BMJ Open

Satisfaction and its determinants of rural upper gastrointestinal cancer screening in China: a preliminary cross-sectional study

Xiang Feng [1], Jin-Hua Zhu,[1,2] Zhao-Lai Hua,[1] Xing Xu,[3] Yanyan Li,[4] Jun Li,[5] Guo-Hui Song,[6] Xingzheng Wang,[7] Ming Su,[8] Jin-Yi Zhou[9]

Correspondence to
Dr Jin-Hua Zhu;
zhujinhuavip@sina.com and
Dr Zhao-Lai Hua;
75545075@qq.com

ABSTRACT

Objectives To assess participants' satisfaction with and predictors of upper gastrointestinal cancer screening in rural areas.

Design Cross-sectional study.

Setting Ten screening centres in seven cities across five provinces in China.

Participants Of the 452 participants screened during the survey period, 438 completed the survey (response rate: 96.90%).

Primary outcome measures Screening satisfaction was the primary outcome and it was assessed using the Patient Satisfaction Questionnaire-18. Ordinal logistic regression analysis was used to analyse the predictors of satisfaction.

Results The percentages of satisfaction with the General Satisfaction, Technical Quality, Interpersonal Manner, Communication, Financial Aspects, Time Spent With Doctor, and Convenience and Accessibility dimensions were 95.89%, 79.68%, 88.36%, 83.56%, 75.11%, 82.19% and 66.44%, respectively. Education (OR 0.25, 95% CI 0.07 to 0.90), health self-assessment (OR 15.29, 95% CI 2.86 to 81.78) and family history of cancer (OR 4.20, 95% CI 1.29 to 13.71) were associated with General Satisfaction. Residence (OR 4.31, 95% CI 1.89 to 9.81) was associated with Technical Quality. Occupation (OR 0.27, 95% CI 0.08 to 0.88), health self-assessment (OR 11.30, 95% CI 3.94 to 32.43), screening purpose (OR 0.18, 95% CI 0.03 to 0.92) and distance from the screening centre (OR 4.59, 95% CI 1.35 to 15.61) were associated with interpersonal manner. Gender (OR 1.85, 95% CI 1.02 to 3.34), residence (OR 3.23, 95% CI 1.23 to 8.53) and endoscopy in the previous year (OR 2.79, 95% CI 1.13 to 6.90) were associated with Communication. Body mass index (BMI; OR 5.06, 95% CI 1.40 to 18.25) and health self-assessment (OR 2.09, 95% CI 1.12 to 3.88) were associated with financial aspects. Gender (OR 1.90, 95% CI 1.07 to 3.38), residence (OR 3.19, 95% CI 1.30 to 7.79), BMI (OR 5.26, 95% CI 1.14 to 24.34) and health self-assessment (OR 2.14, 95% CI 1.06 to 4.34) were associated with time spent with doctor. Gender (OR 1.64, 95% CI 1.04 to 2.60) and residence (OR 3.17, 95% CI 1.46 to 6.88) were associated with convenience and accessibility.

Conclusion There was heterogeneity across the dimensions of satisfaction with rural upper gastrointestinal cancer screening. Project manager should prioritise improving the aspects related to the convenience and accessibility dimension. Furthermore, to improve the efficiency of potential interventions, the predictors of the various dimensions should be considered.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This is the first multicentre study in China to assess the satisfaction with screening for upper gastrointestinal cancer in rural areas.

⇒ We conducted a preliminary study, using the well-established Patient Satisfaction Questionnaire-18, to identify the shortcomings of screening services and provide a new perspective for cancer screening research.

⇒ The results may not be generalisable to the entire country because of the differences in medical resources, service capacity, and organisational capability and the small sample size.

⇒ This study used only quantitative data to assess screening quality and lacked qualitative information.

⇒ This study did not assess the functional quality of the screening promotion and follow-up phases.

BACKGROUND

Gastric cancer (GC) and oesophageal cancer (OC) are common upper gastrointestinal malignant tumours that burden individuals, families and societies, and consume enormous economic and medical resources.[1–3] According to GLOBOCAN 2020, in 2020, an estimated 19.3 million new cancer cases and nearly 10 million cancer deaths occurred worldwide, and that nearly half (49.3%) of the new cancer cases and 58.3% of the cancer deaths occurred in Asia.[3] China accounts for 24% of the new cancer cases and 30% of the cancer deaths that occur worldwide.[4] Globally, in terms of incidence, GC and OC rank fifth and seventh, respectively, and in terms of mortality, they are ranked fourth and sixth, respectively.[3] Over the past 40 years, the cancer burden in China has increased significantly and become one of the leading

causes of death. Cancer mortality in the population increased from 10.1% in 1973–1975 to 24.2% in 2015, with GC and OC being the leading malignancies.[5] In China, in 2015, it was estimated that, regarding incidence and mortality, GC ranked second (29.31/10 0000) and third (21.16/10 0000), respectively, while OC ranked sixth (17.87/10 0000) and fourth (13.68/10 0000), respectively.[6]

Despite the persistently high incidence and mortality rates of cancer in China, evidence has shown that cancer is preventable and treatable.[6 7] China has adopted a series of cancer prevention and control measures based on international experience and national situations.[8–10] One of these is the rural Early Diagnosis and Treatment of Upper Gastrointestinal Cancer Project (EDTUGCP). Various studies have reported that screening can detect some precancerous lesions and early stage cancer and thereby, reduce the incidence and mortality of upper gastrointestinal cancer (UGC), with good results and benefits among the population.[11 12] A multicentre study showed that the detection rate of positive cases of UGC in endoscopic screening was 1.4% (0.7% for OC and 0.8% for GC), and the early detection rate was 82.6%.[13] Evidence from UGC screening results in Yangzhong city, 2006–2012, showed that extensive endoscopic screening could detect early OC and GC and improve patient prognosis.[14] Similarly, a multicentre cohort study demonstrated a 23% reduction in the incidence and a 57% reduction in the mortality of UGC in the screening group compared with the control group.[15] Further, a lower cumulative OC incidence and mortality were associated with screening.[16]

