

Consumer attitudes and Knowledge about genetically modified foods in Cyprus

A. Varnava Tello¹, A. Zorpas²

^{1,2}Cyprus Open University, Faculty of Pure and Applied Sciences, Environmental

Conservation and Management, Laboratory of Chemical Engineering and Engineering Sustainability. P.O.Box 12794, 2252, Latsia, Nicosia, Cyprus

Keywords: attitudes, gmo, knowledge, self-reported knowledge.

Presenting author email: antritello@hotmail.com

Abstract

Cyprus has always voted against all genetic modifications regardless of use and therefore the present study is of particular importance. The objective of this study was to determine the trend of safety concerns regarding genetically modified foods (GMF) in Cyprus and its correlation with age and knowledge. The findings showed that the concern for GMF presents a declining trend especially at younger ages, while a public understanding of new technology can only be achieved through objective knowledge.

Introduction

GMF, are a constant topic of public debate regarding their safety (McHughen, 2013). Without any doubt it is one of the most controversial technologies that have appeared on the market in recent decades. Consumer attitudes vary across culture and geographical region (Chen and Li, 2007). A number of reasons have been suggested as potentially responsible for the skeptical attitudes towards genetically modified organisms (GMO) based technology. Meanwhile, consumer's preferences are shifting. According to the latest Eurobarometer Survey (EFSA, 2019), the percentage of consumers who are concerned about GMOs in Europe has been substantially reduced from 66% in 2010 (EFSA, 2010), to 27% in 2019. It is essential to identify current attitudes towards the genetically modified (GM), technology in different countries in order to understand public fears and determine potential knowledge gaps.

Materials and Methods

A cross-sectional study was conducted with sample originating from the population of Cyprus. Convenience sampling was conducted between September and December 2019. The research tool used was a questionnaire consisting of two parts with closed-ended questions. The first part of the questionnaire investigates basic information on the socio-economic characteristics of the participants, such as gender, age, income. The second part includes questions aimed at investigating the level of public self-reported knowledge and general attitudes towards GMF. In order to assess the readability and validity of the questionnaire, before pilot testing, face validity and content validity methods were used. All participants' comments were incorporated and led to a new modified version of the tool with a better understanding and a more suitable order of questions. A pilot study with 12 participants was conducted, in order to estimate the validity of the questionnaire. The questionnaire's validity was evaluated by experienced researchers who assessed the ease of completing the questionnaire and the clarity of the questions. The reliability of the questionnaire was evaluated using the test-retest method (Galanis 2013). Data were collected using an online survey. Participants were informed about all aspects of the study and voluntarily confirmed their willingness to participate. No personal data were recorded and all questionnaires were completed anonymously. Study approval was obtained by the Cyprus National Bioethics Committee (Reference number: EEBK EII 2020.01.19). The analysis was carried with a sample of 442 participants.

Results

A total of 442 Cypriot citizens, who completely answered the questionnaire, were considered in this study. In particular, 59.5% (n=263) were males and 40.5% (n=179) were females. 47.9% of the respondents have

had higher education qualification (i.e., postgraduate). The age of the study subjects ranges from 18 to > 65. Most of the participants declared that they had a moderate level of knowledge (36.9%), while 26.5% and 26.2% declared low and good respectively. Regarding GMF, more than half of the participants (58%) believe that they are not safe for health. According to the results of multivariable linear regression the increase in age was associated with a decrease in positive attitudes (coefficient beta=-1.6, 95% confidence interval=-2.4-(-0.8, p<0.001). Participants with higher educational level were more positive (coefficient beta=1.3, 95% confidence interval=0.5-2.0, p=0.002) while participants with higher self-reported knowledge about GMOs were associated with negative attitudes (coefficient beta=-1.4, 95% confidence interval=-0.5-2.4, p=0.003)

Discussion

In this study, more than half of the participants (58%) believe that GMOs are not safe for health. The level of awareness compared to the results of the Eurobarometer for Biotechnology (2010), where 83% of Cypriots disagreed with the statement «*GM Food is safe for your health and your family's health*», indicates significant decrease. Similar results reported in the Eurobarometer of Food Safety (EFSA, 2019), according to which the concern of GMF decreased significantly in both European Union and Cyprus, 39% and 46% respectively. This finding may be due to the fact that GMOs, cannot enter into the food chain unless passing complex food safety tests (Borda et al., 2021), and the risk assessment performed before their authorization (Huang & Peng, 2015). Research findings show that older age is associated with a reduction in positive attitudes. By the literature, age differences have been suggested as a factor influencing citizens' attitudes. However, the results of the various studies are contradictory. Some research suggests that older ages are more positive towards GMOs (Olofsson and Olsson, 1996; Capalbo, et al., 2015) and others that they are more negative (Sparks, Shepherd & Frewer, 1994; Zhang, Xue, Folmer & Hussain, 2019). The reduction of positive attitudes with increasing age may be a consequence of the traditional way of life of older people, which makes it less likely to accept emerging technologies such as GM (Veeman, Adamowicz and Hu, 2005), in contrast to the younger people who are more likely to accept the new technology (Antonopoulou, Papadas and Targoutzidis, 2009), due to the up to date knowledge of GMOs and educational level (Popek, Halagarda, 2017). This interpretation is in line with the finding that the acceptance of GMOs is higher to people with a high academic level and is confirmed by the literature (Gaskell, Bauer, Durant and Allum, 1999; Subrahmanyam and Cheng, 2000; Mielby, Sandøe and Lassen, 2013; Wunderlich and Gatto, 2015) especially for those individuals whose education concern sciences related to GMOs (Allum et al., 2002; Zammit-Mangion, Al-Qallaf, and Vella, 2012; Aleksejeva, 2014). Knowledge is often measured as subjective or objective (Brucks, 1985; Flynn and Goldsmith, 1999). Subjective knowledge is what the consumer thinks s/he knows whereas objective knowledge is what s/he actually knows (House et al. 2004). In this study self-reported knowledge, is inversely proportional with positive attitudes. This kind of knowledge is more «subjective knowledge». According to Fernbach (2019) extreme opponents of GMF know the least but think they know the most. Both objective and subjective knowledge impact consumer perceptions of and behavior towards GM foods. However, studies are inconsistent on the extent that subjective and objective knowledge influence consumer behavior (Zhang and Liu, 2015; Rihn, Khachatryan and Wei, 2021).

