International Journal of Innovative Technologies in Social Science

e-ISSN: 2544-9435

Operating Publisher
SciFormat Publishing Inc.
ISNI: 0000 0005 1449 8214

2734 17 Avenue SW,
Calgary, Alberta, T3E0A7,
Canada
+15878858911
editorial-office@sciformat.ca

ARTICLE TITLE	SOCIAL VULNERABILITY, RURALITY, AND EMERGENCY COLON CANCER CARE: A NARRATIVE REVIEW
DOI	https://doi.org/10.31435/ijitss.1(49).2026.6092
RECEIVED	23 January 2026
ACCEPTED	27 March 2026
PUBLISHED	30 March 2026
LICENSE	The article is licensed under a **Creative Commons Attribution 4.0 International License.**

SOCIAL VULNERABILITY, RURALITY, AND EMERGENCY COLON CANCER CARE: A NARRATIVE REVIEW

Michał Babicz *(Corresponding Author, Email: michal_babicz@wp.pl)*
Jan Kochanowski University, Kielce, Poland
ORCID ID: 0009-0007-7611-4695

Oliwer Muller
Kielce Hospital of St. Aleksandra Sp. z o.o., Kielce, Poland
ORCID ID: 0009-0005-6197-8461

Katarzyna Rosa
Uniwersyteckie Centrum Kliniczne, Gdańsk, Poland
ORCID ID: 0009-0005-9307-4774

Agata Słoma
Uniwersyteckie Centrum Kliniczne, Gdańsk, Poland
ORCID ID: 0009-0004-6807-7706

Jagoda Pałubska
Independent Public Health Care Institution of the Ministry of the Interior and Administration in Kielce named after St. John Paul II, Kielce, Poland
ORCID ID: 0009-0000-3833-7977

Natalia Malatyńska
Jan Kochanowski University, Kielce, Poland
ORCID ID: 0009-0005-3824-8225

Anna Szot
Jan Kochanowski University, Kielce, Poland
ORCID ID: 0009-0003-2613-1068

Dominik Szydełko
Wojewódzki Szpital Zespolony w Kielcach, Kielce, Poland
ORCID ID: 0009-0002-9907-858X

Daria Danielczyk
Wojewódzki Szpital Zespolony w Kielcach, Kielce, Poland
ORCID ID: 0009-0002-4955-4883

Paweł Żurek
Medical University of Warsaw, Warsaw, Poland
ORCID ID: 0009-0006-3023-5128

ABSTRACT

Objective: To integrate recent evidence on the ways neighborhood social vulnerability and rural residence influence emergency presentation in colon cancer and the care trajectory that follows surgery.
Methodology: This narrative review examined PubMed-indexed literature identified through a targeted search on March 5, 2026. Systematic reviews, multicenter observational studies, and intervention studies published in English between 2013 and 2026 were prioritized, with preference for colon-specific evidence and selective inclusion of colorectal studies when directly applicable to colon cancer pathways.
Results: The literature points to a consistent pathway: socially vulnerable and rural populations are screened less often, enter care later, undergo non-elective surgery more frequently, and face greater difficulty completing postoperative and adjuvant care. Studies also suggest that provider availability, Commission on Cancer accreditation, patient navigation, and telehealth-supported follow-up can mitigate part of this disadvantage, although digital strategies remain constrained by broadband access, language barriers, and digital literacy.
Conclusion: Emergency colon cancer surgery is best interpreted as a downstream marker of inequity across the care continuum. Efforts to reduce it should connect public-health outreach, access planning, perioperative care, and technology-enabled continuity rather than treating the emergency operation as an isolated event.

KEYWORDS

Colon Cancer, Social Vulnerability, Rural Health, Emergency Surgery, Treatment Inequities, Public Health

CITATION

Michał Babicz, Oliwer Muller, Katarzyna Rosa, Agata Słoma, Jagoda Pałubska, Natalia Malatyńska, Anna Szot, Dominik Szydełko, Daria Danielczyk, Paweł Żurek. (2026) Social Vulnerability, Rurality, and Emergency Colon Cancer Care: A Narrative Review. *International Journal of Innovative Technologies in Social Science*. 1(49). doi: 10.31435/ijitss.1(49).2026.6092

Introduction

Colon cancer continues to generate a substantial emergency surgical burden, yet the emergency operation itself is only the most visible point in a longer chain of events. Patients who present with obstruction, perforation, severe bleeding, or urgent admission often arrive with more advanced disease and under less favorable physiologic and social circumstances than those diagnosed through planned pathways. A systematic review and meta-analysis by Golder et al. linked emergency presentation in colorectal cancer with advanced TNM stage and adverse tumor characteristics, reinforcing the view that emergency presentation is not random variation in timing but a clinically meaningful sign of delayed entry into care. From a population-health perspective, the emergency colectomy is therefore better understood as a late manifestation of cumulative disadvantage than as the true starting point of treatment. (Golder et al., 2022).

Colon cancer is a useful focus for this discussion because many failures in screening, diagnosis, access, and continuity become visible once surgery is required. The surgical episode sits at the intersection of prevention, diagnostic follow-up, hospital organization, and postoperative oncology care. Looking at colon cancer through that pathway lens makes it possible to connect social and geographic conditions before diagnosis with what happens in the operating room and afterward.

That pathway lens also helps explain why emergency presentation clusters in disadvantaged groups. Carethers and Doubeni argue that colorectal cancer disparities emerge long before treatment through unequal exposure, prevention, screening, diagnostic follow-up, and access to therapy. Brand et al. similarly found that travel distance, region, and insurance status were associated with advanced colon cancer at diagnosis, while Franklin et al. showed that even insured patients with unmet social needs were less likely to remain up to date with screening. Together, these findings suggest that emergency presentation often reflects delayed detection caused by a mix of financial, geographic, and social barriers rather than by disease biology alone. (Brand et al., 2022; Carethers & Doubeni, 2020; Franklin et al., 2025).

