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Generational Differences in Healthy Eating and Gastrointestinal Symptoms: A Cross-Sectional Study From a General Surgery Outpatient Clinic

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ABSTRACT

Gastrointestinal system (GIS) symptoms are prevalent across age groups and are strongly influenced by dietary habits. Understanding how generational differences in nutrition impact GIS can inform targeted public health strategies, yet studies examining this in clinical populations remain limited. This study aimed to investigate the generational differences in Healthy Eating Index (HEI) scores and GIS symptoms in patients attending general surgery outpatient clinics. A descriptive cross-sectional study was conducted with 1100 adults at a city hospital in Türkiye. Diet quality was assessed using the Health Eating Index-2020 (HEI-2020), which ranges from 0 to 100, with higher scores indicating closer adherence to dietary guidelines. HEI scores were interpreted as poor diet quality (< 50), needing improvement (51–80), and good diet quality (> 80). Participants were classified by generation: Gen Z, Gen Y, Gen X, and Baby Boomers. GIS symptoms were categorized as upper or lower, and statistical analyses were conducted using SPSS 25.0. The mean HEI-2020 score was 46.77 ± 13.32 points, indicating poor dietary quality rather than direct evidence of inadequate nutrient intake, particularly among Gen Z and GenY. Women, married individuals, those with chronic illnesses, and urban residents had higher HEI scores. Gen Z exhibited significantly higher BMI values and more frequent lower GIS symptoms. Only in Gen Z was a significant inverse relationship observed between HEI scores and GIS symptoms ($p = 0.043$). Diet quality and GIS complaints differed across generations. Younger generations showed poorer diet quality and more frequent related symptoms. These findings may support the need for generation-specific nutrition interventions and further research on the relationship between diet quality and GIS symptoms.

1 | Introduction

Gastrointestinal system (GIS) disorders remain a major global health concern, with diet emerging as a key modifiable factor influencing both the onset and management of symptoms. The etiology of GIS disorders is multifactorial, influenced by a range of variables including dietary habits, genetic predispositions, environmental factors, and lifestyle choices [1].

Diet quality may play an important role in the development and management of gastrointestinal symptoms. While a balanced and nutritious diet may support digestive health, poor or imbalanced eating habits may trigger or exacerbate gastrointestinal complaints. Dietary interventions have been used in the management of functional gastrointestinal disorders (FGIDs), and previous evidence has shown that dietary modification, such as a low-FODMAP diet, can improve gastrointestinal symptoms in

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patients with irritable bowel syndrome (IBS) [2]. Therefore, evaluating overall diet quality may provide useful information for understanding diet-related gastrointestinal complaints in clinical populations [3]. For instance, adequate fiber intake helps regulate bowel movements and may prevent constipation and diverticulitis. However, excessive fiber consumption can cause bloating and gas in some individuals. Similarly, high-fat foods may delay gastric emptying, leading to symptoms like reflux and bloating. Managing the total fat content in the diet is essential in controlling such symptoms. Furthermore, the overconsumption of sugars and refined carbohydrates may negatively impact gut microbiota and exacerbate IBS symptoms. Excessive alcohol and caffeine intake may increase gastric acid secretion, aggravating gastritis and reflux symptoms [3].

In globalization, promoting awareness of healthy eating behaviors has become essential for maintaining public health. GIS disorders can affect different age groups in various ways. Younger individuals more frequently experience functional gastrointestinal disturbances and food sensitivities, while older adults are more prone to inflammatory bowel diseases, peptic ulcers, and gastrointestinal malignancies. Understanding the influence of generational differences on the prevalence and nature of GIS disorders requires a detailed assessment of dietary habits [4].

Individuals from different generations tend to develop distinct eating behaviors, shaped by the unique sociocultural, economic, and technological environments in which they were raised [4]. Despite mixed findings in the literature [5], older generations commonly follow traditional diets, while younger generations show a greater tendency toward processed foods, fast food, and sugary drinks [6]. These generational differences may contribute to variations in the frequency and severity of GIS symptoms, prompting the core research question of this study: *"Do the differing dietary characteristics of various generations lead to distinct GIS complaints among patients presenting to general surgery outpatient clinics?"* Although there is increasing interest in generational dietary patterns, limited studies have investigated their direct impact on GIS symptoms within clinical populations.

