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ABOUT COVER

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Observational Study

Effect of nutrition-related infodemics and social media on maternal experience: A nationwide survey in a low/middle income country

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Abstract

BACKGROUND
Undernutrition is a crucial cause of morbidity and mortality among children in low- or middle-income countries (LMICs). A better understanding of maternal general healthy nutrition knowledge, as well as misbeliefs, is highly essential, especially in such settings. In the current era of infodemics, it is very strenuous for mothers to select not only the right source for maternal nutrition information but the correct information as well.

AIM
To assess maternal healthy nutritional knowledge and nutrition-related misbeliefs and misinformation in an LMIC, and to determine the sources of such information and their assessment methods.

METHODS
This cross-sectional analytical observational study enrolled 5148 randomly selected Egyptian mothers who had one or more children less than 15 years old. The data were collected through online questionnaire forms: One was for the general nutrition knowledge assessment, and the other was for the nutritional myth score. Sources of information and ways of evaluating internet sources using the Currency, Relevance, Authority, Accuracy, and Purpose test were additionally analyzed.

RESULTS

The mean general nutrition knowledge score was 29 ± 9, with a percent score of 70.8% ± 12.1% (total score: 41). The median myth score was 9 (interquartile range: 6, 12; total score: 18). The primary sources of nutrition knowledge for the enrolled mothers were social media platforms (55%). Half of the mothers managed information for currency and authority, except for considering the author's contact information. More than 60% regularly checked information for accuracy and purpose. The mothers with significant nutrition knowledge checked periodically for the author's contact information ($P = 0.012$). The nutrition myth score was significantly lower among mothers who periodically checked the evidence of the information ($P = 0.016$). Mothers dependent on their healthcare providers as the primary source of their general nutritional knowledge were less likely to hold myths by 13% ($P = 0.044$). However, using social media increased the likelihood of having myths among mothers by approximately 1.2 ($P = 0.001$).

CONCLUSION

Social media platforms were found to be the primary source of maternal nutrition information in the current era of infodemics. However, healthcare providers were the only source for decreasing the incidence of maternal myths among the surveyed mothers.

Key Words: Nutrition; Infodemics; Maternal knowledge; Myth; Low/middle income country

Core Tip: Undernutrition is one of the principal causes of morbidity and mortality in children in low- or middle-income countries. The evaluation of maternal nutrition knowledge scores is crucial to improving practice. The infodemic era has significantly impacted the changing sources of nutrition information and myths. Consequently, this study aimed to assess healthy nutritional knowledge and nutrition-related misinformation and misbeliefs among a significant sample of Egyptian mothers. In addition, other objectives included determining the sources of nutritional information and how those mothers manage the sources of nutritional-related knowledge.

INTRODUCTION

Undernutrition is one of the salient causes of morbidity and mortality among children less than five years old in low- or middle-income countries (LMICs)[1]. Accordingly, proper and adequate nutrition is vital for normal child's growth and development and prevention of long-term morbidity and subsequent mortality. Different previously published data support the effectiveness of variable nutritional interventions in improving the nutritional status of children and reducing mortality[2,3].

Mothers are the primary care providers for their children in all household affairs, especially nutrition[4]. Therefore, the level of maternal general nutritional knowledge usually impacts their nutrition behavior and practice[5]. Consequently, evaluation of maternal health understanding is crucial to filling the gap in training. This will help identify the most deficient points in this community's upcoming nutrition education programs. In addition to parental nutrition knowledge, nutrition myth is another essential factor previously reported in the literature as a determinant factor affecting their feeding style[6].

The phenomenon of infodemics refers to the abundant and widespread dissemination of information, whether accurate or not, through different media platforms, including mass media, social media, and online forums[7]. It can be challenging for mothers to select the correct information from the flow of sources. Different sources of nutrition education are available in this current era of infodemics, such as healthcare providers, family members, mass media, and social media. The sources of nutrition education, with the advent of internet technology and smartphones, have become much more diverse[8]. Despite the fact that this technology facilitates the delivery of information, acquiring the right information at the right time in the appropriate form is of greater importance[9].

To the researchers' knowledge, this is the first published study from Egypt evaluating this problem despite its significance in this LMIC.

This study's main objective was to assess healthy nutritional knowledge and nutrition-related misinformation and misbeliefs among a large sample of Egyptian mothers. In addition, this study aimed to determine the sources of nutritional information and how those mothers manage the sources of nutritional-related knowledge.

MATERIALS AND METHODS

Study design
A cross-sectional analytical observational study.

Sample type
A convenient sample (easy access).

Sample size and sampling technique
A sample size of 5100 was calculated using a formula for survey sample size calculation[10]. Here's a breakdown: n represents the sample size; z signifies the z-score, which is approximately ± 2.58 for a 99% confidence interval (CI); p stands for the degree of variability (proportion of outcome). In this case, 81.2% of mothers were found to have a high to moderate level of nutritional knowledge in a study conducted in Bangladesh[11]; e denotes the level of precision, set at 1%; N refers to the study population size, which mainly consists of females, likely mothers of children under 15, constituting 32% of the Egyptian population aged 15 to 60 years, totaling 32 million[12].

Study population
The study population consisted of Egyptian mothers with one or more children (age of at least one child under 15 years). The participants were recruited from many governorates all over Egypt: The upper Egypt governorates included Giza, Fayoum, Menia, and Assiut; the lower Egypt governorates included Dakahlia, Gharbia, and Kafr El-Sheikh; Cairo and Alexandria.