During screening, electronic endoscopes are used to visualise the oesophagus, cardia, stomach, and duodenum and to perform standardised biopsies of lesions to identify and treat upper gastrointestinal lesions.[8 17] These procedures may be invasive and cause discomfort. Furthermore, since screening involves a series of procedures such as registration, information surveys, health education and preparation, it results in low compliance.[11] As is known, patient satisfaction reflects patients' subjective feelings about the quality of medical services and is an essential indicator of quality improvement.[18] It affects clinical processes, patient outcomes and adherence to consultation and follow-up.[18 19] Similarly, if participants are satisfied with the functional quality of the screening service (technical quality, content and attitude of communication, time spent with doctors and waiting time, etc), it will increase the probability of following up and positively impact health-seeking behaviour. For other potential participants, a good word-of-mouth effect will increase the rate of screening participation, ultimately optimising the generation and sustainability of the benefits of screening. Hence, it is necessary to assess participants' satisfaction regarding understanding their access to various aspects of the existing service. These valuable data can serve as a point of reference for improving the functional quality of the current UGC screening services, the benefits of which include improved adherence to screening, medical advice and follow-up, and are also highly informative for improving future screening design.

Therefore, our project team successively applied the Service Quality Questionnaire and Patient Satisfaction Questionnaire (PSQ-18) to evaluate the functional quality of rural UGC screening services.[20] This study aimed to assess participants' satisfaction with the screening services from their perspective using the PSQ-18 scale and to explore the potential factors that are associated with different quality dimensions.

METHODS
Study design and settings
The EDTUGCP is a national funded project to identify residents with risk factors, precancerous lesions and early stage cancer in the rural high-risk for UGC group through screening. Targeted life or clinical interventions will be provided to reduce the incidence and mortality of UGC in local areas.[8 10 11]

In brief, targeted residents in rural areas at a high risk for UGC were invited to voluntarily participate in UGC screening. Screening services and corresponding medical advice are free at screening centres, however, specific interventions are not free of charge (eg, costs of medication, surgery and radiotherapy). All permanent residents (men and women) aged 40–69 years in the selected rural high-risk areas were invited to the local screening centres and signed an informed consent form prior to participating in the study. The exclusion criteria included non-target groups and all physical conditions unsuitable for endoscopy and pathological biopsies, such as severe heart disease, heart failure and severe respiratory disease.[17] All recruitment, procedures and diagnostic criteria followed a uniform technical protocol.[8 17] The screening programme consists of phase 1 (screening mobilisation), phase 2 (on-site screening: signing of informed consent forms, screening registration, physical examination, epidemiological investigation, endoscopy+biopsy pathology and treatment recommendations), phase 3 (regular follow-up) and health education during these processes. The UGC screening mentioned in this study refers to 'phase 2' and health education.

A cross-sectional questionnaire-based study was conducted between 4 December 2021 and 31 December 2021 among the population screened for UGC at screening centres in seven cities across five provinces in China.

These centres were located in Taixing (Quxia, Binjiang and Xuanbao Health Centre), Yangzhong (Yangzhong People's Hospital) and Huai'an (PingQiao and Fuxing Health Centre) in Jiangsu Province; Cixian (Cixian Cancer Hospital) in Hebei Province; Feicheng City (People's Hospital of Feicheng) in Shandong Province, Yanting County (Yanting County Cancer Hospital) in Sichuan Province and Yangcheng County (Yangcheng County Cancer Hospital) in Shanxi Province.

Sample size calculation

With a 95% CI, 5% margin of error and 89% overall participant satisfaction, the required sample size was calculated to be at least 170 using PASS V.11. Finally, we recruited 438 participants during the study period to compensate for the non-response rate, sampling error and sample estimation error (caused by inaccurate reference to satisfaction). The satisfaction rate for the sample estimation came from three similar Chinese studies on cancer screening (mean)[21–23] because more recent satisfaction data from UGC screening services were unavailable.

Patient recruitment

After completing the screening, all the participants from the screening registration were considered to be potential participants. The potential participants, who woke up naturally in the awakening room within 30–60 min after painless endoscopy, were invited to participate in the UGC screening satisfaction survey. After confirming that the participants had regained consciousness and mobility, the satisfaction questionnaires were distributed by the staff.

Data collection

A three-part screening satisfaction questionnaire was used to collect the data. The first part consisted of basic information regarding the participants, including sociodemographic characteristics (gender, age, residence, marital status, education, occupation and average monthly income). Health-related variables, such as body mass index (BMI),[24] health self-assessments, common chronic diseases, family history of cancer, endoscopy in the previous year, screening purpose and distance from the screening centre, were also collected (see online supplemental table 1 for sources and definitions of BMI, common chronic disease and endoscopy in the previous year).

The second part was a slightly modified version of the satisfaction scale based on the PSQ-18, with good reliability and internal consistency (Standard PSQ, see online supplemental table 2).[25 26] The English version of the PSQ-18 was translated into Chinese by a masters-level student and then translated back into English by another masters-level student to maintain content consistency. The Delphi method evaluated its content validity and face validity by involving five specialists (one clinical specialist, one hospital administrator, one statistician and two epidemiologists) and two resident representatives to ensure that the questionnaire was applicable to the general population. The scale's reliability was above 0.75, as checked by a pretest among 20 participants implemented in Yangzhong People's Hospital. Although screening for UGC is provided freely, there may be additional costs (such as transportation, time and opportunity costs). Hence, the financial aspects of satisfaction were included in the questionnaire. Accordingly, 18 items regarding seven dimensions (General Satisfaction, Technical Quality, Interpersonal Manner, Communication,

Financial Aspects, Time Spent With Doctor and Convenience and Accessibility) were included in the final questionnaire. Each satisfaction-related question had five options, ranging from 'strongly agree' to 'strongly disagree'. Some questions were reversed, and after reverse scoring, each option represented a score ranging from one to five, where five represents the highest satisfaction and one represents the poorest.

The third part contains complementary questions regarding family adherence and screening fidelity, which we did not focus on in this manuscript. Approximately 10–15 min would be required to complete each survey. If the participants were illiterate and unable to complete the questionnaire independently, they were interviewed one-on-one by an investigator from the project team without any advice. Notably, the entire investigation process and the involved investigators were confidential to the staff of the screening centre, as required, and the survey was conducted in separate rooms. Furthermore, the investigators reviewed all questionnaires, and if there were any deficiencies, additional surveys were conducted to ensure the integrity and validity of the data.

