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Supplementary appendix

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Online supplementary appendix

Global variation in postoperative mortality and complications following cancer surgery: A multicentre, prospective cohort study in 82 countries

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Supplementary tables and figures

Table S1. Patient and operative characteristics by country income group stratified by cancer type, including missing data.

		Breast High	Breast Upper middle	Breast Low/lower middle	Colorectal High	Colorectal Upper middle	Colorectal Low/lower middle	Gastric High	Gastric Upper middle	Gastric Low/lower middle
Total N		4220	1319	2867	4174	1113	928	712	289	336
Age (years)	Mean (SD)	61.0 (13.4)	53.4 (13.1)	50.7 (11.9)	68.6 (12.4)	62.4 (12.3)	54.5 (14.4)	67.4 (12.8)	62.5 (13.2)	55.4 (12.9)
Sex	Male	43 (1.0)	13 (1.0)	32 (1.1)	2394 (57.4)	596 (53.5)	485 (52.3)	427 (60.0)	182 (63.0)	206 (61.3)
	Female	4172 (98.9)	1306 (99.0)	2833 (98.8)	1774 (42.5)	515 (46.3)	443 (47.7)	285 (40.0)	107 (37.0)	130 (38.7)
	(Missing)	5 (0.1)	0 (0.0)	2 (0.1)	6 (0.1)	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
ASA	I	767 (18.2)	462 (35.0)	937 (32.7)	319 (7.6)	219 (19.7)	238 (25.6)	62 (8.7)	58 (20.1)	110 (32.7)
	II	2383 (56.5)	726 (55.0)	1576 (55.0)	2042 (48.9)	612 (55.0)	506 (54.5)	344 (48.3)	136 (47.1)	160 (47.6)
	III	744 (17.6)	83 (6.3)	223 (7.8)	1545 (37.0)	227 (20.4)	141 (15.2)	269 (37.8)	81 (28.0)	48 (14.3)
	IV	28 (0.7)	11 (0.8)	10 (0.3)	166 (4.0)	23 (2.1)	18 (1.9)	23 (3.2)	8 (2.8)	8 (2.4)
	V	2 (0.0)	0 (0.0)	0 (0.0)	15 (0.4)	1 (0.1)	6 (0.6)	0 (0.0)	0 (0.0)	4 (1.2)
	(Missing)	296 (7.0)	37 (2.8)	121 (4.2)	87 (2.1)	31 (2.8)	19 (2.0)	14 (2.0)	6 (2.1)	6 (1.8)
	Normal									
BMI	weight (BMI 18.5 to 24.9)	1443 (34.2)	462 (35.0)	887 (30.9)	1510 (36.2)	521 (46.8)	456 (49.1)	314 (44.1)	165 (57.1)	168 (50.0)
	Underweight (BMI < 18.5)	74 (1.8)	23 (1.7)	62 (2.2)	119 (2.9)	63 (5.7)	111 (12.0)	38 (5.3)	25 (8.7)	61 (18.2)
	Overweight (BMI 25 to 30)	1341 (31.8)	458 (34.7)	1077 (37.6)	1517 (36.3)	348 (31.3)	206 (22.2)	221 (31.0)	76 (26.3)	71 (21.1)
	Obese (BMI >30)	928 (22.0)	308 (23.4)	736 (25.7)	749 (17.9)	145 (13.0)	115 (12.4)	96 (13.5)	17 (5.9)	16 (4.8)
	(Missing)	434 (10.3)	68 (5.2)	105 (3.7)	279 (6.7)	36 (3.2)	40 (4.3)	43 (6.0)	6 (2.1)	20 (6.0)
>10% weight loss	No	3321 (78.7)	1091 (82.7)	2468 (86.1)	2817 (67.5)	606 (54.4)	337 (36.3)	422 (59.3)	116 (40.1)	91 (27.1)
	Yes	98 (2.3)	84 (6.4)	187 (6.5)	732 (17.5)	427 (38.4)	514 (55.4)	219 (30.8)	162 (56.1)	216 (64.3)
	(Missing)	801 (19.0)	144 (10.9)	212 (7.4)	625 (15.0)	80 (7.2)	77 (8.3)	71 (10.0)	11 (3.8)	29 (8.6)
ECOG performance status	0	2688 (63.7)	984 (74.6)	1657 (57.8)	2056 (49.3)	583 (52.4)	379 (40.8)	346 (48.6)	165 (57.1)	100 (29.8)
	1	838 (19.9)	242 (18.3)	621 (21.7)	1116 (26.7)	319 (28.7)	318 (34.3)	198 (27.8)	78 (27.0)	146 (43.5)
	2	311 (7.4)	48 (3.6)	400 (14.0)	557 (13.3)	125 (11.2)	117 (12.6)	93 (13.1)	28 (9.7)	53 (15.8)
	3	73 (1.7)	17 (1.3)	68 (2.4)	188 (4.5)	63 (5.7)	81 (8.7)	38 (5.3)	14 (4.8)	27 (8.0)
	4	6 (0.1)	1 (0.1)	14 (0.5)	22 (0.5)	6 (0.5)	12 (1.3)	4 (0.6)	2 (0.7)	5 (1.5)
	(Missing)	304 (7.2)	27 (2.0)	107 (3.7)	235 (5.6)	17 (1.5)	21 (2.3)	33 (4.6)	2 (0.7)	5 (1.5)
Smoking	No, never	2800 (66.4)	1056 (80.1)	2728 (95.2)	2236 (53.6)	688 (61.8)	684 (73.7)	327 (45.9)	158 (54.7)	219 (65.2)
	Stopped >6 weeks ago	517 (12.3)	86 (6.5)	34 (1.2)	965 (23.1)	170 (15.3)	103 (11.1)	168 (23.6)	66 (22.8)	44 (13.1)
	Yes, current smoker	562 (13.3)	133 (10.1)	27 (0.9)	496 (11.9)	173 (15.5)	100 (10.8)	116 (16.3)	41 (14.2)	43 (12.8)
Diabetes	(Missing)	341 (8.1)	44 (3.3)	78 (2.7)	477 (11.4)	82 (7.4)	41 (4.4)	101 (14.2)	24 (8.3)	30 (8.9)
	No	3696 (87.6)	1074 (81.4)	2107 (73.5)	3311 (79.3)	859 (77.2)	720 (77.6)	587 (82.4)	246 (85.1)	273 (81.2)
	Diet	71 (1.7)	16 (1.2)	27 (0.9)	125 (3.0)	20 (1.8)	14 (1.5)	13 (1.8)	6 (2.1)	4 (1.2)
	Medication (non-insulin)	307 (7.3)	139 (10.5)	312 (10.9)	510 (12.2)	161 (14.5)	84 (9.1)	78 (11.0)	24 (8.3)	26 (7.7)
	Insulin	92 (2.2)	55 (4.2)	136 (4.7)	160 (3.8)	52 (4.7)	43 (4.6)	27 (3.8)	13 (4.5)	12 (3.6)
HIV tested	(Missing)	54 (1.3)	35 (2.7)	285 (9.9)	68 (1.6)	21 (1.9)	67 (7.2)	7 (1.0)	0 (0.0)	21 (6.2)
	No	3995 (94.7)	779 (59.1)	1349 (47.1)	3984 (95.4)	689 (61.9)	616 (66.4)	671 (94.2)	158 (54.7)	153 (45.5)
	Yes - Negative	179 (4.2)	524 (39.7)	1511 (52.7)	186 (4.5)	413 (37.1)	308 (33.2)	39 (5.5)	130 (45.0)	182 (54.2)
	Yes - Positive	6 (0.1)	16 (1.2)	7 (0.2)	2 (0.0)	9 (0.8)	4 (0.4)	1 (0.1)	1 (0.3)	1 (0.3)
Distance to home (km)	(Missing)	40 (0.9)	0 (0.0)	0 (0.0)	2 (0.0)	2 (0.2)	0 (0.0)	1 (0.1)	0 (0.0)	0 (0.0)
	< 10 km	1637 (38.8)	340 (25.8)	352 (12.3)	1630 (39.1)	270 (24.3)	179 (19.3)	230 (32.3)	67 (23.2)	44 (13.1)
	10-20 km	859 (20.4)	272 (20.6)	460 (16.0)	814 (19.5)	266 (23.9)	170 (18.3)	125 (17.6)	79 (27.3)	43 (12.8)
	20-50 km	809 (19.2)	241 (18.3)	511 (17.8)	791 (19.0)	206 (18.5)	200 (21.6)	156 (21.9)	32 (11.1)	57 (17.0)
	50-100 km	346 (8.2)	78 (5.9)	385 (13.4)	324 (7.8)	89 (8.0)	97 (10.5)	68 (9.6)	28 (9.7)	32 (9.5)
	>100 km	219 (5.2)	199 (15.1)	1039 (36.2)	279 (6.7)	176 (15.8)	235 (25.3)	78 (11.0)	64 (22.1)	135 (40.2)
(Missing)	350 (8.3)	189 (14.3)	120 (4.2)	336 (8.0)	106 (9.5)	47 (5.1)	55 (7.7)	19 (6.6)	25 (7.4)	