Neighborhood social vulnerability offers a practical way to capture these upstream constraints at area level. Across the cited studies, higher-vulnerability settings were associated with lower screening participation, greater odds of non-elective colorectal surgery, more difficult perioperative recovery, and worse survival after resection. Bauer et al. linked higher county vulnerability with lower screening participation, Diaz et al. associated it with non-elective rather than elective surgery, and Isenberg et al. together with Masoud et al. extended the pattern into postoperative outcomes and survivorship. The overall message is that neighborhood context continues to matter before, during, and after the index admission. (Bauer et al., 2022; Diaz et al., 2021; Isenberg et al., 2024; Masoud et al., 2024).

Rural residence introduces a related but not identical form of disadvantage. Distance matters, but rurality also encompasses provider shortages, hospital closures, longer referral chains, limited local access to colonoscopy and oncology services, weaker supportive infrastructure, and higher non-medical costs of care. Sepassi et al. reported lower screening uptake and broader disparities across diagnosis, treatment, and survivorship in rural populations. Tadé et al. showed that high-risk rural surgical patients had poorer access to elective colorectal cancer surgery, Lin et al. linked travel burden with lower receipt of adjuvant chemotherapy for stage III colon cancer, and Khan et al. found an association between provider density and colorectal cancer mortality independent of social vulnerability. In practical terms, rurality shapes both how patients enter care and whether they can stay on track afterward. (Khan et al., 2024; Lin et al., 2015; Sepassi et al., 2024; Tadé et al., 2024).

Even with these recurring findings, the evidence base is still scattered across separate literatures on screening, emergency surgery, perioperative outcomes, quality metrics, and survivorship. Bondzi-Simpson et al. argue that colorectal surgery quality indicators still do not integrate social determinants of health consistently, while Chan et al. show that system-level features such as treatment in Commission on Cancer-accredited hospitals can improve guideline-concordant care and survival. What is still missing is a synthesis that links community vulnerability, rural access, institutional resources, and technology-enabled interventions within a single care-pathway model. (Bondzi-Simpson et al., 2025; Chan et al., 2025a, 2025b).

This review addresses that gap. It asks three related questions: how neighborhood social vulnerability and rural residence increase the likelihood of emergency presentation; how these exposures continue to influence postoperative recovery and treatment continuity after surgery; and which public-health and technology-enabled responses appear most promising for reducing inequity. By following the pathway from screening to survivorship, the review treats emergency colon cancer care as an equity-sensitive outcome that cannot be understood by surgical factors alone.

Methodology

This manuscript was developed as a narrative review suited to a literature-based article in the Health and Well-being section of IJITSS. The review question was intentionally broad: to synthesize how social vulnerability and rurality shape emergency presentation, perioperative outcomes, and downstream treatment continuity in colon cancer care. A narrative design was chosen because the relevant evidence spans surgery, oncology, public health, health services research, and digital health and includes both epidemiologic and intervention-oriented studies. The goal was interpretive synthesis across levels of care rather than formal pooling of effect estimates.

A targeted PubMed search was conducted on March 5, 2026. Search combinations included terms such as "colon cancer," "colorectal cancer," "social vulnerability," "Social Vulnerability Index," "rural," "rural residence," "emergency presentation," "non-elective surgery," "colectomy," "screening," "provider density," "guideline-concordant care," "Commission on Cancer," "patient navigation," and "telehealth." Priority was given to English-language systematic reviews, meta-analyses, multicenter cohort studies, population-based observational studies, and intervention studies published between 2013 and 2026. Additional relevant papers were identified by reviewing the reference lists of key articles.

Eligible studies involved adult populations and addressed colon cancer or colorectal cancer questions with clear relevance to colon cancer pathways. The review prioritized outcomes related to emergency diagnosis or surgery, screening participation, perioperative outcomes, guideline-concordant care, adjuvant treatment, survivorship, patient navigation, provider distribution, telehealth, or closely related access measures. Pediatric studies, single case reports, and papers without empirical data were excluded unless they provided high-value conceptual framing. When evidence was available only at the broader colorectal level, it was incorporated cautiously and only when the underlying mechanism was directly applicable to colon cancer diagnosis or surgical care.

The synthesis was thematic rather than statistical. Evidence was organized into six domains: emergency presentation as a marker of accumulated disadvantage; neighborhood social vulnerability and non-elective surgery; rurality, travel burden, and the screening environment; postoperative inequities after colectomy; treatment-pathway inequities after diagnosis and surgery; and public-health and technology-enabled responses. Colon-specific evidence was prioritized wherever possible, and the use of broader colorectal literature is made explicit where necessary. Table 1, Table 2, and Figure 1 were prepared for this manuscript as original summary tools derived from the cited studies rather than reproduced from previously published sources.

Results

Results are presented along the care pathway rather than by study design. Figure 1 outlines the conceptual model that emerged from the literature, connecting neighborhood context and rural access with screening, diagnostic delay, emergency surgery, postoperative recovery, and continuity of oncologic care. Table 1 compiles the PubMed-indexed studies most central to the review. Across these sources, a common sequence is visible: social and geographic disadvantage shape entry into care, influence the conditions under which surgery occurs, and affect whether patients complete the next steps of high-quality cancer treatment. (Chan et al., 2025a, 2025b; Diaz et al., 2021; Golder et al., 2022; Sepassi et al., 2024).

