



Determinants of online food purchasing: The impact of socio-demographic and situational factors

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ABSTRACT

The amount of food sold online is increasing, but it accounts for a small share of total e-commerce. In this study, we investigate the factors that influence individuals' likelihood to buy food online. Applying a logit model to a sample of 34,488 respondents who participated in the Italian National Institute of Statistics multipurpose survey 'Aspects of Italian Daily Life', we explore the effects of socio-demographics and situational factors. We found that the food-online consumer is likely to be a young, well-educated, female, living in a small family, with a very good or adequate overall economic condition. Among situational factors, working time, being obese, having health problems, and practising a sport regularly positively affect the probability to buy food online. Surprisingly, distance from brick-and-mortar stores and car possession are not predictors of online shopping. These findings can support marketers and retailers in defining their marketing strategies and enhance the knowledge of this emerging food market.

1. Introduction

The e-commerce industry has been steadily growing over the last few years. According to Statista (2020a), in 2019, retail e-commerce sales worldwide amounted to USD 3.54 trillion, 165% higher than in 2014 (USD 1.34 trillion). Within this large expanding market, food and beverages represents the smallest e-commerce category (Statista, 2020b). Despite a steady growth worldwide of almost 21% per year in 2014–2019 (Alaimo et al., 2020), the grocery category has been well underpenetrated relative to other e-commerce categories such as consumer electronics and clothes. A EUROSTAT (2018) report shows that in 2017, in the European Union (EU), clothing represents the category of goods and services sold online that has received the greatest preference, purchased by 64% of e-buyers. In second place, we find travel and holiday accommodation (53%), followed by the 46% of household goods (furniture, toys, vehicles), 39% of tickets for events, then books and newspapers (36%), and electronic equipment (25%). In the last place is food and grocery, purchased by 24% of e-buyers.

Additionally, the groceries and supermarkets have pursued new strategies to adapt their offer to the increasing demand for online food shopping. Grocery retailers have implemented appealing electronic platforms such as websites and smartphone applications to expand their

presence in e-commerce. The largest brick-and-mortar stores have created online virtual stores, accessible anytime and anywhere, with a wide assortment of products. Small and medium-sized shops, to retain their customers, have started to accept home delivery orders through email or social media. Gradually, retailers have introduced new services as the 'click and collect' option, namely the possibility of ordering products online and then collecting them directly from the store. Furthermore, the increasing number of internet users, increasing adoption of smartphones (ITU, 2020), and evolving food habits (Casini et al., 2015) have facilitated the development of this type of trade channel.

Despite these transformations that have created new and high-tech opportunities for consumers to buy food, the grocery sector shows a lower e-commerce penetration than other consumer goods, and this singular evolution calls for more attention. The determinants of this pattern are rooted in the distinguishing characteristics of these products, such as perishability or the consumer preference for freshness. However, the decision to buy food online can be affected by consumers' characteristics. Investigating this dimension can be relevant because it can provide empirical evidence to scholars to enhance their understanding of why food seems to diverge from the path of development of the online markets of other consumer goods. In addition, marketing professionals can benefit from a better understanding and develop this purchase

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channel.

Several studies have focused on the influence of socio-demographic variables on online food shopping in different countries (e.g. [Finotto et al., 2020](#); [Hamad and Schmitz, 2019](#); [Hood et al., 2020](#); [Hui and Wan, 2009](#); [Naseri and Elliott, 2011](#); [Van Droogenbroeck and Van Hove, 2017](#); [Wang and Somogyi, 2019](#)). However, these studies have provided contrasting conclusions on the effect and significance of the demographic factors. These conflicting results seem to originate from the evidence that the previous studies cover a wide timeframe and concern countries located in different geographical areas.

The focus on socio-demographic characteristics and consumer traits is a meritorious starting point; however, the perspective must be enlarged to fully explain consumers' purchase behaviour in the online setting. For example, contextual circumstances such as situational factors can play a critical role in this aim ([Driediger and Bhatiasevi, 2019](#); [Robinson et al., 2007](#); [Zarei et al., 2020](#)). This function has received insufficient attention despite situational factors being (internal or external) elements that emerge during consumer purchase and can mainly improve the ability to explain and understand consumer behavioural acts ([Belk, 1975](#)). [Robinson et al. \(2007\)](#) conducted qualitative research and found that situational variables appeared to be the dominant triggers for starting online grocery shopping. [Hand et al. \(2009\)](#) confirmed the importance of situational factors in the decision to start buying groceries online. Only a few studies have considered the impact of situational factors in combination with socio-demographics ([Chocarro et al., 2013](#); [Farag et al., 2007](#); [Zarei et al., 2020](#)). From the managerial perspective, understanding the impact of both consumer characteristics and situational variables allows e-retailers to target segments of consumers and identify circumstances that negatively influence individuals' online purchases.

This study contributes to enlarging the knowledge on consumers' decision to buy food online, by exploring the influence of situational factors and socio-demographic characteristics. In particular, using a representative sample, this study investigates this phenomenon in Italy. The worldwide modest popularity of e-grocery compared with other goods and services is evident in the Italian market. In 2018, despite a positive trend of +34% over the previous year, food and grocery sales online amounted to EUR 1.1 billion, equal to 4% of the total worth of the Italian e-commerce sector ([B2c E-Commerce Observatory, 2019](#)). A further inspection shows that for Italian consumers, the propensity to purchase groceries online is even lower than that for other countries in the EU. If the percentage of e-buyers who ordered food and grocery online is equal to 22% in France, 28% in Germany, and 34% in the United Kingdom, this value in comparison scores only 9% in Italy ([EUROSTAT, 2018](#)).