Numbers are n (%), unless otherwise indicated. ASA, American Society of Anesthesiologists operative risk grade. ECOG, Eastern Cooperative Oncology Group. High income included 31 countries and 241 hospitals. Upper middle income included 23 countries and 81 hospitals. Lower middle/low income included 28 countries and 106 hospitals. The total column therefore includes 82 countries and 428 hospitals.

Figure S1. Missing values map. Missing values for main explanatory and dependent variables by observation.

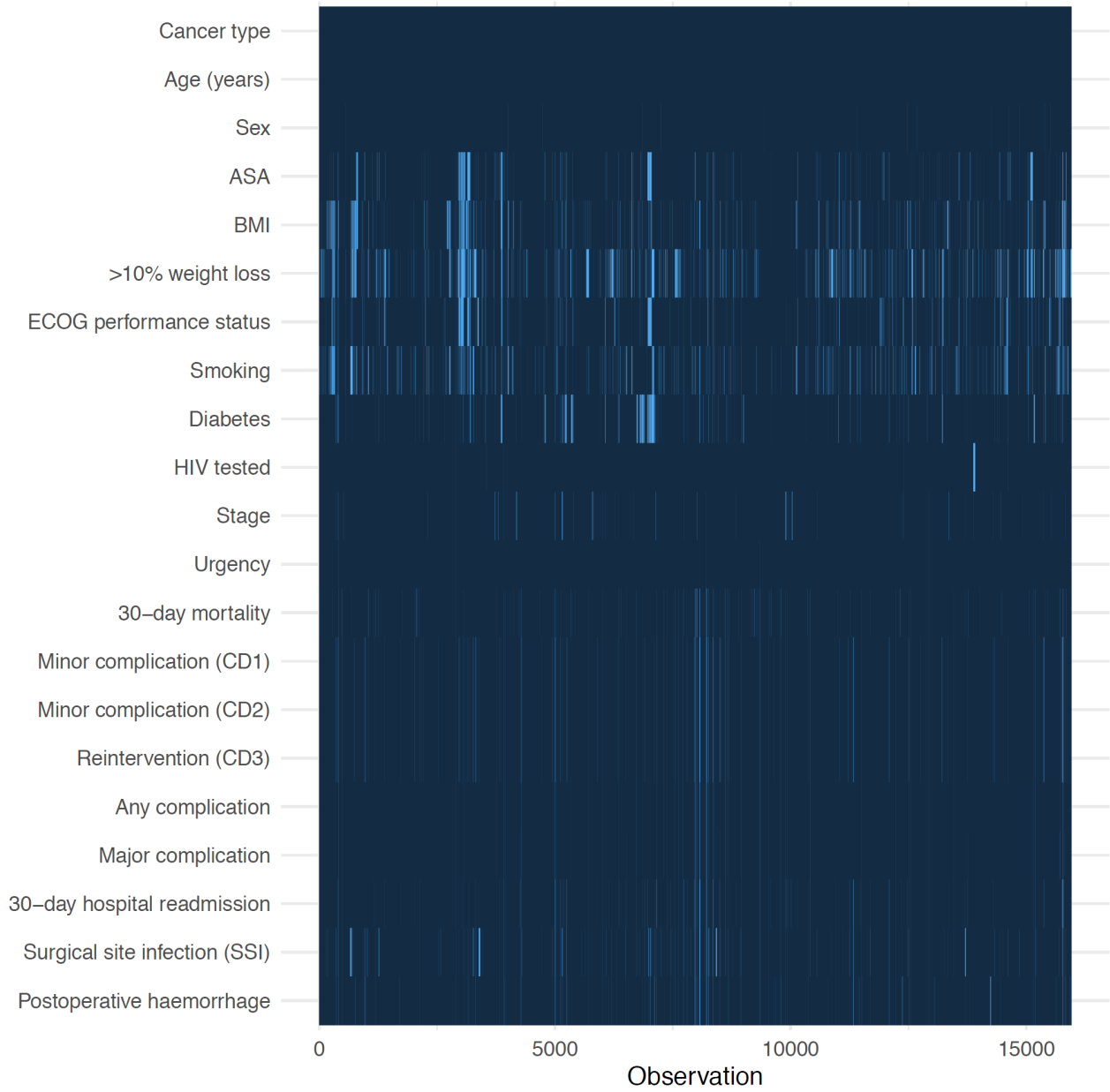