In recent years, tools such as the Healthy Eating Index (HEI) have become increasingly utilized to evaluate the impact of dietary habits on health outcomes. The HEI is a comprehensive index used to assess the quality of an individual's diet and its alignment with established dietary guidelines [7]. Given the direct impact of dietary behaviors on lifestyle and overall health, research in this area has gained growing significance. Notably, while generational differences in food preferences are well recognized, the health implications of these shifts have not been fully elucidated.

This study was designed to investigate the generational differences in HEI scores and GIS symptoms in patients attending general surgery outpatient clinics in a city hospital. By evaluating the association between dietary habits and GIS symptoms, the study aimed to analyze generational shifts in nutrition and contribute to the development of preventive health strategies. It is among the first to examine generational differences in diet quality and related GIS complaints using the HEI in a clinical surgical outpatient setting. Ultimately, the study seeks to enhance our understanding of the role of nutrition in GIS disorders and provide a foundation for future research. Moreover, the findings are expected to inform nutrition policy and support the formulation of effective public health strategies.

2 | Materials and Methods

This descriptive, cross-sectional study investigated how generational differences in dietary habits and HEI scores were related to GIS symptoms in patients attending a general surgery outpatient clinic. General surgery outpatient clinics were chosen because they assess gastrointestinal complaints comprehensively, without distinguishing between upper and lower GI issues, providing a suitable context for evaluating a wide range of symptoms.

2.1 | Study Population and Sampling Method

The study included all literate and voluntary 1100 participants aged 18 and over who applied to the General Surgery Outpatient Clinics of Kayseri City Hospital between December 15, 2023, and March 15, 2024. Symptoms such as heartburn, bloating, nausea-vomiting, and back pain were categorized as upper GIS complaints, while groin pain, constipation, anal pain, and rectal bleeding were classified as lower GIS complaints.

Given the potential for regional or cultural variations in generational classifications, this study adopted the age groupings used in a previous study conducted in Türkiye [8]. Accordingly, individuals born between 1965 and 1979 were categorized as Generation X (GenX), those born between 1980 and 1999 as Generation Y (Gen Y), and those born in 2000 or later as Generation Z (Gen Z).

2.2 | Sample Size Calculation

The sample size was calculated using G ∗ Power 3.1.9.7 software. Assuming chi-square tests would be used for comparisons with a maximum of 3×3 contingency tables, and setting a small effect size (0.1), degrees of freedom (df) = 3, $\alpha = 0.05$, and power = 80%, the required sample size was calculated as 1091. Participants were recruited on a voluntary basis from those attending the clinic, and a total of 1100 individuals were included in the study.

2.3 | Data Collection Tools and Dietary Assessment

Data were collected using a structured questionnaire administered to participants who attended the general surgery outpatient clinics during the study period. The questionnaire consisted of three sections: sociodemographic and health-related characteristics, gastrointestinal symptoms, and dietary intake. Sociodemographic and health-related variables included age, sex, marital status, education level, employment status, income level, place of residence, chronic disease status, regular medication use, special diet status, body weight, and height. Body mass index was calculated as weight in kilograms divided by height in meters squared. The food frequency questionnaire (FFQ) assessed the consumption frequency of 45 food items across five major food groups: dairy, meat–egg–legumes, fruits and vegetables, grains, and fats–sweets–beverages. Participants reported the frequency and portion sizes of 45 food items across five food groups over the past month [9]. Eight frequency options were offered (e.g., daily, weekly, and never), and portion sizes were estimated using the Turkish Food and Photo Catalog [10]. The Healthy Eating Index-2020 (HEI-2020) was used to assess overall diet quality and

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adherence to dietary guidelines. The HEI-2020 is not a direct measure of nutrient deficiency or nutrient adequacy; rather, it reflects the extent to which an individual's dietary pattern aligns with recommended dietary components. The index includes 13 components: nine adequacy components, namely, Total Fruits, Whole Fruits, Total Vegetables, Greens and Beans, Whole Grains, Dairy, Total Protein Foods, Seafood and Plant Proteins, and Fatty Acids, and four moderation components, namely, Refined Grains, Sodium, Added Sugars, and Saturated Fats. Component scores are calculated using a density-based approach per 1000 kcal, and the total score ranges from 0 to 100 points, with higher scores indicating better overall diet quality. In the present study, HEI-2020 scores were interpreted as follows: ≤ 50 points indicated poor diet quality, 51–80 points indicated diet quality requiring improvement, and > 80 points indicated good diet quality [7].

