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Impact of pandemic and socioeconomic influences on decision-making for emergency ostomy procedures

Key factors affecting hospital visit decisions

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Abstract

Emergency surgeries are linked with increased morbidity and reduced life expectancy, often associated with low socioeconomic status, limited access to healthcare, and delayed hospital admissions. While the influence of socioeconomic status on elective surgery outcomes is well-established, its impact on emergency surgeries, including ostomy creation and closure, is less clear. This study aimed to explore how the pandemic and socioeconomic status affect emergency ostomy procedures, seeking to determine which has a greater effect. It emphasizes the importance of considering socioeconomic factors in patient care pathways for ostomy procedures. A total of 542 patients who underwent emergency ostomy formation between 2016 and 2022 were retrospectively analyzed and divided into pre-pandemic and pandemic periods. The pre-pandemic and pandemic periods were compared between themselves and against each other. Demographic data (age and sex), comorbidities, socioeconomic status, etiology of the primary disease, type of surgery, stoma type, length of hospital stay, ostomy closure time, and postoperative complications were retrospectively analyzed for all patients. In total, 290 (53%) patients underwent surgery during the pandemic period, whereas 252 (47%) underwent surgery during the pre-pandemic period. Emergency surgery was performed for malignancy in 366 (67%) patients. The number of days patients underwent ostomy closure was significantly higher in the low-income group ($P = .038$, 95% CI: 293,2, 386–945). The risk of failure of stoma closure was 3-fold (95% CI: 1.8–5.2) in patients with metastasis. The risk of mortality was 12.4-fold (95% CI: 6.5–23.7) when there was failure of stoma closure. When compared to pandemic period, the mortality risk was 6.3-fold (95% CI: 3.9–10.2) in pre-pandemic period. Pandemic patients had a shorter hospital stay than before the pandemic ($P = .044$). A high socioeconomic status was significantly associated with early hospital admission for ostomy closure, and lower probability of mortality. More metastases and perforations were observed during the pandemic period and mortality was increased during pandemic and in patients without ostomy closure. The socioeconomic status lost its effect in cases of emergency ostomy creation and had no impact on length of hospital stay in either the pre-pandemic or pandemic period.

Abbreviations: ASA score = American Society of Anesthesiologists physical status classification system score, COVID-19 = coronavirus disease 2019.

Keywords: COVID-19, emergency ostomy, ostomy closure, pandemic, socioeconomic status

1. Introduction

A patient admission to the hospital and access to the healthcare system depends on various factors. Patients undergoing emergency ostomy surgery may include those who postponed their care and were late in seeking care either because of underlying socioeconomic reasons or delays during the pandemic. Income, education, and occupation commonly serve as classification variables for socioeconomic status. Socioeconomic factors affect stoma closure after elective colon and rectal surgery.[1–3] Understanding how socioeconomic status and the pandemic have impacted emergency ostomy procedures and elective ostomy closures provides valuable insights for addressing disparities in surgical outcomes and for formulating appropriate plans.

Informed consent was obtained from all the subjects involved in the study.

The authors have no funding and conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Ege University (protocol code 22–7T/46 and date of approval:21.07.2022).

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To date, research on the impact of socioeconomic status on surgical outcomes has mainly focused on major elective surgeries. However, there is limited knowledge regarding the effect of socioeconomic status on emergency surgery and ostomy creation, especially during the pandemic. Based on the existing literature, socioeconomic disadvantage is associated with increased mortality rates, higher risk of significant complications, and longer hospital stays for all types of surgical procedures.[4–7] In our study population, patients undergoing elective ostomy surgery were excluded, allowing us to examine the influence of socioeconomic status on emergency ostomy creation and closure. Understanding how socioeconomic disadvantage affects these rates, especially during crises such as the pandemic, represents a distinct and significant area for investigation.

Living with an ostomy has been associated with a lower quality of life, more negative illness perceptions, and a greater need for healthcare services than living without an ostomy.[8] Ileostomy or colostomy can cause morbidity and hospital readmission.[9] The hospitalization of patients with ostomies is often caused by fluid-electrolyte imbalances that decrease the quality of life, dehydration leading to acute renal failure, and complications related to the stoma (such as retraction, prolapse, or parastomal hernia). Consequently, ostomy closure remains essential even during a pandemic.

The coronavirus disease 2019 (COVID-19) pandemic has had a major impact on clinical operations in healthcare facilities.[10,11] As a result of the pandemic, there has been a surge in hospitalizations and greater demand for intensive care. This has resulted in disruptions across the healthcare system, with medical care and procedures being postponed or suspended to optimize limited hospital resources and minimize the risk of transmission.[12] According to a 2020 report from the European Center for Disease Prevention and Control, people who were at a high risk of serious illness from COVID-19 included those aged 65 years and over, those residing in nursing homes or long-term care facilities, and individuals of any age with comorbidities. Specifically, individuals with chronic lung disease or moderate-to-severe asthma, severe heart conditions, immunocompromised patients, severely obese diabetic patients, and dialysis patients with chronic kidney disease or liver disease were at a higher risk. Therefore, many patients who required ostomy surgery were already categorized as high-risk and avoided going to the hospital until they needed urgent care.

