

ORIGINAL ARTICLE

Medical students' awareness and infodemic management capacity: A descriptive study from Türkiye

 Dilek Aslan¹,  Kervin Raymond²,  Ercüment Altıntaş³,  Gülsen Güneş⁴,
 Meltem Şengelen⁵,  Banu Buruk⁶,  Ferda Özyurda⁷

¹ Prof. Dr., Hacettepe University, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

² MPH, Hacettepe University, Institute of Health Sciences, Department of Public Health, Ankara, Türkiye

³ Dr., Hacettepe University, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

⁴ Prof. Dr., Lokman Hekim University, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

⁵ Lecturer Dr., Hacettepe University, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

⁶ Assist. Prof. Dr., Radboud University, Donders Institute of Brain, Cognition and Behaviour, School of Artificial Intelligence, Nijmegen, Netherlands

⁷ Prof. Dr., TOBB ETÜ, Faculty of Medicine, Department of Public Health, Ankara, Türkiye

Received: 01.08.2024, Accepted: 29.03.2025

Abstract

Objective: The aim of the study is to determine the awareness and infodemic management capacity of medical students at three different medical faculties in Türkiye.

Method: Conducted as a descriptive study, an online survey via Google Forms® was distributed to students from three medical faculties throughout 2023-2024 academic year. The survey aimed to evaluate students' knowledge, attitudes, and perceived readiness concerning infodemic management.

Results: The participants were predominantly female (58.2%) with a mean age of 21.2 years, and all were single. Notably, 67.9% of the students had not previously heard of infodemic. However, a significant majority recognized the infodemic as a global threat (92.5%), beyond Coronavirus Disease-2019 (99.3%), with negative health impacts (93.3%), including fatalities (70.9%). Despite this, only 55.9% believed that infodemics are preventable. Importantly, 94.8% acknowledged the role of doctors in managing infodemics.

Conclusion: The study highlights a gap in the medical curriculum regarding infodemic management training, as transparency and the importance of managing infodemics are not fully appreciated by all students. These findings suggest the necessity of integrating infodemic management training into medical education to better equip future healthcare professionals. This research adds to the limited scientific literature on infodemic management and underscores the need for enhanced proficiency among medical students in this emerging field.

Keywords: Infodemic, Education, Medical, Students, Medical, Türkiye

Correspondence: MPH, Kervin Raymond, Hacettepe University, Institution of Health Sciences, Department of Public Health, Ankara, Türkiye. **E-mail:** zimkervin@gmail.com

Cite This Article: Aslan D, Raymond K, Altıntaş E, Güneş G, Şengelen M, Buruk B, Özyurda F. Medical students' awareness and infodemic management capacity: a descriptive study from Türkiye. Turk J Public Health 2025;23(1): 35-43.

©Copyright 2025 by the Association of Public Health Specialist (<https://hasuder.org.tr>)
Turkish Journal of Public Health published by Cetus Publishing.



Turk J Public Health 2025 Open Access <http://dergipark.org.tr/tjph/>.

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

INTRODUCTION

An infodemic is defined as an abundance of information with a wide range of manifestations, such as misinformation, disinformation, rumor, information voids, and conspiracy theory, that prevents individuals from turning to the right health behaviors in times of crisis, such as outbreaks, disasters, etc. Due to infodemics, individuals are unable to adopt the correct behaviors and are therefore negatively affected.^{1,2,3}

The onset of the Coronavirus Disease-2019 (COVID-19) pandemic in early 2020 starkly illuminated the global scale and profound impact of infodemics. As the virus rapidly spread across continents, so too did a deluge of misinformation, disinformation and conspiracy theories, complicating public understanding and response efforts.³ Director-General of the World Health Organization (WHO) highlighted the criticality of addressing this infodemic alongside the pandemic itself, emphasizing the need for a cohesive global strategy to counteract the rampant dissemination of false and misleading information.⁴

