

Observational Study

Investigation and analysis of the status of cancer health
popularization in China, 2023

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Abstract

BACKGROUND

Cancer presents a significant public health challenge in China, necessitating broad collaboration across society. The Chinese government has articulated a goal to increase the overall five-year survival rate for cancer by 15% by 2030. Achieving this objective requires not only advances in medical technology, but also an improvement in the dissemination of knowledge pertaining to cancer prevention and treatment.

AIM

To provide a comprehensive understanding of the status of cancer prevention and level of popularization in China in 2023.

METHODS

From January 2023 to May 2023, online questionnaires were distributed to 3000 participants, including medical personnel, patients with cancer, their families, and the general public. There were 2711 valid responses, covering the entire nation.

RESULTS

A total of 1020 medical personnel and 1691 patients with cancer, their family members, and the general public participated in the survey. Among medical personnel, 93.2% had popularized cancer health. Commonly addressed topics included cancer prevention (85.9%) and cancer screening (77.8%). Primary challenges included time constraints (73.9%), insufficient personnel and material support (66.7%), and uncertainty as to where to begin (49.3%). Among patients with cancer, their family members, and the general public, 93.4% reported reading

or watching cancer science popularization materials and 56.9% expressed a desire for deeper understanding. The most sought-after topics in cancer science popularization included cancer screening (80.2%) and cancer prevention (75.8%). The greatest challenge encountered in accessing cancer health popularization was an abundance of misinformation (67.5%).

CONCLUSION

Most clinical doctors, patients, family, and the general public wish to participate in cancer education. However, improvement in the quality of content in cancer prevention and treatment education is required.

Key Words: Cancer health popularization; Patient education; Science popularization; Cancer prevention

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Core Tip: Cancer poses a significant threat to the health and lives of the Chinese population. Therefore, enhancing public awareness of cancer health is of paramount importance. Prior to this study, there has been no investigation of the status of cancer health education in China. Through the distribution of random questionnaires across 31 provinces in China, 1020 healthcare professionals and 1691 patients with cancer, their family members, and the general public participated. Most participants expressed a strong willingness to participate in cancer health education. Therefore, improvement in the quality of cancer health education is required.

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INTRODUCTION

The global incidence of cancer has been on the rise in recent years[1,2]. And in China, According to data released by the National Cancer Center of China, in 2022, there were 4.82 million new cases of malignant tumors in China, with a total of 2.57 million deaths due to cancer, accounting for a significant proportion of total deaths[3]. From 2000 to 2018, the standardized incidence rate of all cancers in China increased by an average of 1.4% per year. Cancer remains a major public health concern in China. Prior studies focused on the Chinese population identified 23 types of risk factors for cancer, classified into five major categories[4]. Primary risk factors include active smoking, alcohol consumption and low fruit and vegetable intake[5,6]. Faced with the formidable challenge of cancer prevention and control and the clear identification of risk factors for cancer, the timely implementation of proactive primary cancer prevention strategies could effectively reduce the disease burden of cancer in China.

The role of health education, through its popularization as a primary prevention strategy for cancer, cannot be overlooked[7-9]. With continuous development of Internet technology, health information has become more accessible to the public[10]. Among the respondents in China, health popularization was the most frequently searched type of online health information[11]. Simultaneously, healthcare professionals are increasingly recognizing the importance of health popularization and to have the ability to communicate scientific knowledge to the general population[12]. However, the proliferation of misinformation has also led to the spread of false information on health popularization[13]. Instances, such as previous anti-vaccine movements have presented new challenges and risks to health popularization efforts[14-16].

Understanding the status of cancer health popularization in a specific region or country, along with identifying challenges and difficulties, is crucial for formulating effective health popularization policies[17,18]. To our knowledge, no survey reports have specifically addressed the status of cancer popularization in China. Therefore, we conducted a survey and analysis of the status of cancer health popularization, targeting medical personnel, patients with cancer, their families, and the general public.

MATERIALS AND METHODS

Participants

From January 2023 to May 2023, online questionnaires were distributed *via* the Medlive platform (<https://www.medlive.cn/>) to a total of 3000 participants, including medical personnel, cancer patients, their families, and the general public, in China. We subsequently received 2711 valid responses, covering 31 provinces of the country.

