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Background

Methods

Study aims

- To detect consumers' awareness about the content of food labels.
- To detect consumers' attitude towards the utility, clarity, and comprehensibility of food label in its current form.
- To determine the predictors of consumers' usage of food labels.
- To identify the relationship between consumers' awareness of certain food additives and their willingness to purchase food items containing one or more of these additives.
- **Study design**: A cross sectional study design was used to conduct the study.
- **Study setting**: e study was conducted in di erent branches of one of the largest supermarkets in Alexandria Governorate, Egypt.

Study participants

Table 1 Socio-demographic and personal characteristics of the studied sample

Socio-demographic and personal characteristics	Total (n = 719)	
	No.	%
Age (years)		
≤ 30	238	33.1
31–50	397	55.2
51->60	84	11.7
Mean ± SD	37.2 ± 11.0	
Gender		
Males	203	28.2
Females	516	71.8
Marital status		
Single	183	25.5
Married	491	68.3
Divorced	31	4.3
Widowed	14	1.9
Education		
Read and write	58	8.1
Primary/preparatory	126	17.5
Secondary or equivalent	194	27.0
University graduate or beyond	341	47.4
Having children		
No	233	32.4
Yes	486	67.6
Income		
Not enough	212	29.5
Just enough	460	64.0
Enough and saving	47	6.5
Occupation		
Working	363	50.5
Not Working	345	48.0
Retired	11	1.5
Presence of chronic diseases		
No	580	80.7
Yes#	139	19.3

Hypertension, DM, Cancer, renal, hepatic, bone, and thyroid diseases

Sample size

Sampling method

(n = 719)

Data collection

1. A pre- designed pre-coded structured interview questionnaire was constructed by the researchers based on previous literature (Additional file 1). The questionnaire was used to collect the following data:

- Personal data and sociodemographic characteristics: age, sex, marital status, having children, income, education, occupation, and presence of chronic diseases such as hypertension and diabetes.
- Public awareness about the content of current food labels including production/expiry date, list of ingredients, nutritional facts, and country of origin. A list of items (nine items) of food labels was presented to the respondents who were asked to indicate which of these items was included in food labels. The score ranged from 0 to 9, higher scores indicated higher awareness. The score was converted to percentage and categorized, according to Bloom's classification, [21] into low awareness (< 50%), average awareness (50-80%), optimal awareness (> 80%).
- Public attitude towards current food labeling was assessed using a 3-item scale (disagree = 0, not sure = 1, agree = 2), inquiring whether current food labels were informative, useful, clearly written, and easy to understand and whether it would be preferable to use distinctive colors for healthy and unhealthy elements. The score ranged from 0 to 10, higher scores implied favorable attitude. The score was converted to percentage and was classified into unfavorable/negative (< 33%), neutral (33.3-66.6%) and positive/favorable (> 66.6%).
- The practice of reading food labels was assessed by asking participants to indicate how frequently they read each of the listed items (9 items) of food labels. The items were scored on a frequency rating scale with never = 0, sometimes = 1, always = 2. The total score ranged from 0 to 18, it was converted to percentage and classified into poor (< 33.3%), average (33.3-66.6%), good (> 66.6%).
- The frequency of reading the list of ingredients and/or nutrition facts was measured using a single statement rated on a frequency rating scale ranging from "never" to "always". Participants' reasons for reading/not reading the list of ingredients and/or nutrition facts were investigated. A list of possible causes of reading and not reading the list

of ingredients and/or nutrition facts was prepared, and participants were asked to indicate the reasons relevant to them.

- Awareness of respondents about some food additives and its relation to their willingness to purchase the packaged food item containing these additives were assessed. A list of food additives (− ve) was presented to participants, they were asked to indicate whether they recognized each of these items and if the presence of any of them influenced their willingness to purchase the packaged food product (increased, decreased, no change).