Data collection tool
A pre-tested e-questionnaire was used to collect data from the study participants. It included four sections: (1) Socio-demographic characteristics: Maternal, paternal, and siblings' age in years; sex of siblings; maternal and paternal education and occupation; residence; number of home bedrooms; and number of family members; (2) General nutrition knowledge questionnaire (GNKQ): It contains 41 questions that were derived from the validated general health questionnaire[13]. The questions of the original questionnaire were adapted to the Egyptian situation. Reliability analysis was conducted on the GNKQ, in which Cronbach's alpha was 0.73. Correct answers were coded with 1 and incorrect answers with 0. The total GNKQ score was 41. The percent score of the GNKQ was calculated, and the participants were categorized according to their responses into two groups: High to moderate knowledge (GNKQ percent score ≤ 70%) and low knowledge (GNKQ percent score > 70%)[14]; (3) Nutritional myths (misin-formation): 18 misinformation questions were derived from 45 pediatric nutrition consultants based on their clinical experience. The questions had five-level responses (Likert scale): Strongly disagree, disagree, neutral, agree, and strongly agree. The strongly agree, agree, and neutral levels were coded as 0, and disagree and strongly disagree responses were coded as 1. (N.B., the scales of the 2nd and 9th questions were reverted). Cronbach's alpha was 0.76 for the 18-item myth questionnaire. The respondents were categorized into two groups: Holding myths (below median score [≤ 9]) and not holding myths (above median score [> 9])[15]; and (4) The source of information and methods to evaluate internet sources were assessed using the Currency, Relevance, Authority, Accuracy, and Purpose test[16]. Two language experts translated the questions into Arabic and back-translated to English by another two independent language experts.

Data collection tool accuracy, validity, and reliability: A pre-test was performed to confirm the content validity of the questions and assure the validity of the results. In order to eliminate common mistakes and unclear wording and to ensure that the questions were understandable, a panel of 50 volunteers from various backgrounds reviewed the question construction. The final version of the questionnaire was updated to include the expert panel's comments. The questionnaires were distributed to the participants following this pilot study (the pilot results were not included in the final results). Reliability internal test (Cronbach's) was done for the 18-item questionnaire (nutrition misinformation), where Cronbach's alpha was 0.76 (high reliability).

Data collection technique: A Google form was created, and participants were invited through personal communication (*via* Facebook groups, WhatsApp contacts, and emails) with the researchers to complete and submit the form.

Statistical analysis: All the collected data were revised for completeness and logical consistency. The data were extracted from the Google form into the Microsoft Office Excel Software Program, 2019, and then analyzed in the Statistical Package of Social Science Software program, version 26 (SPSS, Chicago, IL, United States) for statistical analyses.

Quantitative variables are described as the mean ± SD, median, minimum, and maximum and compared using an independent *t*-test and a Mann-Whitney *U*-test for two groups, with the level of statistical significance set at $P < 0.05$. Qualitative variables are described as frequencies and percentages. Moreover, qualitative variables were compared using the Chi-square and Fisher exact tests, with the level of statistical significance set at $P < 0.05$. A binary logistic regression model was used to determine which source of knowledge could predict the likelihood of holding myths and be more knowledgeable in nutrition.

Ethical considerations
The study protocol was approved by the scientific committee of the Public Health and Community Medicine Department, Faculty of Medicine, Cairo University. It was approved by the International Ethical Committee at the Faculty of Medicine,

Cairo University (N 318-2023). Written informed consent was obtained from all study participants after thoroughly explaining the study's aim and the importance of the online form before data collection. Only those who agreed were included, and those who refused were excluded from the study by submitting an empty form after answering "Not willing to participate." All procedures for data collection were treated with confidentiality according to the Helsinki Declarations of Biomedical Ethics. Participants were informed that this was an anonymous survey and participation was voluntary. The assessment did not involve any invasive procedures or induce any change in dietary patterns.

RESULTS

The response rate for the online form was 99.4%. There were 5148 responses from mothers with one or more children aged less than 15 years. The sociodemographic background information was collected and is illustrated in Table 1. It was found that more than half of the mothers (56.9%) and fathers (52.5%) were aged from 30 to 40 years; extreme age was found in 2.2% of mothers and 0.5% of fathers aged less than 20 years; 1.6% of mothers and 5.7% of fathers aged more than 50 years. Mothers and fathers had higher university grades at 59.1% and 65.1%, respectively. However, the number of mothers and fathers who could only read and write was 64 and 59, representing 1.2% and 1.1%, respectively. The number of working mothers was 3321 (64.5%), and 96.3% (5061) of fathers were working. Most families were from urban areas (81.6%) and had a house crowding index of two or less (94.8%). Most mothers had fewer than five children; 23.2%, 43.7%, 24.9%, and 6.5% of mothers had one, two, three, or four children, respectively. The questions were asked about the gender and age of the children (from one child to seven children). Their sex distribution was almost the same; 1–5 year age was more evident with the 2nd, 3rd, 4th, 5th, and 6th child (Figure 1). The total general nutrition knowledge score was 41. It was found that the mean available nutrition knowledge score was 29 ± 9, with a percent score of 70.8% ± 12.1%. The median score was 27 (interquartile range [IQR]: 27, 33), with a percent score of 73.2% (IQR: 65.9%, 80.5%). The nutrition myth question score was 18. The mean score was 9 ± 4, and the mean myth percent score was 50.9% ± 23.7%. The median myth score was 9 (IQR: 6, 12), and the median myth percent score was 50% (IQR: 33.3%, 66.7%).

Figure 2 shows the percentage of mothers holding nutrition myths. As an example, it was found that 37% of mothers agreed that fish and milk should be avoided if the child is suffering from fever. Only 12% of mothers agreed that using candy to reward a child was a good idea.

The participants were categorized according to their responses to the GNKQ into the low knowledge group (≤ 70% GNKQ percent score) and the moderate to high knowledge group (> 70% GNKQ percent score). When comparing those groups based on their socio-demographic backgrounds, it was found that there was no statistical difference between the two groups regarding the socio-demographic backgrounds of the mothers and their families.

In the comparison between the mothers who held myths (with a median score of less than 9) and those who did not (with a median score of 9 or more) by their socioeconomic background, it was detected that there was no statistically significant difference except for maternal and paternal education and maternal occupation (P = 0.003, 0.004, and 0.013, respectively), as illustrated in Figure 3.

