

Food safety knowledge, beliefs and myths: results from an exploratory analysis

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ARTICLE INFO

Keywords:

Questionnaire

Survey

Food hazards

Food risk

Risk management

Household food-handling behaviours

ABSTRACT

Despite the existence of stringent European legislation aimed at mitigating risks associated with improper food handling, consumers may remain uninformed about which post-purchase practices best preserve food quality and safety. Practices in this area may be informed less by scientific evidence than by popular cultural beliefs and “food safety myths”. Understanding how such beliefs relate to consumer food risk management is therefore relevant to public-health communication. This study reports results of a survey administered to a non-probability sample of consumers in a developed country to assess their declared knowledge of post-purchase practices that may reduce food-management risks and to identify individual-level factors associated with this knowledge. The case study focuses on Sicily (Italy), a Mediterranean region whose gastronomic and cultural traditions plausibly shape post-purchase food handling alongside regulatory and general social norms. Main results are consistent with the existence of widely shared misconceptions within the investigated sample, which appear also among more educated respondents and among those who declare to be experts on the topics investigated. Younger respondents tend to show lower declared knowledge than adults. The results also indicate that correct answers across different items tend to co-occur, suggesting that knowledge of different aspects of post-purchase food management is not isolated and may reflect a broader food-safety literacy. The study provides preliminary insights that may inform the design of future targeted risk-communication campaigns.

1. Introduction

The consumer plays a key role in food risk management and must be considered not only as the final recipient of the food chain but also as an active player in ensuring food safety. In the European Community, Regulation (EC) No. 178/2002 (from now on “Regulation”), which establishes the general principles and requirements of food law, formally places the consumer as a conscious and responsible protagonist in the management of food safety. In this perspective, food safety should be considered as a shared responsibility among all actors in the food chain, from producers to food business operators, up to consumers themselves who have the duty to follow safe consumption practices to reduce the risks associated with food. This integrated and participatory approach contributes to creating a safer and more sustainable food system (Bánáti and Baicu, 2024; Gassin et al., 2012).

On the one hand, Regulation emphasizes the importance of awareness and correct information for the consumer, highlighting the right to

access clear, accurate and transparent information that allows informed decisions (Arienzo et al., 2008). Adopting appropriate hygiene practices during the handling, preparation and storage of food are fundamental behaviours under the direct responsibility of consumers which are crucial to reduce the risk of contamination and food poisoning (Mahunu et al., 2024).

In this regard, there is a consistent body of evidence that shows how a substantial proportion of foodborne disease is attributable to improper food preparation practices in consumer homes (Langiano et al., 2012; Menini et al., 2022; Redmond and Griffith, 2003). Some incorrect practices of handling, preparing and storing food have been hypothesised to be associated with widely shared misconceptions, often referred to as “food safety myths” (Veflen and Teixeira, 2022). Recent international studies show that misconceptions about household food safety may persist even among educated consumers (e.g., Karam et al., 2024; Hassan et al., 2024).

Despite increasing regulatory and educational efforts, current

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<https://doi.org/10.1016/j.ijgfs.2026.101634>

Received 27 March 2026; Received in revised form 15 July 2026; Accepted 20 August 2026

Available online 20 August 2026

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knowledge on consumers' self-reported understanding of appropriate hygiene practices, and in particular on the prevalence of widely held misconceptions about them, remains limited. Mapping the extent to which consumers endorse such misconceptions and identifying which socio-demographic profiles are more or less likely to do so, is therefore a useful exploratory step to inform risk communication.

This issue may be particularly relevant in Mediterranean contexts, where household food practices are strongly shaped by local gastronomic traditions, intergenerational knowledge transmission and longstanding preservation habits. Historically, many traditional practices were developed to maximize the use of seasonal produce and ensure food availability during periods of scarcity (Essid, 2012). Today, families continue to prepare and store foods such as olives in brine, tomato sauce, jams, sun-dried tomatoes, capers in salt and vegetables in oil according to inherited routines (Godos et al., 2024).

While these practices are an important part of Mediterranean food culture, some associated beliefs or informal rules of thumb may not always be aligned with current scientific evidence on microbiological, chemical and parasitological risk management. This makes Mediterranean regions, and Sicily in particular, a meaningful context in which to investigate how traditional knowledge, food-safety information and post-purchase food management practices interact. Risks may also be exacerbated by the growing diffusion of globalised dishes and modern eating habits that may not fully align with traditional food preparation and conservation routines (Pilcher, 2023).

This study investigates food-safety misconceptions among consumers in a typical Mediterranean context by focusing on declared knowledge as an empirical entry point for examining how consumers recognise, reproduce or reject widely shared misconceptions about post-purchase food management. We acknowledge that declared knowledge and actual behaviour need not coincide; however, declared knowledge can provide useful preliminary evidence on the beliefs that may orient self-reported food handling practices. Following Veflen and Teixeira (2022), we focus on “food safety myths” to refer to widely shared but factually inaccurate beliefs about post-purchase food management.

More specifically, the study has three objectives. First, to map the prevalence of widely held misconceptions about selected post-purchase food management practices. Second, to assess the individual-level factors associated with the overall declared knowledge of these aspects. Third, to explore whether the declared knowledge of specific aspects of food management is statistically associated across items (i.e., whether correct answers tend to co-occur), and which socio-demographic variables explain these item-level associations. Consistently, the research questions (RQ) guiding the analysis are the following:

1. RQ1: What is the overall level of declared knowledge of post-purchase food management practices in the surveyed sample, and which individual-level factors (age, gender, education, self-declared expertise) are associated with it?
2. RQ2: Do consumers show different levels of declared knowledge across distinct dimensions of post-purchase food safety, and are these differences associated with socio-demographic characteristics?
3. RQ3: Do correct answers tend to occur independently across items, or do they reveal broader patterns of food-safety literacy?

The target population for this exploratory study consists of consumers aged 16 years and older who reside in Sicily, Italy. Sicily was chosen as a case study because it is a Mediterranean European region characterised by a strong identification of households with regional gastronomic and traditional food preparation practices, many of which involve foods (raw fish, fresh dairy, home-preserved products, processed cured meats) for which specific post-purchase storage and handling behaviours are particularly relevant for microbiological and chemical risk management. We do not claim that food-safety risks in Sicily differ systematically from those of other regions; rather, the strong presence of established traditional practices provides a meaningful context in which

to investigate the prevalence of beliefs about post-purchase food management.

2. Materials and method

2.1. The case study

To address the research questions, we conducted a cross-sectional online survey from November 2023 to June 2024 among consumers aged 16 years and older residing in Sicily, Italy.

The questionnaire was digitised using Google Forms (Google LLC, Mountain View, CA, USA) and disseminated via email and mobile social messaging apps, with snowball recruitment among the authors' institutional and personal contacts. The resulting sample is therefore a non-probability (convenience) sample and is not intended to be statistically representative of the target population; we made this choice for cost and time reasons, given the exploratory nature of the study.