2.4 | Statistical Analysis

Data analysis was performed using the IBM SPSS Statistics (Statistical Package for the Social Sciences, SPSS Inc., Chicago, IL, USA) 25.0 statistical package program. The normality of distribution was assessed through the coefficient of variation (< 0.20), Q-Q plots, and histograms. Independent Samples *t*-test was used to compare two groups, while one-way ANOVA was applied for comparisons involving more than two groups. When the ANOVA results indicated statistical significance and variances were homogeneous, post hoc analyses were conducted using Tukey and LSD tests. The chi-square test was employed to analyze categorical variables. A p value of less than 0.05 was considered indicative of statistical significance.

2.5 | Ethical Considerations

The study procedure was conducted in accordance with the Declaration of Helsinki and STROBE checklist [11]. The study was approved by the Kayseri City Hospital Clinical Research Ethics Committee approval date: 28.11.2023 and number: 952. Participants were informed about the study, and their verbal consent was obtained.

3 | Results

The sociodemographic characteristics, health status, and dietary habits of the participants in the study group were examined. The mean age of the 1100 participants included in the study was 40.57 ± 14.05 years, with 55.4% female and 73.9% married. Of the participants, 43.1% were overweight, 56.5% were unemployed, and 95.5% lived in urban areas.

Table 1 compares participant characteristics with their HEI scores. The average HEI score of the study group was 46.77 ± 13.32 points. Additionally, women, individuals aged 65–78 years, those with higher education, those with normal or lower BMI, employed individuals, married participants, those with chronic diseases, those on regular medication, and those following special diets had higher HEI scores. Among the participants, 905 had GIS, and their relationship with HEI scores was also evaluated.

Upon analyzing the complaints of the 1100 participants who visited the outpatient clinics, it was found that the most common reason for consultation was GIS complaints. The distribution of these complaints is shown in the following graph. The most common symptoms were heartburn, abdominal bloating, and pain in the anüs (Figure 1). Other reasons for consultation included 9 patients for obesity follow-up, 9 for routine check-ups, and 5 for chest pain.

Table 2 compares some intergenerational characteristics of the participants. The BMI of Gen Z participants was found to be higher compared with other generations. While no significant differences were observed between generations regarding the rate of GIS complaints leading to hospital visits, upper GIS complaints were higher in Gen X, while lower GIS complaints were more common in Gen Y and Gen Z. The diet quality of Gen Y and Gen Z participants was significantly worse compared with other generations, and their HEI scores were notably lower.

In the study, only 12 participants had a good diet quality. Both male and female participants showed higher rates of poor diet quality ($p < 0.005$). However, when considering the diet quality that needs improvement, a higher proportion of females were observed. In all generations, the diet quality was poor, with higher rates among the younger generations ($p < 0.001$).

In Table 3, HEI scores were compared between participants with and without GIS symptoms across generational groups. Among Gen Z, those without GIS symptoms had significantly higher HEI scores than their symptomatic counterparts ($p = 0.043$). In contrast, no statistically significant differences in HEI scores were observed between symptomatic and asymptomatic participants in Gen Y, Gen X, or the Baby Boomer group.

4 | Discussion

In this study, the dietary preferences of 1100 participants who applied to general surgery outpatient clinics for various reasons were recorded using a questionnaire form. Subsequently, the effects of generational differences on GIS complaints and HEI scores were evaluated.

In this clinic-based sample, gastrointestinal complaints constituted the most frequently reported reason for outpatient admission. However, because the study included voluntary participants rather than all patients attending the outpatient clinic during the study period, this finding should be interpreted as the frequency of gastrointestinal complaints within the study sample rather than the prevalence of gastrointestinal symptoms among all clinic attendees. In a cohort study conducted by Sezgin et al. [1], which aimed to evaluate the prevalence of gastrointestinal symptoms and diseases in the general population, abdominal bloating was reported as the most frequently observed upper GIS symptom, followed by heartburn, belching, stomach pain, and halitosis [1]. Similarly, in the study by Barlin and Ercan [12], which examined the use of foods and herbal products for digestive system problems among adults in Türkiye, the most frequently reported complaints were bloating, heartburn, and constipation. This finding was consistent with the symptom pattern observed in the present study. However, because our study was conducted in a clinic-based sample and did not include all patients attending the outpatient clinic during the study period, these findings should be interpreted as the frequency of gastrointestinal complaints among the study participants rather than the prevalence of gastrointestinal symptoms among all clinic attendees. Previous international evidence has also shown

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TABLE 1 | Comparison of participant characteristics with HEI scores.