Statistical analysis

Descriptive statistics described the variables as mean±SD (M±SD), frequency and percentage, where appropriate, using SPSS V.17. We first calculated M and SD and the percentage of satisfaction and dissatisfaction for each item on the PSQ-18 separately. Next, we averaged the items' scores within the same dimension to create a dimensional score and described it (based on the prescribed guide for analysing the PSQ-18 (online supplemental table 3). Finally, we defined satisfaction scores of different dimensions of 1–2.99 as unsatisfactory, 3–3.99 as neutral and 4–5 as satisfactory. All the variables were included in the ordinal logistic regression model analysis to explore independent factors associated with satisfaction in different dimensions. The results were reported as adjusted ORs (AOR) and their corresponding 95% CIs. A two-sided p<0.05 was considered statistically significant.

Patient and public involvement

Patients and the public were not involved in our research design, conduct, reporting or dissemination plans. Two resident representatives were involved in the revision and feedback of the questionnaire. The findings will be reported to the local disease control departments to provide auxiliary information for optimising the quality of cancer screening.

RESULTS
Basic information of the participants

Of the 452 residents who were screened for UGC during the survey period, 438 participants completed the questionnaire (response rate of 96.90%). Their sociodemographic and health-related characteristics are presented in table 1. Of the participants, more than half (50.9%)

Table 1 Sociodemographic and health-related characteristics of the participants

Characteristics (n=438)	Frequency (%)
Gender	
Male	223 (50.9)
Female	215 (49.1)
Age group (years)	
40–49	82 (18.7)
50–59	179 (40.9)
60–69	177 (40.4)
Residence	
Rural	393 (89.7)
Urban	45 (10.3)
Marital status	
Currently married	409 (93.4)
Others*	29 (6.6)
Education	
Primary school and below	184 (42.0)
Junior high school	189 (43.2)
High school and above	65 (14.8)
Occupation	
Farmer	250 (57.1)
Worker	53 (12.1)
Homemaker	47 (10.7)
Others†	88 (20.1)
Average monthly income (CNY)	
≤999	138 (31.5)
1000–2999	184 (42.0)
3000–4999	80 (18.3)
≥5000	36 (8.2)
BMI (M±SD)	23.9±2.9
Normal weight or underweight	234 (53.4)
Overweight	170 (38.8)
Obese	34 (7.8)
Health self-assessment	
Excellent	165 (37.7)
Better	173 (39.5)
General and below	100 (22.8)
Common chronic diseases‡	
Yes	191 (43.6)
No	247 (56.4)
Family history of cancer	
Yes	273 (62.3)
No	165 (37.7)
Endoscopy in the previous year	
Yes	104 (23.7)
No	334 (76.3)

Continued

Table 1 Continued

Characteristics (n=438)	Frequency (%)
Screening purpose	
Medical examination	379 (86.5)
Disease review	59 (13.5)
Distance from the screening centre (min)	
≤30	95 (21.7)
30–60	272 (62.1)
≥60	71 (16.2)

*Unmarried, divorced, widowed and separated.
†Administrative and management personnel, professional and technical personnel (doctors, teachers, technical personnel, sales and service personnel, private owners, retired/retired and not easily classified.
‡Hypertension, hyperlipidaemia, diabetes or some common digestive disorders such as gastroenteritis, gastric/duodenal ulcers, oesophagitis, hepatitis.
BMI, body mass index.

were male, 40.9% were aged 50–59 years, 89.7% lived in rural areas, 93.4% were currently married, 43.2% had an educational level of junior high school, 57.1% were farmers and 42.0% had an average monthly income between CNY1000 and CNY2999 CNY. The participants' mean BMI was 23.9 (SD±2.9), with most (53.4%) being normal weight or underweight. Additionally, 39.5% reported their health status as better, 43.6% reported that they had common chronic diseases, 62.3% had a family history of cancer, 23.7% had an endoscopy in the previous year, 86.5% attended a screening for a medical examination, and most of them (62.1%) took 30–60 min to reach the screening centre.

The participants' screening satisfaction in the seven dimensions

The descriptive statistics of the satisfaction level, segregated by each item of the PSQ-18, are summarised in table 2. Regarding the items pertaining to general satisfaction, the majority (98.17%) reported that the UGC screening and related services they had been receiving were just about perfect. The item 'sometimes doctors and screening staff make me wonder if their diagnosis is correct' received the lowest level (82.42%) in the technical quality dimension. Furthermore, regarding interpersonal manner, 415 (94.75%) participants reported that their doctors and screening staff treated them in a very friendly and courteous manner. The satisfaction level for items pertaining to Communication ranged from 84.25% to 95.66%. Of the participants, 87.90% reported that they felt confident that they could receive the required screening and related services without being financially burdened. Regarding the time spent with doctor, approximately 92.46% of the participants reported that the doctors and screening staff usually spent sufficient with them. The percentage of satisfaction with the accessibility and convenience items ranged from 71.24% to 93.61%.

Table 2 Participants' screening satisfaction segregated by each item in the PSQ-18