The primary source of nutrition knowledge for the enrolled mothers was social media (55%) (Figure 4).

Table 2 portrays how the mothers used to collect health information, with around half managing information for currency and authority except for viewing the author's contact information. More than 60% regularly checked information for its accuracy and purpose.

Table 3 shows ways of managing information among participants with low, intermediate, and high nutritional knowledge and participants who held and did not hold dietary myths. It was discovered that mothers with significantly high nutrition knowledge regularly checked for the author's contact information (P = 0.012). The nutrition myth score was considerably lower among mothers who periodically checked the evidence of the information (P = 0.016).

The bivariate analysis demonstrated that the likelihood of holding myths was significantly higher among those who did not depend on their study at school and university and among mothers who relied on knowledge from friends, relatives, television, radio, newspapers, and magazines (P = 0.037, < 0.001, and = 0.027, respectively). The multivariate analysis identified individuals depending on television, radio, newspapers, and magazines, consulting with friends and relatives, and using social media as independent predictors of holding myths (odds ratio [OR] = 1.15, 1.3, and 1.22, respectively). In addition to that, the bivariate analysis illustrated that the likelihood of being more knowledgeable in nutrition was significantly higher among those who did not depend on television, radio, newspapers and magazines, friends, relatives, and social media (P < 0.001) and among mothers who relied on knowledge from health care providers and scientific websites (P = 0.05). Furthermore, the multivariate analysis identified that individuals not depending on learning from television, radio, newspapers, and magazines, consulting friends and relatives, and using social media were independent factors for being more knowledgeable in nutrition (OR = 1.1, 1.2, and 1.4, respectively) (Tables 4 and 5).

DISCUSSION

The current study focused on evaluating healthy maternal nutritional knowledge and exploring nutrition-related myths among the surveyed mothers in the setting of an LMIC (Egypt), where the per capita income ranged between 1136 and 4465 dollars, according to the World Bank, 2023[17]. In addition, it determined the sources of this nutritional information and the assessment of their sources.

Table 1 Sociodemographic characteristics of enrolled mothers and their families (*n* = 5148)

	N	Percent
Maternal age		
Less than 20 yr	115	2.2
20-yr	1313	25.5
30-yr	2931	56.9
40-yr	708	13.8
50-yr	81	1.6
Paternal age		
Less than 20 yr	27	0.5
20-yr	693	13.5
30-yr	2704	52.5
40-yr	1431	27.8
50-yr	293	5.7
Maternal education		
Read and write	64	1.2
Primary school	28	0.5
Preparatory school	91	1.8
Secondary school	441	8.6
University	3042	59.1
Postgraduate	1482	28.8
Paternal education		
Read and write	59	1.1
Primary school	18	0.3
Preparatory school	63	1.2
Secondary school	433	8.4
University	3353	65.1
Postgraduate	1222	23.7
Maternal occupation		
Working	3321	64.5
Not working	1827	35.5
Paternal occupation		
Working	5061	98.3
Not working	87	1.7
Residence		
Urban	4202	81.6
Rural	946	18.4
Crowding index		
≤ 2	4878	94.8
> 2	270	5.2

Table 2 Management of knowledge source, *n* (%)

Domain	Question	Always	Usually	Often	Sometimes	Never
Currency	When was the information published or posted?	1216 (23.6)	1360 (26.4)	1611 (31.3)	805 (15.6)	156 (3.0)
	Has the information been revised or updated?	1181 (22.9)	1423 (27.6)	1549 (30.1)	802 (15.6)	193 (3.7)
Authority	Who is the author/publisher/source/sponsor?	1453 (28.2)	1351 (26.2)	1243 (24.1)	876 (17.0)	225 (4.4)
	What are the author's qualifications to write on the topic?	1399 (27.2)	1357 (26.4)	1219 (23.7)	907 (17.6)	266 (5.2)
	Is there contact information such as a publisher or e-mail address?	512 (9.9)	763 (14.8)	1300 (25.3)	1786 (34.7)	787 (15.3)
Accuracy	Is the information supported by evidence?	1625 (31.6)	1562 (30.35)	1264 (24.6)	530 (10.3)	167 (3.2)
Purpose	What is the purpose of the information? To inform? Teach? Sell? Entertain? Persuade?	1617 (31.4)	1561 (30.3)	1143 (22.2)	621 (12.1)	206 (4.0)
	Does the point of view appear objective and impartial?	1260 (24.5)	1697 (33.0)	1282 (24.9)	677 (13.2)	232 (4.5)
	Are there political, ideological, cultural, religious, institutional, or personal biases?	1214 (23.6)	1317 (25.6)	1160 (22.5)	987 (19.25)	470 (9.1)
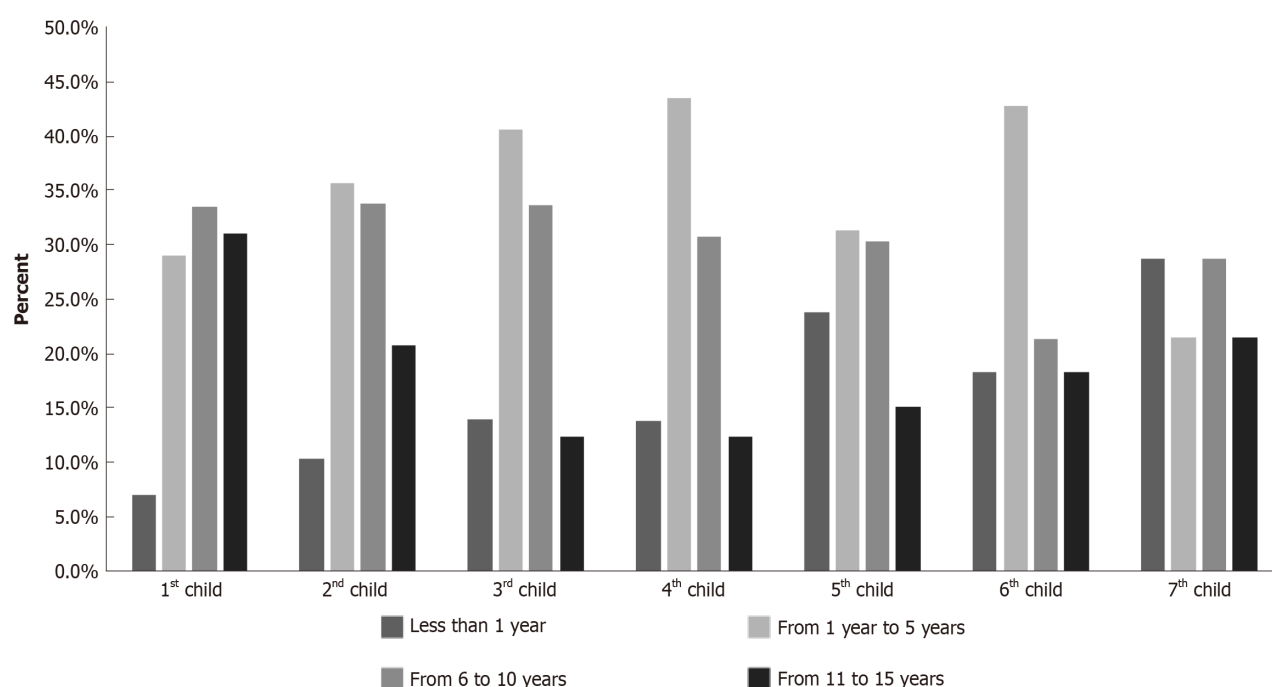
Figure 1 Percent distribution of age of children of enrolled mothers.