The questionnaire was organised in two sections. The first collected respondent profile information (age class, gender, years of education, highest educational degree, and self-declared expertise in food quality and safety); self-declared expertise refers here to the respondent's declared educational background in food quality and safety, rather than to professional experience in the food sector. The second section contained ten single-choice verification items, each presenting a statement about a specific post-purchase food management situation and offering a closed set of mutually exclusive response options (including a “don't know” option); only one option corresponded to the food-safety appropriate behaviour. The items were drafted by the authors, a team combining veterinary food-safety and consumer-economics expertise, starting from widely held beliefs about the storage and handling of foods that are particularly relevant in the Sicilian context (eggs, mozzarella, raw and processed fish, frankfurter sausages, salami, chicken thighs). For each item, the response option corresponding to the correct food-safety behaviour was identified on the basis of current European food-safety regulation (in particular, Regulation No. 178/2002, Regulation No 1169/2011, Regulation No. 1276/2011) and of peer-reviewed scientific literature on the microbiological, chemical and parasitological hazards associated with the food category considered (see the references cited in Section 3.1 for each item). The full list of items, response options and corresponding food-safety dimensions is reported in Table 1; the complete item wording and answer frequencies are provided in the Supplementary material. On average, respondents took approximately 15 min to complete the questionnaire. The instrument was developed internally by the authors on the basis of legislation and the scientific literature: it did not undergo a formal content-validity assessment by an external panel of experts, a structured pre-test, or a pilot study among consumers, and it was not subjected to formal psychometric validation (e.g., assessment of internal consistency through Cronbach's alpha or formal content/construct validation). We explicitly acknowledge that these steps were not undertaken and treat this as a limitation of the study (see Section 4). Consistently, and to avoid over-interpreting an unvalidated instrument, the ten items were analysed conservatively as separate binary indicators within a multivariate framework rather than aggregated into latent subscales; each verification question was framed so as to be answerable independently, and the correct option for every item is anchored in explicit regulatory and scientific references. We nonetheless recognise that, in the absence of a formal comprehension pre-test, the clarity of the item wording for lay respondents could not be empirically verified, which is likewise acknowledged as a limitation.

Accordingly, no a priori sample-size calculation was performed. Instead, the final number of valid observations was used as a working sample to explore associations rather than to draw inferential population claims. Data cleaning consisted of: (i) removing entries without informed consent or with declared residence outside Sicily; (ii) excluding records with missing values on the socio-demographic covariates used in the models; (iii) checking that each verification item had

Table 1

List of verification questions drawn up identifying widely held beliefs regarding traditional food preparation and conservation practices adopted within Sicilian consumers (Sicily region, Italy).^a

Verification question	Responses	Food safety dimension
No. 1	Eggs should be stored at room temperature at home <u>Eggs should be stored in the refrigerator at home</u>	Consumers' knowledge of food storage conditions
No. 2	I don't know how to respond <u>Eggs sold in stores (e.g., supermarkets) are safer</u> Loose eggs bought from domestic farmer are safer because they are more genuine There is no difference.	Consumers' awareness of food risks
No. 3	I don't know how to respond. As soon as they are bought and before storage, eggs must be thoroughly washed with running water <u>As soon as they are bought and before storage, eggs must be stored as they are</u> As soon as they are bought and before storage, eggs must be rubbed with lemon and then rinsed	Consumers' ability in food risk management
No. 4	I don't know how to respond Chicken thighs must be washed with warm running water before cooking to eliminate bacteria Chicken thighs must be washed with cold running water before cooking to eliminate bacteria <u>Chicken thighs should not be washed before cooking</u>	Consumers' ability in food risk management
No. 5	I don't know how to respond Frankfurter sausages must be cooked before consumption only close to their expiration date <u>Frankfurter sausages must always be cooked before consumption</u> Frankfurter sausages can be consumed as they are because they have already been cooked	Consumers' ability in food risk management
No. 6	I don't know how to respond If you had the option to store only one of these foods in the refrigerator, which one would you choose: whole salami If you had the option to store only one of these foods in the refrigerator, which one would you choose: uncut speck <u>If you had the option to store only one of these foods in the refrigerator, which one would you choose: frankfurter sausages</u>	Consumers' ability in food risk management
No. 7	I don't know how to respond You prepared a tray of baked pasta to be consumed the next day; do you store it: in the oven <u>You prepared a tray of baked pasta to be consumed the next day; do you store it: in the fridge</u> You prepared a tray of baked pasta to be consumed the next day; do you store it: on the countertop, properly covered You prepared a tray of baked pasta to be consumed the next day; do you store it: I don't know how to respond	Consumers' ability in food risk management
No. 8	<u>Mozzarella cheese should be stored in the refrigerator</u> Mozzarella cheese should be stored outside the refrigerator Mozzarella cheese should be stored outside the refrigerator only if it is 'Mozzarella di bufala campana DOP'	Consumers' knowledge of food storage conditions

Table 1 (continued)

Verification question	Responses	Food safety dimension
No. 9	I don't know how to respond I consider it more dangerous to consume canned meat after 6 months past the expiration date <u>I consider it more dangerous to consume smoked salmon that has been expired for 5 days</u> I consider it more dangerous to consume yoghurt that has been expired for 5 days	Consumers' awareness of food risks
No. 10	I don't know how to respond Fish intended to be consumed raw that is 'blast frozen' is safe from a parasitological and microbiological point of view (e.g., <i>Salmonella</i> spp.) Fish intended to be consumed raw that is 'blast frozen' is safe from a parasitological, microbiological, and chemical point of view (e.g., mercury) <u>Fish intended to be consumed raw that is 'blast frozen' is safe only from a parasitological point of view (e.g., <i>Anisakis</i> spp.)</u> I don't know how to respond	Consumers' awareness of food risks

^a The underlined italic text identifies the correct answer.

exactly one response selected. After cleaning, the analytical dataset comprises 582 valid observations. Table 2 reports descriptive statistics for the respondent profile variables.

The study was based on an anonymous, voluntary, online survey of consumers that collected no sensitive, health, biometric or personally identifying information and entailed no foreseeable risk for participants; under the applicable Italian and institutional provisions, non-interventional anonymous survey research of this kind does not fall within the categories for which prior approval by an Institutional Review Board or Ethics Committee is mandatory, and no such formal approval was therefore sought. The study was nevertheless conducted in accordance with the ethical principles for research involving human participants set out in the Declaration of Helsinki. Adult respondents provided consent directly, while participants aged 16–17 years took part only after parental or legal guardian consent had been obtained, together with the minor's assent. The first screen of the Google Forms questionnaire presented the aim of the study, the voluntary and anonymous nature of participation, the exclusive use of the data for research purposes and the possibility to withdraw at any time by not submitting the form, and respondents could access the questionnaire only after explicitly declaring that they had read this information and agreed to take part. No direct or indirect personal identifiers (name, contact details, IP address or geolocation) were recorded, and all data were collected, stored and analysed in fully anonymised and aggregated form, thereby ensuring participant confidentiality throughout data handling.