Since our study period encompassed the COVID-19 pandemic, we were able to analyze and compare the association between socioeconomic status, emergency ostomy creations, and ostomy closure numbers during the pre-pandemic and pandemic periods. To accomplish this, we analyzed the differences in ostomy closure proportions between the pre-pandemic and pandemic periods. In addition, we examined how socioeconomic status influenced ostomy closure rates during the COVID-19 pandemic.

2. Materials and methods

We conducted a retrospective review of the electronic medical records at Ege University General Surgery Clinic for patients who underwent emergency ostomy creation between January 2016 and March 2022. All patients enrolled in the study were over 18 years old and underwent emergency surgery resulting in ostomy. Patients younger than 18 years, those who underwent elective ostomy creation, those who underwent revision surgery due to complications such as anastomotic leak, stoma necrosis, or bleeding, those with incomplete data, and those who declined to participate in the study were excluded.

In order to assess the impact of the pandemic on outcomes, we analyzed the patient population during both the pre-pandemic period and the pandemic period. The timeframe of January 2016 to March 2020 was designated as the pre-pandemic period, while the duration of April 2020 to March 2022 was identified as the pandemic period. A national curfew was not imposed until April in Turkey, and on 3rd of April the president imposed a curfew in several provinces, banned entry and exit to and from cities, and suspended domestic flights. As of March 31, the number of Covid positive patients in Istanbul province was 8852, while the number of Covid positive patients in Izmir province, where our university is located, was 853, one tenth of this number. By the end of March, the government asked for plans to postpone non-emergency surgeries, and by April, only emergency operations were being performed. Since April, access to health services has been hampered by the start of curfews, increased hospital crowding and the suspension of elective procedures.

Demographic data, co-morbidities, socioeconomic status, disease etiology, type of surgery, ostomy classification, length of hospitalization, time to ostomy closure, and postoperative complications were retrospectively analyzed for all patients.

The internationally validated Modified Kuppuswamy Scale[13] was used to classify patients according to socioeconomic status. Participants were asked about education, income, and occupation using a 6-point scale from 1 to 6 for each question. According to the total score achieved from all 3 questions, situated at one socioeconomic level on a scale divided into 5 distinct levels (Table 1).

2.1. Statistical analysis

Statistical analyses were performed using SPSS v21.0 (IBM Corp., Armonk, NY). Kolmogorov Smirnov Test was used to evaluate the normality. Continuous variables were presented as mean ± standard deviation or median (25th-75th percentile) according to normality. Categorical variables were presented as frequency and percentage. The Chi-square test was used to analyze categorical variables and Fisher Exact test was

Table 1

Modified Kuppuswamy score.

Educational level	1 point illiterate	2 points primary school	3 points middle school	4 points high school	5 points university	6 points Phd-masters
Occupation	1 point Unemployed	2 points Unskilled Worker	3 points Farmer, Agricultural Worker, Craftsman, Skilled Worker	4 points Office Worker	5 points Civil Service	10 points White Collar Employee
Income level	1 point No Income	2 points Min.wage	3 points Min.wage × 3	4 points Min.wage × 6	6 points Min.wage × 8	12 points Min.wage × 13
Level-1 high			24–28 points			
Level-2 upper mid			16–23 points			
Level-3 mid			11–15 points			
Level-4 upper low			6–10 points			
Level-5 low			3–5 points			

Min.wage = minimum wage.

used when the assumptions were violated. Comparisons of continuous variables were performed using Student *t* test or Mann–Whitney U test according to normality. Univariate and multivariate logistic regression analyses were used to determine the risk factors for failure of stoma closure and mortality. Parameters with a *P* value < .2 in univariate analysis were added to the multivariate logistic regression (Backward LR method). Results were presented as odds ratio (OR) and 95% confidence intervals (95% CI). Kaplan–Meier curves were used for survival analysis and the log-rank test was used to test whether the difference between survival times between 2 groups was significant. A *P* value < .05 was accepted for statistical significance. The specific tests were mentioned under corresponding table.

3. Results

A total of 542 patients were included in this study. Of these, 236 (43.5%) were female and 306 (56.5%) were male. During the pandemic period, 290 patients (53%) underwent ostomy creation, whereas 252 patients (47%) were included in the prepandemic period. The mean age of the patients was 65.2 ± 14.3 years (range:19–98) (Table 2).

According to American Society of Anesthesiologists physical status classification system score (ASA scores), 177 patients (32.7%) were classified as ASA 1, 195 patients (36.0%) as ASA 2, 144 patients (26.6%) as ASA 3, 25 patients (4.6%) as ASA 4, and 1 patient as ASA 5 (0.2%) and there was statistically significant difference before and during the pandemic periods (*P* < .001) (Table 2).