Study design

The cancer health popularization survey and analysis conducted in this study used a randomized questionnaire survey conducted anonymously. The questionnaire included single-choice, multiple-choice, numeric fill-in-the-blank, and text fill-in-the-blank questions. In designing the survey questionnaire, a draft questionnaire was sent to relevant industry experts and clinical specialists affiliated with the Chinese Anti-Cancer Association, for feedback. The questionnaire content was reviewed, supplemented, and finalized based on the input.

The survey questionnaire for medical personnel included the following: Sex, age, professional title, hospital level, region and city of residence, participation in cancer health popularization activities, common forms and frequency of cancer health popularization activities, time allocated to cancer health popularization activities per week, perspectives on cancer health popularization, difficulties encountered in conducting cancer health popularization activities, and areas of interest in receiving health popularization training.

The survey questionnaire for patients, family members, and the general public included the following: Sex, age, education level, region and city of residence, attitude towards cancer health popularization, demand for cancer health popularization content, common forms and frequency of accessing cancer health popularization knowledge, common sources and timing of accessing cancer health popularization knowledge, credibility of current cancer health popularization knowledge, and difficulties encountered in accessing cancer health popularization knowledge.

Data interpretation

Single-choice questions (%): Percentage of respondents selecting each option for the question, with the sum of the percentages for each option totaling 100%.

Multiple-choice questions (%): Percentage of respondents selecting each option for the question, with the sum of percentages for each option exceeding 100%.

Numeric fill-in-the-blank questions: Arithmetic mean.

Text fill-in-the-blank questions: Encoding by induction method followed by statistical processing.

Statistical analysis

Frequencies and frequency rates were used to represent count or ordinal data. The collected survey questionnaires underwent data cleaning, incomplete questionnaires were removed, and data logic issues and doubtful data were reviewed. Once the data cleaning process was complete, IBM SPSS Statistics 21 was used for statistical analysis.

RESULTS

Outcomes for medical personnel

Characteristics: There were 1020 medical personnel and 65.1% were male and 34.9% were female. The 31-40 years age group had the highest proportion (46.7 %). Most medical personnel were affiliated with third-level Grade A hospitals (69.4%). Directors accounted for 16.8%, vice-directors 39.2%, attending physicians 41.7%, and residents 2.4%. The oncology department was the predominant department among the respondents (37.4 %). They were primarily located in the East China region (40.9%). Third-tier cities accounted for the majority (38.0%) of the city distribution (Table 1).

Organizational forms of cancer health popularization: The most common organizational form of cancer health popularization activities conducted by medical personnel was assigned and arranged by their workplace (73.9%). This was followed by invitations by media organizations, social institutions, and academic groups (64.7%). Additionally, 46.0% of the respondents independently organized these activities. In first-tier and second-tier cities, there were more opportunities for medical personnel to be invited by media organizations, social institutions, and academic groups, for health popularization activities, whereas doctors in towns and villages had fewer such opportunities and mostly organized activities independently (Figure 1A). On average, medical personnel spend approximately four hours per week on cancer health popularization activities.

Perspectives of cancer health popularization: Medical personnel primarily conduct cancer health popularization for patients (87.4%) and their family members (89.8%), followed by the general public (70.8%). Their efforts focused on cancer prevention (85.9%), cancer screening (77.8%), cancer treatment and related adverse reactions (74.1%), cancer diagnosis (69.5%), cancer rehabilitation follow-up (66.2%), and lifestyle management of patients with cancer (62.3%; Table 2).

Forms and frequency of cancer health popularization activities: Seven hundred and twenty-six (76.3%) respondents selected for "Popular Science Lectures", with the majority attending one to three times per month. Seven hundred and twenty-one (75.8%) respondents selected "Text and Image Popularization", involving writing popular science articles and publishing them on public platforms, with 621 (65.3%) respondents selecting "Short Video Popularization", mainly creating and publishing short science videos on video platforms, with most individuals doing so one to three times every two to three years or one to three times per year. Four hundred and eighty-five (51.0%) respondents selected "Q&A Style Popularization", providing question-and-answer services on internet medical health service platforms, primarily one to three times per month. Overall, 401 (42.2%) respondents selected "Comic Popularization", participating in the production of popular science comics and publishing them on public platforms, mostly one to three times per year or every two to