2.2. Data analysis

From the verification questions we derive two complementary outcome representations. The first is the overall knowledge score, defined as the total number of correct answers given by each respondent across the ten verification items; it is a non-negative integer count bounded between 0 and 10. The second consists of ten binary indicators (one per verification item), each taking value 1 if the respondent selected the food-safety appropriate option for that item and 0 otherwise (including "don't know" responses). By construction, the overall score is the sum of these ten binary indicators.

The two outcome representations are analysed with two complementary models that are consistent with these data-generating structures: a Truncated Poisson regression for the count overall knowledge

Table 2

Summary statistics of the variables related to the respondents' profile.

Summary statistics (N = 582)	Symbol	Type of variable	Mean (or % of yes)	Standard deviation	Min	Max
Gender = Other	gender1	Dummy	0.00	NA	0	1
Gender = Female	gender2	Dummy	0.62	NA	0	1
Gender = Male	gender3	Dummy	0.38	NA	0	1
Number of years of education	edu	Continuous	14.62	3.49	5	21
Primary school	educational4	Dummy	0.02	NA	0	1
Middle School	educational5	Dummy	0.06	NA	0	1
High School	educational6	Dummy	0.53	NA	0	1
Bachelor's degree	educational2	Dummy	0.10	NA	0	1
Master's degree	educational1	Dummy	0.20	NA	0	1
Advanced academic degrees and specialized education programs	educational3	Dummy	0.10	NA	0	1
16- to 18-year-olds	Age5	Dummy	0.19	NA	0	1
18- to 25-year-olds	Age1	Dummy	0.31	NA	0	1
26 to 35-year-olds	Age2	Dummy	0.17	NA	0	1
36 to 50-year-olds	Age3	Dummy	0.15	NA	0	1
51 to 60-year-olds	Age4	Dummy	0.10	NA	0	1
Older than 60-year-olds	Age6	Dummy	0.08	NA	0	1
Education is partially related to food quality and safety	expert2	Dummy	0.18	NA	0	1
Education is not related to food quality and safety	expert1	Dummy	0.48	NA	0	1
Education is related to food quality and safety	expert3	Dummy	0.34	NA	0	1
Number of correct answers (score)	score	Count	6.47	1.82	1	10
Did the questions we asked cast doubt on your knowledge? (1 if yes)	Doubt	Dummy	0.59	NA	0	1

NA: Not applicable.

score and a Multivariate Probit regression for the system of ten binary verification items. We chose the Truncated Poisson, rather than an ordered or linear specification, because the score is a count with a known upper bound (10), the Poisson likelihood naturally accommodates the count structure, and truncation explicitly accounts for the bounded support. We adopted the Multivariate Probit, rather than ten independent Probit regressions, because the items were answered by the same respondent and are therefore plausibly correlated; the Multivariate Probit jointly estimates the ten equations while allowing free off-diagonal correlations across the error terms, providing both individual-level coefficients and item-level cross-correlations.

The Truncated Poisson is a statistical model used for counting data that have been truncated because, as in our case, the dependent variable shows an upper threshold (Cameron and Trivedi, 2013; Grogger and Carson, 1991).

The conditional probability of observing the event y_i is calculated as follows:

$$\Pr(Y = y_i | y_i < \tau_i, x_i) = \frac{\exp(-\lambda) \lambda^{y_i}}{y_i! \Pr(Y > \tau_i | x_i)} \quad (1)$$

where:

- y_i is the dependent variable, i.e. the overall knowledge score (total number of correct answers, 0–10);
- τ_i is the truncation point (in our case 11), with $y_i < \tau_i$;
- x_i are n variables assumed to be able to explain the score y_i (such as, for instance, the respondent's age, gender, educational level, expertise, and so on);
- and λ is the parameter that characterizes the Poisson distribution, and which represents the mean (or expected) number of events.

From the ten verification items we derived ten binary indicators correspond to dummy variables that take the value 1 when the respondent selected the food-safety appropriate option for the corresponding verification item and 0 otherwise.

To jointly analyse these data and account for the plausible correlation across responses, given that they were elicited by the same respondent, we adopted the Multivariate Probit framework (Greene, 2000). It is composed of a system of ten-equation Probit regression models that assume the following formulation:

$$\begin{cases} y_1^* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon_1 \\ y_2^* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon_2 \\ \dots\dots\dots \\ y_{10}^* = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \varepsilon_{10} \end{cases} \quad (2)$$

where:

- j ranges from 1 to 10 and represents the index that identifies each equation (one for each verification question);
- i ranges from 1 to n and represents the index that identifies independent variables that, in our model specification, are the same across equations;
- y_j^* is a latent (unobservable) continuous variable¹;
- y_j is the observed response that equals 1 if $y_j^* > 0$, zero otherwise;
- x_i are explicative variables related to the respondent's profile (e.g., age, gender, educational level, and so on);
- β_i is the vector of the parameter to be estimated;
- ε_j is the error term for each equation.

The system of simultaneous equation figured out in (2) assumes that the error terms $\varepsilon_1, \varepsilon_2, \dots, \varepsilon_{10}$ follow a multivariate normal distribution with zero mean and a variance-covariance matrix equals to Σ :

$$\varepsilon = (\varepsilon_1, \varepsilon_2, \dots, \varepsilon_{10}) \sim N(0, \Sigma) \quad (3)$$

The variance-covariance matrix of the cross-equation error terms has values equal to one on the leading diagonal, while the off-diagonal elements which differ from zero represent the correlations across equations to be estimated:

¹ The latent variable in equation (2) is denoted y_j^* and is conceptually distinct from the count y_i in equation (1); by construction the sum of the observed y_i , $j = 1, \dots, 10$, equals the score y_i modelled in equation (1).

$$\Sigma = \begin{pmatrix} 1 & \sigma_{1,2} & \sigma_{1,3} & \dots & \sigma_{1,10} \\ \sigma_{2,1} & 1 & \sigma_{2,3} & \dots & \sigma_{2,10} \\ \sigma_{3,1} & \sigma_{3,2} & 1 & \dots & \sigma_{3,10} \\ \dots & \dots & \dots & \dots & \dots \\ \sigma_{10,1} & \sigma_{10,2} & \sigma_{10,3} & \dots & 1 \end{pmatrix} \quad (4)$$

Estimates have been obtained by using the software STATA (18.0, StataCorp LLC, College Station, TX).

3. Results and discussion

3.1. Overall level of knowledge on food quality and safety aspects

Figs. 1 and 2 display, respectively, the distribution of the overall score across the 582 respondents and the frequencies of correct answers for each verification question.

The score, which ranges from 0 to 10, has an empirical mean of 6.47, median of 6.00 and standard deviation of 1.82 ($n = 582$). The full score (10/10) is reached by 4.5% of respondents, while 5.2% record a score below 4. We do not attach a normative or clinical meaning to specific cut-offs (e.g., “score < 4”): in the absence of a validated reference scale, these thresholds are reported as descriptive markers of the lower tail of the empirical distribution rather than as classifications of “adequate” or “inadequate” knowledge (see the Supplementary material for the full item-level frequencies).