[illegible]

Ethical considerations

[illegible]

Statistical analysis

[illegible]

Results

[illegible]

Table 2 Awareness about the content of food labels

Awareness score	Total (n = 719)	
	No.	%
Low	366	50.9
Average	148	20.6
Optimal	205	28.5
Mean ± SD	4.85 ± 3.05	

Table 3 Overall food label reading practice

Food label reading practice score	Total (n = 719)	
	No.	%
Poor	183	25.5
Average	277	38.5
Good	259	36.0
Mean ± SD	9.88 ± 5.72	

[illegible]

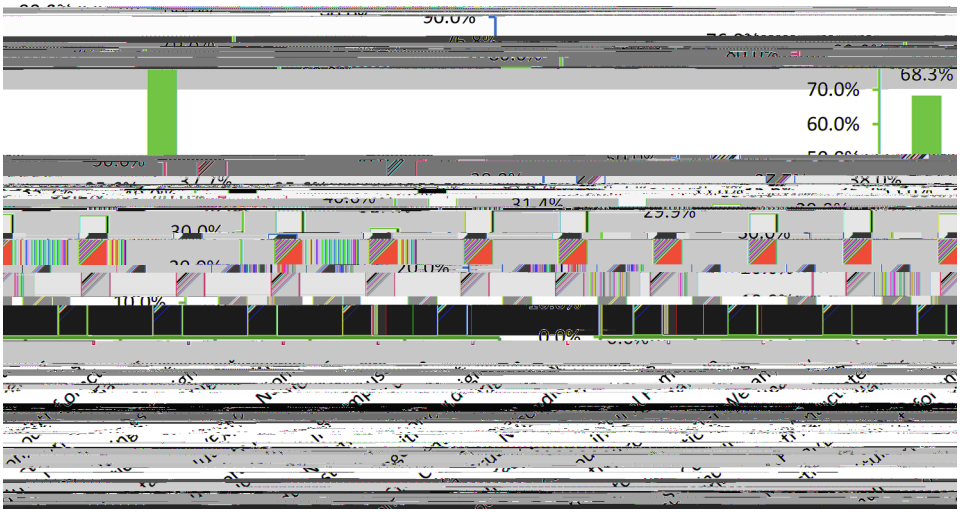

Fig. 1 Food label content items read by the participants (%)

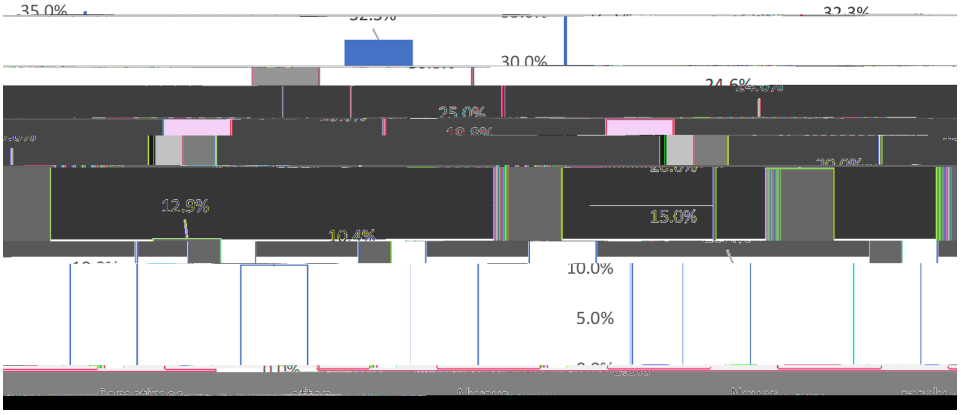

Fig. 2 Frequency of reading food ingredients and/or nutrition facts (%)