Characteristics	*n*	%	Mean ± SD	*t*/*F*	*p*
Gender					
Male	491	44.6	44.88 ± 13.23	4.260*	< 0.001
Female	609	55.4	48.30 ± 13.22		
Generation					
Gen Z	153[a]	13.9	43.47 ± 14.02	14.180**	< 0.001
Gen Y	539[a]	49.0	45.66 ± 12.95		
Gen X	281[b]	25.5	48.01 ± 12.50		
Baby Boomers	127[b]	11.5	52.75 ± 13.79		
Body Mass Index (BMI) classification					
Normal and below ($\leq 24.99\ kg/m^2$)	312	28.4	45.20 ± 12.16	2.468*	0.010
Above normal ($\geq 25.00\ kg/m^2$)	788	71.6	47.40 ± 13.72		
Education level					
Below high school	523[a]	47.5	48.36 ± 12.76	7.182**	0.001
High school graduate	307[b]	27.9	45.54 ± 13.85		
Higher education	270[b]	24.5	45.11 ± 13.48		
Employment					
Employed	478	43.5	44.61 ± 12.97	4.755*	< 0.001
Unemployed	622	56.5	48.43 ± 13.37		
Marital status					
Married	813	73.9	47.31 ± 13.16	2.247*	0.025
Not married	287	26.1	45.26 ± 13.07		
Economic status					
Income more than expenditure	116	10.5	44.15 ± 12.96	2.733**	0.065
Income equals expenditure	888	80.7	47.17 ± 13.40		
Income less than expenditure	96	8.7	46.22 ± 12.76		
Living area					
Urban	1051	95.5	46.83 ± 13.34	0.707*	0.048
Rural	49	4.5	45.46 ± 13.15		
Chronic disease					
Present	337	30.6	49.72 ± 13.19	4.926*	< 0.001
Absent	763	69.4	45.47 ± 13.18		
Special diet					
Present	48	4.4	51.03 ± 11.43	2.267*	0.024
Absent	1052	95.6	46.58 ± 13.38		
GI symptoms					
Present	905	82.3	46.47 ± 13.27	1.641*	0.101
Absent	195	17.7	48.19 ± 13.54		
Upper GI symptoms					
Present	498	45.3	46.08 ± 13.04	1.566*	0.118
Absent	602	54.7	47.34 ± 13.54		
Lower GI symptoms					
Present	569	51.7	46.77 ± 13.38	0.012*	0.990
Absent	531	48.3	46.78 ± 13.28		

Note: Significant differences were found between groups marked with a and b.
*Independent t-test.
**ANOVA was used.

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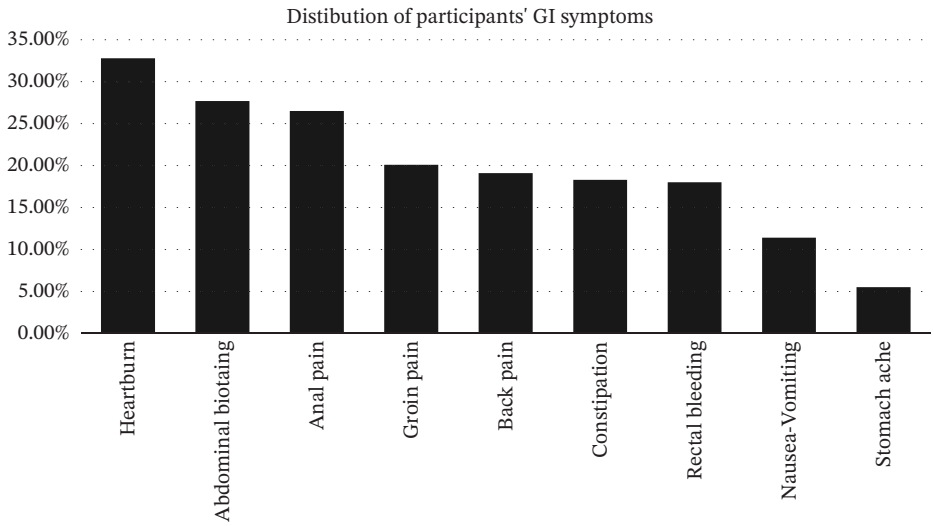


FIGURE 1 | Distribution of GI complaints among participants.

that dietary and lifestyle factors, including high-fat food intake, irregular meal timing, late-night eating, and other diet-related behaviors, may be associated with reflux-related and functional gastrointestinal symptoms [13]. Therefore, diet quality may be considered a relevant factor when evaluating gastrointestinal complaints in clinical populations although causal inference cannot be made because of the cross-sectional design of the present study.

