

Title: Socioeconomic Gaps Over Time in Colorectal Cancer Survival in
England: Flexible Parametric Survival Analysis

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Supplementary Material 1. Operation Code and Name for Colon and Rectal Cancer.

Regarding the extraction of the date and type of operation procedure of the first major surgery, we defined the NBOCA data as the priority.

Information on operation procedure and date of the first major surgery was extracted from HES if NBOCA data had no information.

A major operation for the primary lesion was extracted from 30 days before diagnosis to 180 days after diagnosis.

NBOCA data covered 82.0% and 80.3% of the total information on the first major surgery for the primary lesion in colon and rectal cancers, respectively.

Continued from Supplementary Material 1.

| Code | Operation Name for Colon Cancer |
|-------------|---------------------------------------------------------------------------------------------------|
| H04.1 | Proctocolectomy NEC, Panproctocolectomy and Ileostomy |
| H04.2 | Panproctocolectomy and anastomosis of ileum to anus and creation of pouch HFQ |
| H04.3 | Panproctocolectomy and anastomosis of ileum to anus NEC |
| H04.8 | Other specified total excision of colon and rectum |
| H04.9 | Panproctocolectomy NEC, Total excision of colon and rectum, unspecified- |
| H05.1 | Total colectomy and anastomosis of ileum to rectum |
| H05.2 | Total colectomy and ileostomy and creation of rectal fistula HFQ |
| H05.3 | Total colectomy and ileostomy NEC |
| H05.8 | Total excision of colon, other specified |
| H05.9 | Total excision of colon, Unspecified |
| H06.1 | Extended right hemicolectomy and end to end anastomosis |
| H06.2 | Extended right hemicolectomy and anastomosis of ileum to colon |
| H06.3 | Extended right hemicolectomy and anastomosis NEC |
| H06.4 | Extended right hemicolectomy and ileostomy HFQ |
| H06.8 | Other specified extended excision of right hemicolon |
| H06.9 | Extended excision of Right hemicolon, unspecified, excision of Right colon and surrounding tissue |
| H07.1 | Right hemicolectomy and end to end anastomosis of ileum to colon, Ileocaecal resection |
| H07.2 | Right hemicolectomy and side to side anastomosis of ileum to transverse colon, |
| H07.3 | Right hemicolectomy and anastomosis NEC |
| H07.4 | Right hemicolectomy and ileostomy HFQ |
| H07.8 | Other specified other excision of right hemicolon |
| H07.9 | Other excision of right hemicolon, unspecified; Right hemicolectomy NEC |
| H08.1 | Transverse colectomy and end to end anastomosis |
| H08.2 | Transverse colectomy and anastomosis of ileum to colon |
| H08.3 | Transverse colectomy and anastomosis NEC |
| H08.4 | Transverse colectomy and ileostomy HFQ |
| H08.5 | Transverse colectomy and exteriorisation of bowel NEC CODE COLOSTOMY SPERATELY |
| H08.8 | Other specified excision of transverse colon |
| H08.9 | Excision of transverse colon, unspecified |
| H09.1 | Left hemicolectomy and end to end anastomosis of colon to rectum |
| H09.2 | Left hemicolectomy and end to end anastomosis of colon to colon |
| H09.3 | Left hemicolectomy and anastomosis NEC |
| H09.4 | Left hemicolectomy and ileostomy HFQ |
| H09.5 | Left hemicolectomy and exteriorisation of bowel NEC CODE COLOSTOMY SEPERATELY |
| H09.8 | Excision of left hemicolon, Other specified |
| H09.9 | Left hemicolectomy NEC, Excision of left hemicolon, Unspecified |
| H10.1 | Sigmoid colectomy and end to end anastomosis of ileum to rectum |
| H10.2 | Sigmoid colectomy and anastomosis of colon to rectum |
| H10.3 | Sigmoid colectomy and anastomosis NEC |
| H10.4 | Sigmoid colectomy and ileostomy HFQ |
| H10.5 | Sigmoid colectomy and exteriorisation of bowel NEC |
| H10.8 | Other specified excision of sigmoid colon |
| H10.9 | Unspecified excision of sigmoid colon |
| H11.1 | Colectomy and end to end anastomosis of colon to colon NEC |
| H11.2 | Colectomy and side to side anastomosis of ileum to colon NEC |
| H11.3 | Colectomy and anastomosis NEC |
| H11.4 | Colectomy and ileostomy NEC |
| H11.5 | Colectomy and exteriorisation of bowel CODE COLOSTOMY SEPERATELY |
| H11.8 | Other excision of colon, other specified |
| H11.9 | Hemicolectomy NEC; Colectomy NEC, Other excision of colon, unspecified; |

Continued from Supplementary Material 1.

| Code | Operation Name for Colon Cancer |
|-------------|---------------------------------------------------------------------------------------------------------------------------|
| H29.1 | Subtotal excision of colon and rectum and creation of colonic pouch and anastomosis of colon to anus |
| H29.2 | Subtotal excision of colon and rectum and creation of colonic pouch NEC |
| H29.3 | Subtotal excision of colon and creation of colonic pouch and anastomosis of colon to rectum |
| H29.4 | Subtotal excision of colon and creation of colonic pouch NEC |
| H29.8 | Subtotal excision of colon, Other specified |
| H29.9 | Subtotal excision of colon, Unspecified |
| H33.1 | Abdominoperineal excision of rectum and end colostomy; APR; SCAPER |
| H33.2 | Proctectomy and anastomosis of colon to anus |
| H33.3 | Anterior resection of rectum and anastomosis of colon to rectum using staples |
| H33.4 | Anterior resection of rectum and anastomosis NEC |
| H33.5 | Hartmann procedure, Rectosigmoidectomy and closure of rectal stump and exteriorisation of bowel CODE COLOSTOMY SEPERATELY |
| H33.6 | Anterior resection of rectum and exteriorisation, CODE COLOSTOMY SEPARATELY |
| H33.7 | Perineal resection of rectum HFQ |
| H33.8 | Anterior Resection of Rectum NEC, Rectosigmoidectomy and anastomosis of colon to rectum |
| H33.8 | Excision of rectum, other specified |
| H33.9 | Rectosigmoidectomy NEC, Excision of rectum, unspecified; |
| H34.1 | Open excision of lesion of rectum: Open removal of polyp; Yorke Mason |
| H40.1 | Trans-sphincteric excision of mucosa of rectum |
| H40.2 | Trans-sphincteric excision of lesion of rectum |
| H40.8 | Other specified operations on rectum through anal sphincter |
| H40.9 | Unspecified operations on rectum through anal sphincter |
| X14.1 | Total exenteration of pelvis |
| X14.3 | Posterior exenteration of pelvis |
| X14.8 | Other specified clearance of pelvis |

Continued from Supplementary Material 1.

| Code | Operation Name for Rectal Cancer |
|-------|---------------------------------------------------------------------------------------------------|
| H04.1 | Proctocolectomy NEC, Panproctocolectomy and Ileostomy |
| H04.2 | Panproctocolectomy and anastomosis of ileum to anus and creation of pouch HFQ |
| H04.3 | Panproctocolectomy and anastomosis of ileum to anus NEC |
| H04.8 | Other specified total excision of colon and rectum |
| H04.9 | Panproctocolectomy NEC, Total excision of colon and rectum, unspecified- |
| H05.1 | Total colectomy and anastomosis of ileum to rectum |
| H05.2 | Total colectomy and ileostomy and creation of rectal fistula HFQ |
| H05.3 | Total colectomy and ileostomy NEC |
| H05.8 | Total excision of colon, other specified |
| H05.9 | Total excision of colon, Unspecified |
| H06.1 | Extended right hemicolectomy and end to end anastomosis |
| H06.2 | Extended right hemicolectomy and anastomosis of ileum to colon |
| H06.3 | Extended right hemicolectomy and anastomosis NEC |
| H06.4 | Extended right hemicolectomy and ileostomy HFQ |
| H06.9 | Extended excision of Right hemicolon, unspecified, excision of Right colon and surrounding tissue |
| H07.1 | Right hemicolectomy and end to end anastomosis of ileum to colon, Ileocaecal resection |
| H07.2 | Right hemicolectomy and side to side anastomosis of ileum to transverse colon, |
| H07.3 | Right hemicolectomy and anastomosis NEC |
| H07.4 | Right hemicolectomy and ileostomy HFQ |
| H07.8 | Other specified other excision of right hemicolon |
| H07.9 | Other excision of right hemicolon, unspecified; Right hemicolectomy NEC |
| H08.1 | Transverse colectomy and end to end anastomosis |
| H08.3 | Transverse colectomy and anastomosis NEC |
| H08.4 | Transverse colectomy and ileostomy HFQ |
| H08.5 | Transverse colectomy and exteriorisation of bowel NEC CODE COLOSTOMY SPERATELY |
| H08.8 | Other specified excision of transverse colon |
| H09.1 | Left hemicolectomy and end to end anastomosis of colon to rectum |
| H09.2 | Left hemicolectomy and end to end anastomosis of colon to colon |
| H09.3 | Left hemicolectomy and anastomosis NEC |
| H09.4 | Left hemicolectomy and ileostomy HFQ |
| H09.5 | Left hemicolectomy and exteriorisation of bowel NEC CODE COLOSTOMY SEPERATELY |
| H09.8 | Excision of left hemicolon, Other specified |
| H09.9 | Left hemicolectomy NEC, Excision of left hemicolon, Unspecified |
| H10.1 | Sigmoid colectomy and end to end anastomosis of ileum to rectum |
| H10.2 | Sigmoid colectomy and anastomosis of colon to rectum |
| H10.3 | Sigmoid colectomy and anastomosis NEC |
| H10.4 | Sigmoid colectomy and ileostomy HFQ |
| H10.5 | Sigmoid colectomy and exteriorisation of bowel NEC |
| H10.8 | Other specified excision of sigmoid colon |
| H10.9 | Unspecified excision of sigmoid colon |
| H11.1 | Colectomy and end to end anastomosis of colon to colon NEC |
| H11.2 | Colectomy and side to side anastomosis of ileum to colon NEC |
| H11.3 | Colectomy and anastomosis NEC |
| H11.4 | Colectomy and ileostomy NEC |
| H11.5 | Colectomy and exteriorisation of bowel CODE COLOSTOMY SEPERATELY |
| H11.8 | Other excision of colon, other specified |
| H11.9 | Hemicolectomy NEC; Colectomy NEC, Other excision of colon, unspecified; |