In our sample, item 10 (concerning blast-frozen raw fish) recorded the lowest share of correct answers, indicating that most respondents declared they did not associate blast freezing only with the parasitological dimension of safety (verification question no. 10). As regulated by Regulation (EU) No 1276/2011, freezing treatment (at temperature of $-20\text{ }^{\circ}\text{C}$ for 24 h or equivalent treatments) of fishery products to be consumed raw or almost raw is only used to kill viable parasites while it is not a suitable strategy to manage microbiological and chemical risks. Freezing may reduce or stop microbial growth during frozen storage, but it should not be considered a reliable technique for eliminating all microbiological hazards. Several bacteria may survive freezing and, after thawing, may resume growth if the initial bacterial load, the intrinsic properties of the food and the subsequent storage conditions are favourable (Berry et al., 2008; Miyamoto-Shinohara et al., 2008).

Likewise, chemical contaminants, such as heavy metals accumulated intra-vitam in fish tissues, are also unaffected and the concentrations remain unchanged after freezing (Li et al., 2021). For this verification question, the percentage of correct answers equals only 31.4% of the sample. Verification question no. 9 also shows that a remarkable share of the sample is not aware of certain food risks. The percentage of incorrect answers equals 60%. In this regard, more than half of respondents did not, in their declared answers, distinguish between “perishable” products, such as smoked salmon, “stable” products, such as canned meat, and “fairly stable” products, such as yoghurt, indirectly displaying little knowledge or little attention in distinguishing on the label between “use by date” (reported in perishable and fairly stable products) and the “date of minimum durability” (reported in stable products) (Legarreta, 2010; Løvdal, 2015; Regulation (EU) No 1169/2011; Tribby and Teter 2023). The intrinsic characteristics of the stable and fairly stable products (i.e., pH and water activity) or the production process itself (e.g., post-packaging sterilization) prevent the growth or even the presence of viable foodborne pathogenic microorganisms keeping them safe even if consumed well beyond the date reported on the label (Rahman, 2020). Otherwise, perishable products represent an excellent substrate for the growth of pathogenic microorganisms whose occurrence is not totally prevented by any production treatment and whose management is achieved through good manufacturing and hygiene practices that guarantee their safety only within their shelf-life (Singh and Shalini, 2016).

The only question related to awareness of food risks (besides verification questions no. 9 and 10) in which consumers showed a high level of knowledge concerns the greater safety of eggs sold in store (verification question no. 2). Coming from controlled supply chains that include rigorous hygienic-sanitary standards subjected to continuous monitoring, eggs sold in store are safer than those purchased from domestic farms (Aung and Chang, 2014). For this last verification question, the percentage of correct answers was 69.4%.

Finally, the declared knowledge about handling chicken thighs before cooking appears limited in this sample. The percentage of correct answers for this verification question (no. 4) equals 55%. This result shows the tendency of a large part of consumers to wash raw chicken before cooking, a practice that is not recommended as it can contribute to the spread of pathogenic bacteria in the domestic environment. During washing, the water used can splash and contaminate kitchen surfaces, utensils and other nearby foods, increasing the risk of cross-

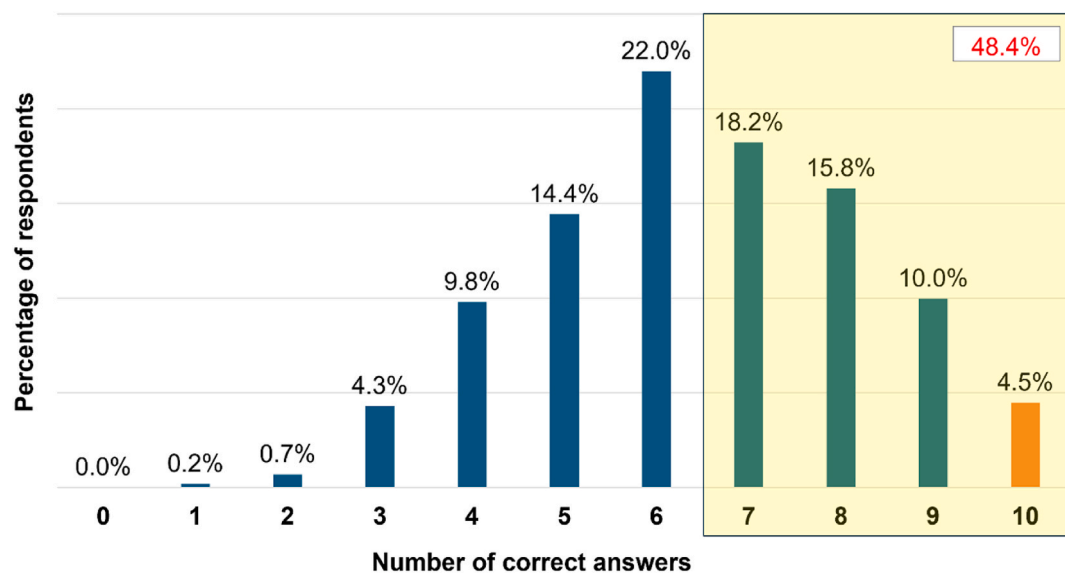


Fig. 1. Distribution of the verification score across respondents. In detail, the figure shows the percentage of respondents based on the number of correct answers provided. The yellow rectangle specifies the percentage of respondents who correctly answered more than six verification questions (i.e., the median) whose sum is equal to 48.4%.