Briefly, the literature reports contrasting results related to socio-demographics and little attention has been devoted to situational factors. Therefore, the main merit of this study is the simultaneous consideration of the impact of both socio-demographics and situational factors. We intend to bring empirical evidence that it can provide insights into this topic to allow food retailers to define customised marketing strategies for targeting those individuals and for reaching new potential users. Moreover, the findings can help scholars to better understand the reasons why the food sector represents a peculiarity in online sales since it has a lower penetration in the online market than the other goods. Accordingly, we attempt to answer two research questions: (i) which socio-demographic characteristics affect individuals' shopping grocery online in Italy? (ii) Which situational factors and how do they influence the decision to shop for food online for Italian consumers?

After this introduction, the paper reviews the relevant literature on the socio-demographic characteristics and situational variables influencing online shopping, including online food purchase. The next section illustrates the methodology used to conduct the analysis and presents the results obtained. The paper ends with a discussion of the results and offers opportunities for the future evolution of online grocery purchases. The conclusion provides insights into the development of

strategies for supermarkets to better fulfil their consumers' shopping needs.

2. Conceptual framework and hypotheses

The following subsections provide an overview of the most important findings on the variables that drive online purchases. We focused on the socio-demographic variables and situational factors that are the main dimensions of our model.

2.1. Socio-demographic variables

The effect of socio-demographic variables on e-grocery purchases has been extensively discussed in the literature. [Arce-Urriza and Cebollada \(2010\)](#) indicated that frequent Spanish e-grocery shoppers (who buy at least 50% of their purchases online) were more likely to be men than women and were younger than conventional buyers. [Naseri and Elliott \(2011\)](#) stated that in Australia, the probability of purchasing food online decreases with the age of the purchasers; however, they found that e-grocery buyers were more likely to be women than men. These findings confirm the results of [Wang and Somogyi \(2019\)](#), who provided evidence that, in China, women and younger individuals constituted the majority of e-grocery shoppers. Additionally, [Saphores and Xu \(2020\)](#) found that in the United States women are more likely to shop online for groceries than men. Conversely, some authors have considered that gender is not influential in predicting individuals' willingness to purchase food online. A study by [Goethals et al. \(2012\)](#) demonstrated that in France, even if most e-grocery shoppers are younger than 55 years, there are no significant differences between genders. These results on the insignificance of gender are in line with the findings of [Van Droogenbroeck and Van Hove \(2017\)](#), who demonstrated that, in Belgium, the propensity for online grocery shopping is more evident in two age groups: 31–40 and 41–50 years. Accordingly, [Hui and Wan \(2009\)](#) conducted a study in Singapore and demonstrated that gender does not affect the use of online grocery services, adding that consumers aged from 21 to 40 years tend to have a more positive attitude towards these than other age groups. In a recent study on Italian consumers, [Finotto et al. \(2020\)](#) demonstrated that men aged 40–49 years are more likely to buy grocery online. Considering this conflicting evidence among consumers living in different countries, including the study of Italian shoppers, we propose that gender and age seem to be an important driver of e-grocery behaviour. Thus, we propose hypothesis 1 (H1):

H1. Gender and age affect the likelihood of buying food online.

Studies on online shopping and e-grocery shopping have attested the influence of individual education and income. Specifically, consumers with a higher level of education ([Hui and Wan, 2009](#); [Van Droogenbroeck and Van Hove, 2017](#); [Lin et al., 2019](#)) and who are living in higher-income households ([Gan et al., 2007](#); [Hansen, 2005](#); [Wang and Somogyi, 2019](#)) are more likely to buy grocery online. By contrast, the findings of [Naseri and Elliott \(2011\)](#) highlighted that education and income are not significant determinants. Despite this article, most studies support the impact of education and income on online food shopping; thus, we propose hypothesis 2 (H2):

H2. Well-educated and wealthier consumers frequently shop for food online.

Additionally, the effect of household characteristics on the choice of buying groceries online has been investigated. For example, the greater the number of family members, the higher the probability of using an online grocery service ([Chintagunta et al., 2012](#); [Wang and Somogyi, 2019](#)). In large families with young children, the adoption of online shopping for groceries has some advantages, especially in terms of time saved ([Van Droogenbroeck and Van Hove, 2017](#)). However, multi-person households are more likely to have individuals available to do grocery shopping in the 'conventional' manner. Several studies have

thus found a negative effect of household size on the likelihood to buy food online (İlhan and İççioğlu, 2015; Suel et al., 2015). Other analyses (Naseri and Elliott, 2011; Van Droogenbroeck and Van Hove, 2017) have found no significant relationship between household size and e-grocery shopping. Notably, only a few studies have considered marital status as a determinant of buying food through e-commerce. Wang and Somogyi (2019) found that married persons have a more positive attitude towards e-grocery shopping than single individuals do. Additionally, Kaur and Shukla (2016) demonstrated no significant influence of marital status on the overall attitude of the respondents towards online grocery shopping. In summary, we hypothesise that household size and marital status influence online shopping for food but that the sign of this effect remains controversial. Accounting for the opposing findings in the literature, we propose hypotheses 3 and 4 (H3 and H4):

H3. Household size influences e-grocery shopping.

H4. Marital status influences consumers' decision to shop for food online.

These studies cover a wide timeframe and concern different countries. However, online shopping is growing rapidly by the year because of the development of telecommunication infrastructure and widespread technology usage.