Continued from Supplementary Material 1.

| Code | Operation Name for Rectal Cancer |
|-------------|---------------------------------------------------------------------------------------------------------------------------|
| H29.1 | Subtotal excision of colon and rectum and creation of colonic pouch and anastomosis of colon to anus |
| H29.2 | Subtotal excision of colon and rectum and creation of colonic pouch NEC |
| H29.3 | Subtotal excision of colon and creation of colonic pouch and anastomosis of colon to rectum |
| H29.4 | Subtotal excision of colon and creation of colonic pouch NEC |
| H29.8 | Subtotal excision of colon, Other specified |
| H29.9 | Subtotal excision of colon, Unspecified |
| H33.1 | Abdominoperineal excision of rectum and end colostomy; APR; SCAPER |
| H33.2 | Proctectomy and anastomosis of colon to anus |
| H33.3 | Anterior resection of rectum and anastomosis of colon to rectum using staples |
| H33.4 | Anterior resection of rectum and anastomosis NEC |
| H33.5 | Hartmann procedure, Rectosigmoidectomy and closure of rectal stump and exteriorisation of bowel CODE COLOSTOMY SEPERATELY |
| H33.6 | Anterior resection of rectum and exteriorisation, CODE COLOSTOMY SEPARATELY |
| H33.7 | Perineal resection of rectum HFQ |
| H33.8 | Anterior Resection of Rectum NEC, Rectosigmoidectomy and anastomosis of colon to rectum |
| H33.8 | Excision of rectum, other specified |
| H33.9 | Rectosigmoidectomy NEC, Excision of rectum, unspecified; |
| H34.1 | Open excision of lesion of rectum: Open removal of polyp; Yorke Mason |
| H34.2 | Open cauterisation of lesion of rectum, Diathermy |
| H34.5 | Open destruction of lesion of rectum NEC |
| H34.8 | Open removal of lesion of rectum, other specified |
| H40.1 | Trans-sphincteric excision of mucosa of rectum |
| H40.2 | Trans-sphincteric excision of lesion of rectum |
| H40.3 | Trans-sphincteric destruction of lesion of rectum |
| H40.8 | Other specified operations on rectum through anal sphincter |
| H40.9 | Unspecified operations on rectum through anal sphincter |
| X14.1 | Total exenteration of pelvis |
| X14.2 | Anterior exenteration of pelvis |
| X14.3 | Posterior exenteration of pelvis |
| X14.8 | Other specified clearance of pelvis |
| X14.9 | Clearance of pelvis, unspecified |

Supplementary Material 2. Definition of Chronic and Acute Comorbidities.

Ten and 14 comorbidities of the 17 comorbidities in the Charlson Comorbidity Index were selected for chronic and acute comorbidities, respectively, on the basis of their clinical relevance to the selection and timeliness of treatment for CRC e.g. invasive or less invasive treatment, curative or palliative treatment.

Obesity defined here as body mass index: BMI > 30 was included independently in the acute phase only 0 to 0.5 years before CRC diagnosis because BMI is a reversible condition i.e. a time-varying variable and may confound with stage at diagnosis.

Unlike the Charlson Comorbidity Index, the comorbidities in our study were counted but not assigned a weight.

| Chronic Comorbidities | Count | Acute Comorbidities | Count |
|-----------------------------------------------|--------------|-----------------------------------------------|--------------|
| Chronic heart failure | 1 | Chronic heart failure | 1 |
| Dementia | 1 | Dementia | 1 |
| Chronic pulmonary disease | 1 | Chronic pulmonary disease | 1 |
| Connective tissue disease | 1 | Connective tissue disease | 1 |
| Diabetes mellitus with end organ complication | 1 | Diabetes mellitus with end organ complication | 1 |
| Hemiplegia | 1 | Hemiplegia | 1 |
| Chronic renal disease, moderate to severe | 1 | Chronic renal disease, moderate to severe | 1 |
| Liver disease, moderate to severe | 1 | Liver disease, moderate to severe | 1 |
| HIV Human Immunodeficiency Virus infection | 1 | HIV Human Immunodeficiency Virus infection | 1 |
| Malignancy not colorectal cancer | 1 | Myocardial infarction | 1 |
| | | Peripheral vascular disease | 1 |
| | | Cerebrovascular disease | 1 |
| | | Peptic ulcer disease | 1 |
| | | Malignancy not colorectal cancer | 1 |

Supplementary Material 3. Description of Methods for Multiple Imputation Used for Sensitivity Analysis.

| | Colon Cancer | | | | | Rectal Cancer | | | | |
|-----------------------------------|--------------|------|------|------|------|---------------|------|------|------|------|
| | SES | | | | | SES | | | | |
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Stage (%) | | | | | | | | | | |
| I | 13.4 | 12.5 | 12.7 | 11.7 | 11.7 | 23.9 | 22.3 | 22.6 | 21.0 | 19.9 |
| II | 27.2 | 27.6 | 26.6 | 26.2 | 26.3 | 20.7 | 20.7 | 20.3 | 21.0 | 20.0 |
| III | 25.7 | 25.7 | 25.2 | 25.0 | 25.2 | 29.6 | 29.9 | 29.8 | 29.2 | 29.8 |
| IV | 33.6 | 34.2 | 35.5 | 37.0 | 36.7 | 25.9 | 27.1 | 27.3 | 28.8 | 30.4 |
| Histology (%) | | | | | | | | | | |
| Adenocarcinoma | 99.2 | 99.1 | 99.1 | 99.2 | 99.1 | 97.5 | 97.8 | 97.2 | 97.1 | 96.4 |
| Non-adenocarcinoma | 0.8 | 0.9 | 0.9 | 0.8 | 0.9 | 2.5 | 2.2 | 2.8 | 2.9 | 3.6 |
| Tumour grade (%) | | | | | | | | | | |
| G1/G2 | 79.3 | 79.5 | 78.6 | 79.6 | 79.5 | 86.5 | 86.9 | 85.8 | 86.0 | 86.1 |
| G3/G4 | 20.7 | 20.5 | 21.4 | 20.4 | 20.5 | 13.5 | 13.1 | 14.2 | 14.0 | 13.9 |
| Emergency presentation (%) | | | | | | | | | | |
| No | 76.3 | 74.6 | 73.6 | 71.1 | 67.8 | 90.0 | 89.0 | 87.8 | 86.2 | 82.9 |
| Yes | 23.7 | 25.4 | 26.4 | 28.9 | 32.2 | 10.0 | 11.0 | 12.2 | 13.8 | 17.1 |

Abbreviations: SES, socioeconomic status.

Four variables, namely, stage at diagnosis, histology, tumour grade and emergency presentation were missing in some patients.

The missingness was highest in stage with 30.6% and 27.3% for colon and rectal cancer, respectively.

Tumour grade was missing at 24.2% and 22.3%, emergency presentation at 9.9% and 6.7%, and histology at less than 3% for colon and rectal cancer, respectively.

Those variables were multiply imputed for 30 times under the missing at random assumption.

Following variables were used for the multiple imputation: sex, age group, cancer site, number of chronic and acute comorbidities, receipt of major surgery, vital status, Nelson-Aalen estimator and government office region.

The distributions of stage, histology, tumour grade and emergency presentation after the imputation were as follows.