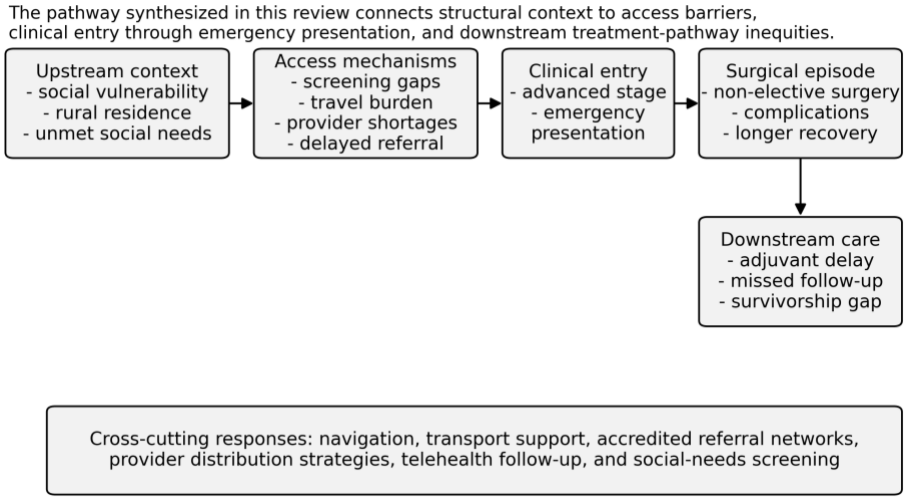

Fig. 1. *Multilevel pathway linking social vulnerability and rurality to emergency colon cancer care.*

Table 1. Key PubMed-indexed studies informing the review.

Theme	Selected PubMed-indexed studies	Main contribution to the review
Emergency presentation	Golder et al. (2022); Brand et al. (2022); Franklin et al. (2025)	Emergency presentation is associated with advanced stage and adverse tumor features, while travel burden, insurance, and unmet social needs contribute to delayed diagnosis and lower screening uptake.
Neighborhood social vulnerability	Bauer et al. (2022); Diaz et al. (2021); Isenberg et al. (2024); Masoud et al. (2024)	Higher vulnerability is linked to lower screening, greater odds of non-elective surgery, worse perioperative outcomes, and poorer survivorship after resection.
Rurality and geographic access	Sepassi et al. (2024); Tadé et al. (2024); Lin et al. (2015); Khan et al. (2024)	Rural residence and travel burden are associated with lower screening, poorer access to elective surgery and adjuvant therapy, and the importance of provider distribution.
Treatment-pathway quality	Chan et al. (2025a, 2025b); Bondzi-Simpson et al. (2025)	Accredited cancer programs can improve guideline-concordant care, but current quality indicators still underintegrate social determinants of health.
Interventions and implementation	Honeycutt et al. (2013); Guillaume et al. (2017); Korn et al. (2023); Marks et al. (2022); Morris et al. (2022)	Navigation, targeted screening support, and telehealth can reduce barriers, but implementation must account for transportation, cost, broadband, language, and digital literacy.

1. Emergency presentation as a sentinel event of accumulated disadvantage

In this review, emergency presentation is treated not simply as an urgent surgical category but as a clinically observable endpoint of earlier failures in prevention, access, and continuity. Definitions vary across datasets and include urgent admission, obstruction, perforation, severe bleeding, sepsis, and non-elective cancer-directed surgery. Despite those definitional differences, the literature consistently identifies emergency presentation as a marker of later-stage entry into care and more adverse clinical context.

A public-health interpretation becomes even more convincing when emergency presentation is linked back to upstream determinants. Carethers and Doubeni argue that colorectal cancer disparities begin well before treatment and arise from differences in exposure, prevention, screening, diagnostic follow-up, and treatment access. Their framework helps explain why emergency presentation clusters in socially disadvantaged populations. When screening participation is lower, symptoms are normalized or deferred, diagnostic colonoscopy is delayed, or transportation and time costs make repeated evaluation difficult, colon cancer is more likely to declare itself through crisis rather than planned diagnosis. Brand et al. reinforce this point by showing that travel distance, region, and insurance status are associated with advanced colon cancer at initial diagnosis. Likewise, Franklin et al. show that even among insured patients, social needs such as financial strain, isolation, and food insecurity are associated with lower screening uptake. From this perspective, emergency colon cancer care is a downstream event generated by upstream inequity. (Brand et al., 2022; Carethers & Doubeni, 2020; Franklin et al., 2025).

This interpretation also helps bridge surgical and public-health vocabularies. Surgeons often encounter emergency presentation as a biological and technical problem: dilated bowel, perforation, septic physiology, urgent operative planning, difficult consent, and limited time for optimization. Public health encounters the same event as a failure of prevention, access, and continuity. The distinction matters because it changes the implied intervention. If emergency surgery is framed only as an acute clinical problem, the response is limited to improving in-hospital management. If it is framed as a sentinel event of inequity, then the response expands to screening strategy, social needs screening, transportation support, referral design, and rural access infrastructure. The literature reviewed here strongly supports the second framing. (Carethers & Doubeni, 2020; Golder et al., 2022).

2. Neighborhood social vulnerability and non-elective colon cancer surgery

Neighborhood social vulnerability is valuable here because it converts diffuse structural disadvantage into a measurable contextual exposure. Although it does not replace individual-level assessment, it helps explain why otherwise separate outcomes—screening uptake, non-elective surgery, postoperative complications, and survivorship—tend to cluster in the same places.

The influence of social vulnerability begins before diagnosis. Bauer et al. found that counties in the highest levels of social vulnerability had lower colorectal cancer screening rates, which is highly relevant to colon cancer because screening remains the principal mechanism for detecting premalignant lesions and early-stage disease before urgent symptoms emerge. Franklin et al. extend this insight from place-based measures to patient-reported social needs. In their study, severe financial strain, severe social isolation, and severe food insecurity were associated with lower odds of being up to date with colorectal cancer screening even in an integrated, insured care setting. These findings matter because they suggest that the pathways from vulnerability to emergency presentation are not abstract. They operate through concrete barriers such as missed preventive visits, delayed bowel preparation, inability to arrange transportation, or lack of social support for diagnostic follow-up. (Bauer et al., 2022; Franklin et al., 2025).

The next step in the pathway is non-elective surgery. Diaz et al. showed that county-level social vulnerability was associated with a shift away from elective and toward non-elective colorectal surgery. Importantly, high social vulnerability in that study was also associated with greater complications and higher expenditures, indicating that vulnerability influences both the type of surgical entry into care and the resource intensity of the episode that follows. This is one of the clearest demonstrations that neighborhood conditions can shape the operative trajectory itself. It also suggests that non-elective surgery may be an equity-sensitive surgical quality indicator rather than merely a marker of disease severity. (Diaz et al., 2021).