Based on socioeconomic status, 29 (5.4%) patients were classified as level 1 (high), 100 (18.5%) as level 2 (upper-middle), 153 (28.2%) as level 3 (lower-middle), 208 (38.4%) as level 4 (upper-low), and 52 (9.6%) as level 5 (low). The socioeconomic status of the patients before and during pandemic were significantly different (*P* < .001) (Table 2).

In 366 (67%) patients, stoma was created due to an emergent presentation of an underlying malignancy. Among these patients with malignancy, 175 (47.8%) had advanced tumors with metastases upon admission. The percentage of metastatic disease at presentation is higher in the pandemic group versus the pre-pandemic group (38.5% vs 25.4, *P* = .001) (Table 2) Perforation findings were present at diagnosis in 196 (36.2%) patients. The percentage of admission with gastrointestinal perforation is higher in the pandemic period than the prepandemic period (*P* = .002).

Emergency surgery was also performed in 176 (33%) patients who did not have cancer. Among those, mesenteric ischemia was observed in 33 (18.8%) patients. while diverticulitis was found in 56 (31.8%) patients. Less common reasons are presented in Table 3.

Loop ileostomy was created in 57 (10%) patients. loop colostomy in 141 (26%) patients. end ileostomy in 19 (3%) patients. end colostomy in 192 (36%) patients. Mikulicz ostomy in 133 (25%) patients (Fig. 1). Stoma related complications developed in 28 (5.2%) patients in the postoperative period. Among the group with stoma complications, stoma prolapse developed in 6 (21.4%) patients, stoma necrosis in 9% patients, retraction in 6% patients, mucocutaneous separation in 4% patients, stoma stenosis in 2% patients and bleeding in 1% patient. The ASA

Table 2

Demographics, ASA scores, socioeconomic status, and clinical outcomes of the patients.

		Total	Prepandemic (n = 252)	Pandemic* (n = 290)	*P* value
Age (yr), mean ± SD		65.2 ± 14.3	65.9 ± 14.3	64.6 ± 14.3	.281†
Gender (Male), n (%)		306 (56.5)	135 (53.6)	171 (59.0)	.206‡
ASA score, n (%)	ASA 1	177 (32.7)	107 (42.5)	70 (24.1)	**<.001**§
	ASA 2	195 (36.0)	88 (34.9)	107 (36.9)	
	ASA 3	144 (26.6)	46 (18.3)	98 (33.8)	
	ASA 4	25 (4.6)	10 (4.0)	15 (5.2)	
	ASA 5	1 (0.2)	1 (0.4)	0 (0)	
ASA score, median (IQR)		2 (1–3)	2 (1–2)	2 (2–3)	**<.001**‖
Modified Kuppuswamy Score, n (%)	Level 1 (High)	29 (5.4)	14 (5.6)	15 (5.2)	**.001**‡
	Level 2 (Upper middle)	100 (18.5)	40 (15.9)	60 (20.7)	
	Level 3 (Middle)	153 (28.2)	63 (25.0)	90 (31.0)	
	Level 4 (Upper low)	208 (38.4)	119 (47.2)	89 (30.7)	
	Level 5 (Low)	52 (9.6)	16 (6.3)	36 (12.4)	
Metastasis, n (%)		175 (32.4)	64 (25.4)	111 (38.5)	**.001**‡
Perforation, n (%)		196 (36.2)	74 (29.4)	122 (42.1)	**.002**‡
Stoma complications, n (%)		28 (5.2)	9 (3.6)	19 (6.6)	.118‡
Complications, n (%)		161 (29.7)	83 (32.9)	78 (26.9)	.125‡
Outcome (exitus), n (%)		290 (53.8)	168 (66.9)	122 (42.4)	**<.001**‡
Time from ostomy creation to closure (days), median (IQR)**		289 (209–460)	294 (219–458)	279 (208–476)	.475‖
Hospital stay (days), median (IQR)		8 (6–14)	9 (7–16)	8 (6–12)	**<.001**‖

Bold values signify statistically significant results.

ASA = American Society of Anesthesiologists Score, IQR = 25th-75th percentile, SD = standard deviation.

*There are missing values. Metastasis n = 288.

**Only patients with stoma closure were analyzed (n = 114).

†Student *t* test.

‡Chi-square test.

§Fisher exact test.

‖Mann–Whitney U test.

score of patients with and without stoma complications was similar (P = .583) (Table 4).