Item	Question	Unsatisfactory (disagree or strongly disagree)	Neutral	Satisfactory (agree or strongly agree)	Mean	SD
1	Doctors and screening staff are good at explaining the reasons for UGC screening and related services.	3 (0.68)	16 (3.65)	419 (95.66)	4.45	0.60
2	I think the screening centre has everything that is needed to provide complete UGC screening and related services.	0 (0.00)	15 (3.42)	423 (96.58)	4.51	0.57
3	The UGC screening and related services I have been receiving are just about perfect.	0 (0.00)	8 (1.83)	430 (98.17)	4.70	0.50
4	Sometimes doctors and screening staff make me wonder if their diagnosis is correct.*	361 (82.42)	22 (5.02)	55 (12.56)	3.78	1.04
5	I feel confident that I can get the required screening and related services without being financially burdened.	24 (5.47)	29 (6.62)	385 (87.90)	4.32	0.85
6	When I go for UGC screening, they are careful to check everything when treating, educating and examining me.	2 (0.46)	12 (2.74)	424 (96.80)	4.45	0.58
7	I have to pay more than I can afford for my UGC screening and related services.*	352 (80.37)	31 (7.08)	55 (12.56)	3.94	1.12
8	I have easy access to the medical specialists and screening staff that I need.	2 (0.46)	26 (5.94)	410 (93.61)	4.33	0.61
9	Where I get UGC screening and related services, people have to wait an extremely long time before doctors and related screening staff arrive.*	317 (72.38)	66 (15.07)	55 (12.56)	3.62	0.98
10	Doctors and screening staff act overly business-like and impersonal towards me.*	386 (88.13)	33 (7.53)	19 (4.33)	4.11	0.74
11	My doctors and screening staff treat me in a very friendly and courteous manner.	0 (0.00)	23 (5.25)	415 (94.75)	4.46	0.60
12	Those who provide my UGC screening and related service sometimes very hurried when they treat, educate and examine me.*	375 (85.62)	21 (4.79)	42 (9.59)	3.84	0.94
13	Doctors and screening staff sometimes ignore what I tell them.*	369 (84.25)	22 (5.02)	47 (10.73)	3.85	1.00
14	I have some doubts about the ability of the doctors and screening staff who treat, educate and examine me.*	376 (85.85)	16 (3.65)	46 (10.50)	3.87	1.02

Continued

Table 2 Continued

Item	Question	Unsatisfactory (disagree or strongly disagree)	Neutral	Satisfactory (agree or strongly agree)	Mean	SD
15	Doctors and screening staff usually spend sufficient with me	6 (1.37)	27 (6.16)	405 (92.46)	4.32	0.67
16	I find it difficult to immediately get an appointment for UGC screening and related services.*	312 (71.24)	62 (14.16)	64 (14.61)	3.60	1.00
17	I am dissatisfied with some things pertaining to the UGC screening and related service that I receive.*	417 (95.21)	19 (4.34)	2 (0.46)	4.24	0.55
18	I am able to get the UGC screening and related services whenever I need them.	6 (1.37)	36 (8.22)	396 (90.41)	4.34	0.69

Scoring of all the items range from 1 to 5, with 1 representing strongly dissatisfied, and 5 representing strongly satisfied.
*Negatively worded item which needs reverse postscore evaluation.
PSQ-18, Patient Satisfaction Questionnaire-18; UGC, upper gastrointestinal cancer.

Table 3 shows the mean satisfaction scores and percentage of satisfaction for the seven dimensions. General satisfaction had the highest satisfaction rate (95.89%) with a mean score of 4.47±0.44. Whereas convenience and accessibility had the lowest satisfaction rate (66.44%). Of the participants, 88.36% were satisfied with the interpersonal manner dimension, followed by communication (83.56%), time spent with doctor (82.19%), technical quality (79.68%) and financial aspects (75.11%).

Factors associated with the seven dimensions of screening satisfaction

Table 4 summarises the associations between the participants' sociodemographic and health-related characteristics and the seven dimensions of screening satisfaction. Participants with excellent health (AOR 6.43; 95% CI 1.47 to 28.05), better health (AOR 15.29; 95% CI 2.86 to 81.78) and a family history of cancer (AOR 4.20; 95% CI 1.29 to 13.71) were more likely to be satisfied compared with their counterparts. In addition, participants with an education level of junior high school (AOR 0.25; 95% CI 0.07 to 0.90) were less likely to be satisfied than those with primary school and below in the general satisfaction dimension. The odds of rural participants being satisfied were nearly four times that of urban participants (AOR 4.31; 95% CI 1.89 to 9.81) in the technical quality dimension. Farmers (AOR 0.27; 95% CI 0.08 to 0.88) and participants with the purpose of medical examination (AOR 0.18; 95% CI 0.03 to 0.92) were less likely to be satisfied than their counterparts. Participants with health self-assessment of excellent (AOR 2.67; 95% CI 1.09 to 6.55) and better (AOR 11.30; 95% CI 3.94 to 32.43)

Table 3 Mean satisfaction scores and percentage of satisfaction for the seven dimensions of the PSQ-18

Satisfaction dimension	Total mean of each dimension	Mean of satisfaction scales*	SD of satisfaction scales	Satisfaction (%)†	Rank
General satisfaction (item 3+17)	8.94	4.47	0.44	95.89	1
Technical quality (item 2+4+6+14)	16.6	4.15	0.57	79.68	5
Interpersonal manner (item 10+11)	8.57	4.28	0.59	88.36	2
Communication (item 1+13)	8.30	4.15	0.60	83.56	3
Financial aspects (item 5+7)	8.26	4.13	0.76	75.11	6
Time spent with doctor (item 12+15)	8.17	4.08	0.59	82.19	4
Convenience and accessibility (item 8+9+16+18)	15.88	3.97	0.54	66.44	7

The mean and SD of the seven dimensions were calculated based on the guidelines for the PSQ-18 (see online supplemental table 3).
*Average of the mean from component items.
†The percentage of satisfaction was the proportion of scores greater than or equal to four for each scale.
PAQ-18, Patient Satisfaction Questionnaire-18.