More recent studies indicate that the consequences of vulnerability do not end after the operation. Isenberg et al. reported that social vulnerability was associated with unplanned operations and worse short- and long-term perioperative outcomes after colectomy for colon cancer. Masoud et al. found that higher Social Vulnerability Index was independently associated with worse all-cause and cancer-specific mortality after colorectal cancer resection. These findings are important because they argue against a narrow interpretation in

which social vulnerability matters only before diagnosis. Instead, the literature suggests a durable effect across the perioperative and survivorship phases. Patients from highly vulnerable neighborhoods may face poorer nutritional reserve, higher comorbidity burden, more fragile discharge environments, lower follow-up completion, and more difficulty reaching oncology services after surgery. (Isenberg et al., 2024; Masoud et al., 2024).

Conceptually, social vulnerability should therefore be viewed as a structural exposure that is expressed repeatedly throughout the pathway: first through lower screening uptake, then through delayed diagnosis or emergency presentation, then through more complicated surgical episodes, and finally through less favorable recovery and survivorship. This interpretation does not mean that every vulnerable patient experiences poor care or that neighborhood measures perfectly represent individual hardship. It does mean that the association between place and pathway is now too consistent to be treated as incidental. For colon cancer surgery, social vulnerability is no longer only a risk-adjustment variable. It is a mechanism-bearing characteristic of the care environment itself. (Bauer et al., 2022; Diaz et al., 2021; Isenberg et al., 2024; Masoud et al., 2024).

At the same time, the literature warns against relying on area-based indices as if they were complete substitutes for patient-level reality. Two patients from the same vulnerable county may face very different caregiving resources, employment flexibility, health literacy, or transportation security. This is why the combination of area-level measures and direct assessment of social needs may be especially important in future colon cancer pathways. Franklin et al. demonstrate that unmet needs remain visible even in highly insured systems, suggesting that a neighborhood score alone cannot tell clinicians which patient is at immediate risk of pathway disruption. The best current interpretation is therefore layered: neighborhood vulnerability identifies where risk is concentrated, while social-needs assessment identifies how that risk is actually experienced by the individual patient. (Franklin et al., 2025).

3. Rural residence, geographic access, and the screening environment

Rural disadvantage intersects with social vulnerability but has its own mechanisms. It is produced not only by geographic distance, but also by thinner provider networks, referral fragmentation, reduced local diagnostic capacity, transportation burden, and fewer opportunities for timely follow-up.

Rurality also appears to affect whether surgery occurs electively or only after deterioration. Tadé et al. described poor access to elective colorectal cancer surgery among high-risk rural patients and showed that the problem is especially pronounced when rurality intersects with advanced age, multimorbidity, Medicaid insurance, and racial or ethnic marginalization. Their work is useful because it moves beyond the simplistic question of whether rural hospitals have worse outcomes. The more fundamental issue is that rural patients may not reach planned cancer surgery at all, or may arrive later and sicker because the pathway leading to surgery is weaker. In this sense, reduced access to elective surgery is itself a rural health-system outcome. (Tadé et al., 2024).

Travel burden provides a measurable mechanism for this process. Brand et al. found that greater travel distance, region, and insurance status were associated with advanced colon cancer at initial diagnosis. Lin et al. then showed that increased travel burden was associated with lower receipt of adjuvant chemotherapy within 90 days of colectomy for stage III colon cancer, and that low oncologist density mattered especially for patients without private insurance. Taken together, these studies indicate that rural disadvantage does not disappear once surgery has occurred. A patient may successfully undergo colectomy yet still lose the survival benefit of multimodality care if travel for oncology appointments is too burdensome. (Brand et al., 2022; Khan et al., 2024; Lin et al., 2015).

Provider distribution further shapes these outcomes. Khan et al. demonstrated that higher county-level provider density was associated with lower colorectal cancer mortality independent of social vulnerability. This finding supports the idea that geography is not merely about how far a patient lives from a hospital. It is about the density, organization, and redundancy of the system around that patient. Two counties may be equally poor yet differ substantially in endoscopy capacity, oncology access, referral speed, or accredited cancer services. In practice, rurality is therefore best understood as a composite access condition involving space, workforce, transport, and system design. (Khan et al., 2024).

An important implication is that rurality should not be treated as a simple binary covariate. It interacts with insurance status, digital infrastructure, age, caregiving capacity, and hospital resources. Some rural patients may receive excellent local stabilization and appropriate regional referral. Others may cycle through delayed workup, fragmented transport, emergency admission, and prolonged postoperative travel for adjuvant therapy. The literature supports a more nuanced view in which rural inequity lies less in the stereotype of a uniformly low-quality rural hospital and more in the longer, more fragile, and more interruption-prone pathway that many rural patients must navigate to obtain high-quality colon cancer care. (Sepassi et al., 2024; Tadé et al., 2024).

4. Postoperative inequities after colectomy

After surgery, inequity does not disappear; it changes form. Social and geographic disadvantage can affect postoperative recovery through comorbidity burden, discharge instability, access to follow-up, rehabilitation, social support, and continuity with oncology services.

Empirically, this pattern is visible in both population-level and institution-level research. Diaz et al. reported that socially vulnerable populations undergoing colorectal surgery had more complications and higher expenditures when care occurred non-electively. Isenberg et al. further showed that social vulnerability among patients undergoing colectomy for colon cancer was associated with unplanned operations and worse short- and long-term outcomes. These findings suggest that the postoperative course is not solely determined by operative technique or tumor stage. It is also shaped by the conditions under which the patient entered surgery and by the support systems available after discharge. (Diaz et al., 2021; Isenberg et al., 2024).