2.2. Situational factors

Situational factors can influence the decision to buy online (Hand et al., 2009; Perea y Monsuwé et al., 2004). The concept of situational variables was introduced by Belk (1974, 1975) who studied the influences on consumers' purchase behaviour in 'traditional' stores. He defined these as 'all those factors particular to a time and place of observation which do not follow from a knowledge of personal (intra-individual) or stimulus (choice alternative) attributes' (Belk, 1974, p. 157). Belk (1975) described five types of situational factors: *physical surroundings*, *social surroundings*, *temporal perspectives*, *task definition*, and *antecedent states*. These concepts were further developed by analysing different shopping contexts or channels, such as e-commerce.

In the range of variables associated with the *physical surroundings* factor, Belk (1975) included store features and the most readily apparent features of the shopping situation, as well as the type of weather. Although these variables are traditionally linked to offline shopping, geographical distance from the store can be a relevant factor affecting e-commerce. Notably, online grocery shopping can solve the issues related to the difficulties of reaching stores located too distant from consumers. Consequently, the probability of purchasing products online should increase the number of consumers living in distant locations from food stores and supermarkets (Chocarro et al., 2013; Perea y Monsuwé et al., 2004). On the basis of these findings, we propose hypothesis 5 (H5):

H5a. The distance to an open-air market positively affects the probability of online food shopping.

H5b. The distance to a grocery store or supermarket positively affects the probability of online food shopping.

The *social surroundings* feature defined by Belk (1975) concerns the social experience of shopping and includes several variables, for example, the presence of other individuals and the interaction with them in the act of purchasing. Shopping with a friend or with a relative can influence a consumer's purchase decision (Zhuang et al., 2006). This social support helps reduce the stress caused by choosing the correct product for purchase and helps increase the shopper's confidence (Chocarro et al., 2013). In the traditional manner of grocery shopping, this type of support can be supplied by a salesperson, who can interact with customers and influence their purchases. Instead, in some cases, someone can prefer to shop alone (Borges et al., 2010), and the presence of companions or other strangers can negatively affect the shopping

experience or the total amount paid (Hart and Dale, 2014). In this sense, the impersonal nature of online grocery shopping allows consumers who are particularly averse to social interaction to avoid social interaction necessitated by traditional face-to-face commerce (Shen, 2012).

The *temporal perspective* (Belk, 1975) refers to time-related factors such as the time of day, time of last purchase, or impact of perceived time pressure. Time pressure positively affects the decision to shop online; the reason for this effect is that online shopping is considered to save time because individuals can compare many different types of goods and quickly and easily buy products directly from their home (Chocarro et al., 2013; Farag et al., 2007). Moreover, e-grocery shopping requires no transportation time, less waiting and service time, and less planning time compared to in-store shopping (Verhoef and Langerak, 2001). The issue of time constraints seems particularly relevant, especially for consumers who have extended working hours (Dellaert and Ruyter, 2004). However, we again found contrasting results. Farag et al. (2007) found that the number of hours of paid work per week had no significant effects on e-shopping, and Bellman et al. (1999) stated that the probability of buying products in the traditional manner decreases with an increase in the total number of hours worked by members of a household. Our study assumes that a working time effect is present in the online grocery context. In particular, we propose hypothesis 6 (H6):

H6. As the number of working hours increases, the probability of shopping for food online increases.

In terms of saving time, the possession of a car is a situational factor that appears to influence the adoption of grocery shopping (Hand et al., 2009). Individuals with access to a car are more likely to prefer shopping in stores to shopping online (Cullinane et al., 2008; Visser and Lanzendorf, 2004; Xu and Paulins, 2005). However, Kang et al. (2016) and Suel et al. (2015) have found that the possession of a car has no significant effect on the adoption of online grocery shopping. In summary, even if the literature provides discordant results, because taking goods from the store back home is perceived as a major problem in everyday life (Visser and Lanzendorf, 2004), we can reasonably assume that online shopping may resolve this problem for those who do not have a car. Thus, we propose hypothesis 7 (H7):

H7. Car possession has a negative relationship with the online purchase of food.

Task definition was defined by Belk (1975) as the purpose or goal of purchasing a specific product. For example, the purchase occasion is a determinant in the choice of a product. For example, in choosing a gift, shopping activities and product selection differ from those used to purchase something for personal consumption (Boncinelli et al., 2019; Jung Chang et al., 2014).

The *antecedent states* refer to the personal mood and individual conditions during the act of purchase. For example, an individual's emotional state, such as happiness or fatigue, can influence the decision to buy something. A happy shopper buys more than an unhappy shopper (Zhuang et al., 2006). In addition to momentary moods, Belk (1975) included chronic individual states in this category. In this sense, an individual's physical condition can be considered an antecedent state. Physical constraints such as ill health and lack of mobility are among the primary reasons for buying groceries online (Morganosky and Cude, 2000). This finding was confirmed by Hand et al. (2009), who found that situational variables such as 'health problems' and 'mobility problems' provide an impetus for some shoppers to start buying groceries online. Obese individuals might have physical limitations that may prevent them from travelling to grocery stores; thus, they might become motivated to purchase food online. Therefore, we propose hypotheses 8–10 (H8–H10):

H8. Individual bad health status increases the probability of shopping for food online.

H9. Consumers engaging in regular physical activity have a higher

probability to purchase groceries online.

H10. Being obese increases the probability of e-grocery shopping.