Table 1 Characteristics of 1020 medical personnel

Variable	n	Percentage (%)
Gender		
Male	664	65.1
Female	356	34.9
Age (year)		
21-30	29	2.8
31-40	476	46.7
41-50	378	37.1
51-60	123	12.1
61-70	13	1.2
Over 70	1	0.1
Professional title		
Directors	171	16.8
Vice directors	400	39.2
Attending	425	41.7
Residents	24	2.4
Hospital level		
Third-level Grade-A	708	69.4
Third-level	181	17.7
Second-level	128	12.5
First-level	24	2.4
Regions		
Northeast	70	6.9
North	201	19.7
East	417	40.9
South	68	6.7
Central	166	16.3
Northwest	54	5.3
Southwest	44	4.3
Cities		
First-tier	131	12.8
Second-tier	288	28.2
Third-tier	388	38.0
Towns	213	20.4
Villages	5	0.5

three years. 315 (33.1%) respondents selected "Live Streaming Popularization", conducting science popularization in a live streaming format on video platforms, mostly one to three times per year or every two to three years. 309 (32.5%) respondents selected "Writing Popular Science Books/Manuals", mostly every two to three years. See [Table 3](#).

Difficulties encountered in conducting cancer health popularization activities: The main challenges to overcome in performing cancer prevention and control popularization activities include busy schedules and lack of time, as cited by the majority of respondents (73.9%). Insufficient support in terms of manpower and resources made it difficult to organize activities (66.7%). Some respondents expressed a lack of direction and uncertainty regarding where to begin (49.3%), whereas others had limited dissemination channels to engage more patients and the general public (47.8%).

Table 2 Main perspectives of cancer health popularization

Variable	n	Percentage (%)
Cancer prevention	817	85.9
Cancer screening	740	77.8
Cancer treatment and related adverse reactions	705	74.1
Cancer diagnosis	661	69.5
Cancer rehabilitation	630	66.2
Cancer patient lifestyle management	592	62.3
Psychological counseling: Depression, anxiety, <i>etc.</i>	379	39.9

Table 3 Main forms of cancer health popularization activities.

Variable	n	Percentage (%)
Text and image popularization	721	75.8
Comic popularization	401	42.2
Popular science lectures	726	76.3
Short video popularization	621	65.3
Live streaming popularization	315	33.1
Q&A style popularization	485	51.0
Writing popular science books/manuals	309	32.5

Inadequate written expression skills, uncertainty regarding presentation methods (42.0%) and deficiencies in verbal communication skills (39.1%) were also noted ([Supplementary Table 1](#)).

Outcomes for patients, family members, and the general public

Characteristics: There were 1691 respondents, including 943 males (55.8%) and 748 females (44.2%). The majority fell within the 41-50 age range (32.1%), followed by the 31-40 age range (31.5%). In terms of educational background, 873 respondents (51.6%) held bachelor's degrees.

Geographically, the distribution was 514 respondents (30.4%) from the East China region and 506 respondents (29.9%) from the North China region. In terms of urban distribution, excluding rural areas, the distribution was relatively uniform with 390 respondents (23.1%) from first-tier cities, 420 (24.8%) from second-tier cities, 458 (27.1%) from third-tier cities, 352 (20.8%) from towns, and 70 (4.1%) from villages ([Table 4](#)).

Attitude towards cancer health popularization: Of the respondents, 93.7% had acquired or studied tumor-related popular science knowledge. 962 respondents (56.9%) expressed a desire for in-depth understanding upon encountering tumor-related popular science content, with patients with tumors and their families showing a stronger inclination towards deepening their understanding, while the general public tended to casually browse (50.6%). Additionally, most of the respondents (81.3%) actively sought tumor-related knowledge. With increasing age, respondents were more inclined to delve deeper into popular tumor science content, while the general public, particularly the younger demographic, demonstrated lower interest in popular tumor science, leaning towards casual browsing or outright neglect ([Figure 1B](#)).

Demand for cancer health popularization content: The respondents expressed a desire to acquire popular science content of multiple aspects related to tumors, including tumor screening (80.2%), tumor prevention (75.8%), tumor treatment methods (65.7%), tumor diagnosis and examination methods (62.3%), tumor symptoms (61.8%), daily life precautions and misconceptions (58.5%), prevention of tumor recurrence (56.3%), coping with adverse reactions to tumor treatment (53.6%), and psychological guidance (47.2%; [Table 5](#)).