Figure S2. Stage of presentation, 30-day mortality, and 30-day complications by cancer and country income group. Panels A, B and C are replicated from Figure 3 to aid comparisons. A, proportion of patients enrolled by cancer stage by country income group. B, proportion of patients dying or sustaining a major complication or any complication by day 30 after surgery stratified by country income group. C, proportion of patients sustaining a major complication who died within 30 days. D, E, F, 30-day mortality (D), major complication (E), and any complication (F) stratified by cancer type, cancer stage, and country income group.

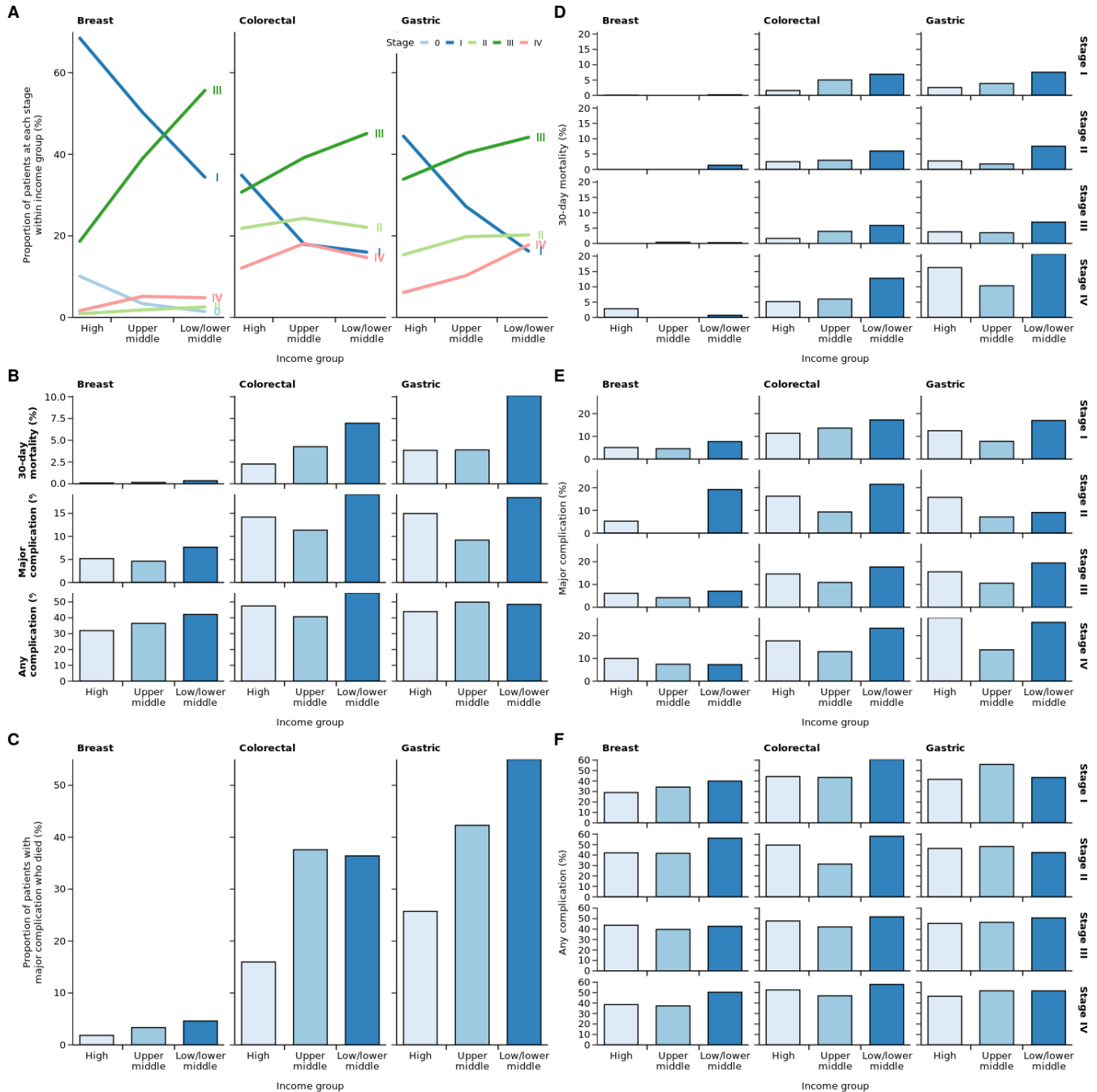
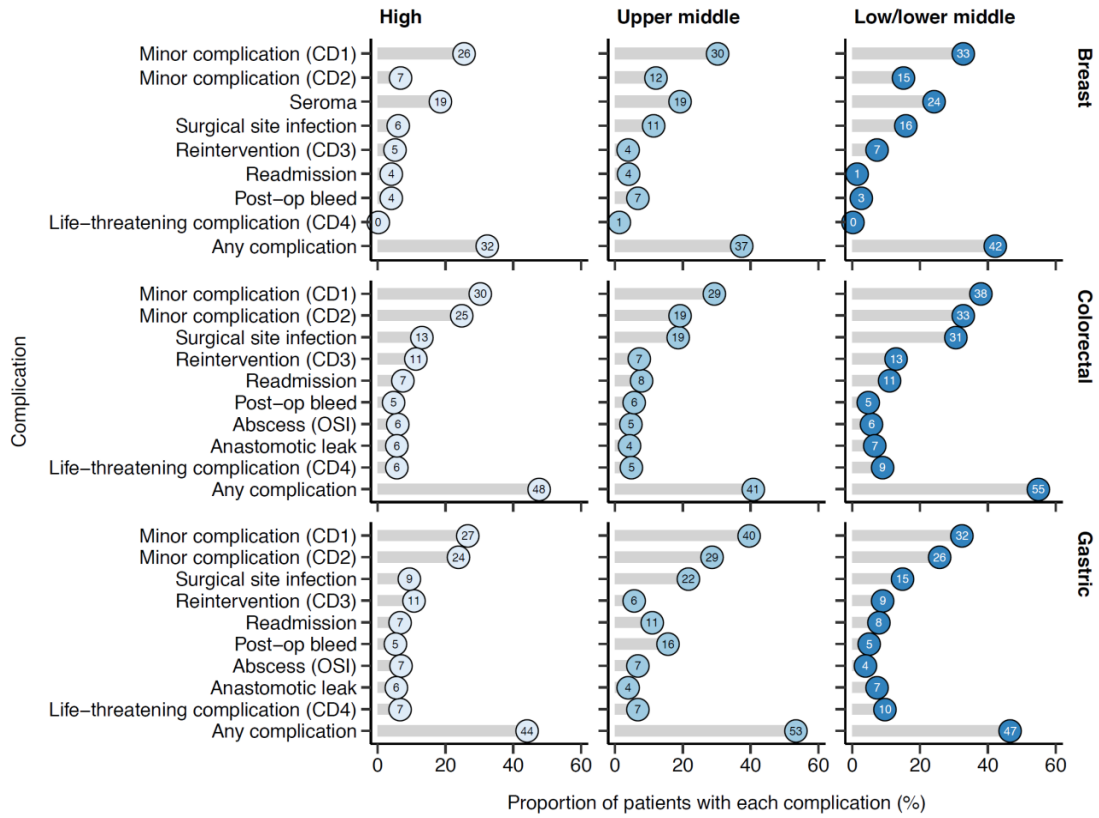