2.3. Control variables

The possession of a credit card positively affects e-commerce (Akram et al., 2018; Farag et al., 2006, 2007), sometimes leading individuals to overspend or purchase impulsively (Karbasivar and Yarahmadi, 2011). However, the risk of fraud or disclosure of personal financial details negatively affects the use of credit cards for online shopping (Saxena, 2019), with some consumers preferring alternative payment methods.

The mode of internet connection is another factor that can influence online shopping. Consumers prefer to use fixed broadband networks for online banking and online shopping, because these operations require a stable connection and availability for long durations, features not always present in mobile networks (Massarczyk and Winzer, 2019). The type of internet connection is strongly linked to speed because a fast connection increases the number of online purchases and the amount of money spent online (Ren and Kwan, 2009). Consistent with the literature, we propose hypothesis 11:

H11. Credit card possession and internet access with fixed broadband have a positive influence on e-grocery shopping.

3. Methodology

3.1. Source of data

This study uses the data of ‘Aspects of Daily Life’, a cross-sectional survey conducted in 2016 by the Italian National Institute of Statistics (ISTAT), to investigate daily life and behaviour of individuals and households. These data are a part of the Multipurpose Household Survey, an integrated system of social surveys for the Italian population. The survey has been conducted annually since 1993 and gathers information on several thematic areas of individual and household characteristics, aspects of daily life, and behaviour. The survey sample is representative of Italian households at the national and regional levels. The dataset comprises 18,504 households, for a total number of 43,360 individuals interviewed. Respondents below 18 years old were excluded from the analysis, as well as observations that included missing values. The final sample comprised 34,488 observations. The descriptive statistics of the whole sample and of the final sample are presented in Table 1.

3.2. Model specification

Sixteen factors were included in this study. The dependent variable (EFOOD) was a dummy equal to 1 if the respondent had purchased food online at least once in the last 12 months.

The covariates were as follows: the gender of the respondent (GENDER), coded as 1 if male; age recorded as three ranges (AGE18–34 for respondents aged between 18 and 34 years old, AGE35–54 for those aged between 35 and 54, and AGE > 54 for those over 54 years old); and the household size (HHSIZE), expressed as the number of household members. The educational level was measured by four indicators for the maximum level of education achieved: (i) P-EDU for respondents with no or only primary school education; (ii) LS-EDU for those who attended lower secondary education; (iii) US-EDU for those with upper secondary education; and (iv) T-EDU for those with tertiary education. The marital status (MARITAL) was a dummy variable, equal to 1 if the respondent was married or cohabiting with a partner, or 0 if the respondent was single, separated, divorced, or widowed. To control for economic conditions, we included the household’s self-assessment of their overall economic resources in the last 12 months (ECONSIT), coded as 0 if it was very good or adequate, and as 1 if it was scarce or absolutely insufficient. Instead of including occupation with its classifications, the total amount

Table 1
Sample composition.

Variables	Whole Sample = 43,360		Final Sample = 34,488	
	Number of respondents	Sample (%)	Number of respondents	Sample (%)
<i>Gender</i>				
Male	20,971	48.4	16,484	47.8
Female	22,389	51.6	18,004	52.2
<i>Age (years)</i>				
0–17	6,969	16.1	0	0
18–24	2,992	6.9	2,791	8.1
25–34	4,364	10.1	4,126	12.0
35–44	5,925	13.7	5,644	16.4
45–54	7,100	16.4	6,767	19.6
55–59	2,923	6.7	2,781	8.1
60–64	2,794	6.4	2,675	7.7
65–74	5,092	11.7	4,869	14.1
Over 74	5,201	12.0	4,835	14.0
<i>Education level*</i>				
Primary school or no education	10,511	24.2	6,770	19.6
Middle school	11,919	27.5	9,794	28.4
High school	13,692	31.6	13,023	37.8
Tertiary education	5,112	11.8	4,901	14.2
<i>Household Size</i>				
1	5,944	13.7	5,603	16.3
2	10,492	24.2	9,681	28.0
3	10,584	24.4	8,439	24.5
4	11,456	26.4	7,769	22.5
5	3,620	8.4	2,230	6.5
Over 5	1,264	2.9	766	2.2
<i>Location of residence**</i>				
North-West Italy	8,780	20.2	7,120	20.7
North-East Italy	9,381	21.7	7,386	21.4
Central Italy	7,691	17.7	6,211	18.0
South Italy	12,873	29.7	10,178	29.5
Insular Italy	4,526	10.4	3,527	10.2

Notes: *Regarding educational level, there are 2,126 pieces of missing information in the whole sample (4.9% of the total); **Regarding the location of residence, there are 109 missing pieces of information in the whole sample (0.3% of the total) and 66 in the final sample (0.2% of the total).

of weekly working hours was used. Specifically, four categories were identified: (i) respondents who did not spend any hours working during the week (ZEROW); (ii) individuals whose number of weekly working hours was less than 40 h (PART); (iii) respondents who worked 40 h a week (FULL); and (iv) individuals whose number of weekly working hours was over than 40 (OVERW). Two indicators represented the self-reported hurdles in reaching an open-air market or a grocery and a supermarket; both were coded into three categories: respondents with no hurdles (MARKET-NH and SUPER-NH, respectively), some hurdles (MARKET-SH and SUPER-SH, respectively), and considerable hurdles (MARKET-CH and SUPER-CH, respectively). Individuals who responded with ‘I don’t know’ to these two last indicators were dropped from the sample. The variable CAR was used to denote whether a car was available in the household; a value of 1 was assumed in an affirmative case. Body mass index (BMI) is the ratio between the bodyweight of an individual, expressed in kilograms, and the square of his height expressed in metres. Following the standard classification, we divided our respondents into four categories: underweight, with a BMI of <18.5 (BMI-UNDER); normal-weight, BMIs ranging from 18.5 to 24.9 (BMI-NORMAL); overweight, BMIs ranging from 25 to 29 (BMI-OVER); and obese, a BMI of ≥30 (BMI-OBESE). A variable (HEALTH) captured the self-reported health conditions of respondents, coded as 1 if the individual declared that they had poor or very poor health. An indicator for regular physical activity (SPORT) was included in the model, and an individual was assigned a value of 1 if they played a sport regularly. Last, this model also considered if the respondent had a credit card (CCARD) and if the respondent had household internet access through a fixed broadband connection (INTERNET); both were dichotomous variables

and classified as 1 in affirmative cases.