Conclusion

The concern for GMF presents a declining trend especially at younger ages. Our strongest finding confirms the importance of public understanding of new technology through the objective knowledge. Future Research could investigate the source of information regarding GM technology.

References

- Allum, N., 2007. An empirical test of competing theories of hazard-related trust: The case of GM food. *Risk Analysis: An International Journal*, 27(4), pp.935-946.
- Antonopoulou, L., Papadas, C.T. and Targoutzidis, A., 2009. The impact of socio-demographic factors and political perceptions on consumer attitudes towards genetically modified foods: An econometric investigation. *Agricultural Economics Review*, 10(389-2016-23332), pp.89-103.
- Borda, D., Mihalache, O.A., Dumitraşcu, L., Gafiţianu, D. and Nicolau, A.I., 2021. Romanian consumers' food safety knowledge, awareness on certified labelled food and trust in information sources. *Food Control*, 120, p.107544.

- Brucks, M., 1985. The effects of product class knowledge on information search behavior. *Journal of consumer research*, 12(1), pp.1-16.
- Chen, M. F. and Li, H. L., 2007. The consumer's attitude toward genetically modified foods in Taiwan. *Food Quality and preference*, 18(4), 662-674.
- EFSA, 2010. Report: Food-related Risks. Special Eurobarometer (354). Parma, Italy. https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/reporten.pdf accessed on 20 February 2022.
- EFSA, 2019. Food Safety in the EU, Report Special Eurobarometer (Wave EB91.3).Parma, Italy. https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/Eurobarometer2019_Food-safety-in-the-EU_Full-report.pdf accessed on 20 February 2022.
- Fernbach, P.M., Light, N., Scott, S.E., Inbar, Y. and Rozin, P., 2019. Extreme opponents of genetically modified foods know the least but think they know the most. *Nature Human Behaviour*, 3(3), pp.251-256.
- Flynn, L.R. and Goldsmith, R.E., 1999. A short, reliable measure of subjective knowledge. *Journal of business research*, 46(1), pp.57-66.
- Galanis, P., 2013. Validity and reliability of questionnaires in epidemiological studies. *Archives of Hellenic Medicine/Arheia Ellenikes Iatrikes*, 30(1).
- Gaskell, G., Bauer, M.W., Durant, J. and Allum, N.C., 1999. Worlds apart? The reception of genetically modified foods in Europe and the US. *Science*, 285(5426), pp.384-387.
- Huang, J.K. and Peng, B.W., 2015. Consumers' perceptions on GM food safety in urban China. *Journal of Integrative Agriculture*, 14(11), pp.2391-2400.
- McHughen, A., 2013. GM crops and foods: what do consumers want to know?. *GM Crops & Food*, 4(3), pp.172-182.
- Mielby, H., Sandøe, P. and Lassen, J., 2013. The role of scientific knowledge in shaping public attitudes to GM technologies. *Public Understanding of Science*, 22(2), pp.155-168
- Olofsson, A. and Olsson, S., 1996. The new biotechnology: Media coverage and public opinion. *Public perceptions of science, biotechnology and a new university*.
- Popek, S. and Halagarda, M., 2017. Genetically modified foods: Consumer awareness, opinions and attitudes in selected EU countries. *International Journal of Consumer Studies*, 41(3), pp.325-332.
- Rihn, A., Khachatryan, H. and Wei, X., 2021. Perceived subjective versus objective knowledge: Consumer valuation of genetically modified certification on food producing plants. *Plos one*, 16(8), p.e0255406.
- Sparks, P., Shepherd, R. and Frewer, L.J., 1994. Gene technology, food production, and public opinion: A UK study. *Agriculture and Human Values*, 11(1), pp.19-28.
- Subrahmanyam, S. and Cheng, P.S., 2000. Perceptions and attitudes of Singaporeans towards genetically modified food. *Journal of Consumer Affairs*, 34(2), pp.269-290.
- Veeman, M.M., Adamowicz, W.L. and Hu, W., 2005. *Risk perceptions, social interactions and the influence of information on social attitudes to agricultural biotechnology* (No. 1528-2016-131835).
- Wunderlich, S. and Gatto, K.A., 2015. Consumer perception of genetically modified organisms and sources of information. *Advances in nutrition*, 6(6), pp.842-851.
- Zammit-Mangion, M., Al-Qallaf, A. and Vella, J., 2012. Acceptance of Genetically Modified Foods among Maltese Youths: Can Exposure to Formal Knowledge Make a Difference?.