Figure S3. Proportion of all patients who sustained specific complications, stratified by cancer-type and country income group.



Ordered by overall frequency. CD, Clavien-Dindo complication grade; OSI, organ space infection. See appendix pp 21-22 for detailed table.

Figure S4. A, adjusted proportion of patients dying or sustaining a major complication or any complication by day 30 after surgery stratified by country income group. B, proportion of patients sustaining a major complication who died within 30 days. Proportions are adjusted for patient complications using multivariable (reduced) logistic regression models in Table S6A/B/C (breast), Table S7A/B/C (colorectal), Table S8A/B/C (gastric), pp 23-39.

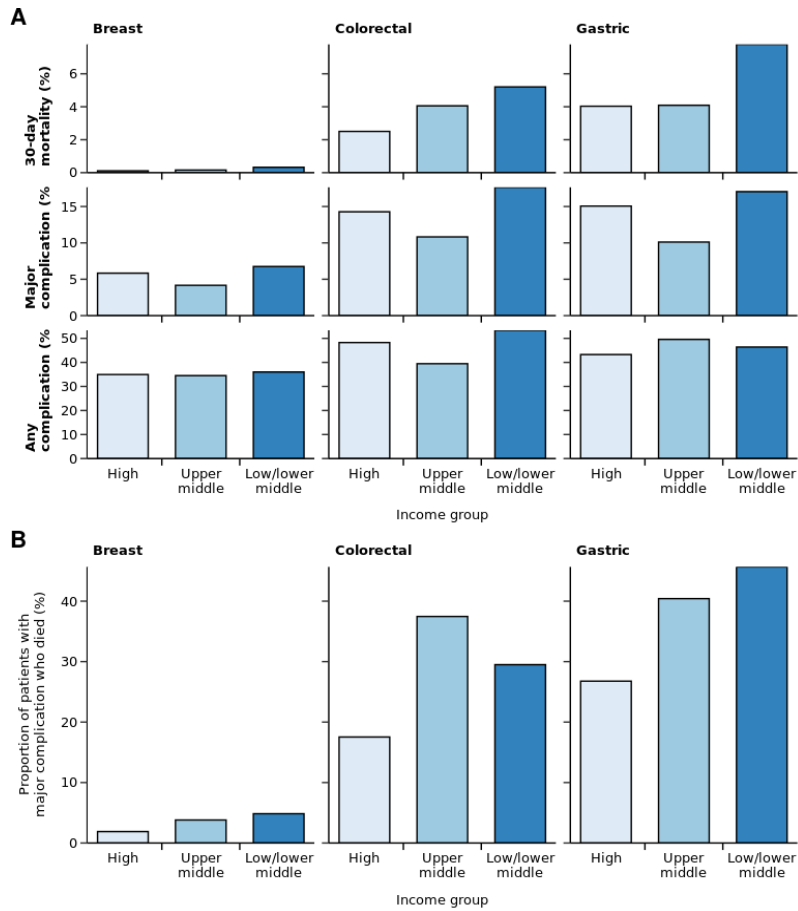
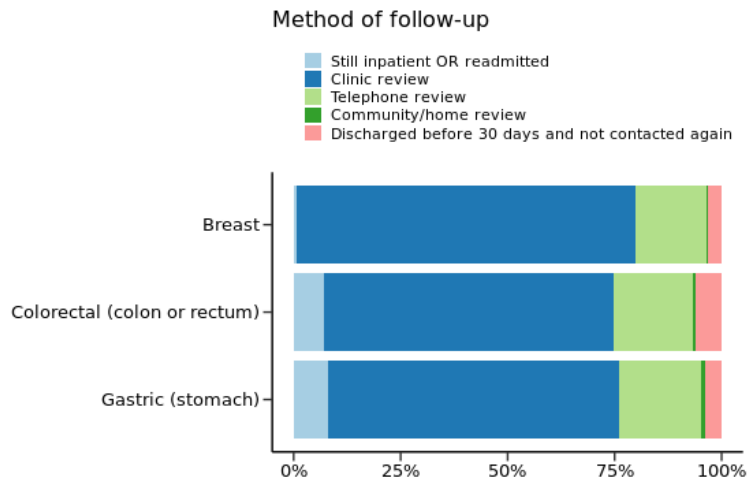