To isolate the relationship between socio-demographic, situational, and other factors and the likelihood of individuals buying food online, a binary logit regression was performed. The maximum likelihood estimation procedure was implemented to obtain the model parameters. Fig. 1 presents a diagram of the variables included in the model.

The empirical model is specified as follows:

$$E\text{FOOD}_i = \beta_0 + \beta_1\text{GENDER} + \beta_2\text{AGE35-54} + \beta_3\text{AGE}>54 + \beta_4\text{HHSIZE} + \beta_5\text{LS-EDU} + \beta_6\text{US-EDU} + \beta_7\text{T-EDU} + \beta_8\text{MARITAL} + \beta_9\text{ECONSIT} + \beta_{10}\text{PART} + \beta_{11}\text{FULL} + \beta_{12}\text{OVERW} + \beta_{13}\text{MARKET-SH} + \beta_{14}\text{MARKET-CH} + \beta_{15}\text{SUPER-SH} + \beta_{16}\text{SUPER-CH} + \beta_{17}\text{CAR} + \beta_{18}\text{BMI-UNDER} + \beta_{19}\text{BMI-OVER} + \beta_{20}\text{BMI-OBESE} + \beta_{21}\text{HEALTH} + \beta_{22}\text{SPORT} + \beta_{23}\text{CCARD} + \beta_{24}\text{INTERNET} + \varepsilon_i \quad (1)$$

where β_s are the coefficients for the explanatory variables previously defined and represent the marginal change in the probability to buy food online when a covariate changes, and ε_i is the error term.

The baseline profile was a low-educated, single, female respondent, with an age range of 18–34 years, working 0 h per week, who had no hurdles to reaching an open-air market, a grocery store, or a supermarket, who was without a car in the household, with a good or adequate overall economic resources, who had a normal BMI and a very good, good, or discreet health status, who did not regularly practise physical activity, and who was without a credit card and had not household internet access with a fixed broadband connection. The descriptive statistics of variables used in the estimation are presented in Table 2.

As shown in Table 2, approximately 2% of the respondents claimed to have purchased food online at least once in the year preceding the interview. The data seem to confirm that only a small segment of the Italian population uses this shopping channel and that there is room for retailers to expand their audience.

4. Results

The results concerning the estimated parameters of the logit analysis are presented in Table 3, where the values reported for each variable—the β -coefficient, the standard error, and the marginal effects—were obtained by using STATA 15.1 software.

The estimated logit model shows that the profile of consumers who buy food online is a young female with very good or adequate overall economic resources. In particular, men are 3.44% less likely to purchase

groceries online, compared with women. Individuals in the middle age range (35–54) are 0.67% less likely to buy food online, and the probability decreases by 1.56% for individuals over 54 years. Household size is negatively linked to consumers’ decision of e-grocery shopping, meaning that the probability decreases as the number of family members increases. The probability of e-grocery purchase decreases by 0.34% if the economic situation is perceived as being scarce or absolutely insufficient. As for education, the higher the educational level of the respondents, the more likely they are to buy food online. Individuals with lower secondary, upper secondary, and tertiary education are 0.97%, 1.91%, and 2.45% more likely to purchase groceries online, respectively. Regarding socio-demographic characteristics, H1, H2, and H3 are supported in terms of significance and sign of the effect; marital status (H4) was the only variable that was not statistically significant.

Among the situational factors, the results suggest that the coefficients related to the hurdles in reaching an open-air market, a grocery store, or a supermarket are not statistically significant; thus, they have no impact on consumers’ choice to buy groceries online. Thus, H5a and H5b are not supported. The same conclusion applies to H7, regarding car possession. Contrary to what we hypothesised; this situational factor is statistically insignificant.

For time pressure, a higher number of weekly working hours positively affected the probability of online food purchases. Respondents who worked less than 40 h do not show a statistically significant coefficient, and those who have weekly working hours equal to or over 40 h are 0.43% more likely to buy groceries online than not-working individuals. In summary, the results support H6.

For the BMI categories, only obese respondents show a positive and significant statistical relationship with online grocery purchases. They are 0.86% more likely to buy food online than normal-weight respondents. Furthermore, the results suggest that individuals with poor health conditions are positively influenced by food e-commerce, and this health status increases the probability of this type of purchase by 0.83%. Additionally, regular physical activity has a positive impact on e-grocery purchase, with a higher probability (0.32%) in those with a ‘sedentary lifestyle’. These three positive relations confirm H8, H9, and H10.

Regarding the other variables, both the possession of a credit card and household internet access with a fixed broadband connection are positively associated with online grocery shopping, supporting H11. Respondents with a credit card have a 1.60% higher probability of purchasing groceries on the internet, and an individual with a fixed broadband connection has a 1.50% higher probability.