Common forms and frequency of accessing cancer health popularization knowledge: One thousand three hundred and thirty-nine (97.4%) respondents selected "graphical and textual online platforms", with frequencies primarily ranging from one to five times per week (29.4%) and at least once daily (23.3%). One thousand two hundred and forty (90.2%) respondents selected "search platforms for retrieval", with a frequency primarily ranging from one to five times per month (25.5%). One thousand two hundred and seven (87.8%) respondents selected "books (physical/e-books), newspapers, magazines, *etc.*", with a frequency primarily ranging from one to five times per month (23.2%). One thousand two hundred and four (87.6%) respondents selected "viewing relevant popular science on internet medical health service

Table 4 Characteristics of 1691 patients, family members, and the general public

Variable	Sum		Patients		Family members		General public	
	<i>n</i>	Percentage (%)	<i>n</i>	Percentage (%)	<i>n</i>	Percentage (%)	<i>n</i>	Percentage (%)
Gender								
Male	943	55.8	76	42.7	246	55.3	621	58.1
Female	748	44.2	102	57.3	199	44.7	447	41.9
Age								
Below 20	5	0.3	1	0.6	0	0.0	4	0.4
21-30	227	13.4	7	3.9	29	6.5	191	17.9
31-40	533	31.5	30	16.9	134	30.1	369	34.5
41-50	543	32.1	59	33.1	167	37.5	317	29.7
51-60	318	18.8	53	29.8	93	21.0	172	16.1
61-70	52	3.1	20	11.2	20	4.5	12	1.1
Over 70	13	0.8	8	4.5	2	0.4	3	0.3
Educational background								
Doctor	133	7.8	4	2.2	34	7.6	95	8.9
Master	405	24.0	16	9.0	85	19.1	304	28.4
Bachelor	873	51.6	58	32.6	222	50.0	593	55.5
Associate	164	9.7	41	23.0	61	13.7	62	5.8
Vocational school	33	2.0	15	8.5	14	3.1	4	0.4
High school	49	2.9	26	14.6	18	4.0	5	0.5
Junior high school or below	34	2.0	18	10.1	11	2.5	5	0.5
Regions								
East	514	30.4	62	34.8	129	29.0	323	30.3
North	506	29.9	34	19.1	135	30.3	337	31.6
Central	242	14.3	28	15.7	63	14.2	151	14.1
South	137	8.1	25	14.0	32	7.2	80	7.5
Southwest	107	6.3	11	6.2	24	5.4	72	6.7
Northeast	104	6.2	14	7.9	41	9.2	49	4.6
Northwest	81	4.8	4	2.3	21	4.7	56	5.2
Cities								
First-tier	390	23.1	35	19.7	93	20.9	262	24.5
Second-tier	420	24.8	31	17.4	111	24.9	278	26.1
Third-tier	458	27.1	44	24.7	118	26.5	296	27.7
Towns	352	20.8	47	26.4	100	22.5	205	19.2
Villages	70	4.1	20	11.2	23	5.2	27	2.5

platforms", with a frequency primarily ranging from one to five times per month (24.7%). One thousand two hundred and one (87.3%) respondents selected "popular science lectures", with a frequency primarily ranging from one to five times per half year (24.2%). One thousand one hundred and sixty three (84.6%) respondents selected "sharing through relatives or friends with experience of tumor illness", with a frequency primarily ranging from one to five times per half year (23.3%). One thousand one hundred and fifty-eight (84.2%) respondents selected "direct consultation with professional doctors", with a frequency primarily ranging from one to five times per half year (27.1%). One thousand one hundred and fifty-four (83.9%) respondents selected "short video platforms", with a frequency primarily ranging from one to five times per month (25.0%). One thousand one hundred and eleven (80.8%) respondents (80.8%) selected "television, radio", with a frequency primarily ranging from one to five times per month (22.9%; **Figure 2**).