The response rate was 99.4% among the surveyed mothers, with 5148 maternal responses to the online survey. The present work reported that the median maternal nutritional knowledge score on the 13 identified questions was 27 out of 41 (73.2%). Accordingly, about half (57.6%) of the respondents had good nutritional knowledge.

The present study demonstrated that mothers referred to multiple sources of nutrition information. The primary source of nutrition information among the interviewed mothers was social media platforms (55%). At the same time, healthcare providers were the source for 22% of the surveyed mothers. Consistent with the results of this study, Griauzde *et al*[18] in 2020 found that 46.3% of recruited Hispanic mothers in Michigan (United States) used social media to explore feeding information for their children. However, other studies in Australia reported that mothers gained their knowledge mainly from their mothers and, to a lesser extent, from healthcare professionals[19,20].

Moreover, the parents' online health-seeking behavior about their children's general health was similarly reported in a systematic review by Kubb *et al*[21] in 2020. The current study reflects the significant impact of social platforms on disseminating nutrition-related information among mothers in the community. Additionally, it highlights the great need for the health care provider to make every visit a chance to provide education and revise already-known information

Table 3 Relationship between management of information sources and nutrition knowledge and myths

	Nutrition knowledge			Nutrition myths		
	Low nutrition knowledge	Intermediate to high nutrition knowledge	*P* value	Holding nutrition myths	Not holding nutrition myths	*P* value
Currency/When was the information published or posted?						
Always	417 (34.3)	799 (65.7)	0.852	528 (43.4)	688 (56.6)	0.441
Usually	447 (32.9)	913 (67.1)		581 (42.7)	779 (57.3)	
Often	559 (34.7)	1052 (65.3)		706 (43.8)	905 (56.2)	
Sometimes	278 (34.5)	527 (65.5)		377 (46.8)	428 (53.2)	
Never	55 (35.3)	101 (64.7)		70 (44.9)	86 (55.1)	
Currency/Has the information been revised or updated?						
Always	405 (34.3)	776 (65.7)	0.571	507 (42.9)	674 (57.1)	0.258
Usually	461 (32.4)	962 (67.6)		623 (43.8)	800 (56.2)	
Often	542 (35.0)	1007 (65.0)		664 (42.9)	885 (57.1)	
Sometimes	283 (35.3)	519 (64.7)		380 (47.4)	422 (52.6)	
Never	65 (33.7)	128 (66.3)		88 (45.6)	105 (54.4)	
Authority/Who is the author/publisher/source/sponsor?						
Always	495 (34.1)	958 (65.9)	0.988	636 (43.8)	817 (56.2)	0.947
Usually	459 (34.0)	892 (66.0)		605 (44.8)	746 (55.2)	
Often	427 (34.4)	816 (65.6)		541 (43.5)	702 (56.5)	
Sometimes	295 (33.7)	581 (66.3)		379 (43.3)	497 (56.7)	
Never	80 (35.6)	145 (64.4)		101 (44.9)	124 (55.1)	
Authority/What are the author's qualifications to write on the topic?						
Always	489 (35.0)	910 (65.0)	0.225	610 (43.6)	789 (56.4)	0.511
Usually	431 (31.8)	926 (68.2)		604 (44.5)	753 (55.5)	
Often	432 (35.4)	787 (64.6)		513 (42.1)	706 (57.9)	
Sometimes	306 (33.7)	601 (66.3)		413 (45.5)	494 (54.5)	
Never	98 (36.8)	168 (63.2)		122 (45.9)	144 (54.1)	
Authority/Is there contact information such as a publisher or e-mail address?						
Always	192 (37.5)	320 (62.5)	0.012[a]	229 (44.7)	283 (55.3)	0.786
Usually	250 (32.8)	513 (67.2)		323 (42.3)	440 (57.7)	
Often	474 (36.5)	826 (63.5)		575 (44.2)	725 (55.8)	
Sometimes	561 (31.4)	1225 (68.6)		778 (43.6)	1008 (56.4)	
Never	279 (35.5)	508 (64.5)		357 (45.4)	430 (54.6)	
Accuracy/Is the information supported by evidence?						
Always	553 (34.0)	1072 (66.0)	0.089	709 (43.6)	916 (56.4)	0.016
Usually	496 (31.8)	1066 (68.2)		664 (42.5)	898 (57.5)	
Often	457 (36.2)	807 (63.8)		542 (42.9)	722 (57.1)	
Sometimes	185 (34.9)	345 (65.1)		268 (50.6)	262 (49.4)	
Never	65 (38.9)	102 (61.1)		79 (47.3)	88 (52.7)	
Purpose/What is the purpose of the information? To inform? Teach? Sell? Entertain? Persuade?						
Always	562 (34.8)	1055 (65.2)	0.716	714 (44.2)	903 (55.8)	0.67
Usually	512 (32.8)	1049 (67.2)		669 (42.9)	892 (57.1)	