These findings were consistent with our results. However, the frequency of GIS complaints in the present study should be interpreted within the clinic-based sample rather than as a prevalence estimate for all clinic attendees. Poor dietary habits—such as excessive consumption of fatty and spicy foods, insufficient fiber intake, and irregular eating patterns—are widely recognized as major contributors to GIS disturbances, which may explain the high rate of symptom-driven clinical visits observed in this study.

In the present study, women had higher HEI-2020 scores than men although diet quality was generally low in both sexes. This finding partially differs from the study by Uyar and Yücecan [14], which reported higher HEI scores among men in a Turkish adult sample. Differences between studies may be related to variations in age distribution, study population, dietary assessment methods, and sociocultural characteristics. Previous evidence has also shown that HEI patterns may vary by sex and age and may be associated with cardiometabolic risk factors [15]. Therefore, the sex-related difference observed in the present study should be interpreted within the context of the clinic-based sample and not as evidence of a universal gender pattern in diet quality.

When assessed by educational level, participants with less than a high school education had significantly higher HEI scores than those with a high school education or above. Additionally, actively employed participants had lower HEI scores than their unemployed counterparts. In a cross-sectional study by Zhao et al. [16], it was observed that individuals with lower education and income levels had lower HEI-2015 scores. Participants indicated that the high cost of healthy foods could contribute to this outcome [16]. These findings may have reflected unmeasured lifestyle-related factors, such as eating outside the home, working conditions, and access to convenient foods; however, these factors were not directly assessed in the present study. Furthermore, increased workforce participation may prompt a shift toward fast and convenient but lower-quality diets. Future studies exploring working hours, income level, and dietary behavior would help to clarify these associations further.

HEI-2020 scores were higher among married participants and those living in urban areas. Similar to other sociodemographic findings, this association should be interpreted cautiously because meal regularity, home-cooking frequency, food access, and nutrition literacy were not assessed in detail in the present study. A previous Turkish study reported differences in nutrition literacy and dietary behaviors among university staff according to sociodemographic characteristics [17]. More recent evidence from Türkiye also suggests that nutrition literacy is related to diet quality, adherence to healthy dietary patterns, and lifestyle behaviors among working adults [18]. Therefore, future studies should evaluate nutrition literacy, food environment, working conditions, and household meal patterns together to better explain sociodemographic differences in diet quality.

HEI-2020 scores were found to be higher among married participants and those living in urban areas. This may be attributed to the more regular meal patterns, greater frequency of home-cooked meals, and balanced intrafamily dietary habits commonly observed among married individuals. Similarly, urban dwellers may have greater access to healthy food options, higher nutritional awareness, and more exposure to healthy eating alternatives compared to rural residents. However, a study by Özdenk and Özcebe [17] on nutrition literacy and dietary behaviors among university staff reported higher levels of unhealthy eating among married individuals. This discrepancy may be due to demographic, socioeconomic, or environmental factors that vary across study populations and influence eating behavior. Work–life dynamics, shifting household food preferences, and broader environmental influences may affect the dietary habits of married individuals in both positive and negative ways. Future studies should consider socioeconomic and cultural factors across diverse populations to better understand the impact of marital status on diet quality.

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TABLE 2 | Intergenerational comparison of some participant characteristics.