Infodemic occurs at mainly four different levels including science, policy and practice, news media, and social media according to Eyesenbach's "*the wedding cake model*"⁵. Information is generated and flows within these four levels. Although all levels have the potential to produce infodemic, the largest segment of the model "social media" represents the vast amount in the model.⁵

The possible consequences of an infodemic include the misunderstanding of health information, a tendency towards risk-taking behavior, and increased anxiety, stress,

and depression. At both individual and societal levels, this can lead to distrust in health authorities, science, experts, public health professionals, and public institutions. Additionally, it can result in longer and more difficult crisis management, hate speech, social segregation, labeling, and stigmatization.^{2,6,7}

Infodemics affect communities and health systems, as well as individuals. Therefore, infodemic management should be done at the right time and with the right methods. Infodemic management (IM) is the systematic use of risk (and evidence-based) analysis and approaches to reduce the adverse effects of infodemic on health behaviors during health emergencies. Infodemic management involves four main actions: listening to community concerns and questions, improving understanding of risks and recommendations from health professionals, building resilience against misinformation, and engaging and empowering communities for positive action.^{1,2} This capacity needs to be developed among relevant professionals. Health professionals are among the professionals who need capacity building on IM. However, there are gaps between healthcare professionals' basic knowledge of infodemic and their capacity in IM, and therefore, it would be appropriate to address these gaps. Among health professionals, physicians are particularly important as a source of accurate information for both individuals and society.⁸ They have a critical role in communication and building trust.⁹ Such missions and roles should be given to physicians from the very beginning, as they start medical education. Research on the issue might be helpful to understand and develop the competencies of future healthcare professionals in dealing with infodemic scenarios effectively.

Based on all these background information, the aim of this study is determining the awareness and IM capacity of the students studying at three different medical faculties located in Ankara-Türkiye.

METHOD

Participants

Participants of the study were medical students from three faculties in Ankara, Türkiye. These faculties were selected based on their offering of both Turkish and English programs, catering to a diverse student population including international enrollees. Total students in three faculties were 3912 [(2938 in HU University (H), 235 in TOBB-ETU University (TE), 739 in YIU University (YIU)]. Despite multiple reminders, a total of 134 students participated in (YIU)). the study across the three faculties.

Data collection and the questionnaire

In this descriptive study, an online survey using Google Forms® was used. The questionnaire was developed by the research team in five sections. Section I included 4 multiple choice questions about faculty and phase information. Section II included 5 multiple choice questions about socio-demographic characteristics. Section III included 6 multiple choice and open-ended questions about health/disease profiles. Section IV included 3 questions about awareness on infodemic and IM capacity. To understand the awareness on the term “infodemics”, participants were asked if they know the term or not. After this question, definition of the term “infodemic” was given in the questionnaire. The students were not allowed to move forward without reading the definition in the questionnaire. The following questions included views of the

students on infodemic-related statements and their routines on selected IM competencies. Five-level Likert questions starting from “completely agree” to “completely disagree” was used. Ten level self-assessment questions were used to understand the students’ self-assessment IM capacity and the importance of medical education in improving IM capacity (from 1 to 10; 1 worst and 10 best). Section V included 3 questions defining the students’ motivation on contributing the IM studies at the faculties. To enhance data standardization, the questionnaire underwent pilot testing among a small group of students to refine question clarity and relevance.

The questionnaire was administered to students between the 2023 and 2024 academic years.

Statistical analysis

Data analysis was performed using SPSS version 23.0. Frequency distributions are displayed using the frequency tables.

Ethics and permissions

Ethical approval for the study was obtained from the relevant ethical board at each of the three universities involved in this study. Additionally, official permissions from the faculty administrations were secured prior to distributing the survey to ensure compliance with institutional guidelines and regulations regarding research involving human subjects.

RESULTS

The majority of the students were females ($n = 78, 58.2\%$); all were single ($n = 134, 100\%$). The mean age of the students was 21.2 years ($SD = 2.0$). Half of the participants stayed in dormitories ($n = 67, 50.0\%$) (Table 1).