Table 4 Ordinal logistic regression analysis of the variables related to the seven dimensions of screening satisfaction

Satisfaction dimension	Explanatory variables	AOR*†	95% CI		P value
General satisfaction					
	Education: junior high school	0.25	0.07	0.90	0.034‡
	Health self-assessment: excellent	6.43	1.47	28.05	0.013‡
	Health self-assessment: better	15.29	2.86	81.78	0.001§
	Family history of cancer: yes	4.20	1.29	13.71	0.017‡
Technical quality					
	Residence: rural	4.31	1.89	9.81	0.001§
Interpersonal manner					
	Occupation: farmer	0.27	0.08	0.88	0.030‡
	Health self-assessment: excellent	2.67	1.09	6.55	0.032‡
	Health self-assessment: better	11.30	3.94	32.43	0.000¶
	Purpose of screening: medical examination	0.18	0.03	0.92	0.039‡
	Distance from the screening centre: less than 30 min	4.59	1.35	15.61	0.015‡
	Distance from the screening centre: 30–60 min	2.32	1.04	5.16	0.040‡
Communication					
	Gender: male	1.85	1.02	3.34	0.043‡
	Residence: rural	3.23	1.23	8.53	0.018‡
	Endoscopy in the previous year: yes	2.79	1.13	6.90	0.027‡
Financial aspects					
	BMI: obese	5.06	1.40	18.25	0.013‡
	Health self-assessment: better	2.09	1.12	3.88	0.020‡
Time spent with doctor					
	Gender: male	1.90	1.07	3.38	0.028‡
	Residence: rural	3.19	1.30	7.79	0.011‡
	BMI: obese	5.26	1.14	24.34	0.033‡
	Health self-assessment: better	2.14	1.06	4.34	0.034‡
Convenience and accessibility					
	Gender: male	1.64	1.04	2.60	0.033‡
	Residence: rural	3.17	1.46	6.88	0.004§

*ORs were obtained after adjusting for gender, age, residence, marital status, education, occupation, average monthly income, BMI, health self-assessment, common chronic diseases, family history of cancer, endoscopy in the previous year, screening purpose and distance from the screening centre.
†The reference adopted in the ordinal logistic regression was female for gender, 60–69 years for age, urban for residence, others for marital status, primary school and below for education, others for occupation, 5000 and above for average monthly income, normal weight or underweight for BMI, general and below for health self-assessment, no for common chronic diseases, no for family history of cancer, no for endoscopy in the previous year, disease review for screening purpose and more than 60 min for distance from the screening centre.
‡P<0.05.
§P<0.01.
¶P<0.001.
AOR, adjusted OR; BMI, body mass index.

and those whose distance from the screening centre was less than 30 min (AOR 4.59; 95% CI 1.35 to 15.61) and 30–60 min (AOR 2.32; 95% CI 1.04 to 5.16) were more likely to be satisfied compared with their counterparts in the interpersonal manner dimension. Male participants (AOR 1.85; 95% CI 1.02 to 3.34), rural participants (AOR 3.23; 95% CI 1.23 to 8.53) and participants who underwent endoscopy in the previous year (AOR 2.79; 95% CI 1.13 to 6.90) were more likely to be satisfied than their counterparts in the communication dimension. Participants with obesity (AOR 5.06; 95% CI 1.40 to 18.25) and a health self-assessment of better (AOR 2.09; 95% CI 1.12 to 3.88) were more likely to be satisfied than their counterparts in the financial aspects dimension. Male (AOR 1.90; 95% CI 1.07 to 3.38), rural (AOR 3.19; 95% CI 1.30 to 7.79), obese (AOR 5.26; 95% CI 1.14 to 24.34) participants and those with better health self-assessment (AOR 2.14; 95% CI 1.06 to 4.34) were more likely to be satisfied

than their respective counterparts in the time spent with doctor dimension. Male (AOR 1.64; 95% CI 1.04 to 2.60) and rural participants (AOR 3.17; 95% CI 1.46 to 6.88) were more likely to be satisfied than their counterparts in the convenience and accessibility dimension.

DISCUSSION

Our study evaluated participant satisfaction with rural EDTUGCP-funded UGC screening and its influencing factors. Nearly 96% of the participants were satisfied with the General Satisfaction dimension, which was the highest among the seven dimensions. However, the percentage of satisfaction was lower in the technical quality, financial aspects, and convenience and accessibility dimensions. Additionally, several sociodemographic and health-related factors were associated with the different dimensions of satisfaction.

Our study observed that the participants' satisfaction with the general satisfaction dimension was high (95.89%), with a score of 4.47±0.44, concluding that the services provided by the screening centres met participants' expectations. More clinical and professional support and praise from managers should be provided to UGC screening practitioners. Such support and praise can improve their job satisfaction and help maintain the participants' high satisfaction level or directly result in high-quality screening services.[27–29] Mazlan *et al* and Alhumud *et al* found that the score in general satisfaction dimension of their screening programmes was 3.93 and 4.28, respectively, which is lower than our findings.[30 31] Recent studies in Australia and Nepal showed that 85.2% and 38.9% of the participants were satisfied with their respective services in general satisfaction dimension, which is also lower than ours.[32 33] Although the findings varied across studies, overall, participants' satisfaction with the general satisfaction dimension was high in our study. The difference may be due to the heterogeneity of the services, target population and the service providers included in the studies. Furthermore, it may also be due to the preponderance of the participants from rural areas, who usually have lower expectations than the urban ones.[20]
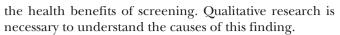
The percentages of satisfaction with the interpersonal manner and communication dimensions were 88.36% and 83.56%, respectively, which ranked second and third, respectively. Ifediora and Rogers reported that among patients who received home-visit services, 75.7% and 87.3% were satisfied with the same dimensions of satisfaction.[32] Furthermore, another study reported that of the 204 patients, 92.16% and 77.44%, respectively, were satisfied.[33] Additionally, Poudel *et al* found that the percentages of satisfaction were 85.74% and 79.25%, respectively, which are slightly lower than our findings.[34] Our findings indicate that our screening staff treated the participants in an amiable and courteous manner and explained the reasons for UGC screening and related services. This can be verified by the fact that approximately 88.13% of the participants disagreed that the doctors and screening staff acted in an overly business-like and impersonal manner towards them. In addition, 95.66% of the participants agreed that the doctors and related screening staff were good at explaining the reasons for UGC screening and related services.