Characteristics	Gen Z ($n = 153$)	Gen Y ($n = 539$)	Gen X ($n = 281$)	Baby Boomers ($n = 127$)	χ^2/p value/Cramer's v
Gender					
Male ($n = 491$)	71 (46.4%)	246 (45.6%)	116 (42.3%)	58 (44.4%)	1.748/0.626/0.039
Female ($n = 609$)	82 (53.6%)	293 (54.4%)	165 (57.7%)	69 (55.6%)	
Body Mass Index (BMI) classification					
Normal and below (≤ 24.9 kg/m^2)	87 (56.9%)	164 (30.4%)	36 (12.8%)	25 (27.0%)	100.446/< 0.001/0.302
Above normal (≥ 25.0 kg/m^2)	66 (43.1%)	375 (69.6%)	245 (87.2%)	102 (73.0%)	
Employment status					
Employed ($n = 478$)	61 (39.9%)	308 (57.1%)	90 (32.0%)	19 (15.0%)	98.796/< 0.001/0.300
Unemployed ($n = 622$)	92 (60.1%)	231 (42.9%)	191 (68.0%)	108 (85.0%)	
Living area					
Urban ($n = 1051$)	143 (93.5%)	527 (97.8%)	268 (95.4%)	113 (89.0%)	20.741/< 0.001/0.137
Rural ($n = 49$)	10 (6.5%)	12 (2.2%)	13 (4.6%)	14 (11.0%)	
Marital status					
Married ($n = 813$)	31 (20.3%)	414 (76.8%)	257 (91.5%)	111 (87.4%)	287.574/< 0.001/0.512
Not married ($n = 287$)	122 (79.7%)	125 (23.2%)	24 (8.5%)	16 (12.6%)	
Economic status					
Income more than expenditure	20 (13.1%)	61 (11.3%)	25 (8.9%)	10 (7.9%)	5.201/0.518/0.069
Income equals expenditure	121 (79.1%)	436 (80.9%)	229 (81.5%)	102 (80.3%)	
Income less than expenditure	12 (7.8%)	42 (7.8%)	27 (9.6%)	15 (11.8%)	
Chronic disease					
Present ($n = 366$)	17 (11.1%)	119 (22.1%)	139 (49.5%)	91 (71.7%)	181.723/< 0.001/0.406
Absent ($n = 734$)	136 (88.9%)	420 (77.9%)	142 (50.5%)	36 (28.3%)	
Medication use					
Yes ($n = 315$)	15 (9.8%)	90 (16.7%)	121 (43.1%)	89 (70.1%)	199.487/< 0.001/0.426
No ($n = 785$)	138 (90.2%)	449 (83.3%)	160 (56.9%)	38 (29.9%)	
Special diet					
Yes ($n = 48$)	4 (2.6%)	21 (3.9%)	13 (4.6%)	10 (7.9%)	5.201/0.158/0.097
No ($n = 1052$)	149 (97.4%)	518 (96.1%)	268 (95.4%)	117 (92.1%)	
GI symptoms*					
Present ($n = 905$)	123 (80.4%)	441 (81.8%)	239 (85.1%)	102 (80.3%)	2.271/0.518/0.045
Absent ($n = 195$)	30 (19.6%)	98 (18.2%)	42 (14.9%)	25 (19.7%)	
Upper GI symptoms*					
Present ($n = 498$)	51 (33.3%)	243 (45.1%)	175 (50.7%)	29 (46.0%)	12.964/0.005/0.108
Absent ($n = 602$)	102 (66.7%)	296 (54.9%)	170 (49.3%)	34 (54.0%)	
Lower GI symptoms*					
Present ($n = 569$)	87 (56.9%)	282 (52.3%)	168 (48.7%)	32 (50.8%)	2.983/0.394/0.052
Absent ($n = 531$)	66 (43.1%)	257 (47.7%)	177 (51.3%)	31 (49.2%)	
HEI classification					
Poor diet quality ($n = 682$)	110 (71.9%)	355 (65.9%)	161 (57.3%)	56 (44.1%)	38.870/< 0.001/0.188
Diet quality to be improved ($n = 406$)	41 (26.8%)	180 (33.4%)	119 (42.3%)	66 (52.0%)	
Good diet quality ($n = 12$)	2 (1.3%)	4 (0.7%)	1 (0.4%)	5 (3.9%)	

*Multiple options could be selected.

This study found no statistically significant differences in HEI scores based on income levels. HEI-2020 scores were higher among participants with chronic diseases and those using regular medication. This finding may reflect greater health awareness or previous exposure to dietary advice among individuals receiving long-term medical care. However, this explanation remains

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TABLE 3 | Comparison of GIS symptoms and related factors among participants.