Table 1. Socio-demographic features of the students

Feature	n	%
Age (year) (n=132)		
18-24	123	93.2
25 and over	9	6.8
Mean (SD)	21.2 (2.0)	
Median	21	
Gender (n=134)		
Male	56	41.8
Female	78	58.2
Marital status (n=134)		
Not married	134	100.0
Live in (n=134)		
Dormitory	67	50.0
House	67	50.0

In Table 2, the health and disease profiles of the students are presented. The majority of the students perceived their health status as “healthy” (n = 116, 86.5%). Thirty-eight students had a self-reported diagnosed disease (28.4%), and twenty-one students used medicine prescribed by a doctor (16.5%). Most of the students stated that they had no diagnosed COVID-19 history (60.4%). Seven students did not receive COVID-19 vaccines (5.2%).

Table 2. Self-perceived health status and medical history of participating students (n=134).

Feature	n	%
Health status		
Healthy	116	86.5
Do not have an idea	13	9.7
Unhealthy	5	3.8
Disease diagnosed by doctor		
No	96	71.6
Yes	38	28.4
Use medicine prescribed by a doctor (n=133)*		
No	112	83.5
Yes	21	16.5
Diagnosed COVID-19 disease history (self-reported)		
No	81	60.4
Yes	53	39.6
COVID-19 vaccination		
No	7	5.2
Yes	127	94.8

*One student used medicine without a doctor's prescription.

In Table 3, students' awareness on the term “infodemic” is presented. Most of the students stated that they had heard “infodemic” for the first time (n=91, 67.9%).

Table 3. Awareness of the term “infodemic” among participating students (n=134)

Awareness of the term “infodemic”	n	%
Did not hear the term before	91	67.9
Know the term	43	32.1
Total	134	100.0

In Table 4, the students' views on a number of infodemic-related statements are presented. Before collecting students' views, the definition of “infodemic” was provided to them.

The majority of the students agreed that “infodemic is a global threat (92.5%)”, “infodemic is a national threat (87.3%)”, “infodemic is not limited to COVID-19 (99.3%)”, “infodemic is not limited to health consequences (98.5%)”, “people have been affected by the negative health consequences of infodemic (93.3%)”, “people have died because of infodemic (70.9%)”, “infodemic is preventable (55.9%)”, transparency is essential for infodemic management (88.8%)”, “health workers have roles in infodemic management (94.8%)”, “doctors have roles in infodemic management (94.8%)”, “teachers have roles in infodemic management (94.8%)”, and “journalists have roles in infodemic management (97.1%)”. Students majorly disagreed that “infodemic is only experienced online (92.5%)”, and “infodemic does not affect trust (91.0%)”.

Table 4. Views of the students on infodemic-related statements (%)

Statement	Strongly agree	Agree	Undecided	Do not agree	Strongly disagree
Infodemic is a global threat.	60.4	32.1	6.0	0.7	0.7
Infodemic is a national threat.	56.0	31.3	9.7	2.2	0.7
Infodemic is only experienced online.	2.2	2.2	3.0	52.2	40.3
Infodemic is not limited to COVID-19.	73.9	25.4	0.7	-	-
Infodemic is not limited to health consequences.	69.4	29.1	0.7	0.7	-
People have been affected by the negative health consequences of infodemic.	56.7	36.6	4.5	0.7	1.5
People have died because of infodemic.	40.3	30.6	25.4	3.0	0.7
Infodemic does not affect trust.	1.5	1.5	6.0	38.8	52.2
Infodemic is preventable.	14.9	41.0	28.4	14.2	1.5
Transparency is essential for IM.	42.5	46.3	6.7	3.0	1.5
Health workers have roles in IM.	47.8	47.0	5.2	-	-
Doctors have roles in IM.	47.8	47.0	4.5	0.7	-
Teachers have roles IM.	47.8	47.0	3.7	1.5	-
Journalists have roles in IM.	57.5	39.6	3.0	-	-

In Table 5, routines of the students on selected IM competencies are presented. Definition of IM is given to the students before taking their routines.