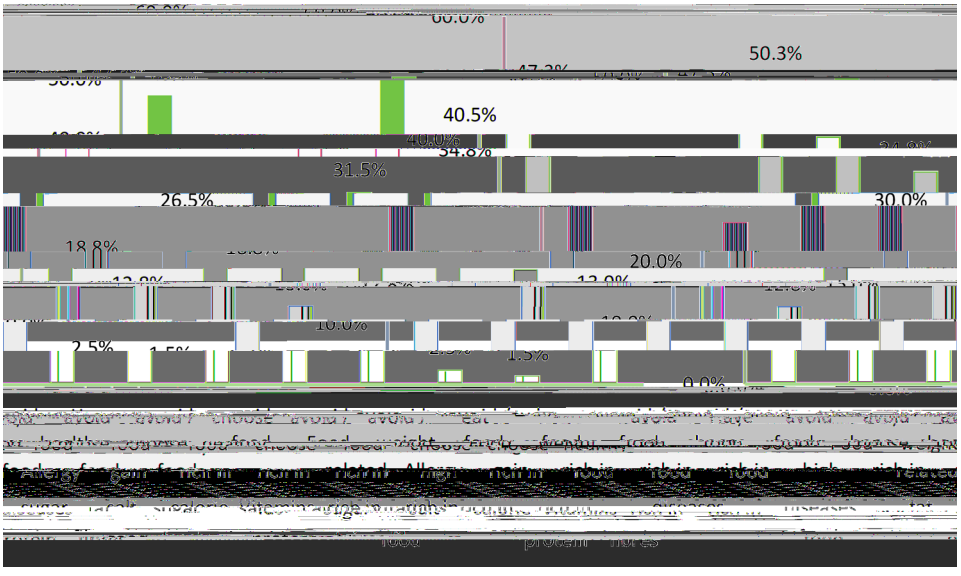

Fig. 3a Causes of reading list of ingredients and/or nutrition facts *. *Multiple response variable

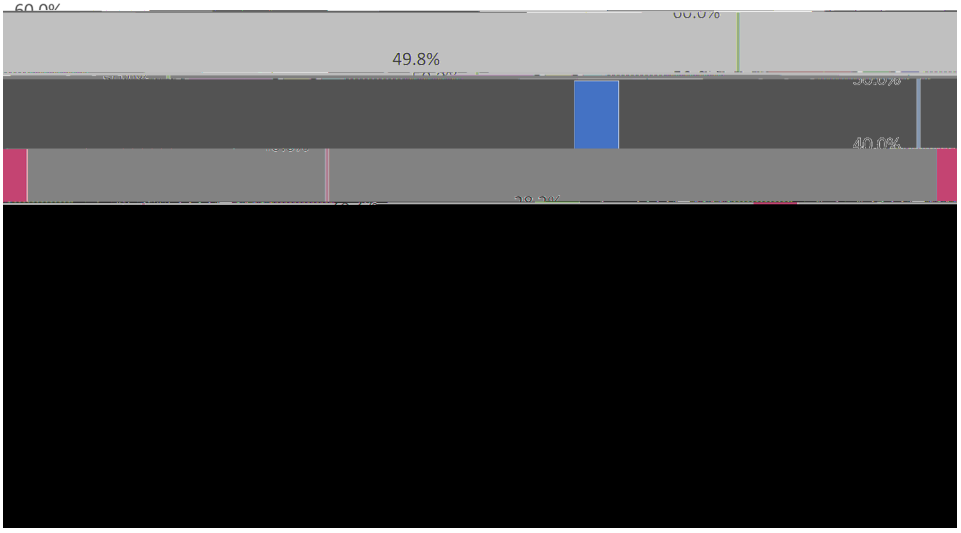

Fig. 3b Causes of not reading list of ingredients and/or nutrition facts*. *Multiple response variable

Table 4 Overall attitude towards the current food label form

Attitude Score	**Total (n = 719)**	
	No.	**%**
Negative (unfavorable)	5	0.7
Neutral	126	17.5
Positive (favorable)	588	81.8
Mean ± SD	7.166 ± 1.027	