The postoperative phase is especially important in colon cancer because surgical recovery is tightly linked to the rest of the treatment pathway. Complications can delay adjuvant chemotherapy, increase readmissions, prolong ostomy dependence, and weaken functional recovery. In socially vulnerable or rural populations, such complications may be harder to absorb because transport is more difficult, caregiving resources are thinner, and follow-up coordination is less reliable. Masoud et al. provide a longer horizon on this problem by showing that higher social vulnerability remains associated with worse survivorship after colorectal cancer resection. The implication is that postoperative inequity is not reducible to the first 30 days. It extends into cancer-specific and all-cause survival. (Masoud et al., 2024).

These observations also raise questions about how surgical quality is measured. Traditional metrics such as mortality, readmission, length of stay, or complication rates remain essential, but they do not fully reveal why inequities occur. Bondzi-Simpson et al. note that social determinants of health are still poorly integrated into quality indicators for colorectal cancer surgery. As a result, hospitals may be judged on outcomes without adequately accounting for whether they serve populations facing more emergency presentations, greater travel barriers, or greater social needs after discharge. The answer is not to excuse poor outcomes, but to recognize that quality improvement must incorporate both care delivery and social context. (Bondzi-Simpson et al., 2025).

For clinicians, this means that the postoperative period should be treated as a point for equity-sensitive intervention. Social work assessment, transportation planning, stoma education, telephonic or telehealth follow-up, rapid coordination with oncology, and proactive management of nutrition and wound care may all matter more for patients whose recovery context is fragile. For researchers, it means that postoperative inequities should be analyzed not only as outcomes but as windows into how the health system does or does not support socially vulnerable populations after major colon cancer surgery. (Bondzi-Simpson et al., 2025; Isenberg et al., 2024).

5. Treatment-pathway inequities after diagnosis and surgery

The post-resection period is a critical test of whether health systems can convert technically successful surgery into complete cancer care. Staging, lymph node evaluation, oncology referral, timely adjuvant treatment, and surveillance all depend on organizational continuity that is especially vulnerable to social and geographic barriers.

The same study provides an important systems-level insight: treatment at Commission on Cancer-accredited hospitals was associated with higher odds of guideline-concordant care and partially mitigated vulnerability-related deficits in survival. A related colon-specific analysis by Chan et al. showed that accreditation was one of the strongest modifiable predictors of adequate lymphadenectomy and chemotherapy receipt in colon cancer. These data suggest that structural characteristics of hospitals and networks matter. They also indicate that vulnerability is not destiny. The organization of cancer services can reduce, though not fully erase, the downstream effects of social disadvantage. (Chan et al., 2025b).

Geographic barriers remain central in this phase. Lin et al. showed that increased travel burden was associated with lower receipt of adjuvant chemotherapy after colectomy for stage III colon cancer, and that low oncologist density was especially consequential for patients without private insurance. This finding is highly relevant to rural populations and to patients recovering from emergency surgery, whose postoperative burden is already substantial. A patient discharged after colectomy may still need repeated travel for wound review, stoma support, pathology discussion, oncology consultation, port placement, and chemotherapy initiation. When travel is costly, time-intensive, or dependent on unstable support systems, the probability of delayed or omitted adjuvant treatment increases. (Chan et al., 2025a).

The survivorship literature suggests that the cumulative effect of these pathway interruptions is clinically meaningful. Masoud et al. found worse overall and cancer-specific survival after resection in more socially vulnerable patients, implying that inequity in the surgical pathway is not confined to acute morbidity. Bondzi-Simpson et al. further argue that current quality indicators often fail to capture these socially patterned pathway losses. A hospital may appear technically proficient while the broader care system still fails to deliver equitable continuity after surgery. For colon cancer, measures such as emergency presentation, time to oncology consultation, time to adjuvant chemotherapy, completion of indicated systemic therapy, and successful surveillance may therefore deserve greater prominence as equity-sensitive endpoints. (Lin et al., 2015).

This broader pathway view also clarifies why emergency presentation is so consequential. Emergency surgery can be life-saving, but it is often followed by a more difficult postoperative recovery, more frequent complications, and a compressed timeline for regaining functional status before adjuvant therapy decisions. When emergency surgery occurs in populations already exposed to high vulnerability or rural access barriers, the risk of pathway disruption compounds. In this sense, social vulnerability and rurality are not separate chapters of care from surgery. They are forces that continue to operate after the incision is closed. (Bondzi-Simpson et al., 2025; Masoud et al., 2024).

6. Public-health and technology-enabled responses

Because the problem unfolds across the continuum, the response must also be layered. The reviewed intervention literature suggests that screening support, navigation, service organization, and digital follow-up work best when they are combined rather than deployed as isolated fixes.

Patient navigation remains one of the most promising evidence-based tools in this space. Honeycutt et al. evaluated a navigation program designed to promote colorectal cancer screening in rural Georgia and showed that navigation can address both individual and system barriers in underserved settings. Guillaume et al. similarly demonstrated in a cluster randomized trial that patient navigation reduced social inequalities in colorectal cancer screening participation. Korn et al., in a systematic review of social determinants and U.S. cancer screening interventions, concluded that the strongest favorable effects were often seen when interventions addressed policy, access, and cost barriers rather than relying on information alone. In practical terms, this means that navigation should be linked to transport assistance, reminder systems, multilingual communication, time-off-work accommodations, and capacity for rapid colonoscopy after abnormal screening. (Guillaume et al., 2017; Honeycutt et al., 2013; Korn et al., 2023).

The second layer is health-system organization. Rural and vulnerable populations benefit when diagnostic and treatment pathways are intentionally designed rather than left to ad hoc referral patterns. Tadé et al. highlight poor access to elective colorectal surgery among high-risk rural patients, while Khan et al. show the importance of provider density. Chan et al. further show that Commission on Cancer accreditation improves receipt of guideline-concordant care and survival. These findings support strategies such as regional referral agreements, shared-care models between rural hospitals and accredited centers, faster transfer protocols for suspected obstructing colon cancer, and deliberate maintenance of local diagnostic and postoperative services even when more complex cancer care is regionalized. (Chan et al., 2025a, 2025b; Khan et al., 2024; Tadé et al., 2024).