The majority of the students agreed with the personal experiences as “I confirm the health-related information I access through online (digital) media from the scientific literature (79.8%)”, “I verify the health-related information I access through physical environments from the scientific literature (79.9%)”, “I verify the health-related information I access through online (digital) media from scientific literature before sharing it with others (78.4%)”, “I verify the health-related information I access through physical media from scientific literature before sharing it with others (77.7%)”, “I prefer to use information on digital platforms with

.edu extension (71.7%)”, “websites of well-established international organizations such as the World Health Organization are among the information sources I use to be informed about health-related issues (78.2%)”, “the website of the Ministry of Health is a source of information that I use to update my knowledge on health-related issues (57.4%)”, “I use the websites of health professional organizations to update my knowledge on health-related issues (65.7%)”. Almost half of the students could not decide on using information on digital platforms with .com extension (47.8%). Students largely disagreed on the given experiences; “the extensions of digital platforms do not affect my intention to read the content (53.8%)”, and “the extensions of digital platforms do not affect my intention to share the content with others (53.7%)”.

Table 5. Routines of the students on selected IM competencies (%)					
Experience	Strongly agree	Agree	Undecided	Do not agree	Strongly disagree
I confirm the health-related information I access through online (digital) media from scientific literature.	24.6	55.2	11.9	7.5	0.7
I verify the health-related information I access through physical environments from scientific literature.	23.9	56.0	10.4	9.0	0.7
I verify the health-related information I access through online (digital) media from scientific literature before sharing it with others.	29.9	48.5	16.4	4.5	0.7
I verify the health-related information I access through physical media from scientific literature before sharing it with others.	29.9	47.8	15.7	6.0	0.7
I prefer to use information on digital platforms with .edu extension.	26.9	44.8	20.9	6.7	0.7
I prefer to use information on digital platforms with .com extension.	3.7	22.4	47.8	19.4	6.7
The extensions of digital platforms do not affect my intention to read the content.	8.2	23.1	14.9	46.3	7.5
The extensions of digital platforms do not affect my intention to share the content with others.	6.0	20.9	19.4	41.8	11.9
Websites of well-established international organizations such as the World Health Organization are among the information sources I use to be informed about health-related issues.	31.2	47.0	9.0	9.0	3.0
The website of the Ministry of Health is a source of information that I use to update my knowledge on health-related issues.	20.1	37.3	19.4	14.2	9.0
I use the websites of health professional organizations to update my knowledge on health-related issues.	15.7	50.0	17.9	10.4	6.0

Table 6 shows the students’ self-assessment on IM capacity and the importance of medical education in improving IM capacity. Students’

scores for the importance of medical education to improve IM capacity were higher than their scores given for their current IM capacity.

Table 6. Students’ self-assessment of IM capacity and the importance of medical education in improving IM capacity (%)										
Students’ self-assessment	Score (1 worst and 10 best)									
	1	2	3	4	5	6	7	8	9	10
IM capacity	1.5	1.5	6.7	8.2	11.9	14.2	26.9	20.1	6.7	2.2
Mean (SD)	6.3 (1.9)									
Median	7									
Importance of medical education in improvement of IM capacity	0.7	1.5	0.7	0.7	6.0	2.2	14.9	23.9	20.9	28.4
Mean (SD)	8.2 (1.8)									
Median	8									