Table 5 Main demands for cancer health popularization content

Variable	<i>n</i>	Percentage (%)
Tumor screening	1326	80.2
Tumor prevention	1253	75.8
Tumor treatment methods	1086	65.7
Tumor diagnosis and examination methods	1030	62.3
Tumor symptoms	1022	61.8
Daily life precautions and misconceptions	968	58.5
Prevention of tumor recurrence	932	56.3
Management of adverse reactions	886	53.6
Psychological guidance: Depression, anxiety, <i>etc.</i>	780	47.2

Difficulties encountered in accessing cancer health popularization knowledge

Studies reported that difficulties in acquiring knowledge about cancer prevention and treatment include an overabundance of false information, making it difficult to discern authenticity (67.5%), excessive complexity of theoretical knowledge that lacks practical relevance (57.9%), lack of engagement and excessive professionalism, making it challenging for the general public to understand (45.5%), and uncertainty about where to access reliable information (22.1%). These challenges underscore the importance of providing accurate, practical, and engaging information on cancer prevention and treatment to effectively educate the public[19] (Supplementary Table 2).

DISCUSSION

Cancer represents a significant global public health challenge, necessitating broad collaboration across various sectors of society. The "Healthy China 2030" plan explicitly outlines one of its goals as increasing the overall five-year survival rate for cancer by 15% by the year 2030[20]. To accomplish this formidable task, not only to rely on overall economic and technological advances, but also to intensify efforts to disseminate knowledge regarding tumor prevention and treatment and more broadly and promote the concept of "prevention first" in cancer control[21]. This will enhance cancer prevention awareness among the general population and contribute to the realization of the strategic goals of Healthy China.

According to the survey results, 93.2% of doctors were engaged in cancer prevention and treatment health education. However, the majority were assigned by their employers, followed by invitations from media organizations, social institutions, and academic groups, particularly those from developed regions (first-tier, second-tier, and third-tier cities). This indicates that clinicians should take more initiative in cancer-related health education. More professionals should be encouraged to participate in grassroots health education, particularly by igniting the enthusiasm of grassroots doctors for cancer-related health education[22,23]. By implementing incentive measures through government authorities, the enthusiasm of healthcare professionals to engage in popular science education can be stimulated. Policies should be enacted to support the expansion of the cancer health education workforce, with particular emphasis on fostering cancer education specialists in rural and grassroots areas.

In the current landscape of health education, artificial intelligence (AI) technology is playing an increasingly important role[24,25]. Previous studies have shown that ChatGPT's responses perform comparably to those of professional doctors in some areas and can even provide dietary advice[26,27]. Healthcare professionals should actively pursue learning the latest content creation techniques and leverage AI technology to efficiently produce cancer health education materials. While creating accessible and relatable educational content for the general public, attention must also be paid to ensuring the scientific accuracy and reliability of AI-generated materials[28].

For patients, their families, and the general public, 93.4% of the survey respondents have read or watched educational materials related to cancer diagnosis and treatment. More than half (57.0%) of the respondents expressed a desire to delve deeper into cancer-related educational content, and the majority (81.3%) actively sought knowledge on cancer-related topics. This indicates a growing demand for cancer prevention and treatment education among the general population and presents opportunities for cancer education initiatives[29,30]. Healthcare professionals should proactively adapt to the public's health needs, conducting targeted educational outreach and actively participating in organized health literacy training programs to enhance their ability to communicate effectively with the general public.

With the flourishing development of new media technologies and handheld mobile devices, the general public has primarily gained knowledge on cancer prevention and treatment through graphic and text-based online platforms, search engines, and short video platforms[31,32]. Traditional forms such as television/radio, educational lectures, and books/newspapers/magazines also serve as important channels for acquiring knowledge regarding cancer prevention and treatment, although their frequency of use is lower. Patients with cancer not only trust healthcare professionals, but also place greater trust in fellow patients with similar experiences when it comes to disseminating knowledge regarding cancer prevention and treatment[33,34]. Therefore, it is essential to encourage patients to share their authentic expe-