The median hospital stay in the postoperative period for all patients was 8 days (6–14) (Table 5). During the early postoperative period, 69 patients (12.7%) died before discharge due to causes including sepsis, pneumonia, acute renal failure, and aspiration. During the follow-up period 221 (40.8%) patients died after the discharge, and the mean survival in this group was 210.9 days. Of the 252 patients who underwent surgery and survived, 114 (45.2%) had their stoma closed. The median closure time for patients whose stoma was closed after the first operation was 289 days (209–460). When we compared the pre pandemic and pandemic periods in terms of ostomy closure, the median time to ostomy closure before the pandemic was longer than that after the pandemic but the difference was not significant (P = .475).

Regarding the effect of socioeconomic status on the proportion of ostomy closure, no significant difference was found between patients with and without closure (P = .268) (Table 6). No statistically significant correlation was found (P = .748) when the effect of socioeconomic status on postoperative mortality was examined. However, the number of days the patient applied for ostomy closure was significantly associated with socioeconomic status (P = .034).

In the comparison of the effect of socioeconomic status on patient survival, no correlation was found between life expectancy and socioeconomic status (P = .748), and overall survival was 51 days (Fig. 2). We then examined survival with and without ostomy closure, and found that ostomy closure was associated with longer survival. There was a statistically significant difference between the survival times of patients with and without ostomy closure. The mean survival time of patients with open ostomies was significantly shorter than that of those with closed ostomies.

The effect of the Covid pandemic on ostomy closure and length of hospital stay was also investigated. A statistically significant difference (P < .001) was observed in the length of hospital stay before and during the pandemic (Table 2). Pandemic patients had shorter hospital stays than pre-pandemic patients did. The time to closure of patients before the pandemic was longer than that during the pandemic, however, the difference was not statistically significant (P = .475).

There was a statistically significant difference in the ostomy closure status, mortality, complications, metastasis, and perforation before and after the pandemic. The median survival time was 913 days and the pre-pandemic survival was higher than pandemic survival (P < .001). (Fig. 3) No significant difference was found between the pre-pandemic and pandemic periods in terms of occurrence of complication (P = .125).

Multivariate analysis was performed to analyze the factors related to failure of stoma closure. It was found that 1-year increase in age caused 2.9% (95% CI: 1.3%–4.6%) increase in the risk of failure of stoma closure. The risk of failure of stoma closure was 3-fold (95% CI: 1.8–5.2) in patients with metastasis. Every increase in ASA score caused 58% (95% CI: 18%–112%) increase in the risk of failure of stoma closure (Table 5).

The factors related to mortality were also assessed with multivariate analysis. It was found that 1-year increase in age increases the risk of mortality by 2.7% (95% CI: 1.2%–4.3%). When compared to patients with high socioeconomic status, the risk of mortality was 3.8-fold (95% CI: 1.3–10.9) in patients with upper-middle socioeconomic status and 8.8-fold (95% CI: 2.7–28.7) in patients with low socioeconomic status. The mortality risk was 2.2-fold (95% CI: 1.4–3.4) in the presence of metastasis and 2.8-fold (95% CI: 1.7–4.6) in the presence of complication. The risk of mortality was 12.4-fold (95% CI: 6.5–23.7) when the failure of stoma closure. When compared to pandemic period, the mortality risk was 6.3-fold (95% CI: 3.9–10.2) in prepandemic period (Table 7).

4. Discussion

Our study was conducted at Ege University Hospital, İzmir, Türkiye, which is one of the top university hospitals in the country and as a tertiary referral center in the region receives patients from the surrounding cities and districts, as well as from all over Turkey or foreign patients. As a tertiary institution, it receives a large number of patients from various socioeconomic backgrounds. Because our study includes only emergency surgical cases and excludes elective procedures, the evaluation of socioeconomic factors in this diverse population provides a unique perspective on changes in emergency approaches, particularly during crises such as the pandemic.

Multicomponent (mixed-variable) social status index measures are multidimensional measures of social class. Social class is a structure that combines different socioeconomic and demographic variables. Such indices acknowledge that social class is a multidimensional construct that is influenced by all the factors examined.

The Kuppuswamy Scale, an internationally accepted scale, was used in our study. According to this scale, the application time for stoma closure was shorter in those with high

Table 3

Causes for emergency ostomy creations.

Causes	Subgroup	n (%)
Malignancy (n = 366, 67%)	Metastatic	175 (47.8)
	Non-metastatic	191 (52.2)
Nonmalignant causes (n = 176, 33%)	Diverticulitis	56 (31.8)
	Mesenteric ischemia	33 (18.8)
	Perianal necrotizing fasciitis	20 (11.4)
	Complicated inflammatory bowel disease	16 (9.1)
	Volvulus	10 (5.7)
	Iatrogenic perforation	8 (4.5)
	Mechanical bowel obstruction	7 (4.0)
	Strangulated inguinal hernias	6 (3.4)
	Rectovaginal fistula	5 (2.8)
	Perforated appendicitis	5 (2.8)
	Firearm injury	3 (1.7)
	Stab wounds	3 (1.7)
	Anal sphincter injury	2 (1.1)
	Foreign body perforation	2 (1.1)