Figure S5. A, method of determination of 30-day follow-up variables. B, basis for cancer diagnosis stratified by cancer type and country income group.

A



B

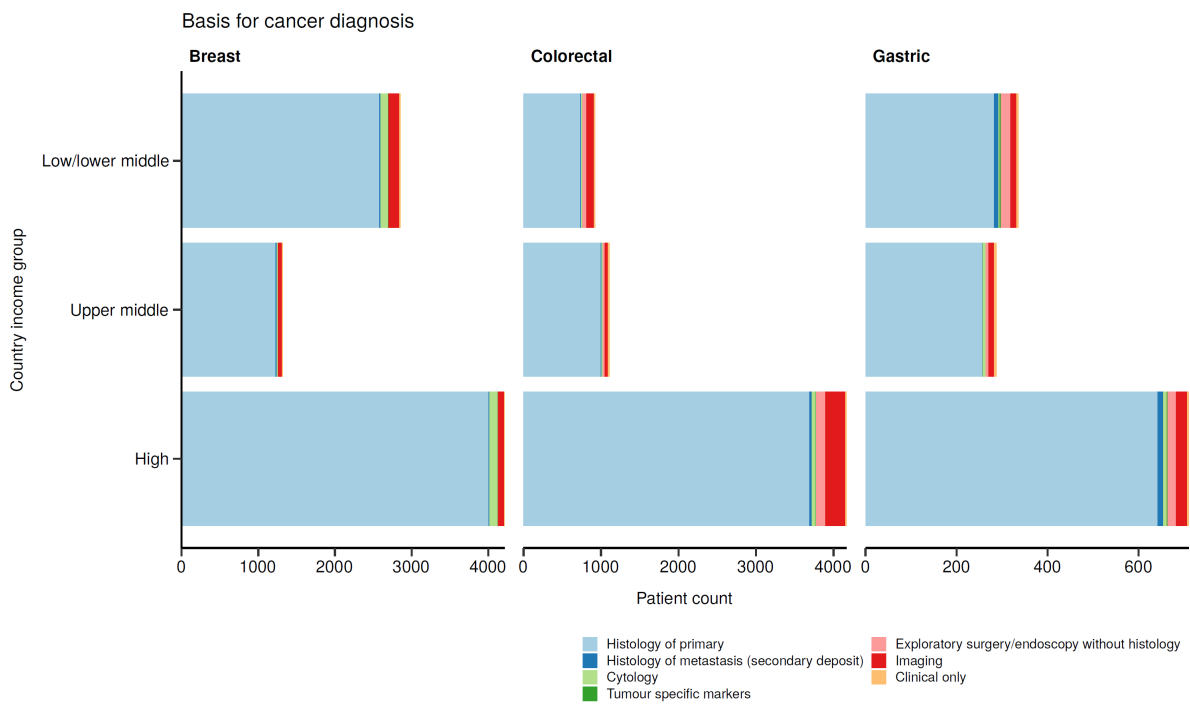


Table S2. Stage of presentation by region.

World Bank income (tertile)		High	Upper middle	Low/lower middle	p
eTNM pre-op (breast)	Tis	427 (10.1)	45 (3.4)	42 (1.5)	<0.001
	L1	1760 (41.8)	298 (22.7)	245 (8.7)	
	L2	1129 (26.8)	361 (27.5)	741 (26.2)	
	A	38 (0.9)	25 (1.9)	74 (2.6)	
	R1	646 (15.3)	404 (30.8)	1184 (41.8)	
	R2	141 (3.3)	109 (8.3)	406 (14.3)	
	M+	70 (1.7)	71 (5.4)	140 (4.9)	
eTNM pre-op (colorectal)	L	1457 (35.1)	198 (17.9)	147 (16.2)	<0.001
	A	911 (21.9)	269 (24.3)	206 (22.7)	
	R+	1276 (30.7)	437 (39.4)	415 (45.8)	
	M+	511 (12.3)	204 (18.4)	138 (15.2)	
eTNM pre-op (gastric)	L	316 (44.5)	77 (27.3)	57 (17.2)	<0.001
	A	108 (15.2)	58 (20.6)	69 (20.8)	
	R+	243 (34.2)	115 (40.8)	147 (44.4)	
	M+	43 (6.1)	32 (11.3)	58 (17.5)	

eTNM, Essential TNM Classification of Malignant Tumours as defined by the Union for International Cancer Control (UICC).

Breast cancer: Tis, No invasive cancer (e.g. DCIS); L1, Tumour ≤2 cm in size (T1); L2, Tumour >2 cm in size (T2/T3); A, Inflammatory cancer, chest wall invasion or ulceration present (T4); R1, 1 to 3 nodes involved inside axilla but none outside axilla (N1); R2, >3 nodes involved inside axilla or nodal involvement outside axilla (N2/N3); M+, Metastases present (M1).

Gastric cancer: L, Tumour contained within stomach wall with no nodal involvement (Stage I); A, Tumour through stomach wall with no nodal involvement (Stage II); R+, Regional lymph node involvement (Stage III); M+, Metastases present (Stage IV)

Colorectal cancer: L, Tumour contained within bowel wall with no nodal involvement (Stage I); A, Tumour through bowel wall with no nodal involvement (Stage II); R+, Regional lymph node involvement (Stage III); M+, Metastases present (Stage IV).