DISCUSSION

Medical students are expected to gain competencies to prevent and manage global health challenges.¹⁰ They should react to

protect individuals and communities in emerging and re-emerging crises, as well as their routine competencies. Although infodemics are an ongoing threat, their

burden peaks during times of crisis. The COVID-19 pandemic is a recent devastating example that the world has experienced. As medical professionals, including students, are among the most important and accurate information sources in the community, their IM capacity is expected to be improved.¹¹ In the same way, medical education is a good opportunity to improve IM capacity. Capacity development needs to be aware of the content. Nevertheless, students' awareness about infodemic is limited. In the research group, the majority of the students stated that they had heard of "infodemic" for the first time (n = 91, 67.9%). To fulfill this missed opportunity, faculties are recommended to integrate IM into their curricula. One of the faculties has already integrated the IM theme into its first-year curriculum in 2024 following the analysis of the data in this study.¹²

In the research questionnaire prepared for the students, after taking their response on their level of information about infodemics, the official "infodemic" definition of WHO¹ was given to them. Learning the definition of the term seems to help the students to make theory-based connections between the issues. For example, the majority of the students agreed that "infodemic is a global threat (92.5%)", "infodemic is a national threat (87.3%)", "infodemic is not limited to COVID-19 (99.3%)", "infodemic is not limited to health consequences (98.5%)", and "people have been affected by the negative health consequences of infodemics (93.3%)" (Table 4). The awareness of health professionals is thought to be helpful in taking relevant action in infodemic management.

Students agree that "transparency is essential for infodemic management (88.8%)".

Transparency is among the requirements of IM.¹³ Although the majority of the students thought similarly, there are students who do not agree with the importance of transparency for IM. In the same way, it is unfortunate that only 55.9% of the students believe in the preventable feature of infodemics. However, infodemic management strategies are built to prevent infodemics.¹⁴

Potential for the spread of infodemic through online and offline channels^{16, 17} and health workers' crucial role in IM as the first point of contact in health systems¹⁵ are confirmed by the students.

The participants of our research have gaps in using evidence-based scientific literature, selecting the correct information sources, sharing accurate information sources with others, etc. Medical education might be a good opportunity to meet and strengthen the students in this regard.

Our study has strengths and limitations. First, our results are thought to reflect the situation of medical students in a "new" study field, as there is limited scientific literature on the issue. Although participation numbers are limited, efforts to gather data from three different faculties have been important. The results of our study are expected to give faculties the opportunity to integrate IM activities into their curricula. There are limitations to our study. In the first place, the number of participants does not give us the opportunity to conduct detailed statistical analysis or generalize the results to university students. Secondly, the answers are self-reported by the students. Self-reported data on knowledge, attitudes, and behaviors might be influenced by recall or social desirability bias, potentially leading to overestimating

participants' capacities or the perceived importance attributed to medical education. Thirdly, students who responded might have had a particular interest or greater awareness of infodemic issues than non-respondents. Lastly, although pilot testing of the survey was conducted, the questionnaire was specifically developed for this research and may require further validation to confirm its reliability and generalizability across different contexts or populations.

CONCLUSION

Our study has emphasized the possible lacking points in IM among medical students. Medical education curriculum assessment from the IM perspective might give us the opportunity to think on the issue and plan further detailed studies to be prepared for the possible future crises in health.

ACKNOWLEDGEMENTS

Results of this research was presented in the 26th National Public Health Congress organized by HASUDER (December 2024). Abstract of the presentation can be accessed via https://uhsk.org/2024/dosya/kongre_kitabi.pdf

Conflict of Interest: All authors declare no conflicts of interest.

Financial Support: No funding was received for conducting this study.

Ethical Statement: Ethical approval for the study was obtained from the relevant ethical board at each of the three universities involved in this study. Additionally, official permissions from the faculty administrations were secured prior to distributing the survey to ensure compliance with institutional guidelines and regulations regarding research

involving human subjects.

Author Contribution: Concept: DA, KR, EA, GG, MŞ, BB, FÖ, Design: DA, KR, EA, GG, MŞ, BB, FÖ, Writing: DA, KR, EA, GG, MŞ, BB, FÖ, Data collection: DA, KR, EA, GG, MŞ, BB, FÖ, Data analysis: DA, KR, EA, GG, MŞ, BB, FÖ, Revising the manuscript critically: DA, KR, EA, GG, MŞ, BB, FÖ, Final approval: DA, KR, EA, GG, MŞ, BB, FÖ.