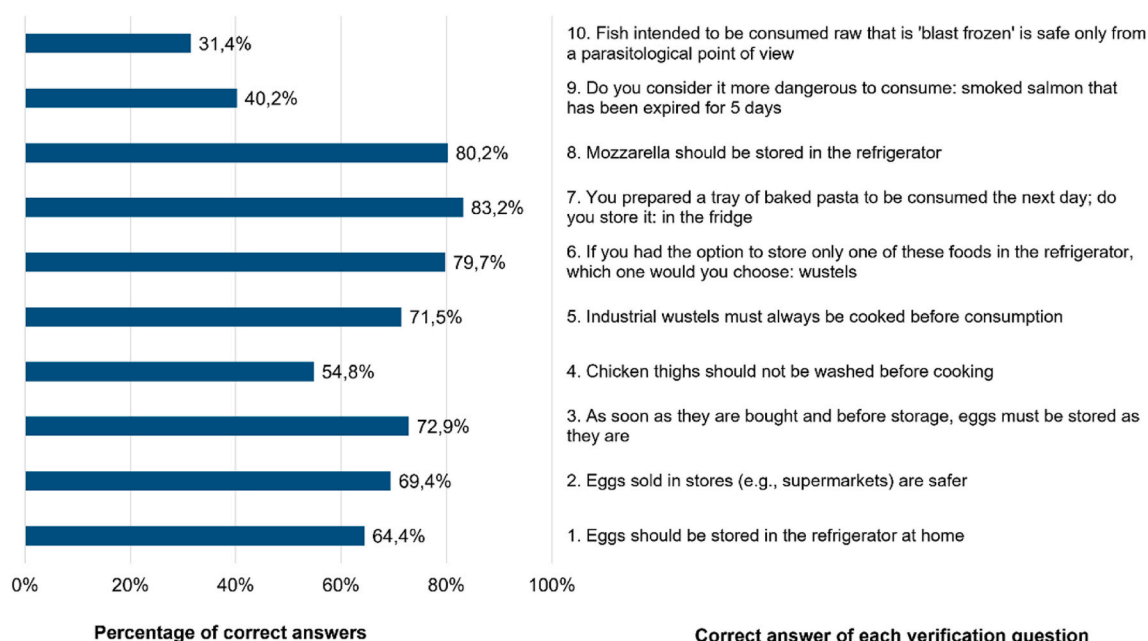


Fig. 2. Frequencies of correct answers for each verification question (from 1 to 10). See Table 1 for a detailed description of each verification question.

contamination, one of the main routes of human exposure to *Campylobacter* spp. and *Salmonella* spp. through chicken consumption (EFSA Panel on Biological Hazards, 2010).

For all the other questions, correct answers were reported by a percentage of respondents exceeding 60%, showing that for the other investigated aspects relating to the consumers' knowledge of food storage conditions (verification questions no. 1 and 8), and the consumers' ability in food risk management (verification question no. 3, 5, 6 and 7), the general level of knowledge is higher. In detail, as regards the storage ability, consumers were more likely to know the importance of storing foods at refrigeration. Although marketed at room temperature, storing eggs in the fridge guarantees greater safety and quality of the product (verification question no. 1). On the one hand, refrigeration slows down the replication and penetration through the shell pores of pathogenic bacteria (especially *Salmonella* spp.) potentially present on egg surface and, on the other, slows down all those physico-chemical processes that preside over egg deterioration (e.g., loss of moisture) (Chousalkar et al., 2021). Similarly, keeping mozzarella cheese at refrigeration prevents the growth of both spoilage and pathogenic microorganisms, guaranteeing quality and safety (verification question no. 8) (Ricciardi et al., 2015). However, the cold influences the organoleptic characteristics, hardening structure and attenuating flavour, while room temperature enhances natural softness, taste and aroma (Alinovi et al., 2020). Hence the incorrect practice of storing mozzarella cheese at room temperature. However, taking it out of the fridge just before consumption (e.g., 30 min before) is sufficient to restore organoleptic properties without allowing time for bacterial growth.

Regarding verification question no. 3, 72.9% of respondents correctly identified that it is not necessary to wash eggs before storing as washing can damage the thin natural film, called cuticle, which covers and protects the shell by acting as a barrier against penetration of bacteria through pores. Consumers were also aware (71.5% of correct answers) that frankfurter sausages must be consumed cooked even though they have already been heat treated at the industrial level (verification question no. 5) since it is not possible to exclude post-cooking and pre-packaging bacterial contamination (Nalbone et al., 2024). For the same reason, frankfurter sausages must be stored in the fridge (verification question no. 6) to avoid bacterial growth, unlike products such as whole salami or uncut speck in which aging guarantees microbiological stability to the product, slowing down the water activity and selecting

favourable microbial flora (Rahman, 2020). The percentage of correct answers for verification question no. 6 was 79.7%. Finally, the highest percentage of correct answers (83.2%) was obtained for verification question no. 7 regarding the need to store food in the fridge after cooking if not consumed shortly after. In fact, the cooking temperatures at the domestic level are capable of inactivating only the vegetative forms of bacteria and not the spores of some foodborne pathogens, such as *Clostridium perfringens* and *Bacillus cereus*. If foods are not rapidly cooled, newly germinated vegetative cells can proliferate, increasing the risk of food poisoning (Bennett et al., 2013).

3.2. Relation between the profile of respondents and their knowledge on aspects of food quality and safety

Table 3 reports the results of the Truncated Poisson model estimated to identify individual-level factors able to explain the overall knowledge score. This model accounts for the count nature of the dependent variable while accounting for its upper bound of 10. We did not impose a low constraint given that, despite the 0 value not being observed, this could occur under the hypothesis that verification responses were always wrong.

As Table 3 shows, the score is predominantly associated with the respondent's age. The different dummies included in the model to represent age groups are in general highly significant ($p < 0.001$). We

Table 3

Truncated Poisson model's results.

	Coefficient		Robust standard error ^b
Doubt	−0.10114	**	0.035
Male	−0.00266		0.034
18 to 25-year-olds ^a	0.32379	***	0.048
26 to 35-year-olds ^a	0.41793	***	0.062
36 to 50-year-olds ^a	0.24206	***	0.057
51 to 60-year-olds ^a	0.27057	***	0.069
> 60-year-olds ^a	0.08202		0.065
edu	−0.00627		0.006
expert3	0.09438	*	0.037
_cons	1.83353	***	0.083

$p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

^a Reference class: 16- to 18-year-olds.

^b Huber-White sandwich estimator.

considered the ‘youngest’ group (e.g., 16- to 18-year-olds) as a reference level to highlight differences across age classes concerning those that represent the future generation. Results suggest that the score improves across older people, but not linearly. The coefficient magnitude, always positive, reaches the maximum value in the age class 26 to 35-year-olds and after that decreases. Moreover, model results indicate no statistically significant difference in the knowledge score between younger and the oldest categories (e.g., > 60-year-olds).

In addition, according to expectations, respondents with education related to food quality and safety tend to have a higher score, with the coefficient being significant at $p < 0.05$.

Oppositely, lower scores are observed for respondents who after completing the questionnaire expressed doubt about their knowledge of food processing and storage (i.e., explanatory variable named “Doubt”). In the latter case, the coefficient is negative and statistically significant (with $p < 0.01$).

Finally, gender and education level do not seem to have a key role in determining the knowledge score, as both variables are not statistically significant assuming conventional p -value thresholds.

Tables 4a and 4b report results on the Multivariate Probit models simultaneously estimated to identify variables affecting the respondent's ability to identify the right food management behaviour for each verification question. The need to estimate a system of simultaneous equations is supported by the result of the Likelihood Ratio Test (Greene, 2000) which assumes as a null hypothesis that all the off-diagonal elements of the variance-covariance matrix are simultaneously equal to zero. The χ^2 corresponding to 45 degrees of freedom, in fact, equals 125.031 and shows a $p < 0.001$.

Regarding the coefficient estimates, since each question focuses on a particular food management aspect, it is reasonable to hypothesize that the ability to identify the correct response across the ten items is affected by different determinants. Our hypothesis is supported by the results.