Table S3A. Cancer stage by other predictors (breast).

		Tis N=514	L1/L2 N=4534	A N=137	R1/R2 N=2890	M+ N=281	p
Age (years)	Mean (SD)	56.9 (12.9)	58.4 (13.8)	57.3 (16.9)	53.0 (13.1)	53.9 (13.3)	<0.001
Sex	Male	3 (0.6)	40 (0.9)	5 (3.6)	37 (1.3)	3 (1.1)	0.013
	Female	510 (99.4)	4491 (99.1)	132 (96.4)	2850 (98.7)	278 (98.9)	
ASA	I	122 (26.2)	1108 (25.9)	31 (23.7)	816 (29.6)	69 (25.7)	<0.001
	II	273 (58.7)	2553 (59.6)	69 (52.7)	1625 (59.0)	142 (52.8)	
	III	66 (14.2)	599 (14.0)	30 (22.9)	303 (11.0)	48 (17.8)	
	IV	2 (0.4)	23 (0.5)	1 (0.8)	12 (0.4)	10 (3.7)	
	V	2 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
BMI	Normal weight (BMI 18.5 to 24.9)	172 (37.2)	1537 (36.9)	45 (34.4)	933 (34.2)	92 (34.3)	0.122
	Underweight (BMI < 18.5)	5 (1.1)	90 (2.2)	2 (1.5)	54 (2.0)	7 (2.6)	
	Overweight (BMI 25 to 30)	153 (33.1)	1529 (36.7)	45 (34.4)	1040 (38.1)	90 (33.6)	
	Obese (BMI >30)	132 (28.6)	1010 (24.2)	39 (29.8)	705 (25.8)	79 (29.5)	
>10% weight loss	No	397 (98.5)	3730 (96.5)	109 (90.8)	2388 (93.0)	216 (87.1)	<0.001
	Yes	6 (1.5)	136 (3.5)	11 (9.2)	179 (7.0)	32 (12.9)	
ECOG performance status	0	359 (76.9)	2903 (67.8)	72 (55.4)	1823 (65.8)	142 (52.0)	<0.001
	1	78 (16.7)	928 (21.7)	35 (26.9)	573 (20.7)	76 (27.8)	
	2	25 (5.4)	361 (8.4)	19 (14.6)	319 (11.5)	34 (12.5)	
	3	3 (0.6)	78 (1.8)	4 (3.1)	52 (1.9)	19 (7.0)	
	4	2 (0.4)	12 (0.3)	0 (0.0)	5 (0.2)	2 (0.7)	
Smoking	No, never	354 (76.5)	3373 (78.9)	115 (90.6)	2459 (88.8)	239 (90.9)	<0.001
	Stopped >6 weeks ago	53 (11.4)	420 (9.8)	9 (7.1)	143 (5.2)	9 (3.4)	
	Yes, current smoker	56 (12.1)	481 (11.3)	3 (2.4)	167 (6.0)	15 (5.7)	
Diabetes	No	444 (88.3)	3783 (86.5)	98 (81.0)	2286 (84.1)	228 (84.1)	0.004
	Diet	10 (2.0)	64 (1.5)	4 (3.3)	30 (1.1)	6 (2.2)	
	Medication (non-insulin)	39 (7.8)	392 (9.0)	12 (9.9)	285 (10.5)	24 (8.9)	
	Insulin	10 (2.0)	134 (3.1)	7 (5.8)	117 (4.3)	13 (4.8)	
HIV tested	No	456 (89.4)	3572 (79.3)	92 (67.2)	1809 (62.7)	170 (60.7)	<0.001
	Yes - Negative	52 (10.2)	927 (20.6)	45 (32.8)	1054 (36.6)	110 (39.3)	
	Yes - Positive	2 (0.4)	7 (0.2)	0 (0.0)	20 (0.7)	0 (0.0)	
Distance to home (km)	< 10 km	172 (36.8)	1415 (34.1)	33 (25.8)	617 (22.9)	76 (29.5)	<0.001
	10-20 km	120 (25.6)	909 (21.9)	16 (12.5)	489 (18.1)	52 (20.2)	
	20-50 km	96 (20.5)	840 (20.2)	31 (24.2)	532 (19.7)	59 (22.9)	
	50-100 km	41 (8.8)	415 (10.0)	20 (15.6)	306 (11.4)	22 (8.5)	
	>100 km	39 (8.3)	574 (13.8)	28 (21.9)	751 (27.9)	49 (19.0)	
Mode of diagnosis	Symptomatic	174 (34.7)	2547 (56.9)	120 (89.6)	2302 (80.3)	220 (78.9)	<0.001
	Screening	299 (59.7)	1519 (33.9)	6 (4.5)	267 (9.3)	25 (9.0)	
	Detected incidentally	28 (5.6)	410 (9.2)	8 (6.0)	296 (10.3)	34 (12.2)	
Urgency	Elective	511 (99.4)	4515 (99.6)	133 (97.1)	2872 (99.4)	273 (97.5)	<0.001
	Emergency	3 (0.6)	19 (0.4)	4 (2.9)	18 (0.6)	7 (2.5)	
Treatment intent	Palliative	5 (1.0)	50 (1.1)	10 (7.3)	81 (2.8)	98 (35.0)	<0.001
	Curative	509 (99.0)	4483 (98.9)	127 (92.7)	2809 (97.2)	182 (65.0)	
Primary procedure	B27 Mastectomy	161 (31.3)	1559 (34.4)	100 (73.0)	1747 (60.5)	193 (69.7)	<0.001
	B28 Partial mastectomy / wide local excision / lumpectomy	305 (59.3)	2790 (61.5)	34 (24.8)	1037 (35.9)	61 (22.0)	
	B32 Open biopsy of breast	21 (4.1)	54 (1.2)	1 (0.7)	15 (0.5)	5 (1.8)	
	B37 Other operations on breast	27 (5.3)	131 (2.9)	2 (1.5)	89 (3.1)	18 (6.5)	
	No, not available in this hospital	9 (1.8)	236 (5.3)	12 (9.0)	309 (11.2)	42 (15.9)	
SNLB	No, but available in this hospital	259 (52.1)	894 (20.1)	89 (66.4)	1784 (64.8)	165 (62.5)	<0.001
	Yes, single technique	131 (26.4)	1825 (41.1)	15 (11.2)	431 (15.7)	45 (17.0)	
	Yes, dual technique	98 (19.7)	1487 (33.5)	18 (13.4)	227 (8.3)	12 (4.5)	
Axillary lymph node dissection	No	467 (91.7)	3263 (73.2)	50 (37.0)	560 (19.9)	57 (21.1)	<0.001
	Yes	42 (8.3)	1197 (26.8)	85 (63.0)	2254 (80.1)	213 (78.9)	
Margin check	No, not available in this hospital	23 (4.9)	344 (7.9)	14 (10.4)	307 (11.1)	40 (15.3)	<0.001
	No, but available in this hospital	193 (41.2)	1927 (44.5)	95 (70.4)	1681 (60.8)	139 (53.3)	
	Yes, by x-ray	198 (42.2)	1028 (23.7)	6 (4.4)	236 (8.5)	17 (6.5)	
	Yes, by frozen section	55 (11.7)	1034 (23.9)	20 (14.8)	540 (19.5)	65 (24.9)	
Primary reconstruction	No, not available in this hospital	28 (5.4)	306 (6.8)	13 (9.5)	307 (10.6)	34 (12.1)	<0.001
	No, but available in this hospital	358 (69.6)	3434 (75.8)	96 (70.1)	2116 (73.3)	199 (71.1)	
	Yes, immediate - prosthesis	52 (10.1)	227 (5.0)	2 (1.5)	117 (4.1)	4 (1.4)	
	Yes, immediate - flap	59 (11.5)	449 (9.9)	14 (10.2)	237 (8.2)	32 (11.4)	
	Yes, planned at later stage	17 (3.3)	117 (2.6)	12 (8.8)	109 (3.8)	11 (3.9)	