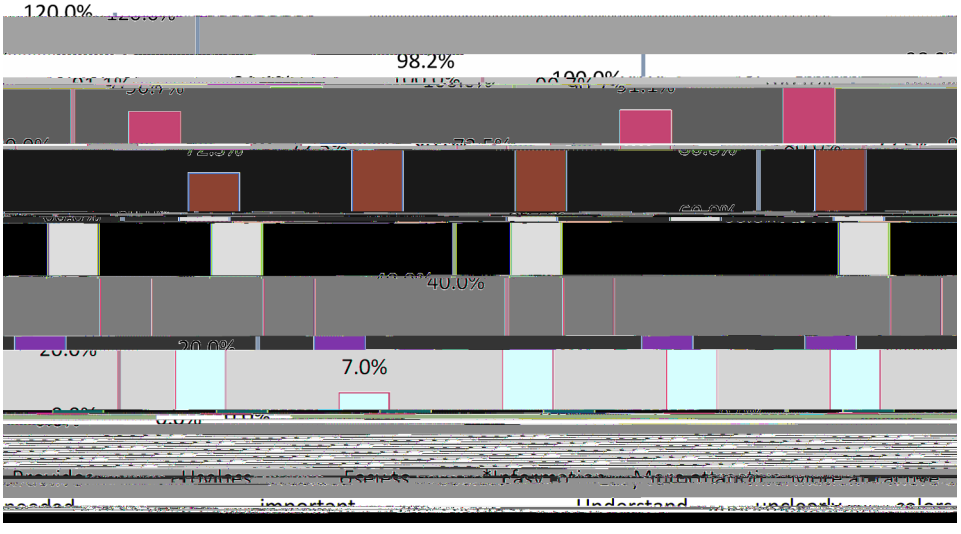

Fig. 4 Percent of agreement with each item of the attitude scale. *Letters very small or wiped out

Table 5 Multiple linear regression analysis for variables a□ecting participants' food label reading practice

Predictors	Unstandardized Coe□cients (B)	Signi□cant	95.0% Con□dence Interval for B	
			LL	UL
Age (years)	0.045	0.005*	0.014	0.076
Sex (female)	1.162	0.000*	0.541	1.784
Presence of chronic diseases (yes)	0.636	0.073	-0.059	1.332
Marital status				
Married	0.044	0.935	-1.014	1.102
Divorced/widowed	0.561	0.437	-0.857	1.980
Income				
Just enough	0.490	0.080	-0.059	1.039
Enough and saving	-0.501	0.346	-1.543	0.542
Education				
Primary/preparatory	0.656	0.205	-0.359	1.670
Secondary or equivalent	1.042	0.040*	0.050	2.034
University graduate or beyond	3.090	0.000*	2.132	4.048
Occupation (working)	-0.053	0.846	-0.588	0.482
Having children (Yes)	0.196	0.687	-0.758	1.150
Total attitude score	0.058	0.625	-0.176	0.292
Total awareness score	1.407	0.000*	1.324	1.490

Adjusted linear regression model; F = 111.698, p = 0.00, adjusted R^2 = 0.683

*Signi□cant variable p < 0.05

Table 6 Awareness of participants about some food additives

Food Additives	Total (n = 719)	
	No.	%
Sodium nitrate	216	30.0
Added sugars	294	40.9
Aspartame	106	14.7
Monosodium glutamate	42	5.8
Palm oil	156	21.7
Hydrogenated oils	210	29.2

Discussion

Fig. 5 Willingness of participants to buy additive-containing food items

Conclusion and recommendations

Practical implications

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40795-023-00770-5.

Supplementary Material 1

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Author contributions
MA: developed the questionnaire, participated in writing the manuscript, and revised the final draft of the manuscript; AA: data collection supervision, substantial contributions to analysis and interpretation of data for the work, and final approval of the version to be published. TD: selected the idea of the study, searched literature, participated in writing the manuscript and prepared the final manuscript for submission. All authors reviewed the manuscript.