The “Doubt” variable is statistically significant only for verification questions no. 1, 2 and 4 meaning that, concerning these aspects related to food storage and risk management, consumers are generally less confident in their answers. In fact, if consumers declare doubts about their answers after completing the questionnaire, the probability that those answers are correct decreases. Being male is positively associated with the probability of a correct answer to verification question no. 1 (how to store eggs at home) and negatively associated with the probability of a correct answer to question no. 7 (how to conserve cooked food) (i.e., verification question no. 7). Overall, gender does not seem to be a key variable in explaining individual knowledge of food management. Age matters for all the considered knowledge aspects, with the only exception of verification question no. 9 which detects a specific dimension of consumers’ awareness of food risks. For this question, independent variables included in the model do not seem statistically significant in discriminating between true and incorrect responses. In general, older people seem to demonstrate higher knowledge about all investigated aspects compared to younger (16- to 18-year-olds), except for the two last age classes for verification question no. 1 and the three age classes for verification question no. 8. For these dummy variables the coefficients are significant and negative, consistent with the presence of widely shared misconceptions among older respondents in our sample regarding the correct way to store both eggs (verification question no. 1) and mozzarella cheese (verification question no. 8) at home,

Table 4a
Multivariate Probit models’ results obtained for verification questions from no. 1 to no. 5.

	Verification question 1 Eggs should be stored in the refrigerator at home			Verification question 2 Eggs sold in stores (e.g., supermarkets) are safer			Verification question 3 As soon as they are bought and before storage, eggs must be stored as they are			Verification question 4 Chicken thighs should not be washed before cooking			Verification question 5 Frankfurter sausages must always be cooked before consumption		
	Coefficient	Robust standard error ^(b)		Coefficient	Robust standard error ^(b)		Coefficient	Robust standard error ^(b)		Coefficient	Robust standard error ^(b)		Coefficient	Robust standard error ^(b)	
Doubt	−0.3185	**	0.1154	−0.4175	***	0.1225	−0.0880		0.1187	−0.3212	**	0.1147	−0.0604		0.1205
Male	0.2453	*	0.1138	−0.0645		0.1220	−0.0709		0.1168	−0.1060		0.1114	−0.1267		0.1175
18 to 25-year-olds ^(a)	−0.1994		0.1689	0.7873	***	0.1710	0.5160	**	0.1685	0.6842	***	0.1663	0.7143	***	0.1813
26 to 35-year-olds ^(a)	−0.0908		0.2085	1.2976	***	0.2262	0.8854	***	0.2195	0.7946	***	0.2099	0.2694		0.2044
36 to 50-year-olds ^(a)	−0.0663		0.2196	1.0746	***	0.2238	0.6402	**	0.2189	0.4393	*	0.2087	−0.2832		0.2114
51 to 60-year-olds ^(a)	−0.4733	*	0.2389	1.3362	***	0.2561	0.7676	**	0.2542	0.5834	*	0.2357	−0.0066		0.2334
> 60-year-olds ^(a)	−0.8048	***	0.2451	1.0002	***	0.2505	0.2956		0.2415	0.4181	(.)	0.2343	−0.2204		0.2379
edu	−0.0161		0.0149	−0.0081		0.0163	0.0030		0.0161	0.0034		0.0153	−0.0268	(.)	0.0157
expert3	−0.0040		0.1243	0.5062	***	0.1335	0.1864		0.1320	0.2833	*	0.1251	−0.2764	*	0.1325
_cons	0.9236	***	0.2323	−0.0406		0.2503	0.0998		0.2398	−0.2880		0.2358	1.0015	***	0.2491

(.) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

^a) Reference class: 16- to 18-year-olds.

^b) Huber-White sandwich estimator.

Table 4b

Multivariate Probit models' results obtained for verification questions from no. 6 to no. 10.

	Verification question 6 If you had the option to store only one of these foods in the refrigerator, which one would you choose: frankfurter sausages			Verification question 7 You prepared a tray of baked pasta to be consumed the next day; do you store it: in the fridge			Verification question 8 Mozzarella should be stored in the refrigerator		Verification question 9 Do you consider it more dangerous to consume? Smoked salmon that has been expired for 5 days		Verification question 10 Fish intended to be consumed raw that is 'blast frozen' is safe only from a parasitological point of view	
	Coefficient		Robust standard error ^(b)	Coefficient		Robust standard error ^(b)	Coefficient	Robust standard error ^(b)	Coefficient	Robust standard error ^(b)	Coefficient	Robust standard error ^(b)
Doubt	−0.0718		0.1258	−0.1209		0.1369	0.0058	0.1293	0.0073	0.1115	−0.0798	0.1161
Male	0.0558		0.1241	−0.3774	**	0.1304	−0.0523	0.1299	0.1014	0.1102	0.0758	0.1137
18 to 25-year-olds ^(a)	0.3863	*	0.1746	0.6361	***	0.1761	0.3146	0.2133	0.2459	0.1649	0.3593	* 0.1787
26 to 35-year-olds ^(a)	0.4293	(.)	0.2221	1.0525	***	0.2482	−0.1988	0.2391	0.3192	0.2037	0.7009	*** 0.2102
36 to 50-year-olds ^(a)	0.5399	*	0.2410	0.8792	***	0.2469	−0.5230	* 0.2384	−0.0825	0.2150	0.5401	* 0.2212
51 to 60-year-olds ^(a)	1.0296	***	0.3073	1.2066	***	0.3113	−0.6029	* 0.2545	−0.1490	0.2433	0.6136	* 0.2458
> 60-year-olds ^(a)	0.2396		0.2619	0.8099	**	0.2903	−0.9691	*** 0.2554	−0.3764	0.2524	0.4774	(.) 0.2488
edu	0.0111		0.0182	0.0003		0.0189	−0.0178	0.0176	0.0115	0.0157	−0.0121	0.0156
expert3	−0.0289		0.1373	−0.1086		0.1414	0.1319	0.1477	0.1573	0.1206	0.3346	** 0.1256
_cons	0.3391		0.2690	0.6034	*	0.2757	1.3426	*** 0.2698	−0.5976	* 0.2357	−0.8247	*** 0.2460

(.) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.^a Reference class: 16- to 18-year-olds.^b Huber-White sandwich estimator.

while younger exhibit higher awareness. The number of years of education is negatively associated with the probability of a correct answer to verification question no. 5 about the consumption of frankfurter sausages, suggesting that the belief that they do not need to be cooked before eating is widespread also among more-educated respondents in our sample. Consistently, being an expert on food quality and safety (expert3) is also negatively associated with the probability of selecting the correct option for this item. A plausible interpretation, which we offer cautiously and as a hypothesis to be tested with larger samples, is that for frankfurter sausages the conventional Italian consumption pattern is sufficiently dominant to override formal training, with

educated and expert respondents endorsing the everyday practice rather than the formal microbiological recommendation. Results highlight the need to define a well-targeted and designed communication action to mitigate the risks associated with improper consumption of frankfurter sausages in Sicily. In all the other cases, the estimated sign of the coefficient of this variable is coherent with expectation. Self-declared expertise in food quality and safety (expert3) is positively associated with the probability of a correct answer for question no. 1 (how to store eggs at home), no. 4 (how to treat chicken thighs before cooking) and no. 10 (risks associated with raw fish previously subjected to blast freezing), suggesting that for these items expert respondents identify the food-

Table 5

Variance-covariance matrix estimate.