Essential TNM Classification of Malignant Tumours (eTNM), as defined by the Union for International Cancer Control (UICC), for breast cancer:

Tis, No invasive cancer (e.g. DCIS); L1, Tumour ≤2 cm in size (T1); L2, Tumour >2 cm in size (T2/T3); A, Inflammatory cancer, chest wall invasion or ulceration present (T4); R1, 1 to 3 nodes involved inside axilla but none outside axilla (N1); R2, >3 nodes

involved inside axilla or nodal involvement outside axilla (N2/N3); M+, Metastases present (M1). ASA, American Society of Anesthesiologists operative risk grade; BMI, body mass index; ECOG, Eastern Cooperative Oncology Group; HIV, human immunodeficiency virus; SNLB, sentinel lymph node biopsy; SD, standard deviation. Data are n (%).

Table S3B. Cancer stage by other predictors (colon).

		L N=1802	A N=1386	R+ N=2128	M+ N=853	p
Age (years)	Mean (SD)	66.9 (13.0)	67.1 (13.6)	63.8 (13.8)	63.3 (14.0)	<0.001
Sex	Male	1026 (57.1)	771 (55.6)	1172 (55.1)	480 (56.4)	0.636
	Female	771 (42.9)	615 (44.4)	955 (44.9)	371 (43.6)	
ASA	I	207 (11.7)	193 (14.3)	264 (12.7)	104 (12.5)	<0.001
	II	892 (50.4)	679 (50.2)	1175 (56.5)	391 (46.9)	
	III	608 (34.4)	426 (31.5)	578 (27.8)	292 (35.0)	
	IV	59 (3.3)	45 (3.3)	60 (2.9)	43 (5.2)	
	V	4 (0.2)	9 (0.7)	4 (0.2)	4 (0.5)	
BMI	Normal weight (BMI 18.5 to 24.9)	621 (36.5)	570 (43.9)	900 (44.3)	377 (47.7)	<0.001
	Underweight (BMI < 18.5)	57 (3.4)	69 (5.3)	107 (5.3)	60 (7.6)	
	Overweight (BMI 25 to 30)	666 (39.2)	449 (34.6)	693 (34.1)	253 (32.0)	
	Obese (BMI >30)	356 (20.9)	210 (16.2)	331 (16.3)	100 (12.7)	
>10% weight loss	No	1249 (81.0)	846 (70.4)	1248 (65.4)	399 (53.8)	<0.001
	Yes	293 (19.0)	355 (29.6)	660 (34.6)	342 (46.2)	
ECOG performance status	0	963 (56.3)	640 (48.5)	1024 (50.0)	379 (46.3)	<0.001
	1	454 (26.5)	397 (30.1)	658 (32.1)	231 (28.2)	
	2	208 (12.2)	178 (13.5)	259 (12.6)	146 (17.8)	
	3	76 (4.4)	90 (6.8)	102 (5.0)	56 (6.8)	
	4	10 (0.6)	15 (1.1)	7 (0.3)	7 (0.9)	
Smoking	No, never	994 (61.8)	818 (66.2)	1283 (65.3)	485 (63.3)	0.154
	Stopped >6 weeks ago	390 (24.3)	253 (20.5)	410 (20.9)	176 (23.0)	
	Yes, current smoker	224 (13.9)	164 (13.3)	271 (13.8)	105 (13.7)	
Diabetes	No	1405 (80.1)	1096 (81.3)	1681 (80.7)	677 (81.2)	0.331
	Diet	41 (2.3)	42 (3.1)	61 (2.9)	15 (1.8)	
	Medication (non-insulin)	220 (12.5)	159 (11.8)	264 (12.7)	107 (12.8)	
HIV tested	Insulin	89 (5.1)	51 (3.8)	78 (3.7)	35 (4.2)	<0.001
	No	1630 (90.5)	1151 (83.0)	1760 (82.7)	718 (84.3)	
	Yes - Negative	166 (9.2)	232 (16.7)	365 (17.2)	129 (15.1)	
Distance to home (km)	Yes - Positive	5 (0.3)	3 (0.2)	2 (0.1)	5 (0.6)	<0.001
	< 10 km	663 (40.2)	458 (36.1)	688 (34.7)	259 (33.0)	
	10-20 km	342 (20.7)	296 (23.3)	408 (20.6)	196 (24.9)	
	20-50 km	355 (21.5)	246 (19.4)	414 (20.9)	166 (21.1)	
	50-100 km	142 (8.6)	117 (9.2)	180 (9.1)	70 (8.9)	
Mode of diagnosis	>100 km	147 (8.9)	152 (12.0)	290 (14.6)	95 (12.1)	<0.001
	Symptomatic	1101 (62.2)	1140 (82.8)	1815 (85.9)	746 (88.7)	
	Screening	478 (27.0)	154 (11.2)	205 (9.7)	54 (6.4)	
	Detected incidentally	192 (10.8)	82 (6.0)	92 (4.4)	41 (4.9)	
	Urgency	1661 (92.2)	1191 (85.9)	1888 (88.7)	593 (69.5)	
Treatment intent	Emergency	141 (7.8)	195 (14.1)	240 (11.3)	260 (30.5)	<0.001
	Palliative	46 (2.6)	85 (6.1)	129 (6.1)	442 (51.8)	
WHO checklist	Curative	1756 (97.4)	1301 (93.9)	1999 (93.9)	411 (48.2)	<0.001
	No, not available in this hospital	145 (8.3)	202 (15.0)	235 (11.4)	99 (11.9)	
	No, but available in this hospital	63 (3.6)	67 (5.0)	106 (5.1)	46 (5.5)	
Primary procedure	Yes	1541 (88.1)	1079 (80.0)	1725 (83.5)	689 (82.6)	<0.001
	T309 Abdomen: Laparotomy with no other procedure	7 (0.4)	5 (0.4)	5 (0.2)	12 (1.4)	
	T43 Abdomen: Diagnostic laparoscopy with no other procedure	2 (0.1)	0 (0.0)	1 (0.0)	2 (0.2)	
	G74 Small bowel: Formation of ileostomy only	5 (0.3)	6 (0.4)	11 (0.5)	24 (2.8)	
	H04 Colon: Total excision of colon and rectum	13 (0.7)	10 (0.7)	16 (0.8)	10 (1.2)	
	H05 Colon: Total excision of colon	34 (1.9)	33 (2.4)	37 (1.7)	11 (1.3)	
	H06 Colon: Extended excision of right hemicolon	80 (4.4)	89 (6.4)	117 (5.5)	36 (4.2)	
	H07 Colon: Excision of right hemicolon	588 (32.7)	324 (23.4)	503 (23.6)	166 (19.5)	
	H08 Colon: Excision of transverse colon	24 (1.3)	14 (1.0)	22 (1.0)	9 (1.1)	
	H09 Colon: Excision of left hemicolon	142 (7.9)	110 (7.9)	139 (6.5)	54 (6.3)	
H10 Colon: Excision of sigmoid colon	248 (13.8)	177 (12.8)	192 (9.0)	96 (11.3)		