This study also found that 82.19% of the participants were satisfied with the time spent with doctor dimension, which is higher than that of others.[32–34] This is a welcome discovery, given that previous studies reported that 'doctors spent enough time with patients' was a variable that positively impacted patient satisfaction.[35 36] However, this finding differs from the national situation, where the time for doctor–patient communication is shortened due to the uneven distribution of medical resources and a general increase in the demand for medical services.[37 38] The reasons for our finding may be that only a moderate number of participants are invited to the screening each day after considering each centre's screening capacity. Moreover, all staff involved in the screening attended training that is regularly organised by the EDTUGCP specialist group to improve the quality of the service processes.[8 24 39]

In addition, we noted that the satisfaction rate with technical quality was 79.68%. Satisfaction with this dimension among patients in other studies was 82.1%, 70.09% and 78.93%, respectively, suggesting that the satisfaction found in this study was at a medium level.[32–34] On the one hand, this may be because the health facilities undertaking screening are mainly secondary hospitals, aiming to improve the accessibility and sustainability of screening. However, according to the Chinese perception, the technical levels of secondary hospitals are far lower than those of tertiary hospitals.[37] On the other hand, screening centres are located in areas where the people are at a high risk for UGC and have had screening programmes for many years, causing the participants to have some confidence related to the technical aspect.

Regarding the financial aspect, participants' satisfaction was only 75.11%. This was a surprising finding, as the series of services for screening were free of charge because of subsidies from EDTUGCP funding and the local governments matching the funds.[39] Costs were incurred only when therapeutic interventions or indirect materials were required. For instance, towels are used for mouth hygiene during endoscopy. Moreover, residents need to use public transport to travel to the screening centres, which may cost some transportation fees. However, these costs are usually relatively low, and do not pose an enormous financial burden. We believe that our findings may be related to the opportunity costs of screening. The participants were not advised to engage in heavy manual labour for the next 3 days to prevent bleeding at the biopsy site. This may affect attendance and labour efficiency, affecting their income, especially for rural residents who are predominantly manual labourers. In addition, most rural residents generally have poor health literacy[40] and may consider the loss of income to be more important than

the health benefits of screening. Qualitative research is necessary to understand the causes of this finding.

Furthermore, of the seven dimensions, the convenience and accessibility dimension had the lowest satisfaction rate (66.43%), which is consistent with other studies.[32–34] Many factors can contribute to low satisfaction levels. First, if residents want to be candidates for appointments, they must wait on a village-by-village basis because the target population for UGC screening is chosen through cluster sampling.[8 24 39] Second, residents eligible for screening must undergo the necessary appointment-related process before the screening. Hence, the screening centres do not accept individual applications, and 14.61% of the participants agreed that they found it difficult to immediately get an appointment for UGC screening and related services. Third, residents participating in the daily screening are required to complete the screening registration to receive the services. Furthermore, it is impossible to guarantee immediate access to services for all the participants. Approximately 12.56% of the participants agreed that people had to wait for an extremely long time before the doctors and screening staff arrived. Therefore, optimising the screening appointment mechanism, simplifying the screening process and improving the efficiency of the screening's execution are necessary to optimise the satisfaction with this dimension.

We found that male participants were more likely to be satisfied with the communication, time spent with doctor, and convenience and accessibility dimensions, which is consistent with Danielsen et al[41] and Quintana et al's studies.[42] The most likely reason is that, in rural areas, men's socioeconomic status is higher than that of women; leading to advantages in communication skills, understanding, access to healthcare and health literacy,[41 43 44] which contributed to male participants' perceptions of the quality. However, studies in Australia[32] and Nepal[33] reported contrasting findings, suggesting heterogeneity in the relationship between gender and satisfaction.

In our study, rural participants were more likely to be satisfied with the technical quality, communication, time spent with doctor, and convenience and accessibility dimensions, which may be due to lower expectations.[20] Contrastingly, we also found that participants with an education level of junior high school were less likely to be satisfied than those with an education level of primary school and below with the general satisfaction dimension, which can be understood as higher expectations.[41 45] Further, we found that farmers were less likely to be satisfied with the interpersonal manner, which reminds us to pay attention to the service attitude when communicating with farmers and improving the non-technical ability training among screening staff.

This study revealed that obese participants were more likely to be satisfied with the financial aspects and time spent with doctor. A nationally representative survey which included 9914 patients had the same results.[46] However, a tertiary care academic medical centre study and Burgio et al reported no significant association between BMI and patient satisfaction.[47 48] The high financial satisfaction of obese participants may be attributed to the public welfare nature of screening compared with their day-to-day medical care. Moreover, it is unclear why obese participants reported more satisfaction with the time spent with doctor. Further studies are needed to explore this, particularly concerning the impact of different BMI levels on the different dimensions of satisfaction and the mechanisms of their influence. This evidence may provide insights into our findings.

We also found that good health self-assessment was positively associated with four dimensions (general satisfaction, interpersonal manner, financial aspects and time spent with doctor). It was one of the strongest predictors of screening satisfaction, which is consistent with the findings of a systematic review.[49] Specifically, participants with excellent or better health self-assessments were more likely to be satisfied. Similarly, participants with a family history of cancer were more likely to be satisfied with the general satisfaction dimension. Residents who believe that they are in good health and have a family history of cancer may be more concerned about managing their health. Participating in this free UGC screening will help clarify their UGC health status and allay their worries, which is highly cost-effective. In contrast, those who rated their health as general and below may have some symptoms of discomfort. Unfortunately, the primary goal of this screening process is the prevention and detection of UGC. Therefore, only some advice on treating UGC can be obtained, which may not match their expectations.

In our study, the participants who travelled less than 60 min to reach the screening centre were more likely to be satisfied with the interpersonal manner, which is consistent with a study from Australia.[32] The shorter travel time suggests that these residents may be from urban areas and be of a higher socioeconomic status, contributing to a better understanding of screening limitations.[33] This finding reinforces the urgency and importance of improving service attitudes towards rural residents. Meanwhile, the participants who underwent endoscopy in the previous year and participated in screening for the purpose of the disease review were more satisfied with the communication and interpersonal manner dimension, respectively. This is due to the regularity of visiting the screening centres and independent screening systems. A study conducted in Saudi Arabia demonstrated that the more patients visit medical centres, the higher their satisfaction is.[50] In addition, compared with routine outpatient endoscopy, UGC screening has separate screening clinics and a moderate number of clients per day, which may improve perceptions.