When evaluating association between each variable and survival in the Cox regression, the Wald test, instead of likelihood ratio test, was used for both imputed and completed data to account for the uncertainty in imputed data.

For FPM, complete data only were used because imputed data are not technically supported to use in FPM.

Therefore, analyses using imputed data in the first analysis Cox regression were considered sensitivity analyses and results are shown in Appendix Table 3.

Supplementary Table 1. Baseline Characteristics of Patients with Colon Cancer, England, January 2010–March 2013.

| | SES | | | | | | | | | | | |
|-------------------------------|--------------|-------|--------------|------|--------------|------|--------------|------|--------------|------|--------------|------|
| | Total | | 1 (affluent) | | 2 | | 3 | | 4 | | 5 (deprived) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Total number | 68,169 | 100.0 | 14,917 | 21.9 | 15,112 | 22.2 | 14,339 | 21.0 | 13,415 | 19.7 | 10,386 | 15.2 |
| Death at the end of follow up | 31,766 | 46.6 | 6,315 | 42.3 | 6,798 | 45.0 | 6,685 | 46.6 | 6,651 | 49.6 | 5,317 | 51.2 |
| Median age at diagnosis | 74.1 | | 73.7 | | 74.3 | | 74.3 | | 74.3 | | 73.4 | |
| IQR | 65.3 to 81.5 | | 65.3 to 81.0 | | 65.6 to 81.7 | | 65.7 to 81.8 | | 65.2 to 81.7 | | 64.1 to 81.1 | |
| Female | 32,150 | 47.2 | 6,875 | 46.1 | 7,038 | 46.6 | 6,843 | 47.7 | 6,472 | 48.2 | 4,922 | 47.4 |
| Year of diagnosis | | | | | | | | | | | | |
| 2010 | 20,672 | 30.3 | 4,409 | 29.6 | 4,643 | 30.7 | 4,449 | 31.0 | 4,027 | 30.0 | 3,144 | 30.3 |
| 2011 | 21,191 | 31.1 | 4,699 | 31.5 | 4,687 | 31.0 | 4,456 | 31.1 | 4,177 | 31.1 | 3,172 | 30.5 |
| 2012 | 21,213 | 31.1 | 4,647 | 31.2 | 4,670 | 30.9 | 4,383 | 30.6 | 4,198 | 31.3 | 3,315 | 31.9 |
| 2013 | 5,093 | 7.5 | 1,162 | 7.8 | 1,112 | 7.4 | 1,051 | 7.3 | 1,013 | 7.6 | 755 | 7.3 |
| Cancer site ^a | | | | | | | | | | | | |
| Right-sided colon | 27,616 | 40.5 | 6,104 | 40.9 | 6,054 | 40.1 | 5,824 | 40.6 | 5,445 | 40.6 | 4,189 | 40.3 |
| Transverse colon | 7,984 | 11.7 | 1,752 | 11.7 | 1,776 | 11.8 | 1,707 | 11.9 | 1,590 | 11.9 | 1,159 | 11.2 |
| Left-sided colon | 26,887 | 39.4 | 5,923 | 39.7 | 5,995 | 39.7 | 5,679 | 39.6 | 5,246 | 39.1 | 4,044 | 38.9 |
| Overlapping or unspecified | 5,682 | 8.3 | 1,138 | 7.6 | 1,287 | 8.5 | 1,129 | 7.9 | 1,134 | 8.5 | 994 | 9.6 |
| Stage at diagnosis | | | | | | | | | | | | |
| I | 5,812 | 8.5 | 1,359 | 9.1 | 1,274 | 8.4 | 1,242 | 8.7 | 1,089 | 8.1 | 848 | 8.2 |
| II | 13,440 | 19.7 | 2,979 | 20.0 | 3,041 | 20.1 | 2,789 | 19.5 | 2,577 | 19.2 | 2,054 | 19.8 |
| III | 12,595 | 18.5 | 2,793 | 18.7 | 2,813 | 18.6 | 2,598 | 18.1 | 2,442 | 18.2 | 1,949 | 18.8 |
| IV | 15,445 | 22.7 | 3,270 | 21.9 | 3,352 | 22.2 | 3,236 | 22.6 | 3,186 | 23.8 | 2,401 | 23.1 |
| Missing | 20,877 | 30.6 | 4,516 | 30.3 | 4,632 | 30.7 | 4,474 | 31.2 | 4,121 | 30.7 | 3,134 | 30.2 |
| Histology | | | | | | | | | | | | |
| Adenocarcinoma | 66,024 | 96.9 | 14,413 | 96.6 | 14,635 | 96.8 | 13,858 | 96.7 | 13,035 | 97.2 | 10,083 | 97.1 |
| Non-adenocarcinoma | 565 | 0.8 | 116 | 0.8 | 128 | 0.9 | 120 | 0.8 | 105 | 0.8 | 96 | 0.9 |
| Missing | 1,580 | 2.3 | 388 | 2.6 | 349 | 2.3 | 361 | 2.5 | 275 | 2.1 | 207 | 2.0 |
| Tumour grade | | | | | | | | | | | | |
| G1, G2 | 41,998 | 61.6 | 9,472 | 63.5 | 9,449 | 62.5 | 8,758 | 61.1 | 8,100 | 60.4 | 6,219 | 59.9 |
| G3, G4 | 9,655 | 14.2 | 2,221 | 14.9 | 2,142 | 14.2 | 2,081 | 14.5 | 1,811 | 13.5 | 1,400 | 13.5 |
| Missing | 16,516 | 24.2 | 3,224 | 21.6 | 3,521 | 23.3 | 3,500 | 24.4 | 3,504 | 26.1 | 2,767 | 26.6 |
| Emergency presentation | | | | | | | | | | | | |
| No | 45,320 | 66.5 | 10,289 | 69.0 | 10,216 | 67.6 | 9,678 | 67.5 | 8,705 | 64.9 | 6,432 | 61.9 |
| Yes | 16,122 | 23.7 | 3,138 | 21.0 | 3,368 | 22.3 | 3,329 | 23.2 | 3,386 | 25.2 | 2,901 | 27.9 |
| Missing | 6,727 | 9.9 | 1,490 | 10.0 | 1,528 | 10.1 | 1,332 | 9.3 | 1,324 | 9.9 | 1,053 | 10.1 |
| Received major resection | | | | | | | | | | | | |
| Yes | 45,332 | 66.5 | 10,146 | 68.0 | 10,197 | 67.5 | 9,520 | 66.4 | 8,736 | 65.1 | 6,733 | 64.8 |
| No | 22,837 | 33.5 | 4,771 | 32.0 | 4,915 | 32.5 | 4,819 | 33.6 | 4,679 | 34.9 | 3,653 | 35.2 |

Continued from Supplementary Table 1.

| | SES | | | | | | | | | | | |
|---------------------------------|--------|------|--------------|------|--------|------|--------|------|--------|------|--------------|------|
| | Total | | 1 (affluent) | | 2 | | 3 | | 4 | | 5 (deprived) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Number of chronic comorbidities | | | | | | | | | | | | |
| 0 | 58,323 | 85.6 | 13,155 | 88.2 | 13,086 | 86.6 | 12,330 | 86.0 | 11,292 | 84.2 | 8,460 | 81.5 |
| 1 | 7,849 | 11.5 | 1,468 | 9.8 | 1,628 | 10.8 | 1,597 | 11.1 | 1,674 | 12.5 | 1,482 | 14.3 |
| 2+ | 1,993 | 2.9 | 292 | 2.0 | 398 | 2.6 | 412 | 2.9 | 447 | 3.3 | 444 | 4.3 |
| Number of acute comorbidities | | | | | | | | | | | | |
| 0 | 56,534 | 82.9 | 12,767 | 85.6 | 12,716 | 84.2 | 11,917 | 83.1 | 10,925 | 81.5 | 8,209 | 79.0 |
| 1 | 9,565 | 14.0 | 1,792 | 12.0 | 2,010 | 13.3 | 2,013 | 14.0 | 2,018 | 15.1 | 1,732 | 16.7 |
| 2+ | 2,066 | 3.0 | 356 | 2.4 | 386 | 2.6 | 409 | 2.9 | 470 | 3.5 | 445 | 4.3 |
| Obesity at diagnosis | 971 | 1.4 | 139 | 0.9 | 182 | 1.2 | 228 | 1.6 | 228 | 1.7 | 194 | 1.9 |

Abbreviations: G, tumour grade; IQR, interquartile range; NA, not applicable; SES, socioeconomic status. ^a Right-sided colon includes ascending colon, hepatic flexure and caecum. Transverse colon includes transverse colon and splenic flexure. Left-sided colon includes descending colon and sigmoid colon.