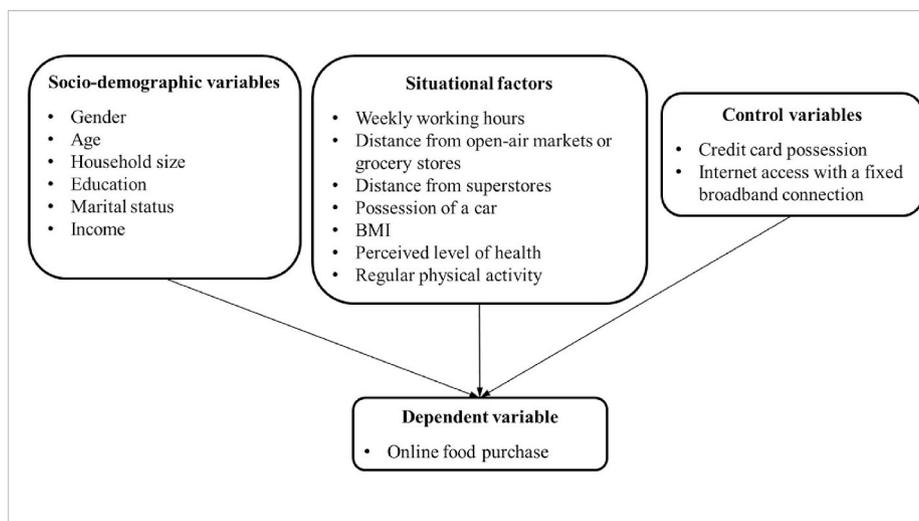


Fig. 1. Variables that impact online grocery purchase.

Table 2
Descriptive statistics of variables used in the estimation (Sample = 34,448).

Variable	Description of variable	Mean	Std. Dev.
EFOOD	1 if the respondent shopped for food online, 0 otherwise	0.02	0.14
GENDER	1 if male,	0.48	0.50
AGE18–34*	1 if the age was between 18 and 34 years,	0.20	0.40
AGE35–54	1 if the age was between 35 and 54 years	0.36	0.48
AGE>54	1 if the age was 54 years or higher	0.44	0.50
HHSIZE	Number of household members	2.83	1.29
P-EDU*	1 if the respondent had no education or attended primary school	0.20	0.40
LS-EDU	1 if the respondent attended lower secondary education	0.28	0.45
US-EDU	1 if the respondent attended upper secondary education	0.38	0.48
T-EDUC	1 if the respondent had tertiary education	0.14	0.35
MARITAL	1 if the respondent was married or cohabitant with a partner	0.53	0.50
ECONSIT	1 if the respondent had perceived his/her economic situation as scarce or absolutely insufficient,	0.39	0.48
ZEROW*	1 if the weekly working hours were equal to 0 h	0.48	0.50
PART	1 if the weekly working hours were between 0 and 40 h	0.19	0.39
FULL	1 if the weekly working hours were equal to 40 h	0.15	0.36
OVERW	1 if the weekly working hours were higher than 40 h	0.18	0.38
MARKET-NH*	1 if there were no hurdles to reaching an open-air market or a grocery store and a supermarket	0.79	0.41
MARKET-SH	1 if there were some hurdles to reaching an open-air market or a grocery store and a supermarket	0.17	0.38
MARKET-CH	1 if there were considerable hurdles to reaching an open-air market or a grocery store and a supermarket	0.04	0.20
SUPER-NH*	1 if there were no hurdles to reaching a supermarket	0.71	0.45
SUPER-SH	1 if there were some hurdles to reaching a supermarket	0.22	0.42
SUPER-CH	1 if there were considerable hurdles to reaching a supermarket	0.06	0.24
CAR	1 if the respondent possessed a car	0.86	0.34
BMI-UNDER	1 if the respondent's BMI was lower than 18.5	0.03	0.17
BMI-NORMAL*	1 if the respondent's BMI was between 18.5 and 24.9	0.50	0.50
BMI-OVER	1 if the respondent's BMI was between 25 and 29	0.36	0.48
BMI-OBESE	1 if the respondent's BMI was higher than 29	0.11	0.31
HEALTH	1 if the respondent had declared poor or very poor health	0.07	0.26
SPORT	1 if the respondent played a sport regularly	0.20	0.40
CCARD	1 if the respondent had a credit card	0.30	0.46
INTERNET	1 if the respondent had household internet access with a fixed broadband connection	0.54	0.50

Note: *Baseline profile; Std. Dev: standard deviation.

5. Discussion

This study attempted to deepen the understanding of the current knowledge of consumers' behaviour to buy food online. Our results confirm our general hypothesis: socio-demographic characteristics and situational factors significantly affect individuals' choice to e-grocery shop. Therefore, it is meritorious to explore the determinants of this behaviour throughout these dimensions.

Except for marital status, all socio-demographic variables influence consumers' likelihood to buy food online. These conclusions are in line with those in the literature (Naseri and Elliott, 2011; Saphores and Xu, 2020; Wang and Somogyi, 2019) on the role of gender. Notably, women have traditionally been responsible for buying household grocery, and the opportunity of online grocery shopping has not changed this habit. Instead, our results contrast with the findings of the only study

Table 3
Results of the logit analysis. Full sample (N = 34,448).