Despite being a multicentre study, there were some limitations. First, our study's sample size was small and the duration was short. Therefore, future studies should consider having a larger sample size and should preferably last for a minimum of 6–12 months. Second, our findings cannot be generalised to the entire country because of the differences in the availability of medical resources,

study populations and level of screening services. In addition, our study only applied the PSQ-18 as a survey tool; therefore, participants' satisfaction may not be completely and meticulously understood. Additionally, the PSQ-18's translation may affect the study's findings due to the different cultural backgrounds, language habits and understanding. Third, we only explored screening satisfaction using quantitative data, and therefore, to gain an in-depth understanding of satisfaction needs qualitative research is also required.

CONCLUSION

We concluded that the satisfaction with UGC screening among the participants was highest in the general satisfaction dimension and lowest in the convenience and accessibility dimension, followed by financial aspects and technical quality dimensions. Gender, residence, education, occupation, BMI, health self-assessment, family history of cancer, endoscopy in the previous year, screening purpose and distance from the screening centre were associated with different dimensions of satisfaction, with residence and health self-assessment being the strongest predictors. Policy-makers and project managers should take appropriate measures to optimise the dimensions with low satisfaction. Furthermore, this study highlights the importance of improving interventions by focusing on influencing factors across multiple dimensions of satisfaction.

Author affiliations
[1]Institute of Tumour Prevention and Control, People's Hospital of Yangzhong, Yangzhong, Jiangsu, China
[2]Department of Gastroenterology, Southeast University Zhongda Hospital, Nanjing, Jiangsu, China
[3]Department of Chronic Disease Prevention and Control, Taixing Center for Disease Prevention and Control, Taixing, Jiangsu, China
[4]Cancer Center, People's Hospital of Feicheng, Tai'an, Shandong, China
[5]Department of Cancer Prevention, Yanting County Cancer Hospital, Mianyang, Sichuan, China
[6]Prevention and Control, Cixian Institute for Cancer, Handan, Hebei, China
[7]Scientific Research Office, Yangcheng County Cancer Hospital, Jincheng, Shanxi, China
[8]Department of Chronic Diseases Prevention and Control, Huai'an District Center, Huai'an, Jiangsu, China
[9]Department of Non-Communicable Disease Prevention, Jiangsu Provincial Center for Disease Control and Prevention, Nanjing, Jiangsu, China

ORCID iD
Xiang Feng http://orcid.org/0000-0001-8997-6381

REFERENCES

1 Ferlay J, Shin H-R, Bray F, *et al*. Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *Int J Cancer* 2010;127:2893–917.
2 Crew KD, Neugut AI. Epidemiology of gastric cancer. *World J Gastroenterol* 2006;12:354–62.
3 Sung H, Ferlay J, Siegel RL. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* 2021;4.
4 Cao W, Chen H-D, Yu Y-W, *et al*. Changing profiles of cancer burden worldwide and in China: a secondary analysis of the global cancer statistics 2020. *Chin Med J* 2021;134:783–91.
5 Wei W, Zeng H, Zheng R, *et al*. Cancer registration in China and its role in cancer prevention and control. *Lancet Oncol* 2020;21:e342–9.
6 Zheng RS, Sun KX, Zhang SW, *et al*. [Report of cancer epidemiology in China, 2015]. *Zhonghua Zhong Liu Za Zhi* 2019;41:19–28.
7 World Health Organization. Preventing cancer. [EB / OL].[2022-05-31]. Available: https://www.who.int/activities/preventing-cancer
8 Chen R, Ma S, Guan C, *et al*. The National cohort of esophageal Cancer-Prospective cohort study of esophageal cancer and precancerous lesions based on high-risk population in China (NCEC-HRP): study protocol. *BMJ Open* 2019;9:e027360.
9 Byers T, Wender RC, Jemal A, *et al*. The American Cancer Society challenge goal to reduce US cancer mortality by 50% between 1990 and 2015: Results and reflections. *CA Cancer J Clin* 2016;66:359–69.
10 Cao MM, Chen WQ, Screening C. Early diagnosis and early treatment help to safeguard health and prosperity for all. *China cancer* 2020;29:641–3.
11 Wang GQ, Wei WW. [A new transition of the screening, early diagnosis and early treatment project of the upper gastrointestinal cancer: opportunistic screening]. *Zhonghua Yu Fang Yi Xue Za Zhi* 2019;53:1084–7.
12 Feng X, Hua ZL, Qian DF, *et al*. [Cost-effectiveness and cost-benefit analysis of upper gastrointestinal cancer screening in Yangzhong City, Jiangsu Province, from 2009 to 2015]. *Zhonghua Yu Fang Yi Xue Za Zhi* 2019;53:1115–8.
13 Zeng H, Sun K, Cao M, *et al*. Initial results from a multi-center population-based cluster randomized trial of esophageal and gastric cancer screening in China. *BMC Gastroenterol* 2020;20:398.
14 Zheng X, Mao X, Xu K, *et al*. Massive endoscopic screening for esophageal and gastric cancers in a high-risk area of China. *PLoS One* 2015;10:e0145097.
15 Chen R, Liu Y, Song G, *et al*. Effectiveness of one-time endoscopic screening programme in prevention of upper gastrointestinal cancer in China: a multicentre population-based cohort study. *Gut* 2021;70:251–60.
16 Liu M, He Z, Guo C, *et al*. Effectiveness of intensive endoscopic screening for esophageal cancer in China: a community-based study. *Am J Epidemiol* 2019;188:776–84.

17 DONG ZW. *China's cancer screening and early diagnosis and treatment technology program*. Beijing: People's medical publishing house, 2009.

18 Prakash B. Patient satisfaction. *J Cutan Aesthet Surg* 2010;3:151–5.

19 Huang J-A, Lai C-S, Tsai W-C, *et al*. Determining factors of patient satisfaction for frequent users of emergency services in a medical center. *J Chin Med Assoc* 2004;67:403–10.

20 Feng X, Zhu J, Hua Z, *et al*. Satisfaction in population-based cancer screening in a Chinese rural high-risk population: the Yangzhong early diagnosis and treatment of upper gastrointestinal cancer. *BMC Health Serv Res* 2022;22:675.

21 Wang JF, Wang ZW, Tan H. Surveyon women's satisfaction status of the gynecological and breast diseases screening and analysis of its supply-demand sides factors. *Chinese Journal of Woman and Child Health Research* 2020;31:1116–20.