Supplementary Table 2. Baseline Characteristics of Patients with Rectal Cancer, England, January 2010–March 2013.

| | SES | | | | | | | | | | | |
|-------------------------------|------------|-------|--------------|------|------------|------|------------|------|------------|------|--------------|------|
| | Total | | 1 (affluent) | | 2 | | 3 | | 4 | | 5 (deprived) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Total number | 38,267 | 100.0 | 7,977 | 20.8 | 8,363 | 21.9 | 8,057 | 21.1 | 7,649 | 20.0 | 6,221 | 16.3 |
| Death at the end of follow up | 15,668 | 40.9 | 2,913 | 36.5 | 3,205 | 38.3 | 3,287 | 40.8 | 3,328 | 43.5 | 2,935 | 47.2 |
| Median age at diagnosis | 70.8 | | 70.8 | | 70.8 | | 70.9 | | 71.2 | | 70.1 | |
| IQR | 62.2, 79.1 | | 62.3, 78.8 | | 62.4, 79.1 | | 62.5, 79.2 | | 62.3, 79.5 | | 60.7, 78.6 | |
| Female | 14,238 | 37.2 | 2,982 | 37.4 | 3,130 | 37.4 | 2,967 | 36.8 | 2,917 | 38.1 | 2,242 | 36.0 |
| Year of diagnosis | | | | | | | | | | | | |
| 2010 | 11,621 | 30.4 | 2,417 | 30.3 | 2,575 | 30.8 | 2,413 | 30.0 | 2,299 | 30.1 | 1,917 | 30.8 |
| 2011 | 11,793 | 30.8 | 2,475 | 31.0 | 2,567 | 30.7 | 2,478 | 30.8 | 2,344 | 30.6 | 1,929 | 31.0 |
| 2012 | 12,019 | 31.4 | 2,504 | 31.4 | 2,605 | 31.2 | 2,560 | 31.8 | 2,457 | 32.1 | 1,893 | 30.4 |
| 2013 | 2,834 | 7.4 | 581 | 7.3 | 616 | 7.4 | 606 | 7.5 | 549 | 7.2 | 482 | 7.8 |
| Cancer site | | | | | | | | | | | | |
| Rectosigmoid junction | 7,247 | 18.9 | 1,489 | 18.7 | 1,591 | 19.0 | 1,489 | 18.5 | 1,437 | 18.8 | 1,241 | 20.0 |
| Rectum | 30,771 | 80.4 | 6,446 | 80.8 | 6,733 | 80.5 | 6,511 | 80.8 | 6,153 | 80.4 | 4,928 | 79.2 |
| Overlapping or unspecified | 249 | 0.7 | 42 | 0.5 | 39 | 0.5 | 57 | 0.7 | 59 | 0.8 | 52 | 0.8 |
| Stage at diagnosis | | | | | | | | | | | | |
| I | 6,355 | 16.6 | 1,417 | 17.8 | 1,408 | 16.8 | 1,379 | 17.1 | 1,220 | 16.0 | 931 | 15.0 |
| II | 5,866 | 15.3 | 1,229 | 15.4 | 1,300 | 15.5 | 1,223 | 15.2 | 1,195 | 15.6 | 919 | 14.8 |
| III | 8,312 | 21.7 | 1,720 | 21.6 | 1,842 | 22.0 | 1,764 | 21.9 | 1,635 | 21.4 | 1,351 | 21.7 |
| IV | 7,286 | 19.0 | 1,426 | 17.9 | 1,566 | 18.7 | 1,518 | 18.8 | 1,497 | 19.6 | 1,279 | 20.6 |
| Missing | 10,448 | 27.3 | 2,185 | 27.4 | 2,247 | 26.9 | 2,173 | 27.0 | 2,102 | 27.5 | 1,741 | 28.0 |
| Histology | | | | | | | | | | | | |
| Adenocarcinoma | 36,240 | 94.7 | 7,581 | 95.0 | 7,956 | 95.1 | 7,621 | 94.6 | 7,229 | 94.5 | 5,853 | 94.1 |
| Non-adenocarcinoma | 1,025 | 2.7 | 192 | 2.4 | 182 | 2.2 | 215 | 2.7 | 218 | 2.9 | 218 | 3.5 |
| Missing | 1,002 | 2.6 | 204 | 2.6 | 225 | 2.7 | 221 | 2.7 | 202 | 2.6 | 150 | 2.4 |
| Tumour grade | | | | | | | | | | | | |
| G1, G2 | 25,919 | 67.7 | 5,550 | 69.6 | 5,759 | 68.9 | 5,426 | 67.4 | 5,098 | 66.7 | 4,086 | 65.7 |
| G3, G4 | 3,831 | 10.0 | 807 | 10.1 | 807 | 9.7 | 843 | 10.5 | 763 | 10.0 | 611 | 9.8 |
| Missing | 8,517 | 22.3 | 1,620 | 20.3 | 1,797 | 21.5 | 1,788 | 22.2 | 1,788 | 23.4 | 1,524 | 24.5 |
| Emergency presentation | | | | | | | | | | | | |
| No | 31,507 | 82.3 | 6,675 | 83.7 | 6,977 | 83.4 | 6,689 | 83.0 | 6,277 | 82.1 | 4,889 | 78.6 |
| Yes | 4,210 | 11.0 | 685 | 8.6 | 795 | 9.5 | 869 | 10.8 | 924 | 12.1 | 937 | 15.1 |
| Missing | 2,550 | 6.7 | 617 | 7.7 | 591 | 7.1 | 499 | 6.2 | 448 | 5.9 | 395 | 6.4 |
| Received major resection | | | | | | | | | | | | |
| Yes | 19,703 | 51.5 | 4,333 | 54.3 | 4,452 | 53.2 | 4,205 | 52.2 | 3,871 | 50.6 | 2,842 | 45.7 |
| No | 18,564 | 48.5 | 3,644 | 45.7 | 3,911 | 46.8 | 3,852 | 47.8 | 3,778 | 49.4 | 3,379 | 54.3 |

Continued from Supplementary Table 2.

| | SES | | | | | | | | | | | |
|---------------------------------|--------|------|--------------|------|-------|------|-------|------|-------|------|--------------|------|
| | Total | | 1 (affluent) | | 2 | | 3 | | 4 | | 5 (deprived) | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| Number of chronic comorbidities | | | | | | | | | | | | |
| 0 | 33,858 | 88.5 | 7,228 | 90.6 | 7,539 | 90.2 | 7,128 | 88.5 | 6,716 | 87.8 | 5,247 | 84.3 |
| 1 | 3,611 | 9.4 | 628 | 7.9 | 672 | 8.0 | 769 | 9.5 | 767 | 10.0 | 775 | 12.5 |
| 2+ | 798 | 2.1 | 121 | 1.5 | 152 | 1.8 | 160 | 2.0 | 166 | 2.2 | 199 | 3.2 |
| Number of acute comorbidities | | | | | | | | | | | | |
| 0 | 33,942 | 88.7 | 7,295 | 91.5 | 7,540 | 90.2 | 7,148 | 88.7 | 6,665 | 87.1 | 5,294 | 85.1 |
| 1 | 3,643 | 9.5 | 578 | 7.3 | 685 | 8.2 | 764 | 9.5 | 832 | 10.9 | 784 | 12.6 |
| 2+ | 682 | 1.8 | 104 | 1.3 | 138 | 1.7 | 145 | 1.8 | 152 | 2.0 | 143 | 2.3 |
| Obesity at diagnosis | 422 | 1.1 | 63 | 0.8 | 81 | 1.0 | 79 | 1.0 | 104 | 1.4 | 95 | 1.5 |

Abbreviations: G, tumour grade; IQR, interquartile range; NA, not applicable; SES, socioeconomic status.

Supplementary Table 3. Hazard Ratios of Death by Bivariable and Multivariable Cox Regression for Colon and Rectal Cancer, Multiple Imputation.