The third layer involves digital health and telehealth, which are especially relevant to the scope of the present journal because they sit at the intersection of technology, social structure, and access. Marks et al. found that telehealth for colorectal cancer care was available at many U.S. hospitals during the COVID-19 era, but availability was not universal and was substantially lower for new patient visits than for follow-up care. Morris et al., in a systematic review of digital health technology in rural cancer care delivery, found that the evidence base remains relatively small and heavily centered on telemedicine, with important concerns about the digital divide. These observations suggest that telehealth can reduce some geographic burdens, but only if broadband access, device availability, language support, digital literacy, and reimbursement are addressed as implementation issues rather than afterthoughts. (Marks et al., 2022; Morris et al., 2022).

For colon cancer specifically, digital tools can be useful at several points in the pathway: symptom triage before diagnosis, preoperative counseling, postoperative wound or stoma review, medication reconciliation, survivorship follow-up, and coordination of adjuvant treatment across dispersed sites. Telehealth cannot replace colonoscopy, pathology, infusion therapy, or emergency surgery. It can, however, reduce unnecessary travel, shorten decision intervals, support multidisciplinary consultation, and keep rural or socially vulnerable patients more connected to the system after discharge. The main caution is that digital health must not be

mistaken for a universal solution. If implemented without attention to social context, it may preferentially benefit patients who already have stronger resources. (Marks et al., 2022; Morris et al., 2022).

Across all three layers, the most effective policy direction is not a choice between surgery and public health, or between local care and technology, but an integrated model. The literature supports combining geospatial identification of high-risk areas, social needs screening, navigation, transport support, accredited referral pathways, and telehealth-enabled follow-up. Emergency colon cancer surgery is unlikely to decline through operative innovation alone. It is more likely to decline when vulnerable populations are reached earlier, guided more effectively, and supported more consistently across the full continuum of care. (Chan et al., 2025a, 2025b; Guillaume et al., 2017; Honeycutt et al., 2013).

An additional lesson from the intervention literature is that implementation details determine whether access strategies truly reduce inequity. Navigation is most effective when it is empowered to solve concrete barriers rather than simply remind patients of appointments. Telehealth is most useful when platforms are simple, language-concordant, device-compatible, and supported by staff who can convert a failed virtual contact into an urgent in-person evaluation when needed. Geospatial targeting is valuable only if it is linked to deployable resources such as endoscopy slots, travel assistance, or community outreach. In other words, technology and analytics are not substitutes for service capacity. They are tools for directing and coordinating that capacity more intelligently. (Honeycutt et al., 2013; Morris et al., 2022).

Discussion

This review suggests that emergency colon cancer care is best interpreted as a multilevel manifestation of inequity rather than as an event confined to the hospital. Social vulnerability and rural residence influence who is screened, who completes diagnostic work-up, who can reach elective surgery in time, and who remains connected to postoperative treatment. By the time urgent surgery occurs, many of the relevant disadvantages have been operating for months or years. Emergency presentation is therefore analytically useful because it makes visible a chain of upstream failures that surgery alone cannot correct. (Carethers & Doubeni, 2020; Golder et al., 2022).

Read together, the studies support a pathway model rather than a set of isolated associations. Community context affects access; access affects timing of diagnosis and mode of surgical entry; mode of entry affects recovery; and recovery affects whether recommended oncology care is completed. That sequencing helps explain why high social vulnerability and rurality are associated not with a single isolated outcome but with repeated disadvantages across screening, surgery, and survivorship. (Bauer et al., 2022; Chan et al., 2025a, 2025b; Diaz et al., 2021; Isenberg et al., 2024; Khan et al., 2024; Lin et al., 2015; Masoud et al., 2024; Sepassi et al., 2024).

Several practical implications follow. First, emergency presentation rates in colon cancer deserve attention as equity-sensitive population indicators, because they may reveal failures in screening uptake, abnormal-result follow-up, diagnostic access, or referral design that routine program metrics miss. Second, social vulnerability and rurality should be used prospectively for targeting resources, not merely retrospectively for statistical adjustment. High-vulnerability areas may warrant intensified mailed testing, navigation, transportation support, and colonoscopy capacity, while rural regions with persistent emergency presentation may require workforce mapping, transfer redesign, and better access to accredited cancer services. (Bauer et al., 2022; Franklin et al., 2025; Tadé et al., 2024).

The findings also argue for a broader view of surgical quality. Mortality, morbidity, and oncologic adequacy remain essential, but they do not fully capture whether the pathway into and out of surgery is equitable. An equity-aware framework would also examine the proportion of non-elective resections, time from diagnosis to surgery, time to oncology review, time to adjuvant chemotherapy, and continuity of surveillance. Bondzi-Simpson et al. make a similar point in noting that current colorectal cancer surgery quality indicators still underrepresent social determinants of health. (Bondzi-Simpson et al., 2025).

Whether such responses scale will depend heavily on policy design. Payment and accreditation models that reward procedural throughput without rewarding continuity, navigation, and social support are unlikely to reduce emergency presentation. By contrast, financing arrangements that sustain mailed screening, transport assistance, social-work integration, and telehealth follow-up are more consistent with the pathway failures described in this review. The present literature does not identify a single ideal model, but it repeatedly indicates that hospitals cannot eliminate community-generated access barriers without broader population-health infrastructure. (Marks et al., 2022; Morris et al., 2022).

Technology has a role here, but mainly as infrastructure for continuity rather than as novelty. For a journal concerned with innovative technologies in social science, the most relevant digital contribution is the ability to detect pathway loss earlier, document barriers more systematically, and reduce avoidable travel after surgery. Geospatial analysis, electronic prompts, navigation platforms, and telehealth all fit this purpose, but the literature also shows that their benefits are limited when broadband, language support, reimbursement, or digital literacy are weak. Digital tools are therefore most effective when paired with human support and explicit equity design. (Bondzi-Simpson et al., 2025; Chan et al., 2025a; Korn et al., 2023).

