both technological and socio-cultural barriers to the adoption of the digital mode for Diary completion. These findings indicate that any future strategies aimed at digitizing data collection should be accompanied by adequate inclusion measures, designed to mitigate the effects of the so-called “digital divide”.

The consistency of these patterns across different aspects of the survey experience – fatigue, support needs, and digital preferences – indicates that the same demographic factors that make the traditional paper Diary more burdensome also influence attitudes toward digital alternatives. This suggests that while digital tools may offer solutions for some respondent groups, a comprehensive approach addressing both technological access and user support will be necessary to improve the overall survey experience across all demographic segments.

5. Profiling the ideal “digital” respondent

Based on aggregated data from the 2023 HBS, a descriptive analysis was conducted to identify the socio-demographic profile most associated with a preference for digital Diary completion. While no individual-level microdata were available, and no inferential statistical modeling was applied, the group-level percentages reported in the tables of this work allow for cautious analytical interpretation. The data suggest that the ideal “digital” respondent is typically a young adult (aged 18-34), with a university degree or higher, employed in a white-collar or entrepreneurial occupation, with personal Internet access and full autonomy in completing the Diary. Indeed, this group exhibits the highest reported preference for digital mode (up to 25.4%), the lowest reported fatigue, and the least reliance on external support. In contrast, older individuals (aged 65+), those with lower levels of education, and retired respondents show much lower digital preference and a higher need for assistance.

Table 10 summarizes the observed variation in digital preference by age, educational level and occupational status, respectively. These findings, while descriptive, are consistent with established research on digital divides and survey mode effects (Agresti, 2002). In fact, they highlight the importance of designing

inclusive digital data collection instruments that consider not only access to technology, but also digital skills, cognitive autonomy, and familiarity with self-managed administrative tasks. These insights do not support causal claims but offer evidence-based guidance for profiling and targeted support strategies.

Table 10 – Digital preference by socio-demographic characteristics of respondents – year 2023 (%).

| Age | Preference for online Diary |
|--|-----------------------------|
| 18-34 years | 25.0 |
| 35-64 years | 14.7 |
| 65+years | 5.8 |
| Educational level | |
| Elementary school/No educational qualification | 3.4 |
| Lower secondary school | 6.3 |
| Upper secondary school | 15.0 |
| Graduated and post-graduated | 25.4 |
| Occupational status | |
| Employee (a) | 24.3 |
| Manual worker (b) | 9.4 |
| Entrepreneur (c) | 23.8 |
| Self-employed (d) | 12.8 |
| Retired | 6.3 |
| Seeking employment | 8.4 |

(a) Employee: executive, middle manager, and clerical worker

(b) Employee: manual worker and equivalent

(c) Self-employed: entrepreneur and freelance professional

(d) Self-employed: other self-employed

Source: Authors' elaboration on Istat data

Moreover, the framework is still valuable for exploratory purposes. It serves to:

- highlight general trends in digital readiness across demographic profiles;
- inform strategies for inclusive digital transformation;
- guide future data collection design with targeted segmentation in mind.

The trend reported reveal a clear gradient in digital preference across age, educational qualification and occupational groups. While these results are based on aggregate data and do not allow for individual-level inference, they provide consistent evidence that digital readiness is strongly associated with socio-

demographic characteristics. This pattern supports the value of targeted strategies for digital inclusion and survey mode adaptation. Indeed, these results emphasize the importance of inclusive design strategies that accommodate varying levels of digital literacy and autonomy. They also point to the need for flexibility in data collection methods, targeted support for digitally vulnerable groups, and the use of pre-screening tools to guide mode assignment. Ultimately, the success of the digital transformation in official statistics depends not only on the adoption of innovative technologies, but on their capacity to respond to the heterogeneity of respondent experiences and capabilities. Future implementations should therefore align digital solutions with both technical usability and social inclusiveness.

6. Future opportunities and challenges in the digitalization of the HBS Diary

The digitalization of the HBS Diary presents significant opportunities for improving data collection, enhancing data quality, and reducing respondent burden. Its success, however, depends on a user-centered, inclusive, and evidence-based approach. The 2023 results indicate that perceptions of effort, need for assistance, and preferences for digital tools vary according to socio-demographic factors such as age, educational level, and occupational status, reflecting both technological and socio-cultural divides. Younger and more highly educated respondents generally demonstrate greater digital readiness and autonomy, whereas older individuals and those with lower educational attainment face more difficulties.

These findings underline the need for survey strategies tailored to the different capabilities and needs of respondents. A recent study presenting a prototype of the HBS mobile application demonstrates its usability and potential to enhance data accuracy and respondent engagement (D'Ambrosio *et al.*, 2025). Based on this evidence, a digital transition strategy should be built on four key pillars:

- a) a gradual and flexible implementation that retains traditional modes for digitally excluded users;
- b) the development of intuitive, accessible, and adaptive digital interfaces;
- c) the integration of real-time support tools and interactive guidance;
- d) targeted communication and training initiatives, particularly aimed at groups most vulnerable to the digital divide (Duflos and Dyer, 2021).

To further enrich the analysis, a territorial breakdown could be applied for instance by geographical area or urban/rural context, to provide additional insights into potential regional digital divides. This would also help ensure broad

participation, minimize respondent burden (Istat, 2019), and maintain high standards of data quality and reliability.

Overall, these findings have important practical implications: they can improve the respondent experience, reduce item nonresponse, enhance data quality, and guide targeted communication strategies during fieldwork, ultimately supporting a more inclusive and effective digital transition.

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References

- AGRESTI A. 2002. *Categorical Data Analysis*. New York: Wiley.
- D'AMBROSIO G., CEZZA E., DE GAETANO L., RAIMONDI E. 2025. Mobile Application as an Innovative Tool for Data Collection in Istat's Household Budget Survey. In DI BELLA E., GIOIA V., LAGAZIO C., ZACCARIN S. (Eds.) *Statistics for Innovation III. SIS 2025. Italian Statistical Society Series on Advances in Statistics*, Springer, pp. 47-51
- DUFLOS E., DYER J. 2021. Bridging the Digital Divide: Lessons from Global Inclusion Initiatives. *CGAP Working Paper*, World Bank Group.
- EUROSTAT. 2015. *Computer-assisted web interviewing (CAWI) – Guidelines*. Luxembourg: Publications Office of the European Union.
- EUROSTAT. 2017. *European Statistics Code of Practice*. Luxembourg: Publications Office of the European Union.
- ISTAT. 2019. *Manuale per la rilevazione delle indagini statistiche*. Roma: Istituto Nazionale di Statistica.

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