Often	400 (35.0)	743 (65.0)			498 (43.6)	645 (56.4)	
Sometimes	209 (33.7)	412 (66.3)			286 (46.1)	335 (53.9)	
Never	73 (35.4)	133 (64.6)			95 (46.1)	111 (53.9)	
Purpose/Does the point of view appear objective and impartial?							
Always	440 (34.9)	820 (65.1)		0.241	557 (44.2)	703 (55.8)	0.378
Usually	556 (32.8)	1141 (67.2)			755 (44.5)	942 (55.5)	
Often	448 (34.9)	834 (65.1)			534 (41.7)	748 (58.3)	
Sometimes	221 (32.6)	456 (67.4)			309 (45.6)	368 (54.4)	
Never	91 (39.2)	141 (60.8)			107 (46.1)	125 (53.9)	
Purpose/Are there political, ideological, cultural, religious, institutional, or personal biases?							
Always	433 (35.7)	781 (64.3)		0.559	533 (43.9)	681 (56.1)	0.343
Usually	428 (32.5)	889 (67.5)			565 (42.9)	752 (57.1)	
Often	400 (34.5)	760 (65.5)			492 (42.4)	668 (57.6)	
Sometimes	333 (33.7)	654 (66.3)			455 (46.1)	532 (53.9)	
Never	162 (34.5)	308 (65.5)			217 (46.2)	253 (53.8)	

[a]$P < 0.05$ is significant.

Table 4 Source of knowledge predictors of holding nutritional myths among mothers with children less than 15 years, *n* (%)

Predictor of holding nutritional myths		Holding nutrition myths	Not holding nutrition myths	Crude OR [95%CI][1]	Adjusted OR [95%CI][2]
Studying at school and university	No	1305 (45.2)	1581 (54.8)	0.95 [0.92-0.99]	0.95 [0.92-0.99]
	Yes	957 (42.3)	1305 (57.7)		
	***P* value**	0.037[a]			0.126
Television, radio, newspapers and magazines	No	1336 (42.7)	1792 (57.3)	0.93 [0.88-0.99]	0.93 [0.88-0.99]
	Yes	926 (45.8)	1094 (54.2)		
	***P* value**	0.027[a]			0.020[a]
Health care providers and scientific websites	No	1741 (43.6)	2255 (56.4)	1.03 [0.97-1.09]	1.03 [0.97-1.09]
	Yes	521 (45.2)	631 (54.8)		
	***P* value**	0.318			0.044[a]
Friends and relatives	No	1473 (42.4)	2002 (57.6)	0.89 [0.84-0.95]	0.89 [0.84-0.95]
	Yes	789 (47.2)	884 (52.8)		
	***P* value**	< 0.001[b]			< 0.001[b]
Social media	No	1051 (45.4)	1263 (54.6)	1.06 [0.99-1.13]	1.06 [0.99-1.13]
	Yes	1211 (42.7)	1623 (57.3)		
	***P* value**	0.053			0.001[a]

[a]$P < 0.05$ is significant.
[b]$P < 0.001$ is highly significant.
[1]Chi-square test.
[2]Binary logistic regression test.
OR: Odds ratio; CI: Confidence interval.

Table 5 Source of knowledge predictors of higher nutritional knowledge among mothers with children less than 15 years, *n* (%)					
Predictor of good nutritional knowledge		**Bad nutrition knowledge**	**Good nutrition knowledge**	**Crude OR [95%CI]**	**Adjusted OR [95%CI]**
Studying at school and university	No	975 (33.8)	1911 (66.2)	1.02 [0.94, 1.04]	1.09 [0.98, 1.23]
	Yes	781 (34.5)	1481 (65.5)		
	P value	0.577			0.126
Television, radio, newspapers and magazines	No	1132 (36.2)	1996 (63.8)	1.09 [1.05, 1.15]	1.15 [1.02, 1.29]
	Yes	624 (30.9)	1396 (69.1)		
	P value	< 0.001[b]			0.02[a]
Health care providers and scientific websites	No	1403 (35.1)	2593 (64.4)	0.85 [0.76, 0.95]	0.87 [0.75, 0.99]
	Yes	353 (30.6)	799 (69.4)		
	P value	0.005[a]			0.044[a]
Friends and relatives	No	1108 (31.9)	2367 (68.3)	0.9 [0.867, 0.943]	1.3 [1.14, 1.49]
	Yes	648 (38.7)	1025 (61.3)		
	P value	< 0.001[b]			< 0.001[b]
Social media	No	683 (29.5)	1631 (70.5)	0.81 [0.756, 0.866]	1.22 [1.09, 1.38]
	Yes	1073 (37.9)	1761 (62.1)		
	P value	< 0.001[b]			0.001[a]

[a]*P* < 0.05 is significant.