Generations	GIS symptoms	*n*	%	HEI score (mean ± SD)	Test statistic/*p* value/Hedges' g
Gen Z	Present	123	80.4	42.34 ± 13.29	4.160/0.043/–0.413
	Absent	30	19.6	48.10 ± 16.09	
Gen Y	Present	441	81.8	45.35 ± 13.13	1.433/0.232/–0.133
	Absent	98	18.2	47.08 ± 12.10	
Gen X	Present	239	85.1	48.17 ± 12.21	0.292/0.590/0.090
	Absent	42	14.9	47.04 ± 14.17	
Baby Boomers	Present	102	80.3	52.29 ± 13.87	0.563/0.455/–0.166
	Absent	25	19.7	54.60 ± 13.54	

speculative because previous nutrition counseling, disease duration, and disease-specific dietary restrictions were not assessed in the present study. Previous evidence has shown that higher diet quality, as measured by indices such as the HEI, Alternate Healthy Eating Index (AHEI), and DASH score, is associated with more favorable long-term health outcomes in cohort studies [19]. Therefore, the higher HEI-2020 scores observed among participants with chronic disease may indicate greater attention to dietary quality, but causal interpretation is not possible because of the cross-sectional design.

However, both low- and high-income participants had lower HEI scores than those in the middle-income group. In a study by Wolfson et al. [20], both low- and high-income households, especially the latter, frequently prepared home-cooked dinners and had higher HEI scores. Our findings may reflect limited access to healthy foods, cost-driven choices of low-nutrient-dense items, and a lack of nutrition education among lower-income groups. On the other hand, in higher-income groups, greater access to ultraprocessed foods, irregular eating patterns due to social lifestyles, and higher consumption of calorie-dense, low-nutrient foods may explain the lower HEI scores. These results indicate that healthy eating is shaped not only by financial means but also by nutritional awareness, lifestyle choices, and cultural influences.

In a systematic review and meta-analysis by Morze et al. [19], higher diet quality scores on the HEI and AHEI were associated with reduced mortality risk from non-communicable diseases such as hypertension, cancer, and neurological conditions. The presence of chronic illness and regular medication use may encourage individuals to become more health conscious, leading to improved dietary behaviors. Physicians often provide dietary guidance to patients as part of chronic disease management, and side effects of certain medications—such as appetite loss or indigestion—may steer patients toward more digestible, healthier food options. While this may not be the case for all individuals, chronic illness and long-term medication use could partially explain the better diet quality observed in this group. Overall, the existing literature strongly supports the link between HEI scores and chronic disease risk, emphasizing the need for public health strategies and individualized dietary counseling that promote high-quality eating patterns to reduce the burden of chronic disease.

This study also revealed notable generational differences in HEI scores. Although all generations displayed generally low HEI scores—indicating a need for dietary improvement—older generations tended to have higher scores than younger ones. Specifically, Baby Boomers and GenX exhibited relatively better diet quality compared with Gen Y and especially Gen Z. These results suggest a potential decline in dietary habits among younger generations. Several factors may explain this trend. Older generations may adhere more to traditional home-cooked meals, maintain more regular eating patterns, and have developed long-standing nutritional routines that align more closely with healthy dietary guidelines. In contrast, younger generations are more frequently exposed to fast food culture, ultraprocessed foods, and time-constrained eating patterns due to work or academic schedules. Additionally, the widespread use of digital platforms promoting convenience foods and snacking may further contribute to poor dietary quality among younger individuals. Furthermore, Gen Z—still in a transitional phase of life and often lacking independent control over food choices—may experience greater influence from environmental and socioeconomic constraints, such as limited cooking skills or financial dependence. These generational differences emphasize the importance of designing age-targeted nutritional interventions. Educational programs aimed at increasing awareness of healthy eating habits, particularly among youth and young adults, could play a crucial role in reversing this decline in diet quality across newer generations. When examining the impact of gastrointestinal symptoms on hospital admission rates, it was found that upper gastrointestinal symptoms are more prevalent in Gen X. No significant difference was observed for lower gastrointestinal symptoms although these symptoms were more common in Gen Y and Gen Z.

In a multicenter intervention study conducted by Yuan et al. [21], it was shown that gastroesophageal reflux disease (GERD) has a multifactorial etiology, with dietary habits and lifestyle factors potentially triggering or exacerbating GERD symptoms. The study suggests that the increase in GERD incidence, particularly in the young adult and middle-aged Chinese population, is related to changes in dietary habits, increased work pace, and chronic stress.