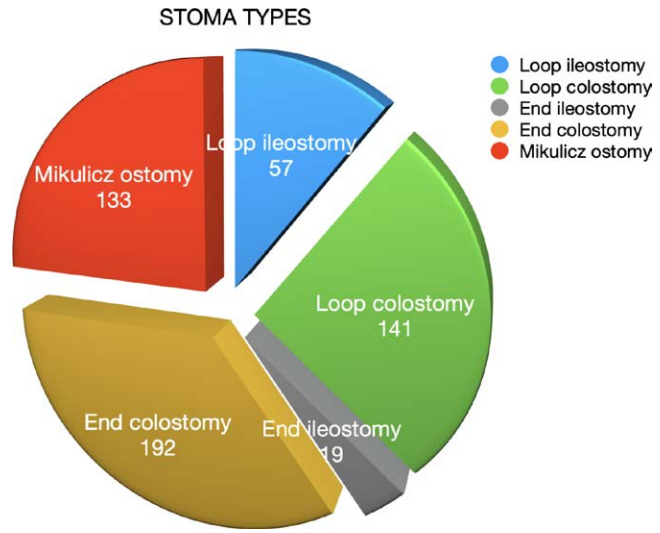

Figure 1. Types of created stomas.

Table 4

Stoma complications according to ASA scores.

		Total	Stoma complication absent (n = 514)	Stoma complication present (n = 28)	*P* value
ASA score, n (%)	ASA 1	177 (32.7)	166 (32.3)	11 (39.3)	.583*
	ASA 2	195 (36.0)	187 (36.4)	8 (28.6)	
	ASA 3	144 (26.6)	135 (26.3)	9 (32.1)	
	ASA 4	25 (4.6)	25 (4.9)	0 (0)	
	ASA 5	1 (0.2)	1 (0.2)	0 (0)	

ASA score = American Society of Anesthesiologists physical status classification system score.
*Fisher exact test.

Table 5

Factors related to failure of stoma closure.

	Univariate LR			Multivariate LR*		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Age (yr)	1.035	1.021–1.050	<.001	1.029	1.013–1.046	<.001
Gender (Ref.female)	0.928	0.611–1.410	.728			
Modified Kuppuswamy Score (Ref.High)			.302			
Upper middle	1.351	0.527–3.464	.532			
Middle	1.440	0.584–3.553	.428			
Upper low	1.305	0.543–3.136	.552			
Low	3.581	1.047–12.252	.042			
Metastasis (Ref. No)	2.688	1.596–4.528	<.001	3.032	1.767–5.204	<.001
Perforation (Ref. No)	1.592	1012–2.503	.044	1.584	0.974–2.577	.064
Pandemic (Ref. Prepandemic)	1.710	1.127–2.594	.012			
ASA score	1.952	1.494–2.551	<.001	1.583	1.181–2.121	.002

ASA score = American Society of Anesthesiologists physical status classification system score, CI = confidence interval, LR = logistic regression, OR = odds ratio, Ref = reference.
*Parameters with a *P* value < .2 in univariate analysis were added to multivariate analysis.

Table 6

Socioeconomic status and stoma closure rates.

		Total	Stoma closure No (n = 428)	Stoma closure Yes (n = 114)	*P* value
Modified Kuppuswamy score, n (%)	Level 1 (High)	29 (5.4)	21 (4.9)	8 (7.0)	.268*
	Level 2 (Upper middle)	100 (18.5)	78 (18.2)	22 (19.3)	
	Level 3 (Middle)	153 (28.2)	121 (28.3)	32 (28.1)	
	Level 4 (Upper low)	208 (38.4)	161 (37.6)	47 (41.2)	
	Level 5 (Low)	52 (9.6)	47 (11.0)	5 (4.4)	

*Chi-square test.

socioeconomic status. Olah et al stated that patients with a lower socioeconomic status think about the limited benefits of the general practitioner or surgeon who operates on them, and this situation mostly hinders their right to be hospitalized.[14] Thus, the importance of stoma closure at discharge and the right to readmission for stoma can be explained in detail to patients with a low socioeconomic status who are thought to have a short or long stoma closure duration. Persson and Hellström conducted a study of 53 patients with stomas and identified the psychological factors associated with living with a stoma. For example, all the patients expressed feelings of disgust and shock when they first saw their stoma. Others reported that they felt less confident in living with a stoma.[15]

The effect of socioeconomic status has also been studied in COVID-19 pandemic. A study aimed to investigate the spatio-temporal association between socioeconomic deprivation and COVID-19 incidence, examining how this relationship evolves with seasonal changes and public health restrictions.[16] It segmented the timeframe into 4 phases with varying restriction levels. Researchers sought to discern the independent impact of deprivation on COVID-19 incidence, while considering age, sex, regional trends, and restriction levels as potential modifiers. Results highlighted higher COVID-19 incidence in areas with greater socioeconomic deprivation, particularly during colder seasons and softer lockdown phases.