[b]*P* < 0.001 is highly significant.
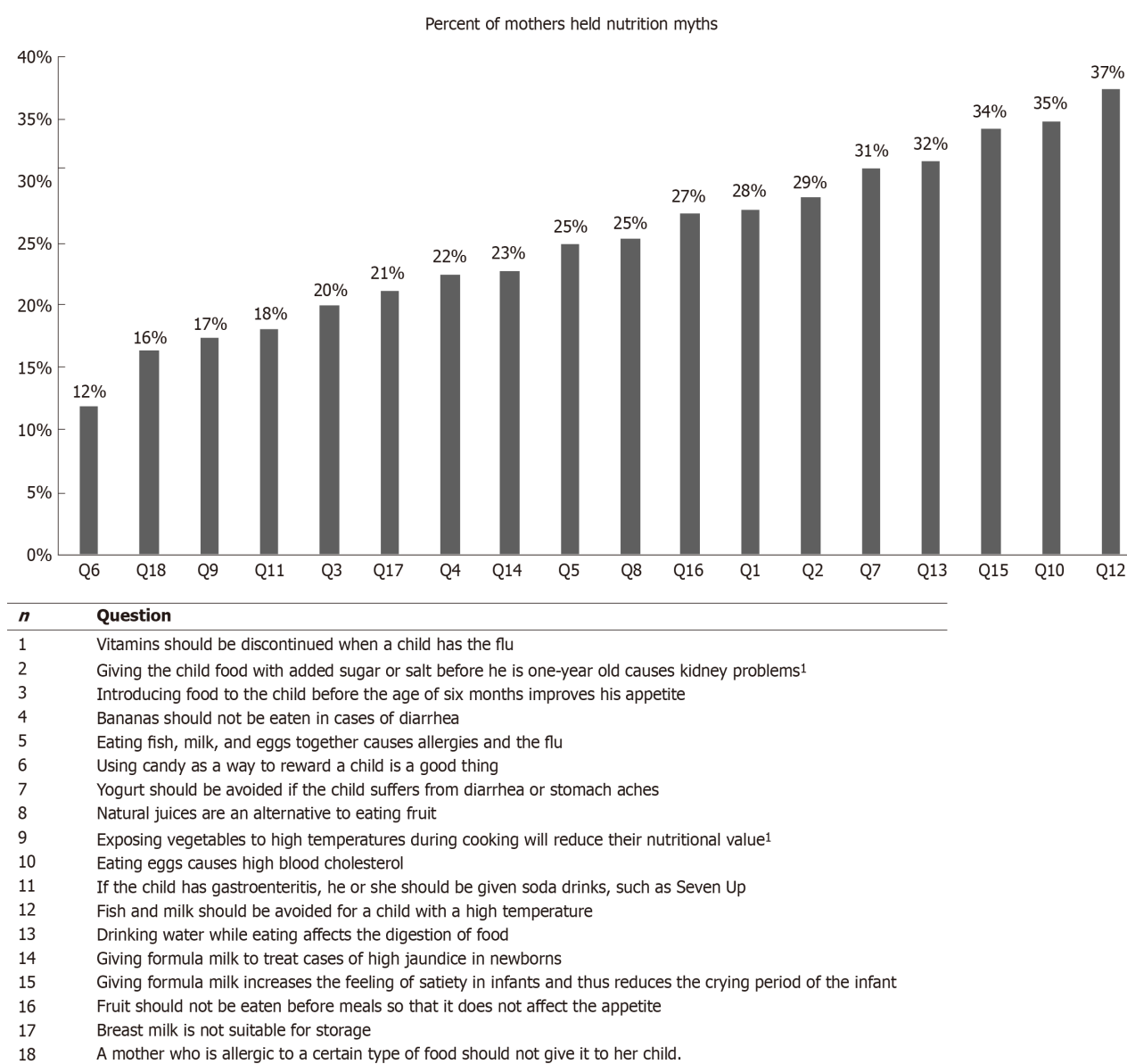
OR: Odds ratio; CI: Confidence interval.

among those mothers. This continuous maternal education process through their healthcare providers will minimize the need to gain experience from untrusted resources.

Surprisingly, an evolving term in public health medicine, "infodemic," has emerged. This new term came out with the coronavirus disease 2019 pandemic[22]. An infodemic is defined as an epidemic of information[23]. This overflow of information is not always correct; some are accurate, and others are inaccurate (misinformation and misbeliefs). Unfortunately, in LMICs like Egypt, the unfavorable effects of such a phenomenon are aggravated by health illiteracy and limited resource settings. Therefore, defining the level of knowledge and the extent of myths is critical to outlining the best approach[24].

The complicated scientific information and sources that cannot easily reach the general public were the leading causes behind mothers' searching other channels for information, mainly social media platforms[25]. According to this study, this is the situation among the surveyed mothers and the reason behind their preference for social media as a source of nutrition information. It is very challenging for mothers to determine what is reliable and evidence-based.

In light of this unique phenomenon, we gained a more profound insight into how these mothers are dealing with the sources of information. The maternal behavior towards the sources of information was analyzed. It was found that 50% of mothers checked for information, currency, and authority except for contact details. Furthermore, more than 60% of mothers checked the accuracy of the information. Aligned with the data in this study, another study among low-income Hispanic mothers in the United States demonstrated that most social media users extracted feeding information from reliable websites to avoid doubtful information on that platform[18]. Consequently, it is vital to provide accessible and trustworthy sources of nutrition information through e-health education or smartphone health applications supplied by the Ministry of Health.

Further analysis of factors affecting maternal knowledge scores was conducted by comparing mothers with good nutrition knowledge to those with inappropriate nutrition knowledge. It was previously reported in Turkey that maternal age is one of the essential factors affecting knowledge, attitude, and behavior[26]. As expected, when getting older, the mother becomes more experienced and are able to gain and process information wisely. However, the data in this research demonstrated no significant differences between different maternal age groups regarding maternal knowledge scores (P = 0.31). A similar result from Turkey was found by Demir *et al*[27] in 2020, who reported that knowledge scores were almost identical among different maternal age groups except for those between 26 and 30 years, who had higher scores.