In a study by Aljaaly and Khatib [2] comparing Gen Z and Gen Y, the most common FGIDs were functional constipation and abdominal pain. The study demonstrated a strong relationship between certain dietary and lifestyle habits—such as the number of meals eaten outside the home and the types of beverages commonly consumed—and FGID. These foods are typically rich in fats, added salt, and sugar but poor in fiber, vitamins, and minerals. In particular, excessive consumption of high-fat and

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processed foods can lead to symptoms such as stomach pain and nausea, while a diet low in fiber and high in sugar may contribute to functional constipation. Furthermore, irregular meal times and fast eating habits are thought to increase stomach acid production, thereby contributing to the development of reflux symptoms.

In this study, we also examined the relationship between gastrointestinal symptoms and HEI scores across generations, it was found that participants in Gen Z without gastrointestinal symptoms had higher scores. This finding suggests that participants with healthier dietary habits may experience fewer gastrointestinal symptoms, which is consistent with previous studies supporting the potential impact of diet quality on digestive system health [12]. In the study conducted by Barlin and Ercan [12], the high HEI scores, particularly those associated with adequate fiber intake, and balanced macro and micronutrient consumption, were linked to a potentially protective effect on gut health. However, a review of the current literature indicates that, in order to more thoroughly explore the relationship between dietary habits and gastrointestinal symptoms across generations, long-term, multicenter studies with larger sample sizes are needed. Specifically, prospective studies that also consider variables such as age, socioeconomic status, environmental factors, and gut microbiota could provide stronger evidence regarding this relationship.

More than half of the participants in Gen Z were observed to have BMI values above the normal range, whereas older generations tended to have BMI values within or below normal levels. According to the study by E. Cowan-Pyle [22], based on NHANES 2015–2018 data, dietary quality was lower in individuals aged 18–23 years compared with other age groups. This may suggest that unfavorable dietary patterns in younger individuals could contribute to the higher BMI levels observed in Gen Z. Additionally, factors such as technology dependence leading to a sedentary lifestyle, rapid work pace, economic conditions, and social media–related stress directing individuals toward quick and convenient foods have been reported as potential contributors to weight gain [23]. However, since obesity is a multifactorial health condition, these findings cannot be generalized to the entire Gen Z population.

Furthermore, when looking at earlier generations—such as the Baby Boomers—it is well known that there is a greater emphasis on traditional cuisines and local foods, a higher prevalence of home cooking habits, and easier access to healthy, natural foods. It is thought that the poor diet quality observed among individuals in Gen Y and Gen Z could have also influenced these findings. Although there has been a renewed awareness of healthy eating among Gen Y—with an increase in healthy eating recommendations on social media, promotions of sustainable agriculture and nutrition, and advertisements for organic products—the fast pace of modern life continues to steer people towards ready-made meals and fast food.

In conclusion, this clinic-based cross-sectional study showed that diet quality was generally low across all generations, with lower HEI-2020 scores among younger participants. Gastrointestinal complaints were frequently reported in the study sample, and a significant association between HEI-2020 scores and gastrointestinal symptoms was observed only among Gen Z participants. These findings should be interpreted cautiously because of the cross-sectional design, self-reported dietary and symptom data, and clinic-based sampling. Future longitudinal studies using validated gastrointestinal symptom scales and more detailed dietary assessment methods are needed to clarify the relationship between diet quality and gastrointestinal symptoms across generations.

This study also has several limitations that should be acknowledged. First, the cross-sectional design restricts the ability to establish causal relationships between dietary habits, GIS symptoms, and HEI scores across different generations. Longitudinal studies would be more effective in observing changes over time and determining causality. Second, the reliance on self-reported data for dietary intake and GIS symptoms introduces the possibility of recall bias and social desirability bias, which may affect the accuracy of the findings. Objective measures, such as dietary records or clinical assessments, could provide more reliable data. Third, the study population consisted of individuals attending general surgery outpatient clinics, which may not be representative of the general population. This selection bias limits the generalizability of the results to broader communities. Future research should consider more diverse and representative samples to enhance external validity. Additionally, the study did not account for other potential confounding factors such as physical activity levels, psychological stress, and socioeconomic status, which could influence both dietary habits and GIS health. Incorporating these variables in future studies would provide a more comprehensive understanding of the observed associations.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Supporting Information.** This manuscript has been prepared in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The completed STROBE checklist is provided as a supporting file (STROBE Checklist.docx) to ensure transparent and standardized reporting of the study.

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