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Data Availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study obtained all required approvals from the Ethics Committee of the High Institute of Public Health, Alexandria University, Egypt (IRB registration 00013692). All methods were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from the participants after explaining the aim of the study.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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References

1. Viola GCV, Bianchi F, Croce E, Ceretti E. Are food labels effective as a means of health prevention? J Public Health Res. 2016;5(3):768.
2. Egypt Today staff. 70% of deaths in Egypt are due to chronic diseases: WHO. egypt today. 2021.
3. World Health Organization. Malnutrition 2021 [cited 2023. Available from: https://www.who.int/news-room/fact-sheets/detail/malnutrition#:~:text=Diet-related%20noncommunicable%20diseases%20%28NCDs%29%20include%20cardiovascular%20diseases%20%28such,for%20these%20diseases%20globally.%20Scope%20of%20the%20problem.
4. WHO. Regional Office for the Eastern Mediterranean. Regional strategy on nutrition 2010–2019 and Plan of action [internet] 2011 [cited 2022. Available from: http://applications.emro.who.int/docs/EM_RC57_4_en.pdf.
5. Shangguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, et al. A meta-analysis of food labeling effects on consumer diet behaviors and industry practices. Am J Prev Med. 2019;56:300–14.
6. Cecchini M, Warin L. Impact of food labelling systems on food choices and eating behaviours: a systematic review and meta-analysis of randomized studies. Obes Rev. 2016;17:201–10.
7. Martini D, Menozzi D. Food labeling: analysis, understanding, and perception. Nutrients. 2021;13(1):268.
8. Joint FAOWHOCAC. Food labelling: Food & Agriculture Organization [Internet] 2018 [cited 2022. Available from: www.fao.org.
9. Wally A, Tate B. Food and Agricultural Import Regulations and Standards - Narrative. FAIRS Egypt Country Report. 2017.
10. Hawkes C. Government and voluntary policies on nutrition labelling: a global overview. In: Albert j, editor. Innovations in food labelling. New York Washington, DC: The Food and Agriculture Organization of the United Nations and Woodhead Publishing Limited (CRC Press); 2010. pp. 37–58.
11. Codex Alimentarius international food standards. Guidelines on nutrition labelling CAC/GL 2-1985 [Internet] 1985 [updated 2011; cited 2021. Available from: ww.fao.org/input/download/standards/34/CXG_002e_2015.pdf.
12. Campos S, Doxey J, Hammond D. Nutrition labels on pre-packaged foods: a systematic review. Public Health Nutr. 2011;14(8):1496–506.
13. Cowburn G, Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. Public Health Nutr. 2005;8:21–8.
14. Drichoutis AC, Lazaridis P, Nagya R. Consumers' use of nutritional labels: a review of research studies and issues. Acad Mark Sci Rev. 2006;2006:1.