In the group of patients included in our study, the median metastasis value was higher during the pandemic period than

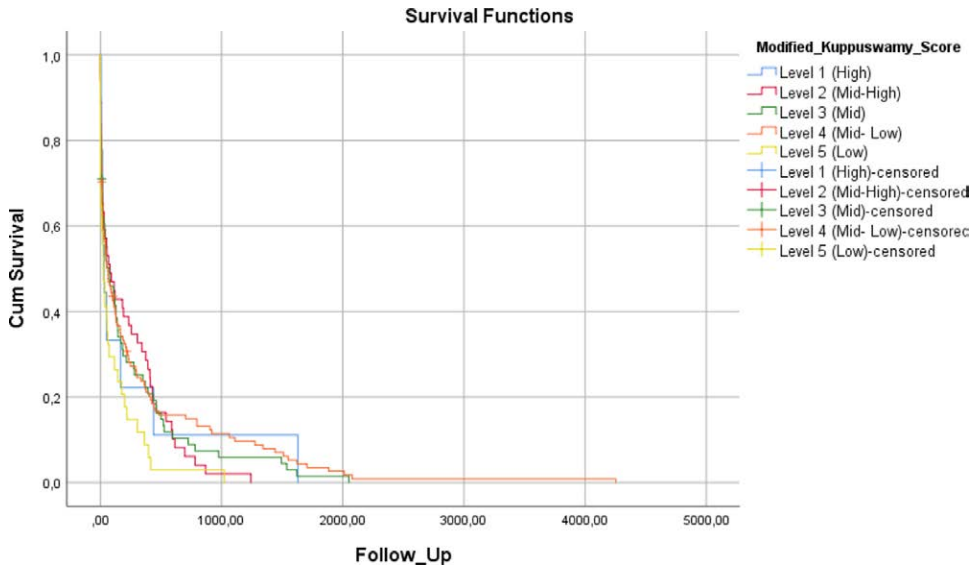

Figure 2. Survival according to Kuppuswamy social scores.

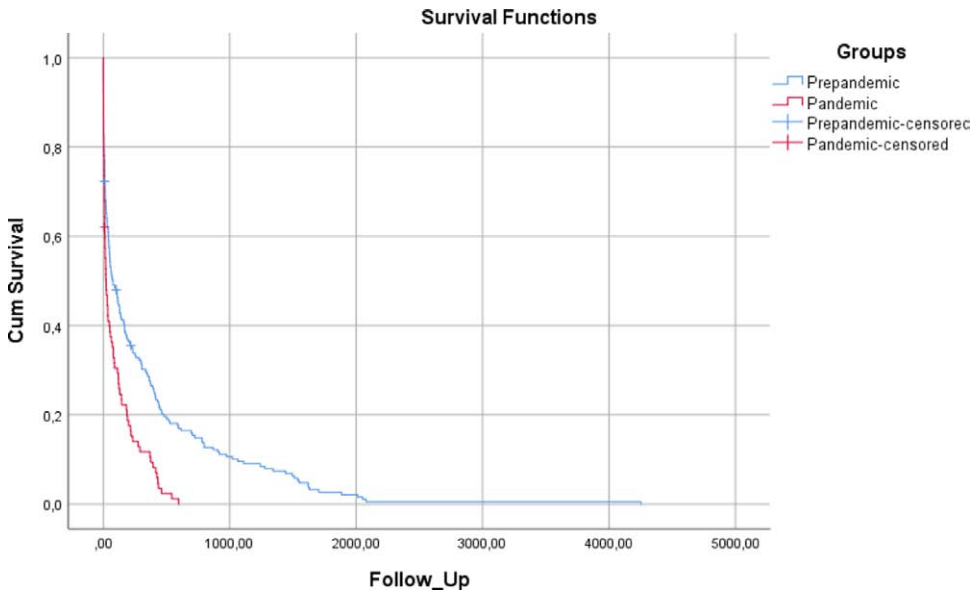

Figure 3. Survival in pre-pandemic and pandemic periods.

before the pandemic, which is in accordance with the literature. A possible reason for this could be that patients avoided the hospital environment and reduced the number of hospital admissions due to fear of COVID-19 infection. In addition, many elective procedures such as endoscopy and colonoscopy were postponed for a period of time during the pandemic. This has led to delayed diagnosis and disease progression, resulting in potential metastasis.[17]

More ostomy closures were observed before than during the pandemic. This was attributed to the postponement of elective surgical procedures during the pandemic, which is consistent with the literature.[18] In a study comparing 377 patients with acute appendicitis who underwent surgery during or before the pandemic, it was concluded that during the COVID-19 period, the ultrasonographic determination rate, perforation rate of acute appendicitis, and duration of hospital stay increased. However, there was no statistically significant delay in hospital admissions that would delay the diagnosis of acute appendicitis.[19]