| | Colon (n=68,165 ^b) | | | | Rectum (n=38,267) | | | |
|-------------------------------------------|--------------------------------|----------------|--------------------------|---------------|---------------------|----------------|--------------------------|---------------|
| | Bivariable Analysis | | Multivariable Analysis | | Bivariable analysis | | Multivariable analysis | |
| | HR | 95% CI | Adjusted HR ^c | 95% CI | HR | 95% CI | Adjusted HR ^c | 95% CI |
| SES | | | | | | | | |
| 1 (affluent) | Referent | | Referent | | Referent | | Referent | |
| 2 | 1.08 | 1.05 to 1.12 | 1.05 | 1.00 to 1.09 | 1.06 | 1.01 to 1.12 | 1.01 | 0.95 to 1.06 |
| 3 | 1.15 | 1.11 to 1.20 | 1.10 | 1.06 to 1.14 | 1.16 | 1.10 to 1.22 | 1.08 | 1.02 to 1.14 |
| 4 | 1.27 | 1.23 to 1.32 | 1.17 | 1.13 to 1.22 | 1.27 | 1.20 to 1.33 | 1.13 | 1.07 to 1.19 |
| 5 (deprived) | 1.33 | 1.28 to 1.38 | 1.24 | 1.19 to 1.30 | 1.43 | 1.36 to 1.51 | 1.22 | 1.15 to 1.30 |
| Sex | | | | | | | | |
| Male | Referent | | Referent | | Referent | | Referent | |
| Female | 1.08 | 1.05 to 1.10 | 0.99 | 0.97 to 1.02 | 1.06 | 1.03 to 1.10 | 0.97 | 0.93 to 1.00 |
| Age group | | | | | | | | |
| <65 | Referent | | Referent | | Referent | | Referent | |
| 65 to 80 | 1.31 | 1.27 to 1.36 | 1.51 | 1.45 to 1.56 | 1.49 | 1.43 to 1.56 | 1.64 | 1.57 to 1.72 |
| 80< | 2.87 | 2.78 to 2.96 | 2.40 | 2.31 to 2.49 | 3.73 | 3.57 to 3.90 | 3.04 | 2.89 to 3.19 |
| Year of diagnosis | | | NA | | | | NA | |
| 2010 | Referent | | | | Referent | | | |
| 2011 | 1.00 | 0.97 to 1.03 | | | 0.94 | 0.90 to 0.98 | | |
| 2012 | 0.98 | 0.95 to 1.01 | | | 0.87 | 0.84 to 0.91 | | |
| 2013 | 1.04 | 0.99 to 1.09 | | | 0.89 | 0.83 to 0.96 | | |
| Cancer site ^a | | | | | | | | |
| Right-sided colon / Rectosigmoid junction | Referent | | Referent | | Referent | | Referent | |
| Transverse colon / Rectum | 0.99 | 0.95 to 1.02 | 1.00 | 0.96 to 1.04 | 0.78 | 0.75 to 0.81 | 0.81 | 0.77 to 0.85 |
| Left-sided colon | 0.74 | 0.72 to 0.76 | 0.79 | 0.77 to 0.82 | NA | | | |
| Overlapping or unspecified | 2.12 | 2.05 to 2.20 | 1.17 | 1.11 to 1.22 | 0.93 | 0.76 to 1.12 | 0.65 | 0.52 to 0.82 |
| Stage at diagnosis | | | NA | | | | NA | |
| I | Referent | | | | Referent | | | |
| II | 1.82 | 1.67 to 1.99 | | | 2.13 | 1.94 to 2.34 | | |
| III | 3.45 | 3.17 to 3.75 | | | 2.89 | 2.66 to 3.15 | | |
| IV | 15.13 | 13.96 to 16.41 | | | 12.34 | 11.40 to 13.36 | | |
| Stage at diagnosis (imputed) | | | | | | | | |
| I | Referent | | Referent | | Referent | | Referent | |
| II | 1.85 | 1.69 to 2.03 | 2.02 | 1.68 to 2.44 | 2.19 | 2.00 to 2.39 | 2.24 | 1.83 to 2.75 |
| III | 3.35 | 3.09 to 3.64 | 3.62 | 3.04 to 4.32 | 2.85 | 2.63 to 3.09 | 2.87 | 2.39 to 3.45 |
| IV | 14.46 | 13.3 to 15.72 | 10.55 | 8.90 to 12.50 | 11.93 | 11.01 to 12.93 | 9.08 | 7.59 to 10.85 |

Continued from Supplementary Table 3.

| | Colon (n=68,165 ^b) | | | | Rectum (n=38,267) | | | |
|----------------------------------|--------------------------------|--------------|--------------------------|--------------|---------------------|--------------|--------------------------|--------------|
| | Bivariable Analysis | | Multivariable Analysis | | Bivariable analysis | | Multivariable analysis | |
| | HR | 95% CI | Adjusted HR ^c | 95% CI | HR | 95% CI | Adjusted HR ^c | 95% CI |
| Histology | | | | | | | NA | |
| Adenocarcinoma | 1.00 | | Referent | | Referent | | | |
| Non-adenocarcinoma | 1.26 | 1.07 to 1.50 | 0.75 | 0.66 to 0.85 | 0.92 | 0.83 to 1.02 | | |
| Tumour grade | | | NA | | | | NA | |
| G1 to G2 | Referent | | | | Referent | | | |
| G3 to G4 | 2.19 | 2.12 to 2.27 | | | 2.15 | 2.05 to 2.26 | | |
| Tumour grade (imputed) | | | | | | | | |
| G1 to G2 | Referent | | Referent | | Referent | | Referent | |
| G3 to G4 | 2.16 | 2.09 to 2.23 | 1.57 | 1.52 to 1.63 | 2.08 | 1.98 to 2.18 | 1.65 | 1.56 to 1.75 |
| Emergency presentation | | | NA | | | | NA | |
| No | Referent | | | | Referent | | | |
| Yes | 2.21 | 2.15 to 2.26 | | | 3.30 | 3.16 to 3.44 | | |
| Emergency presentation (imputed) | | | | | | | | |
| No | Referent | | Referent | | Referent | | Referent | |
| Yes | 2.18 | 2.12 to 2.24 | 1.74 | 1.69 to 1.79 | 3.38 | 3.25 to 3.52 | 1.93 | 1.84 to 2.01 |
| Received major resection | | | | | | | | |
| Yes | Referent | | Referent | | Referent | | Referent | |
| No | 5.31 | 5.18 to 5.43 | 3.04 | 2.95 to 3.14 | 4.82 | 4.64 to 5.01 | 2.85 | 2.72 to 2.97 |
| Number of chronic comorbidities | | | | | | | | |
| 0 | Referent | | Referent | | Referent | | Referent | |
| 1 | 1.49 | 1.45 to 1.54 | 1.21 | 1.17 to 1.26 | 1.62 | 1.54 to 1.70 | 1.31 | 1.24 to 1.38 |
| 2+ | 2.26 | 2.14 to 2.39 | 1.41 | 1.31 to 1.51 | 2.56 | 2.35 to 2.79 | 1.63 | 1.47 to 1.80 |
| Number of acute comorbidities | | | | | | | | |
| 0 | Referent | | Referent | | Referent | | Referent | |
| 1 | 1.56 | 1.52 to 1.61 | 1.26 | 1.22 to 1.30 | 1.81 | 1.73 to 1.90 | 1.34 | 1.27 to 1.41 |
| 2+ | 2.46 | 2.33 to 2.59 | 1.49 | 1.40 to 1.58 | 2.84 | 2.59 to 3.12 | 1.62 | 1.46 to 1.81 |
| Obesity at diagnosis | | | NA | | | | NA | |
| No | Referent | | | | Referent | | | |
| Yes | 0.93 | 0.85 to 1.03 | | | 0.92 | 0.79 to 1.08 | | |

Abbreviations: 95% CI, 95% confidence interval; HR, hazard ratio; NA, not applicable (not included in multivariable model); SES, socioeconomic status. ^aRight-sided colon includes ascending colon, hepatic flexure and caecum. Transverse colon includes transverse colon and splenic flexure. Left-sided colon includes descending colon and sigmoid colon. ^bInformation did not match across different datasets in 4 patients for colon cancer therefore excluded. ^cAll variables are mutually adjusted. For SES only, adjusted HRs are shown without interaction between SES and stage. For other variables, interaction between SES and stage is adjusted.

Supplementary Table 4. Adjusted Stage-specific Hazard Ratios of Death with Interaction between SES and Stage, Multiple Imputation.

| | Colon (n=68,165 ^a) | | Rectum (n=38,267) | |
|------------------|--------------------------------|--------------|--------------------------|--------------|
| | Adjusted HR ^b | 95% CI | Adjusted HR ^c | 95% CI |
| Stage I | | | | |
| SES 1 (affluent) | Referent | | Referent | |
| 2 | 1.13 | 0.89 to 1.43 | 1.05 | 0.84 to 1.31 |
| 3 | 1.18 | 0.94 to 1.48 | 1.08 | 0.87 to 1.35 |
| 4 | 1.29 | 1.03 to 1.63 | 1.21 | 0.97 to 1.51 |
| 5 (deprived) | 1.48 | 1.18 to 1.85 | 1.38 | 1.10 to 1.73 |
| Stage II | | | | |
| SES 1 | Referent | | Referent | |
| 2 | 1.08 | 0.96 to 1.21 | 1.03 | 0.88 to 1.21 |
| 3 | 1.16 | 1.02 to 1.31 | 1.19 | 1.02 to 1.39 |
| 4 | 1.38 | 1.22 to 1.56 | 1.24 | 1.05 to 1.46 |
| 5 | 1.45 | 1.27 to 1.65 | 1.32 | 1.12 to 1.56 |
| Stage III | | | | |
| SES 1 | Referent | | Referent | |
| 2 | 1.14 | 1.05 to 1.24 | 1.03 | 0.91 to 1.16 |
| 3 | 1.15 | 1.04 to 1.26 | 1.15 | 1.02 to 1.30 |
| 4 | 1.22 | 1.12 to 1.33 | 1.23 | 1.09 to 1.39 |
| 5 | 1.38 | 1.25 to 1.51 | 1.20 | 1.06 to 1.37 |
| Stage IV | | | | |
| SES 1 | Referent | | Referent | |
| 2 | 1.01 | 0.96 to 1.07 | 0.99 | 0.91 to 1.07 |
| 3 | 1.07 | 1.02 to 1.13 | 1.03 | 0.95 to 1.12 |
| 4 | 1.12 | 1.06 to 1.17 | 1.06 | 0.98 to 1.15 |
| 5 | 1.16 | 1.09 to 1.23 | 1.20 | 1.09 to 1.31 |

Abbreviations: 95% CI, 95% confidence interval; HR, hazard ratio; SES, socioeconomic status. ^aInformation did not match across different datasets in 4 patients for colon cancer therefore excluded. ^bAdjusted for sex, age, site, histology (imputed), tumour grade (imputed), emergency presentation (imputed), receipt of major resection, number of chronic and acute comorbidities. ^cAdjusted for sex, age, site, tumour grade (imputed), emergency presentation (imputed), receipt of major resection, number of chronic and acute comorbidities.