Important research gaps remain. Much of the evidence is retrospective and U.S.-based; area-level measures do not fully capture individual hardship or resilience; and definitions of rurality and emergency presentation are not standardized across studies. Colon-specific evidence is also thinner than broader colorectal evidence for some upstream and digital-health questions. Future work should therefore prioritize prospective multilevel designs, linkage of neighborhood deprivation with individual social-needs data, mediation analyses connecting vulnerability with emergency presentation and survival, and intervention trials extending beyond screening into the post-discharge and adjuvant phases. (Bondzi-Simpson et al., 2025).

This review also has limitations. It is a narrative synthesis rather than a formal systematic review, so it does not provide pooled estimates or an exhaustive risk-of-bias assessment. Study selection was intentionally purposive because the goal was to build a clinically and policy-relevant account of the pathway linking vulnerability to emergency surgery. That choice limits claims about completeness, but it allows integration of evidence across disciplines that are often analyzed separately.

Taken together, the reviewed literature supports a simple but consequential reframing: emergency colon cancer surgery is one point where population health, social inequality, service organization, and operative care converge. That reframing does not diminish the importance of technical surgical excellence; it clarifies its limits when screening environments, navigation systems, transport support, provider access, referral networks, and continuity tools are weak. Table 2 summarizes the multilevel response framework derived from this synthesis.

Table 2. Multilevel response framework for reducing emergency colon cancer presentation and pathway loss.

Level	Primary barrier	Potential response	Equity-sensitive metrics
Community and screening	Low screening uptake in high-vulnerability and rural areas	Targeted mailed FIT programs, navigation, social-needs screening, outreach through primary care and community partners	Screening completion, colonoscopy follow-up after abnormal FIT, emergency presentation rate
Diagnostic access	Travel burden, delayed colonoscopy, fragmented referral pathways	Fast-track colonoscopy pathways, transportation support, referral coordination, geospatial monitoring of low-access areas	Time from symptom presentation or abnormal test to diagnosis
Surgical pathway	Poor access to elective cancer surgery and accredited centers	Regional referral agreements, shared-care models, protected transfer pathways, quality benchmarking	Proportion of elective versus non-elective resections; adequate lymphadenectomy
Postoperative and adjuvant care	Complications, difficult follow-up, missed oncology appointments	Post-discharge navigation, rapid oncology referral, transport support, coordinated stoma and wound follow-up	Time to oncology visit, time to adjuvant chemotherapy, readmission, treatment completion
Digital infrastructure	Distance, broadband gaps, low digital literacy	Telehealth follow-up, multilingual platforms, low-tech options by phone, digital navigator support	Telehealth completion, no-show rate, patient-reported access, rural retention in follow-up

Conclusions

The studies reviewed here indicate that neighborhood social vulnerability and rural residence are upstream determinants of how colon cancer care unfolds. They influence whether diagnosis occurs through planned evaluation or emergency presentation, how safely patients recover after surgery, and whether the recommended sequence of oncologic care is completed. Emergency colon cancer surgery should therefore be read as a marker of inequity across the care continuum, not merely as an isolated operative episode.

The most promising response is accordingly multilevel. Targeted screening in high-vulnerability communities, systematic assessment of social needs, patient navigation, transportation support, referral to well-resourced cancer programs, and telehealth-enabled follow-up can reinforce one another when implemented as a pathway strategy. For research, the next step is to test interventions that reduce emergency presentation and protect continuity after surgery. For quality improvement, the priority is to measure colon cancer care in ways that reflect both technical performance and equity of access.

Author's contribution:

Research concept and design: Michał Babicz, Oliwer Muller, Jagoda Pałubska
Data collection: Katarzyna Rosa, Daria Danielczyk, Anna Szot, Dominik Szydełko
Data analysis and compilation: Michał Babicz, Daria Danielczyk, Paweł Żurek
Writing: Michał Babicz, Oliwer Muller, Dominik Szydełko
Supervision, project administration: Michał Babicz

All listed authors reviewed and approved the final manuscript text.

Funding: No external funding was received for the preparation of this review.

Conflicts of Interest: No conflicts of interest to declare.

Ethics Statement: Ethics approval was not required because this article is a narrative review of previously published literature.

Data Availability Statement: This narrative review did not generate or analyze new primary datasets. All evidence discussed in the manuscript is drawn from previously published sources cited in the reference list.

REFERENCES

1. Bauer, C., Zhang, K., Xiao, Q., Lu, J., Hong, Y.-R., & Suk, R. (2022). County-level social vulnerability and breast, cervical, and colorectal cancer screening rates in the US, 2018. *JAMA Network Open, 5*(9), e2233429. https://doi.org/10.1001/jamanetworkopen.2022.33429
2. Bondzi-Simpson, A., Ribeiro, T., Zhu, A., Lofters, A., Covelli, A., Snyder, R. A., Clarke, C. N., Coburn, N. G., & Hallet, J. (2025). Integration of social determinants of health in quality indicators for colorectal cancer surgery: A scoping review. *EClinicalMedicine, 89*, 103565. https://doi.org/10.1016/j.eclinm.2025.103565
3. Brand, N. R., Greenberg, A. L., Chiou, S. H., Adam, M., & Sarin, A. (2022). Association of distance, region, and insurance with advanced colon cancer at initial diagnosis. *JAMA Network Open, 5*(9), e2229954. https://doi.org/10.1001/jamanetworkopen.2022.29954
4. Carethers, J. M., & Doubeni, C. A. (2020). Causes of socioeconomic disparities in colorectal cancer and intervention framework and strategies. *Gastroenterology, 158*(2), 354–367. https://doi.org/10.1053/j.gastro.2019.10.029
5. Chan, K., Palis, B. E., Cotler, J. H., Janczewski, L. M., Weigel, R. J., Bentrem, D. J., & Ko, C. Y. (2025a). Association of Commission on Cancer accreditation with receipt of guideline-concordant care and survival among patients with colon cancer. *World Journal of Surgery, 49*(1), 34–45. https://doi.org/10.1002/wjs.12391
6. Chan, K., Palis, B. E., Cotler, J. H., Janczewski, L. M., Weigel, R. J., Ko, C. Y., & Bentrem, D. J. (2025b). Social vulnerability and receipt of guideline-concordant care among patients with colorectal cancer. *Journal of the American College of Surgeons, 240*(2), 167–178. https://doi.org/10.1097/XCS.0000000000001193
7. Diaz, A., Barmash, E., Azap, R., Paredes, A. Z., Hyer, J. M., & Pawlik, T. M. (2021). Association of county-level social vulnerability with elective versus non-elective colorectal surgery. *Journal of Gastrointestinal Surgery, 25*(3), 786–794. https://doi.org/10.1007/s11605-020-04768-3
8. Franklin, I. R., Gambatese, R., Duggan, M. C., Green, B. B., Nocon, R. S., Coronado, G. D., Hahn, E. E., Honda, S. A., Koplan, K., Levin, T. R., Steiner, C. A., & Ngo-Metzger, Q. (2025). Colorectal cancer screening and social needs. *Journal of the American Board of Family Medicine, 37*(5), 868–887. https://doi.org/10.3122/jabfm.2023.230497R1