Socioeconomic disadvantage is associated with an unfavorable prognosis as well as a negative impact on quality of life and psychosocial status. In their study of emergency general surgery cases, Cain et al reported that this was associated with increased mortality after high-risk surgical procedures.[20] Again, among different socioeconomic groups, Pruitt et al found in their study that there was a delay in the diagnosis of colorectal cancer and surgery in the socioeconomically disadvantaged population.[21] Although the socioeconomic status of our patients varied widely, the underlying reason for the lack of effect of socioeconomic status on ostomy closure rates can be attributed to our hospital being a referral center where patients are followed by multidisciplinary teams and having a dedicated colorectal outpatient clinic where patients are frequently referred to our hospital for follow-up visits compared to other hospitals where they must be applied individually for ostomy closure. Nevertheless, in our study, we concluded that high socioeconomic status causes early hospitalization for ostomy closure.

Table 7

Factors related to mortality.

	Univariate LR			Multivariate LR*		
	OR	95% CI	*P* value	OR	95% CI	*P* value
Age (yr)	1.032	1.019–1.045	<.001	1.027	1.012–1.043	.001
Gender (Ref.female)	0.713	0.507–1.004	.053			
Modified Kuppuswamy Score (Ref.High)			.005			.003
Upper middle	1.900	0.804–4.491	.144	3.777	1.313–10.870	.014
Middle	1.645	0.718–3.769	.239	2.799	1.013–7.734	.047
Upper low	2.695	1.194–6.083	.017	4.292	1.578–11.671	.004
Low	4.275	1.627–11.232	.003	8.831	2.717–28.703	<.001
Metastasis (Ref. No)	1.735	1.201–2.507	.003	2.177	1.386–3.422	.001
Perforation (Ref. No)	0.786	0.553–1.117	.179			
Complication (Ref. No)	3.370	2.252–5.044	<.001	2.813	1.726–4.584	<.001
Stoma closure (Ref. No)	9.949	5.730–17.272	<.001	12.447	6.524–23.748	<.001
Pandemic (Ref. Pandemic)	2.979	2.094–4.238	<.001	6.344	3.934–10.230	<.001
ASA score	1.355	1.115–1.645	.002			

ASA score = American Society of Anesthesiologists physical status classification system score, CI = confidence interval, LR = logistic regression, OR = odds ratio, Ref = reference.

*Parameters with a *P* value < .2 in univariate analysis were added to multivariate analysis.

It was also observed that the effect of socioeconomic factors was greater in emergency situations. In patients planned for ostomy closure, as the socioeconomic status rises, the time to apply to the hospital for ostomy closure shortens, and closure operations are performed earlier. We attribute this result to reasons such as easy access to health services, financial means, and psychological support for the trauma caused by ostomy in patients with a high socioeconomic status. Also in the multivariate analysis, the risk of mortality was 12.4-fold when there was a failure of stoma closure. This is also linked to presence of metastasis and complications when we performed multivariate analysis for the risks of failure of stoma closure. It was seen that in patients with metastasis the risk of failure of stoma closure was 3-fold.

As we conclude our discussion, this study highlights the critical impact of socioeconomic factors on the timing and management of planned ostomy closure procedures. It reveals a clear trend: individuals with higher socioeconomic status are more proactive in seeking hospital care and tend to undergo closure surgery more quickly than their counterparts. This finding is invaluable to healthcare providers and policymakers, and underscores the need to consider the influence of socioeconomic variables on patient care pathways for ostomy procedures. Moreover, lower socioeconomic level is linked to higher rates of mortality. Also, times of crisis like the pandemic will deepen this affect. By acknowledging these disparities, healthcare professionals can tailor their approach to elective ostomy closure and ensure equitable access to healthcare services. This includes implementing strategies that provide the necessary support to patients of lower socioeconomic status, thereby bridging the gap in healthcare access and outcomes. Such targeted interventions not only promote equity, but also improve the overall efficiency and effectiveness of healthcare delivery, underscoring the importance of socioeconomic considerations in the planning and delivery of medical care.

The limitations of our study include its single-center nature, and moreover, the patient demographic attending the state university hospital, primarily those residing within close proximity to our facility, represents a preselected group. Patients of higher socioeconomic status might opt for private healthcare institutions, which introduces a selection bias. These factors constitute the primary shortcomings of our study. Future research involving larger and more diverse patient groups could yield more generalizable results.

5. Conclusions

To summarize, it was determined that socioeconomic status is linked to quicker hospital admissions for emergency surgeries, consistent with patterns observed in other surgical interventions. Lower socioeconomic level and pre-pandemic period were associated with increased mortality. Moreover, in patients with metastasis, or presence of complication and those without stoma closure mortality was more common. It was also notable that higher socioeconomic status correlates with reduced wait times for hospital presentation for ostomy closure, resulting in earlier surgical interventions. This phenomenon can be attributed to better access to healthcare, financial resources, and psychological support for individuals of higher socioeconomic status. The socioeconomic status lost its effect in cases of emergency ostomy creation and had no impact on length of hospital stay in either the pre-pandemic or pandemic period.