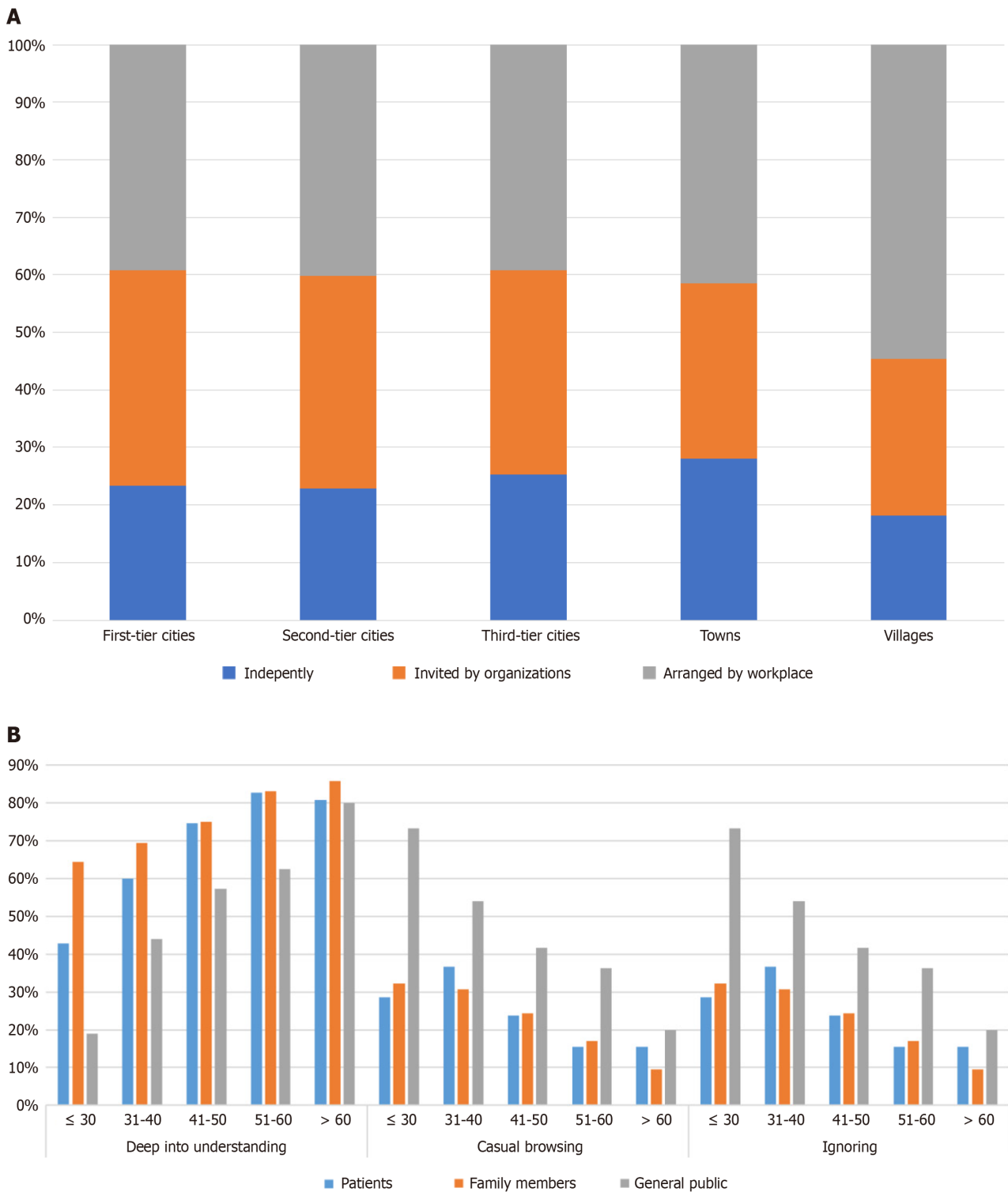


Figure 1 Cancer health education: organizational forms and public attitudes. A: The main organizational forms of cancer health popularization activities conducted by medical personnel in different regions; B: The attitude of the general public towards tumor popular science tends to change with increasing age.

riences, which can help increase the public understanding of the disease, alleviate panic, and correct misconceptions[35].

The quality of cancer prevention and treatment education requires further improvement. The main challenges faced by the public in accessing knowledge in this area include the prevalence of false information and pseudoscience, overwhelming complexity of theoretical knowledge, and a lack of engagement[36]. Currently, text-based and lecture formats remain the primary forms of disseminating cancer prevention and treatment education, while new media, such as short videos and comics, serve as powerful tools for publicizing cancer prevention and treatment. Moreover, patients with cancer and their families showed a high interest in interactive Q&A educational content. To make education more accessible and practical, it is crucial to ensure that the content is both professionally authoritative and easily understandable, catering to a wide audience, while maintaining accuracy[37]. Healthcare professionals should diversify the