Supplementary Table 5. Point Estimates of Hazard/Excess Hazard Ratios of Death for TVCs for Colon Cancer.

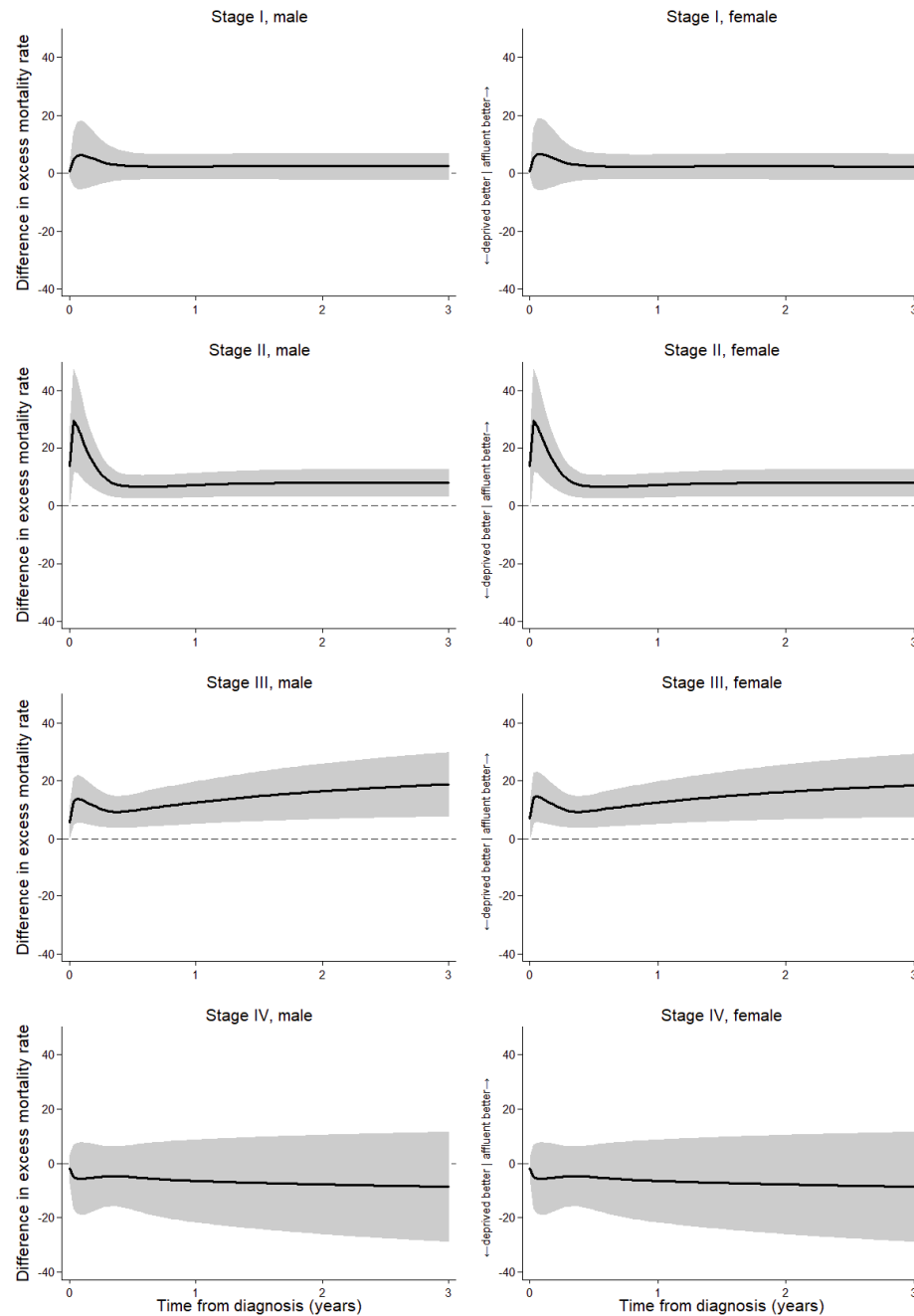
| | Overall Survival | | | | | | Net Survival | | | | | |
|---------------------------------|--------------------------------------|---------------|-------------|---------------|-------------|----------------|--------------------------------------|---------------|--------------|----------------|--------------|----------------|
| | 90 days | | 6 months | | 1 year | | 90 days | | 6 months | | 1 year | |
| | Adjusted HR | 95% CI | Adjusted HR | 95% CI | Adjusted HR | 95% CI | Adjusted EHR | 95% CI | Adjusted EHR | 95% CI | Adjusted EHR | 95% CI |
| SES | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Sex | | | | | | | | | | | | |
| Male | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| Female | 0.96 | 0.91 to 1.02 | 0.95 | 0.89 to 1.01 | 0.93 | 0.89 to 0.98 | 1.00 | 0.94 to 1.07 | 0.99 | 0.91 to 1.08 | 0.99 | 0.93 to 1.06 |
| Age group | | | | | | | | | | | | |
| <65 | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| 65 to 80 | 1.64 | 1.51 to 1.78 | 1.48 | 1.35 to 1.61 | 1.38 | 1.29 to 1.48 | 1.54 | 1.41 to 1.69 | 1.34 | 1.18 to 1.51 | 1.17 | 1.05 to 1.30 |
| 80< | 2.57 | 2.35 to 2.81 | 2.34 | 2.12 to 2.57 | 2.25 | 2.08 to 2.42 | 2.10 | 1.89 to 2.33 | 1.70 | 1.44 to 2.02 | 1.35 | 1.15 to 1.58 |
| Cancer site ^a | | | | | | | | | | | | |
| Right-sided colon | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| Transverse colon | 1.12 | 1.03 to 1.22 | 1.06 | 0.97 to 1.17 | 0.99 | 0.92 to 1.07 | 1.10 | 1.00 to 1.21 | 1.06 | 0.93 to 1.20 | 0.97 | 0.87 to 1.08 |
| Left-sided colon | 0.75 | 0.70 to 0.80 | 0.71 | 0.65 to 0.76 | 0.75 | 0.71 to 0.80 | 0.71 | 0.65 to 0.77 | 0.63 | 0.56 to 0.72 | 0.69 | 0.64 to 0.74 |
| Overlapping/unspecified | 1.20 | 1.06 to 1.35 | 1.01 | 0.86 to 1.19 | 0.97 | 0.86 to 1.09 | 1.16 | 1.01 to 1.34 | 0.96 | 0.76 to 1.20 | 0.89 | 0.75 to 1.05 |
| Stage at diagnosis | | | | | | | | | | | | |
| I | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| II | 1.78 | 1.34 to 2.37 | 1.80 | 1.37 to 2.36 | 1.77 | 1.39 to 2.26 | 2.75 | 1.44 to 5.27 | 2.70 | 1.37 to 5.31 | 3.11 | 1.60 to 6.04 |
| III | 2.50 | 1.90 to 3.29 | 3.49 | 2.69 to 4.54 | 3.88 | 3.06 to 4.91 | 4.90 | 2.61 to 9.20 | 7.51 | 3.90 to 14.48 | 10.54 | 5.52 to 20.13 |
| IV | 8.40 | 6.44 to 10.96 | 12.59 | 9.76 to 16.25 | 13.82 | 11.00 to 17.35 | 18.56 | 9.96 to 34.58 | 31.30 | 16.33 to 60.00 | 43.93 | 23.14 to 83.42 |
| Tumour grade | | | | | | | | | | | | |
| G1/G2 | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| G3/G4 | 2.01 | 1.88 to 2.14 | 2.28 | 2.13 to 2.45 | 1.93 | 1.83 to 2.05 | 2.17 | 2.02 to 2.34 | 2.60 | 2.33 to 2.90 | 2.14 | 1.99 to 2.30 |
| Emergency presentation | | | | | | | | | | | | |
| No | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| Yes | 1.75 | 1.61 to 1.91 | 1.83 | 1.70 to 1.98 | 1.88 | 1.78 to 1.99 | 1.74 | 1.52 to 1.99 | 1.91 | 1.72 to 2.11 | 2.00 | 1.86 to 2.16 |
| Received major resection | | | | | | | | | | | | |
| Yes | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| No | 3.91 | 3.63 to 4.22 | 3.72 | 3.46 to 4.00 | 3.04 | 2.85 to 3.24 | 4.30 | 3.90 to 4.75 | 4.07 | 3.69 to 4.47 | 3.22 | 2.95 to 3.51 |
| Number of chronic comorbidities | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Number of acute comorbidities | | | | | | | | | | | | |
| 0 | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| 1 | 1.26 | 1.16 to 1.36 | 1.13 | 1.02 to 1.24 | 1.15 | 1.07 to 1.23 | 1.24 | 1.13 to 1.37 | 1.10 | 0.95 to 1.28 | 1.13 | 1.02 to 1.24 |
| 2+ | 1.72 | 1.51 to 1.95 | 1.45 | 1.21 to 1.73 | 1.45 | 1.28 to 1.64 | 1.69 | 1.45 to 1.99 | 1.45 | 1.13 to 1.86 | 1.44 | 1.21 to 1.72 |