Percent of mothers held nutrition myths

n	Question
1	Vitamins should be discontinued when a child has the flu
2	Giving the child food with added sugar or salt before he is one-year old causes kidney problems[1]
3	Introducing food to the child before the age of six months improves his appetite
4	Bananas should not be eaten in cases of diarrhea
5	Eating fish, milk, and eggs together causes allergies and the flu
6	Using candy as a way to reward a child is a good thing
7	Yogurt should be avoided if the child suffers from diarrhea or stomach aches
8	Natural juices are an alternative to eating fruit
9	Exposing vegetables to high temperatures during cooking will reduce their nutritional value[1]
10	Eating eggs causes high blood cholesterol
11	If the child has gastroenteritis, he or she should be given soda drinks, such as Seven Up
12	Fish and milk should be avoided for a child with a high temperature
13	Drinking water while eating affects the digestion of food
14	Giving formula milk to treat cases of high jaundice in newborns
15	Giving formula milk increases the feeling of satiety in infants and thus reduces the crying period of the infant
16	Fruit should not be eaten before meals so that it does not affect the appetite
17	Breast milk is not suitable for storage
18	A mother who is allergic to a certain type of food should not give it to her child.

[1]The scale was inverted.

Figure 2 Percent of mothers holding nutrition myths.

In addition, the maternal knowledge status was analyzed according to maternal education and paternal education, and it was not significantly different (P = 0.64 and 0.64, respectively). However, it was different from other reports from Ghana, the United Arab Emirates, and Turkey, where the level of knowledge score was positively correlated with maternal education level[27-30].

It is assumed that mothers acquire experience in nutrition and different health aspects when having more than one child or when children are getting older. However, this research discovered no difference regarding the nutrition knowledge scale according to the child's age, order, or sex.

A dietary myth is a negative or positive belief regarding nutritional concepts that cannot be supported or opposed by scientific evidence[31]. According to the extent of belief in myths, the healthy behavior of parents and, consequently, the nutritional status of their children are affected.

Regarding the nutrition myth score, the median score was 9 out of 18 (50%). Therefore, 56% of the mothers did not hold nutrition myths. This study found that the most frequent nutrition myth was reported by about 37% of respondents about avoiding eating fish and milk if the child was feverish.

However, the least frequently determined myth by only 12% of respondents was about rewarding children with candy. This behavior supports the recommendation of the American Academy of Pediatrics, which is against the administration of unnecessary additional calories as it increases the risk of obesity among children.

This study demonstrated that maternal education was significantly different between mothers with nutrition myths and those without (P = 0.003). Those with higher education (above the university) had substantially lower myth scores. Although the education level of mothers was not related to the maternal nutrition knowledge score, it was related to the lower myth group. This information emphasizes the importance of maternal education, even if only it positively reduces the myth belief. This differs from the results of Mrosková *et al*[32], who found that maternal education was related to food
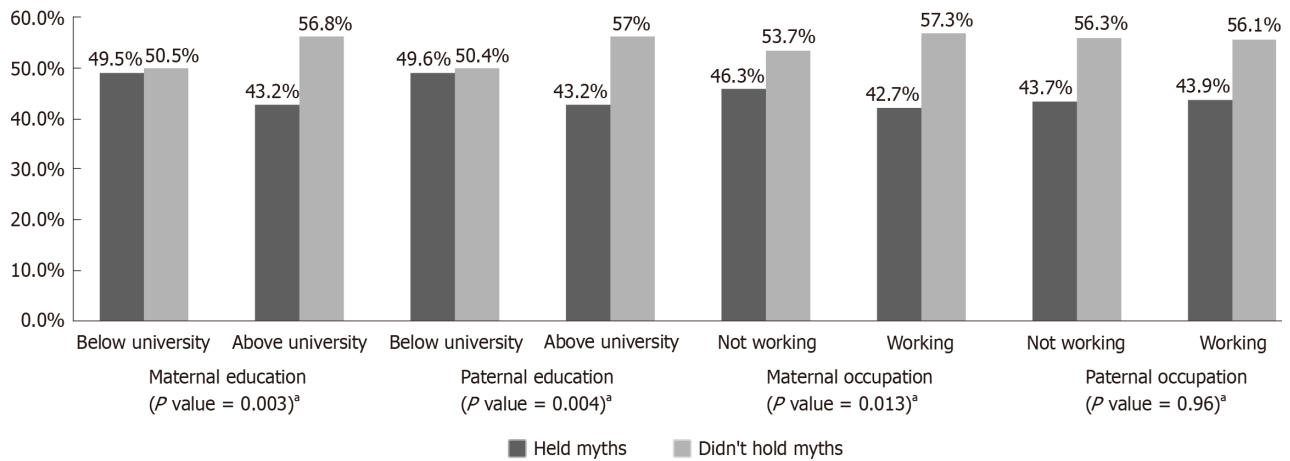
Figure 3 Relationship between participants according to holding myth score and their sociodemographic background (maternal and paternal education and occupation). [a]*P* value < 0.05 is significant.
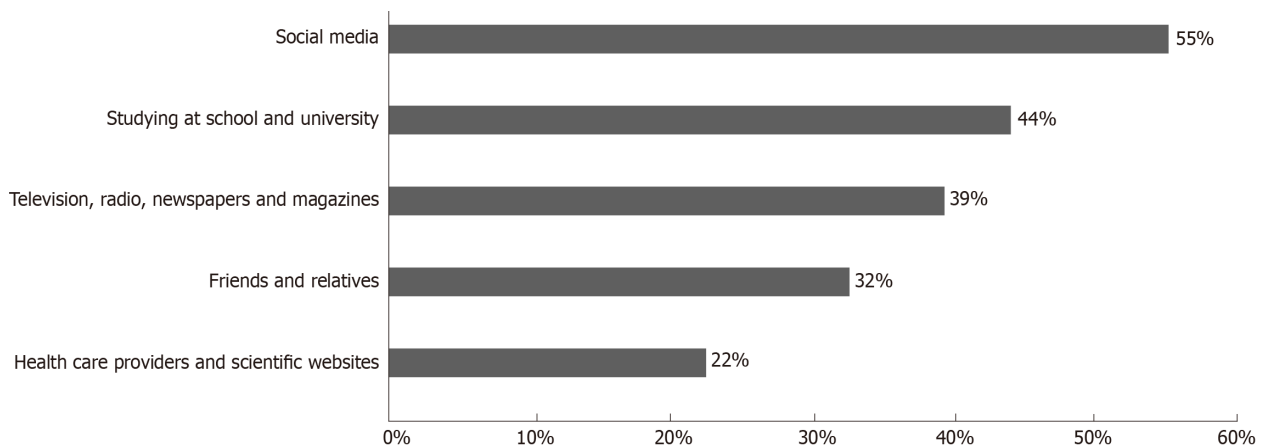
Figure 4 Main sources of nutrition knowledge for enrolled mothers.