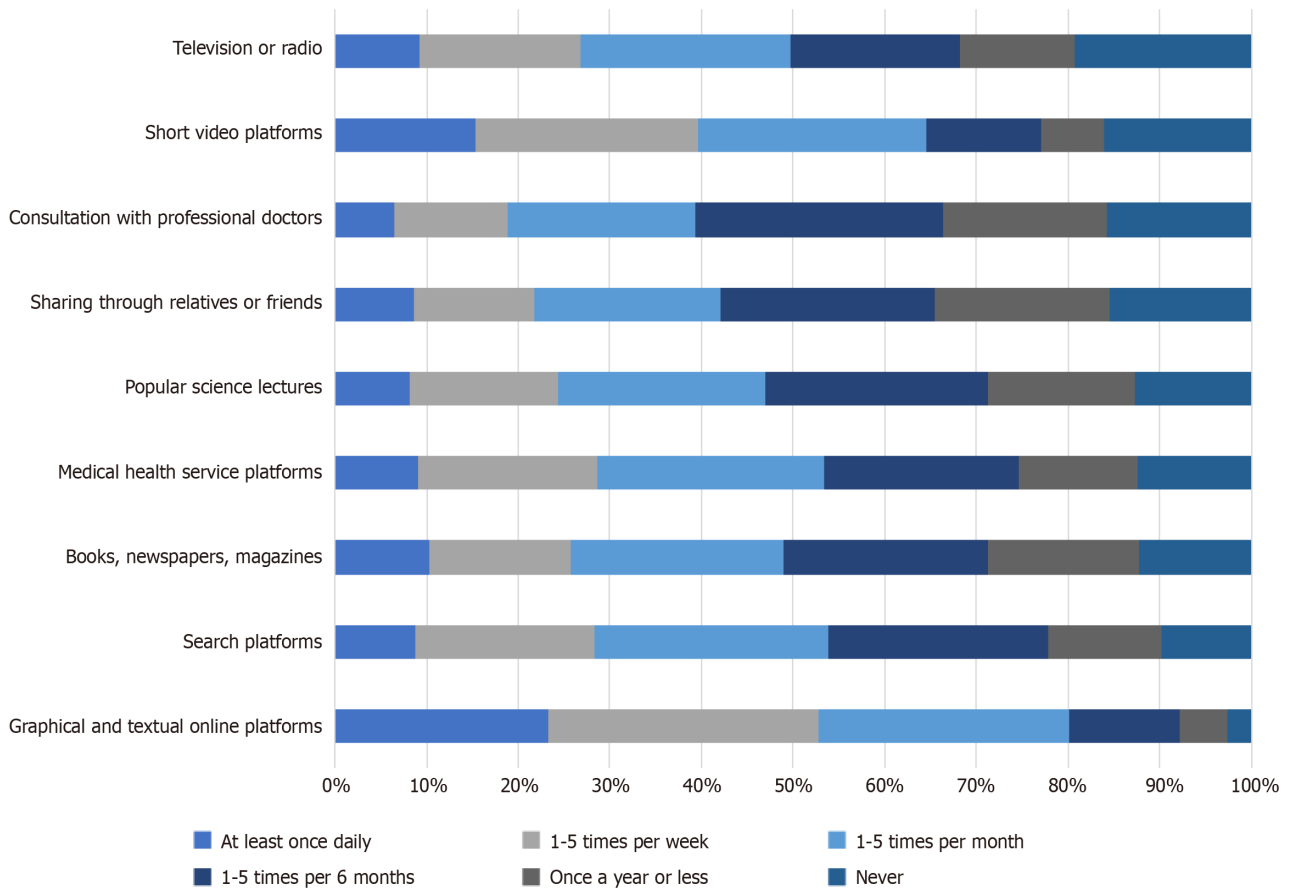


Figure 2 Common forms and frequencies of public access to cancer health popularization knowledge.

formats of health education by incorporating new media technologies. In addition to lectures, they should actively use platforms like short videos and comics to promote health knowledge, enhancing interactivity with the general public.

CONCLUSION

Most medical personnel, patients, family members, and the general public expressed a strong willingness to participate in cancer education. However, there is a mismatch between the output and demand between these groups. There is a need for further improvement in the quality of cancer prevention and treatment education content.

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FOOTNOTES

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