9. Golder, A. M., McMillan, D. C., Horgan, P. G., & Roxburgh, C. S. D. (2022). Determinants of emergency presentation in patients with colorectal cancer: A systematic review and meta-analysis. *Scientific Reports, 12*(1), 4366. https://doi.org/10.1038/s41598-022-08447-y
10. Guillaume, E., Dejardin, O., Bouvier, V., De Mil, R., Berchi, C., Pornet, C., Christophe, V., Notari, A., Delattre Massy, H., De Seze, C., Peng, J., Guittet, L., & Launoy, G. (2017). Patient navigation to reduce social inequalities in colorectal cancer screening participation: A cluster randomized controlled trial. *Preventive Medicine, 103*, 76–83. https://doi.org/10.1016/j.ypmed.2017.08.012
11. Honeycutt, S., Green, R., Ballard, D., Hermstad, A., Brueder, A., Haardörfer, R., Yam, J., & Arriola, K. J. (2013). Evaluation of a patient navigation program to promote colorectal cancer screening in rural Georgia, USA. *Cancer, 119*(16), 3059–3066. https://doi.org/10.1002/cncr.28033
12. Isenberg, E. E., Kunnath, N., Suwanabol, P. A., Ibrahim, A., Tipirneni, R., & Harbaugh, C. M. (2024). Social vulnerability and perioperative outcomes after colectomy for colon cancer. *Journal of Gastrointestinal Surgery, 28*(11), 1783–1790. https://doi.org/10.1016/j.gassur.2024.08.014
13. Khan, M. M. M., Munir, M. M., Khalil, M., Tsilimigras, D. I., Woldesenbet, S., Endo, Y., Katayama, E., Rashid, Z., Cunningham, L., Kaladay, M., & Pawlik, T. M. (2024). Association of county-level provider density and social vulnerability with colorectal cancer-related mortality. *Surgery, 176*(1), 44–50. https://doi.org/10.1016/j.surg.2024.03.035
14. Korn, A. R., Walsh-Bailey, C., Correa-Mendez, M., DelNero, P., Pilar, M., Sandler, B., Brownson, R. C., Emmons, K. M., & Oh, A. Y. (2023). Social determinants of health and US cancer screening interventions: A systematic review. *CA: A Cancer Journal for Clinicians, 73*(5), 461–479. https://doi.org/10.3322/caac.21801
15. Lin, C. C., Bruinooge, S. S., Kirkwood, M. K., Olsen, C., Jemal, A., Bajorin, D., Giordano, S. H., Goldstein, M., Guadagnolo, B. A., Kosty, M., Hopkins, S., Yu, J. B., Arnone, A., Hanley, A., Stevens, S., & Hershman, D. L. (2015). Association between geographic access to cancer care, insurance, and receipt of chemotherapy: Geographic distribution of oncologists and travel distance. *Journal of Clinical Oncology, 33*(28), 3177–3185. https://doi.org/10.1200/JCO.2015.61.1558
16. Marks, V. A., Hsiang, W. R., Umer, W., Haleem, A., Kim, D., Kunstman, J. W., Leapman, M. S., & Schuster, K. M. (2022). Access to telehealth services for colorectal cancer patients in the United States during the COVID-19 pandemic. *American Journal of Surgery, 224*(5), 1267–1273. https://doi.org/10.1016/j.amjsurg.2022.06.005
17. Masoud, S. J., Seo, J. E., Singh, E., Woody, R. L., Muhammed, M., Webster, W., & Mantyh, C. R. (2024). Social Vulnerability Index and survivorship after colorectal cancer resection. *Journal of the American College of Surgeons, 238*(4), 693–706. https://doi.org/10.1097/XCS.0000000000000961
18. Morris, B. B., Rossi, B., & Fuemmeler, B. (2022). The role of digital health technology in rural cancer care delivery: A systematic review. *Journal of Rural Health, 38*(3), 493–511. https://doi.org/10.1111/jrh.12619
19. Sepassi, A., Li, M., Zell, J. A., Chan, A., Saunders, I. M., & Mukamel, D. B. (2024). Rural-urban disparities in colorectal cancer screening, diagnosis, treatment, and survivorship care: A systematic review and meta-analysis. *The Oncologist, 29*(4), e431–e446. https://doi.org/10.1093/oncolo/oyad347
20. Tadé, Y., Timperley, J., Dilsaver, D., McDermott, J., de Rosa, N., & Al-Refaie, W. B. (2024). High-risk rural surgical patients and poor access to elective colorectal cancer surgery: Insight for multilevel intervention for rural America. *Journal of Gastrointestinal Surgery, 28*(11), 1883–1889. https://doi.org/10.1016/j.gassur.2024.08.011