Variable	Coefficient	Std. Error	Marginal Effect
GENDER	-0.19**	0.09	-0.0344**
AGE35–54	-0.3***	0.11	-0.0067***
AGE>54	-0.9***	0.14	-0.0156***
HHSIZE	-0.12***	0.04	-0.0021***
LS-EDU	1.69***	0.43	0.0097***
US-EDU	2.28***	0.43	0.0191***
T-EDUC	2.52***	0.43	0.0245***
MARITAL	0.11	0.10	0.0020
ECONSIT	-0.19**	0.10	-0.0034**
PART	0.14	0.12	0.0023
FULL	0.24**	0.12	0.0043**
OVERW	0.24**	0.12	0.0043**
MARKET-SH	-0.04	0.14	-0.0007
MARKET-CH	-0.12	0.34	-0.0021
SUPERSH	0.10	0.13	0.0018
SUPERCH	0.10	0.29	0.0019
CAR	0.05	0.19	0.0010
BMI-UNDER	-0.17	0.23	-0.0028
BMI-OVER	0.00	0.10	-0.0001
BMI-OBESE	0.4***	0.14	0.0086***
HEALTH	0.46**	0.21	0.0083**
SPORT	0.18**	0.09	0.0032**
CCARD	0.89***	0.09	0.0160***
INTERNET	0.83***	0.11	0.0150***
COSTANT	-6.49***	0.46	-

Note: ** and *** denote statistical significance levels of 0.05 and 0.01, respectively.

conducted in Italy, by Finotto et al. (2020), which highlighted the higher propensity of men to buy food and beverages online. However, the study by Finotto et al. (2020) has a geographical limitation because it regards a convenience sample of consumers aged 20–69 years living in the Veneto region, a limited area in North-East Italy.

Our results also highlight that younger consumers are likely to opt for e-grocery shopping more often. This finding is in line with the belief that younger individuals are more technology-oriented and likely to shop online than older individuals. Furthermore, older consumers tend to check food products before buying them (Goethals et al., 2012), especially fresh food such as fruits and vegetables. This absence of the 'touch and feel' factor, along with the possibility that their trusted grocery retailer would not be available online, may explain their reluctance. Our results also support the previous literature on education and income, showing that consumers with a higher level of education and income have a greater propensity to buy food online (Gan et al., 2007; Lin et al., 2019; Van Droogenbroeck and Van Hove, 2017).

Regarding household size, the number of family members negatively affects online grocery purchase. This result, in line with the findings of İlhan and İşçioğlu (2015) and Suel et al. (2015), is in contrast with the studies that did not detect a significant relationship between household size and the propensity of purchasing food online (Arce-Urriza and Cebollada, 2010; Naseri and Elliott, 2011; Van Droogenbroeck and Van Hove, 2017). In general, the greater the number of family members, the higher the probability of the availability of individuals who can go to the market and shop for groceries in the traditional manner. A reason for this could be that, in larger families, the need to contain the food expenditure is more stringent than it is in smaller families; thus, the formers prefer using the channel that allows them to save money. Contrary to the non-food sector, several multi-channel food retailers, who sell products both on web platforms and in physical stores, do not offer significantly different online and offline product prices (Fedoseeva et al., 2017). Therefore, larger households do not have any advantage in terms of potential saving, and in this sense, they find e-grocery shopping not so attractive. This deduction could be reinforced by the evidence that the online channels often charge additional fees for delivery or other services.

The results of this study provide a relevant contribution to the

literature in terms of understanding the impact of situational factors on e-grocery shopping. The positive association between working hours (more than or equal to 40 h) and e-grocery shopping highlights the influence of the work-life balance perspective. For these consumers, the opportunity provided by a time-saving service makes this shopping channel extremely attractive (Frentz, 2020; Zheng et al., 2020). The possibility to buy food just by clicking anytime and anywhere avoids the round-trip time, time spent looking for a parking space, and waiting times in stores. Full-time workers tend to adopt strategies to save non-discretionary time in obligatory tasks, such as buying food (Van Droogenbroeck and Van Hove, 2017). Additionally, the results have demonstrated that owning a private car does not have a significant influence on purchasing groceries online, according to Kang et al. (2016) and Suel et al. (2015).

Surprisingly, we find no relationship between the obstacles to reaching food markets such as an open-air market or supermarket and e-grocery shopping. In terms of the physical surrounding, the geographical distance between the supermarket and an individual's home does not affect the consumer's probability to buy groceries online. This finding contradicts the results of Chocarro et al. (2013) and Perea y Monsuwé et al. (2004) and provides some notable clues for food retailers. The non-significance of distance to stores may occur because the individuals who bought groceries online continue to shop in traditional grocery stores because they consider online shopping not as an alternative but as a complementary shopping mode (Hand et al., 2009; Harris et al., 2017). Moreover, many consumers still perceive going to the supermarket as an enjoyable and satisfactory experience and, in some cases, a pleasurable way to spend time. In Italy, approximately 60% of the consumers like to shop in a store, compared with 42% in France or 44% in the United Kingdom, according to Nielsen (2016). As demonstrated by Casini et al. (2019), a consistent group receives utility in tasks related to food.

Regarding the other situational factors, our results underline the impact of antecedent states on e-grocery shopping. In detail, the probability of purchasing food online increases in individuals affected by obesity or health problems.

The reasons why obese individuals are more likely to choose for e-commerce could be various. For example, they could have restricted mobility and then prefer the more comfortable and less strenuous solution that e-commerce provides. This is suggested by several studies, for example, Hand et al. (2009) and Morganosky and Cude (2000).