REFERENCES

1. World Health Organization. Infodemic [online]. Available at: https://www.who.int/health-topics/infodemic#tab=tab_1. Accessed June 15, 2024.
2. Aslan D. Halk Sağlığı Bakış Açısıyla İnfodemi Yönetimi. Hipokrat Yayıncılık; 2022.
3. Torpan S, Hansson S, Rhinard M, Ewing M. Handling false information in emergency management: A cross-national comparative study of European practices. *Int J Disaster Risk Reduct.* 2021;57:102151.
4. Zarocostas J. How to fight an infodemic. *Lancet.* 2020;395(10225):676.
5. Eysenbach G. How to fight an infodemic: The four pillars of infodemi management. *J Med Internet Res.* 2020;22(6):e21820.
6. Jakovljevic M, Bjedov S, Mustac F, Jakovljevic I. COVID-19 infodemic and public trust from the perspective of public and global mental health. *Psychiatr Danub.* 2020;32(3-4):449-457.
7. Dubey S, Biswas P, Ghosh R, Chatterjee S, Dubey MJ, Chatterjee S, et al. Psychosocial impact of COVID-19. *Diabetes Metab Syndr.* 2020;14(5):779-788.
8. Scott J. Managing the infodemic about COVID-19: Strategies for clinicians and researchers. *Acta Psychiatr Scand.* 2021;143(5):377-379.
9. Canavera K. Rebuilding trust. *Patient Educ Couns.* 2021;104(5):996-997.
10. UÇEP. Ulusal Çekirdek Eğitim Programı [online]. Available at https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Ulusal-cekirdek-egitimi-programlari/mezuniyet-onesi-tip-egitimi-cekirdek-egitimi-programi.pdf Accessed June 15, 2024.
11. Choi S. The coronavirus disease 2019 infodemic: a concept analysis. *Front Public Health.* 2024 Apr 25;12:1362009. doi: 10.3389/fpubh.2024.1362009. PMID: 38726229; PMCID:

PMC11081101

12. HUMF. Learning to be a physician program, social responsibility program. Phase I, Hacettepe [online] Available at: https://medinfo.hacettepe.edu.tr/en/menu/undergraduate_education-27 Accessed June 15, 2024.
13. Zhou Y, Zhang A, Liu X, Tan X, Miao R, Zhang Y, Wang J. Protecting public's wellbeing against COVID-19 infodemic: The role of trust in information sources and rapid dissemination and transparency of information over time. *Front Public Health*. 2023;11:1142230.
14. World Health Organization. Infodemic management courses. [online] Available at: <https://openwho.org/channels/infodemic-management> Accessed June 15, 2024.
15. Briand S, Hess S, Nguyen T, et al. Infodemic Management in the Twenty-First Century. 2023 May 10. In: Purnat TD, Nguyen T, Briand S, editors. *Managing Infodemics in the 21st Century: Addressing New Public Health Challenges in the Information Ecosystem* [Internet]. Cham (CH): Springer; 2023. Chapter 1. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK609021/> doi: 10.1007/978-3-031-27789-4_1.
16. Bin Naeem S, Kamel Boulos MN. COVID-19 misinformation online and health literacy: A brief overview. *Int J Environ Res Public Health*. 2021;18(15):8091.
17. Chiou H, Voegeli C, Wilhelm E, Kolis J, Brookmeyer K, Prybylski D. The future of infodemic surveillance as public health surveillance. *Emerg Infect Dis*. 2022;28(13):S121-S128.
18. De Angelis L, Baglivo F, Arzilli G, Privitera GP, Ferragina P, Tozzi AE, Rizzo C. ChatGPT and the rise of large language models: The new AI-driven infodemic threat in public health. *Front Public Health*. 2023;11:1166120.