Calculated for complete cases only (n=38,070). Interaction between SES and stage is added for the multivariable flexible parametric model. Abbreviations: 95% CI, 95% confidence interval; EHR, excess hazard ratio; HR, hazard ratio; SES, socioeconomic status; TVCs, time-varying covariates. ^aRight-sided colon includes ascending colon, hepatic flexure, and caecum. Transverse colon includes transverse colon and splenic flexure. Left-sided colon includes descending colon and sigmoid colon.

Supplementary Table 6. Point Estimates of Hazard/Excess Hazard Ratios of Death for TVCs for Rectal Cancer.

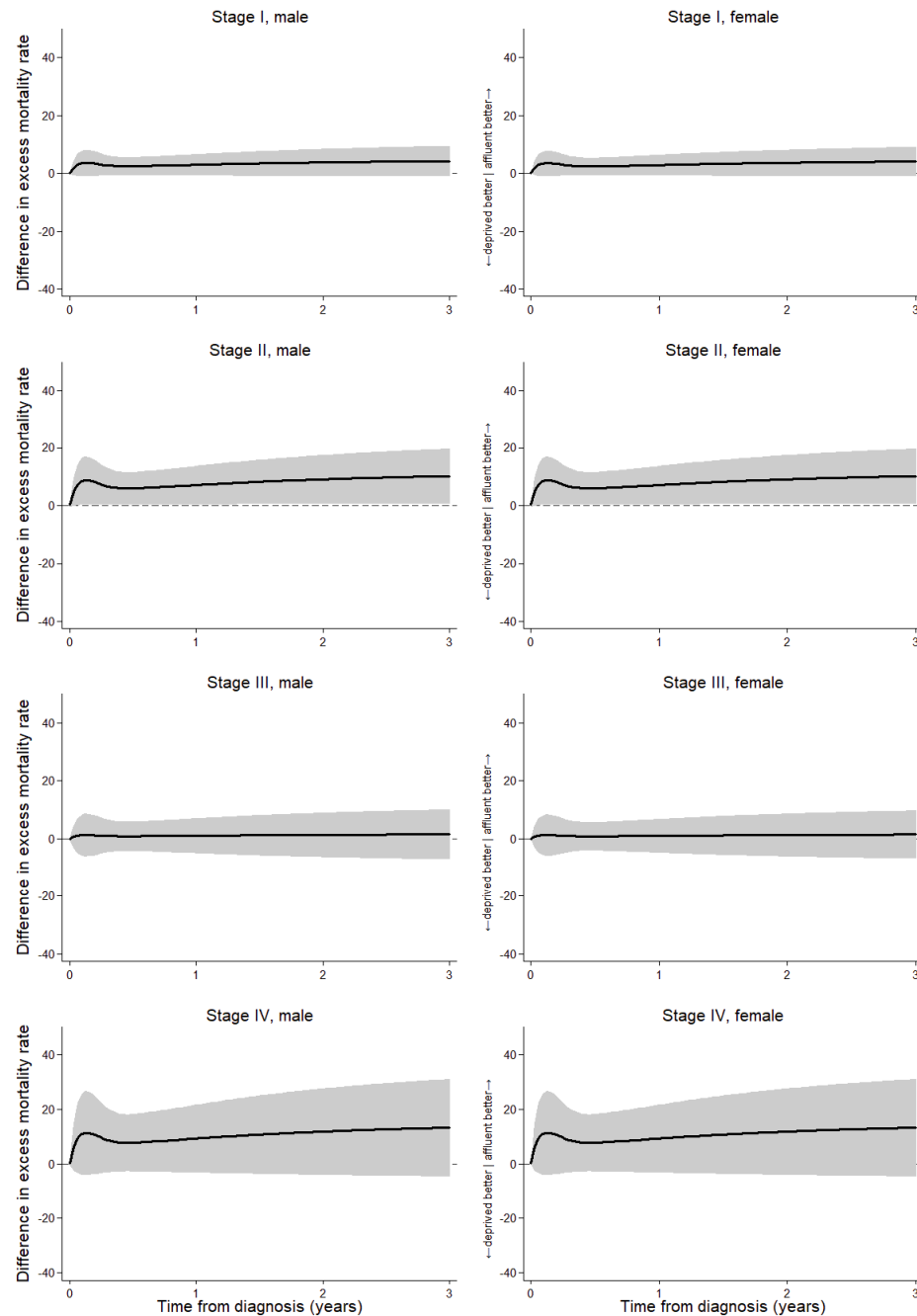
| | Overall survival | | | | | | Net survival | | | | | |
|---------------------------------|--------------------------------------|--------------|-------------|--------------|-------------|--------------|--------------------------------------|--------------|--------------|--------------|--------------|--------------|
| | 90 days | | 6 months | | 1 year | | 90 days | | 6 months | | 1 year | |
| | Adjusted HR | 95% CI | Adjusted HR | 95% CI | Adjusted HR | 95% CI | Adjusted EHR | 95% CI | Adjusted EHR | 95% CI | Adjusted EHR | 95% CI |
| SES | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Sex | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Age group | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| <65 | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| 65 to 80 | 1.85 | 1.62 to 2.11 | 1.73 | 1.56 to 1.92 | 1.59 | 1.45 to 1.75 | 1.73 | 1.50 to 2.01 | 1.59 | 1.41 to 1.78 | 1.40 | 1.26 to 1.56 |
| 80< | 3.08 | 2.68 to 3.55 | 3.07 | 2.74 to 3.44 | 3.02 | 2.73 to 3.34 | 2.43 | 2.07 to 2.85 | 2.39 | 2.09 to 2.73 | 2.21 | 1.96 to 2.50 |
| Year of diagnosis | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Cancer site | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Rectosigmoid junction | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| Rectum | 0.82 | 0.73 to 0.93 | 0.88 | 0.80 to 0.98 | 0.91 | 0.83 to 1.00 | 0.80 | 0.70 to 0.92 | 0.85 | 0.75 to 0.96 | 0.86 | 0.78 to 0.96 |
| Overlapping/unspecified | 0.48 | 0.12 to 1.96 | 0.78 | 0.30 to 2.00 | 0.61 | 0.27 to 1.35 | 0.39 | 0.07 to 2.23 | 0.71 | 0.24 to 2.14 | 0.61 | 0.25 to 1.51 |
| Stage at diagnosis | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Tumour grade | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| G1/G2 | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| G3/G4 | 2.01 | 1.79 to 2.24 | 2.21 | 2.01 to 2.42 | 1.97 | 1.80 to 2.16 | 2.15 | 1.90 to 2.43 | 2.38 | 2.14 to 2.64 | 2.14 | 1.94 to 2.37 |
| Emergency presentation | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| No | Referent | | Referent | | Referent | | Referent | | Referent | | Referent | |
| Yes | 1.64 | 1.40 to 1.92 | 1.57 | 1.38 to 1.79 | 1.62 | 1.47 to 1.79 | 1.58 | 1.29 to 1.95 | 1.64 | 1.41 to 1.90 | 1.76 | 1.57 to 1.97 |
| Received major resection | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Number of chronic comorbidities | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |
| Number of acute comorbidities | Proportional hazard assumption holds | | | | | | Proportional hazard assumption holds | | | | | |

Calculated for complete cases only (n=22,631). Interaction between SES and stage is added for the multivariable flexible parametric model. Abbreviations: 95% CI, 95% confidence interval; EHR, excess hazard ratio; HR, hazard ratio; SES, socioeconomic status; TVCs, time-varying covariates.