Additionally, the pandemic was found to delay hospital admissions for emergencies and was associated with more advanced metastatic disease, regardless of socioeconomic status. This highlights the need for comprehensive follow-up to better address the requirements of patients from lower socio-cultural backgrounds, especially in times of crisis, considering the challenges posed by income disparities, educational deficits, and limited healthcare access.

Author contributions

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References

[1] Kuryba AJ, Scott NA, Hill J, et al. Determinants of stoma reversal in rectal cancer patients who had an anterior resection between 2009 and 2012 in the English National Health Service. Colorectal Dis. 2016;18:O199–205.
[2] Zafar SN, Changoor NR, Williams K, et al. Race and socioeconomic disparities in national stoma reversal rates. Am J Surg. 2016;211:710–5.

[3] Dodgion CM, Neville BA, Lipsitz SR, et al. Do older Americans undergo stoma reversal following low anterior resection for rectal cancer? J Surg Res. 2013;183:238–45.
[4] Ambur V, Taghavi S, Kadakia S, et al. Does socioeconomic status predict outcomes after cholecystectomy? Am J Surg. 2017;213:100–4.
[5] Armenia SJ, Pentakota SR, Merchant AM. Socioeconomic factors and mortality in emergency general surgery: trends over a 20-year period. J Surg Res. 2017;212:178–86.
[6] Bennett KM, Scarborough JE, Pappas TN, et al. Patient socioeconomic status is an independent predictor of operative mortality. Ann Surg. 2010;252:552–7; discussion 557.
[7] Crawford S, Schold J. Association between geographic measures of socio-economic status and deprivation and major surgical outcomes. Med Care. 2019;57:949–59.
[8] Mols F, Lemmens V, Bosscha K, et al. Living with the physical and mental consequences of an ostomy: a study among 1-10 year rectal cancer survivors from the population-based PROFILES registry. Psychooncology. 2014;23:998–1004.
[9] Messaris E, Sehgal R, Deiling S, et al. Dehydration is the most common indication for readmission after diverting ileostomy creation. Dis Colon Rectum. 2012;55:175–80.
[10] Bracale U, Podda M, Castiglioni S, et al. Changes in surgical behaviors during the CoviD-19 pandemic. The SICE CLOUD19 Study. Updates Surg. 2021;73:731–44.
[11] Morales-Conde S, Balla A, Alvarez Gallego M, et al. A dynamic scale for surgical activity (DYSSA) stratification during the COVID-19 pandemic. Br J Surg. 2020;107:e425–6.
[12] Reichert M, Sartelli M, Weigand MA, et al. Impact of the SARS-CoV-2 pandemic on emergency surgery services-a multi-national survey among WSES members. World J Emerg Surg. 2020;15:64.
[13] Kumar N, Shekhar C, Kumar P, et al. Kuppuswamy's socioeconomic status scale-updating for 2007. Indian J Pediatr. 2007;74:1131–2.
[14] Olah ME, Gaisana G, Hwang SW. The effect of socioeconomic status on access to primary care: an audit study. CMAJ. 2013;185:E2639.
[15] Persson E, Hellström AL. Experiences of Swedish men and women 6 to 12 weeks after ostomy surgery. J Wound Ostomy Continence Nurs. 2002;29:103–8.
[16] Bartolomeo N, Giotta M, Tafuri S, et al. Impact of socioeconomic deprivation on the local spread of COVID-19 cases mediated by the effect of seasons and restrictive public health measures: a retrospective observational study in Apulia Region, Italy. Int J Environ Res Public Health. 2022;19:11410.
[17] Di Saverio S, Pata F, Gallo G, et al. E.C.D Journal. Coronavirus pandemic and colorectal surgery: practical advice based on the Italian experience. Color Dis 2020;22:625–34.
[18] Chen Y, Chen L, Deng Q, et al. The presence of SARS-CoV-2 RNA in feces of COVID-19 patients. J Med Virol. 2020. Advanced online publication.
[19] Akbulut S, Tuncer A, Ogut Z, et al. Effect of the COVID-19 pandemic on patients with presumed diagnosis of acute appendicitis. World J Clin Cases. 2022;10:10487–500.
[20] Cain BT, Horns JJ, Huang LC, et al. Socioeconomic disadvantage is associated with greater mortality after high-risk emergency general surgery. J Trauma Acute Care Surg. 2022;92:691–700.
[21] Pruitt SL, Davidson NO, Gupta S, et al. Missed opportunities: racial and neighborhood socioeconomic disparities in emergency colorectal cancer diagnosis and surgery. BMC Cancer. 2014;14:927.