choices, whether healthy or not, but not associated with paternal myth belief.

Further analysis of other factors related to nutrition myths revealed that maternal occupation was significantly different between the two groups. Substantially, more working mothers were not holding nutrition myths (*P* = 0.013). It could be assumed that employment raises socialization and awareness among mothers.

Additionally, logistic regression analysis was conducted to evaluate the impact of the five different sources of nutrition information on the development of nutrition myths. Interestingly, it was found that using social media, consulting with family members, and depending on knowledge from television, radio, newspapers, and magazines increased the likelihood of holding myths among mothers approximately 1.2, 1.3, and 1.14 times more than mothers who do not depend on those sources as a source of knowledge. However, mothers dependent on their health care providers and scientific websites are less likely to hold myths by 13%. This information emphasizes that informal sources of nutritional information increase the incidence of nutrition myths. However, using formal sources through health care providers and scientific websites positively decreased the misinformation rate. Regulatory health authorities should provide sufficient nutrition training for general pediatricians for that finding. In addition to that, adequate auditing for non-supervised nutrition training courses is deeply needed to minimize the incidence of myths among physicians and mothers.

Strengths and limitation

Since the survey was online, this gave the researcher more freedom to answer than a physical interview. Furthermore, it was less expensive and took less time. The study was a nationwide survey with randomly selected mothers from many governorates nationwide. The online survey involved only mothers who could access the Internet, which limited the conclusion. Future research, including all mothers, is needed to help identify the different sources and barriers of nutritional myths and knowledge among different socioeconomic levels.

CONCLUSION

In our LMIC setting, almost 50% of the mothers had good nutrition knowledge level scores. In the era of infodemics, social media platforms were the principal source of nutrition information, with more than 50% of mothers managing information currency and authority. For this finding, novel strategies are needed to raise maternal awareness for proper evaluation and selection of the suitable material offered through these platforms. In addition, updated maternal nutrition information sources should be developed and managed by different health authorities. Mothers holding nutritional myths represented 56% of the surveyed mothers. Maternal education and occupation reduced the frequency of myths and beliefs. Health care providers, as sources of nutritional information, are the only source of information, decreasing the mythic incidence among mothers.

ARTICLE HIGHLIGHTS

Research background

Nowadays, diversity of sources of maternal nutritional education becomes a fact in the light of infodemics era. Evaluation of these sources and the method of their assessment is crucial to improve the practice. To the best of our knowledge, this is the first published study from Egypt evaluating this problem in spite of its significance in this low/middle income country.

Research motivation

Healthcare providers, family members, mass media, and social media are different sources of maternal information. Technology enables faster delivery of information but cannot guarantee acquiring the right information. The results of the current study will help to innovate novel strategies to improve maternal awareness for proper evaluation and selection of the suitable material offered to them through different sources.

Research objectives

To assess the healthy nutritional knowledge and nutrition related myths among a large sample of Egyptian mothers, and to determine the sources of these information and how those mothers mange the sources of nutritional related knowledge.

Research methods

This cross-sectional analytical observational study enrolled 5148 randomly selected Egyptian mothers who had one or more children less than 15 years old. The data were collected through online questionnaire forms: One was for the general nutrition knowledge assessment, and the other was for the nutritional myth score. Sources of information and ways of evaluating internet sources using the Currency, Relevance, Authority, Accuracy, and Purpose test were additionally analyzed.

Research results

The main source of maternal nutrition knowledge was social media platforms (55%). Half of the mothers managed information for currency and authority, except for considering the author's contact information. The mothers with higher nutrition knowledge checked periodically for the author's contact information ($P = 0.012$). The nutrition myth score was significantly lower among mothers who periodically checked the evidence of the information ($P = 0.016$). Mothers dependent on their healthcare providers as the primary source of their general nutritional knowledge were less likely to hold myths by 13% ($P = 0.044$). However, using social media increased the likelihood of having myths among mothers by 1.2 ($P = 0.001$).

Research conclusions

In the era of infodemics, social media platforms are the principal source of nutrition information, with more than 50% of mothers managing information currency and authority. Health care providers, as sources of nutritional information, are the only source of information, decreasing the myth incidence among mothers.

Research perspectives

The online survey involved only mothers who could access the internet, which limited the conclusion. Future research, including all mothers, is needed to help identify the different sources and barriers of nutritional myths and knowledge among different socioeconomic levels.

FOOTNOTES

Institutional review board statement: The study was reviewed and approved by the scientific committee of the Public Health and Community Medicine Department, Faculty of Medicine, Cairo University, and was approved by the International Ethical committee at Faculty of Medicine, Cairo University No. 318-2023.

Informed consent statement: All study participants provided informed written consent prior to study enrollment.

Conflict-of-interest statement: There are no conflicts of interest to report.

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