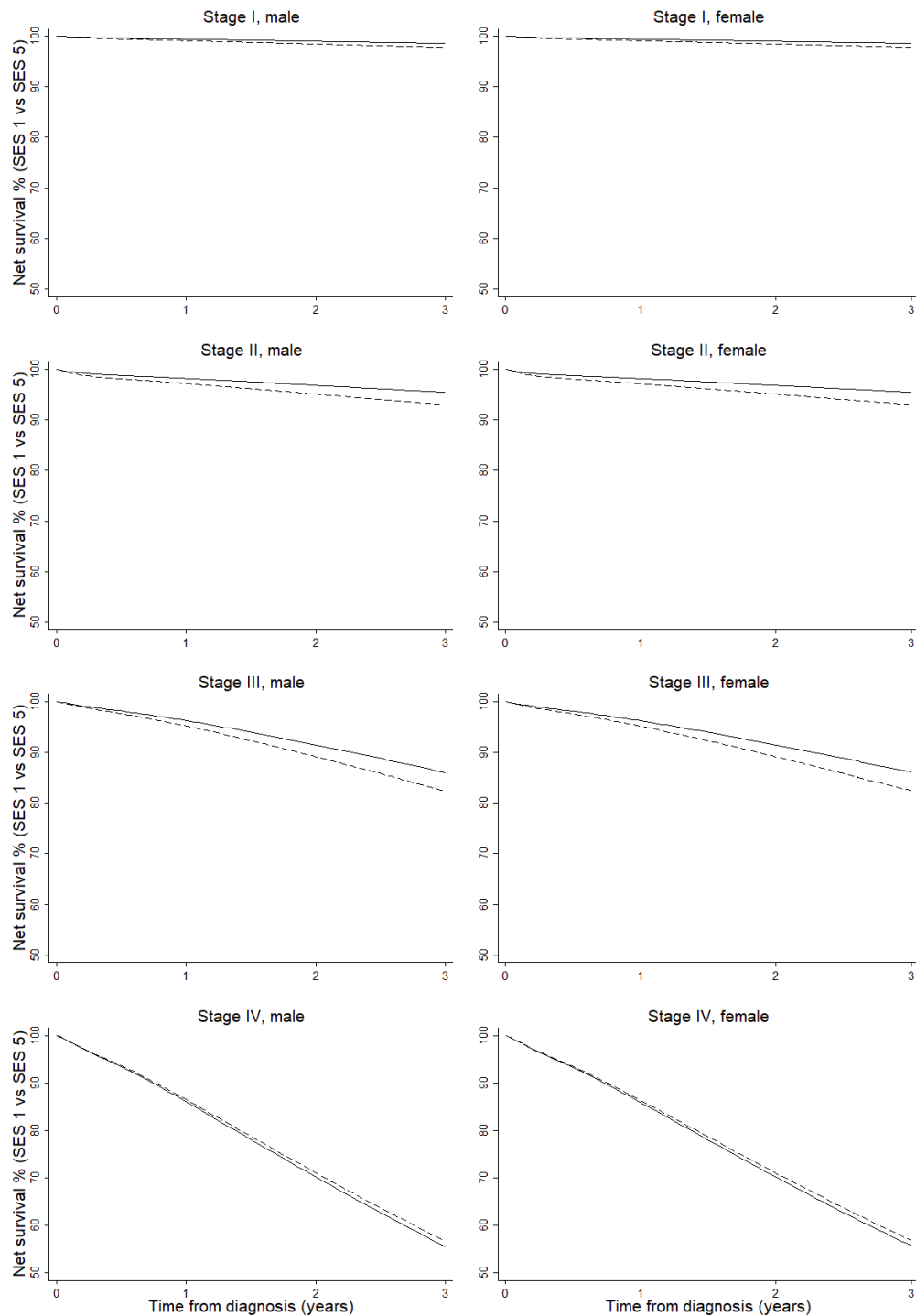
Supplementary Figure 1. Difference in Excess Hazard of Death between SES 1 (the Most Affluent) and SES 5 (the Most Deprived), Colon Cancer.

Per 1000 PYs (person-years). Abbreviations: SES, socioeconomic status. Age group was set at under 65 years old, cancer site at right-sided colon, tumour grade at G1/G2, no emergency presentation, received major resection and no chronic or acute comorbidities.



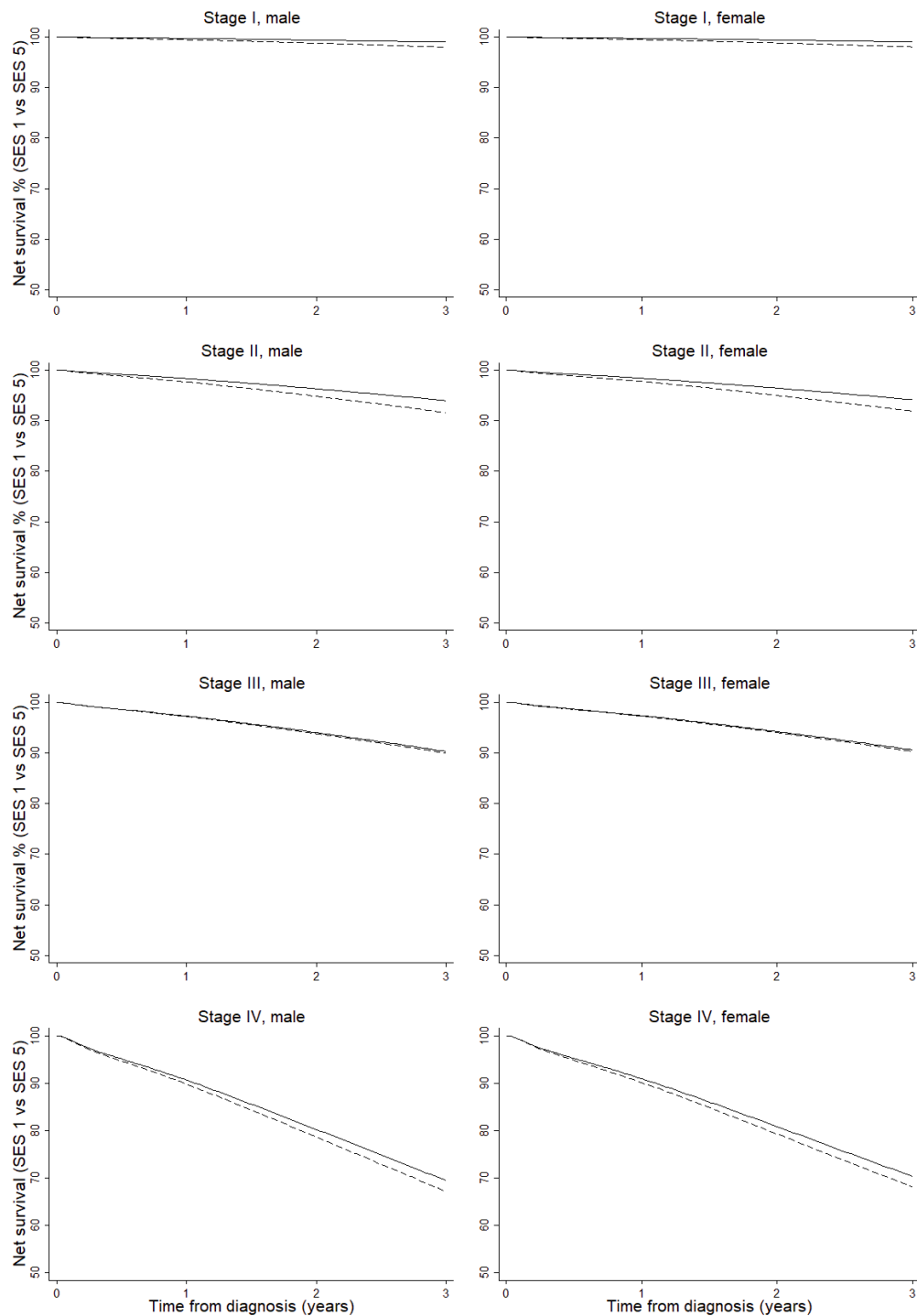
Supplementary Figure 2. Difference in Excess Hazard of Death between SES 1 (the Most Affluent) and SES 5 (the Most Deprived), Rectal Cancer.

Per 1000 PYs (person-years). Abbreviations: SES, socioeconomic status. Age group was set at under 65 years old, cancer site at rectosigmoid junction, tumour grade at G1/G2, no emergency presentation, received major resection and no chronic or acute comorbidities. Year of diagnosis was set at 2010.



Supplementary Figure 3. Net Survival Curves of SES 1 (Solid Line) and SES 5 (Dotted Line), Colon Cancer.

Abbreviations: SES, socioeconomic status.



Supplementary Figure 4. Net Survival Curves of SES 1 (Solid line) and SES 5 (Dotted line), Rectal Cancer.

Abbreviations: SES, socioeconomic status.