22 Liu Y, Liu HZ, Liang YR. Survey on satisfaction for the first round colorectal cancer screening program in Guangzhou. *China Cancer* 2020;29:339–43.

23 JA L, Zhu XY, Chen DS. Survey on satisfaction of colorectal cancer screening among residents in Jinshan district, Shanghai. *Journal of Applied Preventive Medicine* 2016;22:324–6.

24 Feng X, Hua Z-L, Zhou Q, *et al*. Prevalence and coprevalence of modifiable risk factors for upper digestive tract cancer among residents aged 40-69 years in Yangzhong City, China: a cross-sectional study. *BMJ Open* 2021;11:e042006.

25 Marshall GN, Hays RD. *The Patient Satisfaction Questionnaire Short Form (PSQ-18)*. Santa Monica, CA: Rand publication, 1994.

26 Bautista RED, Glen ET, Shetty NK. Factors associated with satisfaction with care among patients with epilepsy. *Epilepsy Behav* 2007;11:518–24.

27 Ifediora CO. Quality in Australian after-hours doctor home visits: exploring the clinical, professional and security supports available to involved practitioners. *J Eval Clin Pract* 2017;23:308–15.

28 Sveinsdóttir H, Ragnarsdóttir ED, Blöndal K. Praise matters: the influence of nurse unit managers' praise on nurses' practice, work environment and job satisfaction: a questionnaire study. *J Adv Nurs* 2016;72:558–68.

29 Nurmeksela A, Mikkonen S, Kinnunen J, *et al*. Relationships between nurse managers' work activities, nurses' job satisfaction, patient satisfaction, and medication errors at the unit level: a correlational study. *BMC Health Serv Res* 2021;21:296.

30 Mazlan R, Ting TL, Mukari SZ-MS, *et al*. A questionnaire-based study on parental satisfaction with a universal newborn hearing screening program in Kuala Lumpur, Malaysia. *Int J Pediatr Otorhinolaryngol* 2014;78:348-–53.

31 Alhumud A, Al Adel F, Alwazae M, *et al*. Patient satisfaction toward a Tele-Retinal screening program in endocrinology clinics at a tertiary hospital in Riyadh, Saudi Arabia. *Cureus* 2020;12:e7986.

32 Ifediora CO, Rogers GD. Levels and predictors of patient satisfaction with doctor home-visit services in Australia. *Fam Pract* 2017;34:63–70.

33 Adhikari M, Paudel NR, Mishra SR, *et al*. Patient satisfaction and its socio-demographic correlates in a tertiary public hospital in Nepal: a cross-sectional study. *BMC Health Serv Res* 2021;21:135.

34 Poudel L, Baskota S, Mali P, *et al*. Patient satisfaction in out-patient services at a tertiary care center: a descriptive cross-sectional study. *JNMA J Nepal Med Assoc* 2020;58:301–5.

35 Etier BE, Orr SP, Antonetti J, *et al*. Factors impacting press Ganey patient satisfaction scores in orthopedic surgery spine clinic. *Spine J* 2016;16:1285–9.

36 Brignardello-Petersen R. Feeling welcomed, time spent on appointment, and receiving information were associated with patient satisfaction in highly satisfied patients from a primary care setting. *J Am Dent Assoc* 2018;149:e74.

37 Zhao D, Zhou Z, Shen C, *et al*. Rural and urban differences in patient experience in China: a coarsened exact matching study from the perspective of residents. *BMC Health Serv Res* 2021;21:330.

38 Zeng Y, Xu W, Chen L, *et al*. The influencing factors of Health-Seeking preference and community health service utilization among patients in primary care reform in Xiamen, China. *Patient Prefer Adherence* 2020;14:653–62.

39 Hua Z, Zhu J, Dai C. Early diagnosis and early treatment of cancer based on secondary hospital in Yangzhong city of Jiangsu Province. *China Cancer* 2020;29:815–9.

40 Wang W, Zhang Y, Lin B, *et al*. The urban-rural disparity in the status and risk factors of health literacy: a cross-sectional survey in central China. *Int J Environ Res Public Health* 2020;17:3848.

41 Danielsen K, Garratt AM, Bjertnaes Øyvind Andresen, *et al*. Patient experiences in relation to respondent and health service delivery characteristics: a survey of 26,938 patients attending 62 hospitals throughout Norway. *Scand J Public Health* 2007;35:70–7.

42 Quintana JM, González N, Bilbao A, *et al*. Predictors of patient satisfaction with Hospital health care. *BMC Health Serv Res* 2006;6:102.

43 Ishikawa Y, Nishiuchi H, Hayashi H, *et al*. Socioeconomic status and health communication inequalities in Japan: a nationwide cross-sectional survey. *PLoS One* 2012;7:e40664.

44 Stormacq C, Van den Broucke S, Wosinski J. Does health literacy mediate the relationship between socioeconomic status and health disparities? integrative review. *Health Promot Int* 2019;34:e1–17.

45 Zun AB, Ibrahim MI, Hamid AA. Level of satisfaction on service quality dimensions based on SERVQUAL model among patients attending 1 Malaysia clinic in Kota Bharu, Malaysia. *Oman Med J* 2018;33:416–22.

46 Fong RL, Bertakis KD, Franks P. Association between obesity and patient satisfaction. *Obesity* 2006;14:1402–11.

47 Barber EL, Bensen JT, Snavely AC, *et al*. Who presents satisfied? Non-modifiable factors associated with patient satisfaction among gynecologic oncology clinic patients. *Gynecol Oncol* 2016;142:299–303.

48 Burgio KL, Goode PS, Richter HE, *et al*. Global ratings of patient satisfaction and perceptions of improvement with treatment for urinary incontinence: validation of three global patient ratings. *Neurourol Urodyn* 2006;25:411–7.

49 Batbaatar E, Dorjdagva J, Luvsannyam A, *et al*. Determinants of patient satisfaction: a systematic review. *Perspect Public Health* 2017;137:89–101.

50 al-Qatari G, Haran D. Determinants of users' satisfaction with primary health care settings and services in Saudi Arabia. *Int J Qual Health Care* 1999;11:523–31.