$\sigma_{\mu\kappa}$		k									
		1	2	3	4	5	6	7	8	9	10
M	1	1	−0.02	0	0.14*	0.14*	0.04	0.05	0.06	−0.02	−0.02
	2	−0.02	1	0.20**	0.22***	0	0.22**	0.14(.)	0.02	0.06	0.11
	3	0	0.20**	1	0.34***	0.02	0.09	0.03	−0.1	0.12(.)	0.11
	4	0.14*	0.22***	0.34***	1	0.1	0.25***	0.20*	−0.06	0.14*	0.22***
	5	0.14*	0	0.02	0.1	1	0.21**	0.18*	0.08	0.06	0.07
	6	0.04	0.22**	0.09	0.25***	0.21**	1	0.20*	−0.06	0.07	0.19**
	7	0.05	0.14(.)	0.03	0.20*	0.18*	0.20*	1	0.09	0	0.08
	8	0.06	0.02	−0.1	−0.06	0.08	−0.06	0.09	1	−0.03	0.05
	9	−0.02	0.06	0.12(.)	0.14*	0.06	0.07	0	−0.03	1	−0.02
	10	−0.02	0.11	0.11	0.22***	0.07	0.19**	0.08	0.05	−0.02	1

(.) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

safety appropriate option more often than non-experts.

Table 5 reports covariance estimates across cross-equation error terms and produces useful insights about the cross-item associations across responses. Many responses appear conditionally independent (see for instance those related to verification question no. 8), whereas the statistically significant covariances are all positive: in other words, the probability of a correct answer to one item and the probability of a correct answer to another item tend to move together across respondents. For instance, in our sample, respondents who are more likely to give a correct answer to question no. 2 are also more likely to give a correct answer to question no. 4.

Significant covariance estimates are those that relate to:

Insight no. 1: verification question no. 1 and questions no. 4 and no. 5 ($p < 0.01$);

Insight no. 2: verification question no. 2 and verification question no. 4 ($p < 0.001$), no. 3 and no. 6 ($p < 0.01$) and no. 7 ($p < 0.10$);

Insight no. 3: verification question no. 3 with questions no. 4 ($p < 0.001$) and no. 9 ($p < 0.10$);

Insight no. 4: verification question no. 4 with verification questions no. 6 and no. 10 ($p < 0.001$), no. 7 and no. 9 ($p < 0.05$);

Insight no. 5: verification question no. 5 with verification question no. 6 ($p < 0.01$) and no. 7 ($p < 0.05$);

Insight no. 6: and, finally, verification question no. 6 with question no. 10 ($p < 0.01$) and no. 7 ($p < 0.05$).

These results show that different aspects of food management are correlated, particularly in terms of individual knowledge related to storage ability and food risk management (insight no. 1), as well as awareness of food risks and food risk management abilities (insight no. 3, no. 4 and no. 6). Furthermore, as demonstrated by insight no. 2 and no. 5, there is a significant correlation among responses related to questions that assess the same food management dimension, named consumers' ability in food risk management.

Read jointly with the Truncated Poisson estimates of Section 3.2, these findings provide an exploratory but coherent picture in relation to the three research questions. Concerning RQ1, declared knowledge varies systematically with respondent age, self-declared expertise and the "Doubt" indicator, while gender and continuous years of education are not robustly associated with the overall score. Concerning RQ2, item-level associations show that the relevance of individual characteristics is heterogeneous across food-safety dimensions: age effects are consistent across most items, whereas expertise effects are item-specific and even reverse sign for verification question no. 5 (frankfurter sausages). This heterogeneity is consistent with the idea that misconceptions are not generic ignorance but reflect culturally consolidated practices around specific food categories. Concerning RQ3, the positive and statistically significant off-diagonal elements of the variance-covariance matrix indicate that, after conditioning on the same set of individual covariates, knowing the correct answer to one item is positively associated with knowing the correct answer to another. This is consistent with the existence of a shared latent "food-safety literacy" that the questionnaire is partly capturing, while also reinforcing the need for future studies with formally validated multi-item scales. We refrain from claims about "influence" or causal mechanisms; results describe associations within a non-probability sample and should be interpreted as hypothesis-generating. Comparable cross-country evidence (e.g., Karam et al., 2024; Hassan et al., 2024; Serhan et al., 2024; Dankar et al., 2022) suggests that misconceptions and gaps in declared food-safety knowledge persist also in other Mediterranean and developing-country contexts, reinforcing the relevance of mapping such beliefs in additional populations.

Beyond the statistical associations reported above, several of these findings can be read through the lens of the risk-perception literature. Because risk perception was not directly measured in this study, the interpretations that follow are offered as hypotheses to be tested in future work rather than as conclusions. A first relevant concept is familiarity: in risk psychology, hazards that are familiar and embedded in

everyday routines tend to be perceived as less dangerous (Nardi et al., 2020). Sicily's deeply rooted gastronomic traditions and long-standing household preservation practices may therefore foster a sense of familiarity with certain foods (for instance home-stored eggs, fresh dairy or cured products) that lowers the perceived need for the corresponding precautionary behaviours, plausibly contributing to the persistence of specific misconceptions despite formal information (Zanetta et al., 2022).

A second concept, optimism bias (or overconfidence), may help interpret the study's most counterintuitive result, namely the negative association between self-declared expertise and formal education, on the one hand, and the probability of selecting the correct option for the frankfurter-sausage item, on the other. Individuals with training in the field may believe that their technical competence protects them and may consequently follow the conventional Italian consumption pattern (eating frankfurters without further cooking) rather than the formal microbiological recommendation. Interpreted in this way, the "expert effect" observed here would be a plausible manifestation of overconfidence, in which perceived competence displaces precautionary behaviour; this reading reinforces, as a hypothesis, the interpretation that academic training does not automatically translate into safer food-management choices (Wang and Yueh, 2020).

Finally, these considerations enrich the interpretation of the food-safety literacy pattern suggested by RQ3. Food-safety literacy may be understood not only as a set of factual notions, but also as the consumer's ability to appraise risk realistically and to override culturally embedded biases. Framing literacy in this broader sense helps to move from a purely technical description of who answers correctly and who does not, towards an understanding of the Mediterranean consumer mindset, which is arguably more informative for the design of the targeted risk-communication campaigns that motivate this study (da Cunha, 2025; Nardi et al., 2020). We stress that, in the absence of direct measures of risk perception, these interpretations remain hypotheses that future studies, ideally combining knowledge items with validated risk-perception scales, should test explicitly.