15. Benajiba N, Mahrous L, Bernstein J, Aboul-Enein BH. Food labeling use by consumers in arab countries: a scoping review. J Community Health. 2020;45(3):661–74.
16. El-Meligy RA. Knowledge, attitude, and practice of mothers as regards nutritional lable of canned food [thesis]. Faculty of medicine: Menoufiya; 2012.
17. Gamal Eldin AA. The role of selection and handling of packed food and its microbiological evaluation among the sta and personnel of Alexandria university [thesis]. Faculty of agriculture: Alexandria; 2008.
18. Basarir A, Sherif S. Consumers' awareness of food labeling: A case study of United Arab Emirates. Afr J Agric Res. 2012;7(28):4021–8.
19. Alexandria Portal -Ministry of State For Administrative Development. About Alexandria 2014 [cited 2023. Available from: http://www.alexandria.gov.eg/Alex/english/tourism.html.
20. Fathalla Market Branches in Alexandria. 2023 [cited 2023. Available from: https://www.google.com/search?client=firefox-b-d&sca_esv=562704264&tbs=lf:1,lf_ui:10&tbm=lcl&sxsrf=AB5stBh5j6Xa3M6VMe2tWtmU9P947ecd2g:1693907583464&q=fathalla+supermarket+branches+alexandria&rflfq=1&num=10&ved=2ahUKEwj0ua2-mZOBAxWCxgIHHQJuAZcQtgN6BAgXEAg#rlfi=hd:;si:;mv:[[31.249904999999995,29.972063000000002],[31.187019799999995,29.8724449]];tbs:lrf:!1m4!1u3!2m2!3m1!1e1!1m4!1u2!2m2!2m1!1e1!2m1!1e2!2m1!1e3!3sIAE,lf:1,lf_ui:10.
21. Bloom BS. Taxonomy education. New York: David McKay; 1956.
22. Stapor K. Descriptive and inferential statistics. In: Kacprzyk J, Jain LC, editors. Introduction to probabilistic and statistical methods with examples in R. Switzerland: Springer International Publishing; 2020. pp. 63–131.
23. GBD 2015 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the global burden of disease study 2015. Lancet. 2016;388(10053):1659–724.
24. WHO. Global action plan for the prevention and control of noncommunicable diseases 2013–2020 [cited 2021. Available from: https://apps.who.int/iris/bitstream/handle/10665/94384/9789241506236_eng.pdf;jsessionid=05FA3071FDF140DEA54009BC0D577C74?sequence=1.
25. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020–2025. Available from: https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf.
26. Song J, Huang J, Chen Y, Zhu Y, Li H, Wen Y, et al. The understanding, attitude and use of nutrition label among consumers (China). Nutr Hosp. 2015;31(6):2703–10.
27. Food Standards Australia New Zealand. Consumer label survey 2015 food labelling use and understanding in Australia and New Zealand 2017 [cited 2021. Available from: https://www.foodstandards.gov.au/publications/Documents/Consumer%20label%20survey%202015/consumerlabelsurvey2015.pdf.
28. International Food Information Council Foundation, American Heart Association. Food Labeling Survey 2019 [cited 2021. Available from: https://foodinsight.org/wp-content/uploads/2019/01/IFIC-FDN-AHA-Report.pdf.
29. Gomes S, Nogueira M, Ferreira M. Portuguese consumers' attitudes towards food labelling. WHO Regional O ce for Europe and the Portuguese Ministry of Health; 2017.
30. Deshmukh N, Goyal R. Food label reading knowledge and understanding among consumers. Int J Nutr Pharmacol Neurol Dis. 2017;7(3):71–2.
31. Food Standards Australia New Zealand (FSANZ). Consumer label survey 2015 food labelling use and understanding in Australia and New Zealand 2015 [cited 2021 July]. Available from: https://www.foodstandards.gov.au/publications/Pages/consumerlabelsurvey2015.aspx.
32. Grunert KG, Wills JM, Fernández-Celemín L. Nutrition knowledge, and use and understanding of nutrition information on food labels among consumers in the UK. Appetite. 2010;55(2):177–89.
33. Seyedhamzeh S, Nedjat S, Shakibazadeh E, Doustmohammadian A, Hosseini H, Motlagh AD. Nutrition labels' strengths & weaknesses and strategies for improving their use in Iran: a qualitative study. PLoS ONE. 2020;15(10):e0241395.
34. Ajzen I, Fishbein M. The influence of attitudes on behavior. In: Albarracin D, Johnson BT, Zanna MP, editors. The handbook of attitudes. Mahwah: Lawrence Erlbaum Associate; 2005. pp. 173–221.
35. Miller L, Cassady D. The e ects of nutrition knowledge on food label use. A review of the literature. Appetite. 2015;92:207–16.
36. Dörney KR, Gyulavári T. Why do not you read the label? – an integrated framework of consumer label information search. Int J Consum Stud. 2016;40:92–100.
37. Shahrabani S. Determinants of israeli consumers' decision to use food label information more frequently: a national survey study. Isr J Health Policy Res. 2021;10:25.

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