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 1.14 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. Further, 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.\textsuperscript{9} 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.\textsuperscript{6}

Despite the persistently high incidence and mortality rates of cancer in China, evidence has shown that cancer is preventable and treatable.\textsuperscript{67} China has adopted a series of cancer prevention and control measures based on international experience and national situations.\textsuperscript{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.\textsuperscript{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%.\textsuperscript{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.\textsuperscript{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.\textsuperscript{15} Further, a lower cumulative OC incidence and mortality were associated with screening.\textsuperscript{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.\textsuperscript{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.\textsuperscript{11} As is known, patient satisfaction reflects patients’ subjective feelings about the quality of medical services and is an essential indicator of quality improvement.\textsuperscript{18} It affects clinical processes, patient outcomes and adherence to consultation and follow-up.\textsuperscript{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.\textsuperscript{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 through screening. Targeted life or clinical interventions will be provided to reduce the incidence and mortality of UGC in local areas.\textsuperscript{8,10} 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.\textsuperscript{17} All recruitment, procedures and diagnostic criteria followed a uniform technical protocol.\textsuperscript{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) 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), 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). 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.

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.

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%)
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%.

| 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)    |
| 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 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 0.88) 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 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 3.83), 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. 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. 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. 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.

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. Furthermore, another study reported that of the 204 patients, 92.16% and 77.44%, respectively, were satisfied. Additionally, Poudel et al found that the percentages of satisfaction were 85.74% and 79.25%, respectively, which are slightly lower than our findings. 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. 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. 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. 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.

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. 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. 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 government matching the funds. 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 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.30-34 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. 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’s studies. 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, which contributed to male participants’ perceptions of the quality. However, studies in Australia and Nepal 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. 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 44 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. However, a tertiary care academic medical centre study and Burgio et al reported no significant association between BMI and patient satisfaction. 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. 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. 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. 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. 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.

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