4. Conclusions

This exploratory study documents the presence of widely shared misconceptions about post-purchase food management practices in a non-probability sample of Sicilian consumers and examines the individual-level factors statistically associated with consumers' declared knowledge of food storage conditions, awareness of food risks and ability in food risk management. The study also explores whether correct answers across different verification items tend to occur independently or as part of broader patterns of food-safety literacy.

The findings should be interpreted in light of the exploratory nature of the study. The analysis is based on a non-probability convenience sample of Sicilian consumers recruited online and through snowball sampling. Therefore, the results are not intended to be representative of the Sicilian or Italian population and may be affected by self-selection bias, particularly towards digitally connected respondents. Moreover, no formal a priori sample-size calculation was performed, and the working sample reflects the dataset obtained after data cleaning. These aspects limit external validity and suggest that the results should be read as preliminary evidence rather than as population-level estimates.

Within these limits, the results are consistent with the existence of widely shared misconceptions about post-purchase food management. These misconceptions appear not only among younger and less experienced respondents, but also among more educated individuals and among those who declare themselves to be experts on the topics investigated. In our sample, younger respondents, particularly those aged 16–18 years, show on average lower declared knowledge than older age classes for several items. This descriptive pattern should be interpreted with caution and tested in future studies based on larger and probabilistic samples.

The most critical descriptive gaps concern the safety of blast-frozen raw fish, the interpretation of expiration dates and product perishability, and the handling of raw chicken before cooking. In addition, frankfurter sausages deserve specific attention because the model reveals a counterintuitive association with education and self-declared expertise, suggesting that consolidated consumption habits may persist even among respondents with higher formal knowledge or perceived competence.

The questionnaire was developed by the authors on the basis of European food-safety regulation and peer-reviewed literature, but it was not subjected to a formal psychometric validation procedure. For this reason, the three dimensions used in the study — knowledge of storage conditions, awareness of food risks and ability in food risk management — should be interpreted as a descriptive organisational framework rather than as formally validated subscales. Consistently, the analysis treats the verification items as separate binary indicators within a multivariate framework.

A further limitation concerns the nature of the outcome variable. The study measures declared knowledge through a closed-answer survey and does not observe actual food-handling behaviour. The right/wrong coding of answers necessarily simplifies a more complex phenomenon and does not allow conclusions about real practices in domestic settings. Future research should therefore integrate survey-based measures with observational, experimental or mixed-method designs able to capture the relationship between knowledge, beliefs and actual behaviour.

From a modelling perspective, the Truncated Poisson specification used for the overall knowledge score should also be interpreted with caution, as the assumption of equidispersion was not formally tested against alternative specifications such as a negative binomial model. Given the bounded nature of the count variable and the modest variability of the score in the sample, this represents an additional avenue for future work with larger and more heterogeneous datasets. Furthermore, the cross-sectional design does not allow conclusions about persistence over time or causal mechanisms. For this reason, the study refers to statistical associations rather than causal effects.

Despite these limitations, the Multivariate Probit model provides useful evidence of positive cross-item correlations after conditioning on individual covariates. This suggests that declared knowledge of different aspects of post-purchase food management tends to co-occur within respondents, rather than being entirely item-specific. From a risk-communication standpoint, this result indicates that food-safety knowledge may be structured as a broader literacy pattern, and that integrated communication actions covering several related practices together may be more effective than isolated messages focused on single behaviours.

The practical implications of the study can be summarised in three main points. First, misconceptions appear to be concentrated on a limited number of specific issues, particularly the handling of raw chicken, the consumption and management of processed foods such as frankfurter sausages, the interpretation of expiration dates and the safety of blast-frozen raw fish. These issues should be prioritised in targeted educational and risk-communication campaigns. Second, self-declared expertise does not necessarily guarantee correct knowledge across all areas, suggesting that communication strategies should not rely on assumed prior competence. Third, the co-occurrence of correct answers across items supports the development of integrated food-safety messages that connect storage, preparation, perishability and risk awareness.

Interventions should ensure that the overall safety and quality of food products guaranteed by stringent European regulation along the supply chain are not compromised by improper conservation and handling practices after purchase. Educational programmes and public communication campaigns should therefore be tailored to different groups, with particular attention to younger consumers, while also maintaining lifelong learning opportunities for adults and older generations. Clear, practical and accessible post-purchase instructions on food

labels could represent an additional tool to support consumers in preventing foodborne illness.

Finally, the geographical focus on Sicily represents both a strength and a limitation. Sicily offers a meaningful Mediterranean case study because traditional food practices, household preservation routines and local gastronomic knowledge remain highly salient. However, this focus limits comparison with other Mediterranean and non-Mediterranean settings. Future research should extend the analysis to other regional and national contexts and develop comparative studies able to examine how traditional food knowledge, modern consumption habits and food-safety communication interact across different food cultures. In this sense, risk communication should be understood not only as an informative process, but also as a strategic component of food risk management.

CRediT authorship contribution statement

Maria De Salvo: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Simone Cannella:** Investigation, Methodology. **Alessandro Giuffrida:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Graziella Ziino:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Aurelian Schiopu-Mariean:** Methodology, Software. **Luca Nalbene:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Filippo Giarratana:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Implications for gastronomy

The findings of this study provide relevant insights for gastronomy, particularly in contexts where traditional culinary practices strongly influence food handling behaviours. While the present research focuses on Sicily as a case study, similar dynamics are likely to occur in many regions where food culture is deeply rooted and transmitted across generations.

Gastronomy encompasses not only the preparation and appreciation of food, but also the knowledge and practices that govern how food is handled, preserved, and consumed. In this perspective, the persistence of “false myths” highlights a critical interface between traditional gastronomic knowledge and modern food safety principles. Although many traditional practices retain cultural and sensory value, some may no longer be appropriate under current conditions and may introduce unintended risks.

The results demonstrate that incorrect practices, such as washing raw poultry, misinterpreting expiration dates, or improperly storing perishable foods, are not limited to specific populations, but may represent broader patterns linked to the way gastronomic knowledge is informally transmitted. This suggests that tradition alone is not always a reliable proxy for safe food practices.

From a gastronomic standpoint, these findings underline the need to reinterpret traditional knowledge through a scientific lens, preserving cultural identity while ensuring food safety. This is particularly relevant for chefs, culinary professionals, and food educators, who act as mediators between tradition and innovation. By integrating food safety principles into gastronomic education and practice, it is possible to enhance both the cultural and functional value of food.

Furthermore, gastronomy can play a key role in risk communication. Through menus, food narratives, and culinary experiences, the gastronomic sector can contribute to shaping consumer behaviour and

promoting correct food handling practices beyond the professional environment.

Finally, the observed interconnection among different dimensions of food knowledge suggests that improving awareness in one area may positively influence others. In this sense, gastronomy represents a strategic platform for fostering safer food behaviours, combining cultural heritage, sensory experience, and scientific knowledge within a more resilient and informed food system.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijgfs.2026.101634>.

Data availability

I have shared all the data in the manuscript

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