We also found a positive relationship between the e-commerce of food and being an individual who engages in regular physical activity. At first glance, this behaviour of sportspersons seems to conflict with the positive attitude of e-grocery shopping of individuals with health problems. However, one explanation for this positive relationship could be the time savings. Overall, individuals who practise physical activity regularly, exercising before or after work, are time-poor, and e-grocery shopping may represent an opportunity to save time. Notably, it allows for eliminating 'waste of time', such as going to the store or spending time in the store waiting at food preparation counters or for the checkout.

6. Conclusions

Consumers who buy food online are a small share of the whole population. In our sample, only 2% of the participants performed this act. These data are in contrast to the market share of the online sale of other consumer goods, such as clothes or household goods. The causes of the apparent lag of the food industry have been insufficiently explored.

The findings of this study are meritorious because they accomplish two main goals. First, we provide new empirical evidence on the understanding of the determinants of the online food market. This topic deserves more attention because this channel with its low penetration rate seems to show peculiarities because it follows a different growing path than other consumer goods. Second, we have broadened and enriched the study perspective, including situational factors in the

model that can partially help explain the heterogeneous results of the literature. The findings help to provide a profile of the online food consumer because we explore how socio-demographics and situational factors affect e-grocery shopping. Moreover, our analysis is conducted on a large sample with data gathered by ISTAT, which follows European quality standards.

The outcomes and implications of this study can benefit different subjects. Food retailers can benefit from our results because they can better define customised marketing strategies for targeting certain segments of individuals or reaching new potential users. Promotions, loyalty programmes, and advertising should be aimed at younger, more-educated females. Complementary services should be supplied to increase the convenience features of online shopping. For example, marketers should better explore the potentialities offered by the use of virtual assistant artificial intelligence (AI) devices or use data collected from frequent users. The gathered information could be useful to develop tools aimed to reduce time necessary to select food online or avoid annoying tasks. In this sense, the convergence of multiple technologies in informatics, AI, and electronics offers endless combinations of solutions to encourage online shopping.

In this manner, marketers could endeavour to attract individuals less appealed to e-grocery shopping, such as elderly individuals. Online platforms or applications should be developed with a more user-friendly, more efficient, and smarter interface with easily available information. A multimedia presentation of the products supplied has to spread to consumers' perception of freshness and quality, especially for groceries such as fruit and vegetables.

To pull in price-sensitive consumers (e.g. low-income or large households), providers should offer special prices or promotions, by placing discounted products at the top of the screen or near focal items or increasing the convenience of the delivery conditions. Moreover, resellers could propose a purchase option that provides for the scheduled periodic delivery of products with more advantageous prices and without additional transport costs. This service could be suitable for the purchase of frequently consumed products that are also difficult to transport, such as bottles of water and milk. Large families and elderly individuals may be the most attracted to this service, which would save them money and cognitive and physical effort. In addition, supermarkets could develop more intensively the 'order and collect' service that allows consumers to order their shopping online and to pick it up at dedicated desks in supermarkets. This option could be appreciated by individuals who cannot be at home to receive the order and want to save time and the delivery cost. Customer service that promptly helps consumers in case of necessity and that answers their questions, reproducing a real store environment, is a useful asset for consumers' loyalty. Finally, advertising campaigns can be a valuable tool to communicate these aspects and to increase the consumer base.

The evidence that individuals affected by obesity or health problems are more likely to buy food online can be an opportunity for retailers to help their customers follow a healthier diet. For example, they could promote the purchasing of fruit and vegetables or ease the selection of healthier products, low in calories or salt. These strategies have relevant public health implications. Moreover, because at-risk individuals are likely to 'haunt' the online retailers' platforms, policymakers can design more effective campaigns by using these virtual places to advertise their public actions in favour of healthy food consumption.

Finally, policymakers in collaboration with retailers could find means to promote the purchase of food online to some consumer groups, such as older individuals. The segment of elderly individuals that cannot go to supermarkets is enlarging with the ageing of the population and is simultaneously more reluctant to buy food online. In addition, elderly individuals and individuals with chronic disease represent population segments at risk during contagious epidemic diseases (e.g. COVID-19) and should avoid the traditional mode of shopping. Therefore, stakeholders should adopt strategies to incentivise those consumers to buy food online by increasing their trust. Privacy and credit card information

protection is already disciplined by national law. However, implementing a certification system that guarantees both the protection of personal data and the correct storage of food during the delivery could constitute a further incentive to shop for food online.

The findings reported in this study are subject to the following limitations that underscore the necessity of additional research. First, the model rates as Italian e-grocery consumers those who had purchased food online at least once in the last 12 months. This assumption does not allow discrimination between consumers who purchase regularly food online and consumers who bought a specific food product just once in a year. The knowledge of the frequency of purchase would allow a greater explanation of the phenomenon, with a distinction between adopters and rare users. Second, by using the data of 'Aspects of Daily Life' of ISTAT, it was only possible to analyse e-grocery purchase in an aggregate form. Notably, the data we used did not furnish information on the type of grocery purchased online (e.g. fresh, canned, or packaged products), the company that provided the service (e.g. supermarkets, restaurants, or other e-commerce companies), or the residence area of the purchaser (e.g. urban or rural). In addition, the database did not include variables that considered the motivations for online food purchases (e.g. saving time or reducing effort). These aspects may be studied in future research projects to enlarge the understanding of online food shopping.

Another notable investigation would be the analysis of online and in-store food purchases during and after COVID-19. This study provides a framework of the e-grocery sector in Italy before this pandemic. COVID-19 has changed consumer shopping habits because of its extremely contagious nature. Therefore, food retailers and policymakers should consider these phenomena to adequately match e-grocery services to new consumer needs.

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