	H11 Colon: Other excision of colon	35 (1.9)	38 (2.7)	26 (1.2)	22 (2.6)	
	H15 Colon: Formation of any colonic stoma	22 (1.2)	26 (1.9)	53 (2.5)	116 (13.6)	
	H19 Colon: Other open operations on colon	15 (0.8)	20 (1.4)	20 (0.9)	33 (3.9)	
	H331 Rectum: Abdominoperineal resection	83 (4.6)	116 (8.4)	217 (10.2)	51 (6.0)	
	H332 Rectum: Resection with anastomosis of colon to anus	57 (3.2)	28 (2.0)	93 (4.4)	17 (2.0)	
	H333 Rectum: Anterior resection with anastomosis	334 (18.6)	292 (21.1)	516 (24.3)	119 (14.0)	
	H335 Rectum: Resection with closure of rectal stump (Hartmanns)	48 (2.7)	74 (5.3)	120 (5.6)	53 (6.2)	
	H46 Rectum: Other open operations on rectum	63 (3.5)	24 (1.7)	39 (1.8)	22 (2.6)	
Approach	Open	763 (42.6)	774 (56.1)	1195 (56.3)	597 (70.4)	<0.001
	Minimally invasive	1027 (57.4)	606 (43.9)	928 (43.7)	251 (29.6)	
Site	Caecum	233 (13.1)	116 (8.4)	196 (9.3)	96 (11.4)	<0.001
	Ascending colon	385 (21.7)	240 (17.5)	372 (17.6)	129 (15.3)	
	Transverse colon	136 (7.7)	105 (7.6)	127 (6.0)	72 (8.6)	
	Descending colon	125 (7.0)	125 (9.1)	116 (5.5)	61 (7.2)	
	Sigmoid colon	402 (22.6)	310 (22.6)	387 (18.3)	212 (25.2)	
	High rectum (>10 to 15 cm)	178 (10.0)	173 (12.6)	256 (12.1)	111 (13.2)	
	Middle rectum (>5 to 10 cm)	131 (7.4)	131 (9.5)	283 (13.4)	68 (8.1)	
	Low rectum (<=5 cm from anal verge)	186 (10.5)	173 (12.6)	379 (17.9)	93 (11.0)	
Anastomosis	Not performed	269 (15.3)	330 (24.3)	495 (23.9)	327 (39.4)	<0.001
	Handsewn	330 (18.8)	300 (22.1)	391 (18.9)	153 (18.5)	
	Stapled	1161 (66.0)	727 (53.6)	1188 (57.3)	349 (42.1)	
Pre-op obstruction	No	1575 (91.0)	1075 (79.5)	1678 (81.4)	496 (60.0)	<0.001
	Yes	155 (9.0)	277 (20.5)	383 (18.6)	330 (40.0)	
Pre-op perforation	No	1750 (98.3)	1258 (93.0)	1983 (94.3)	745 (89.1)	<0.001
	Yes	30 (1.7)	94 (7.0)	120 (5.7)	91 (10.9)	
Stoma formed	No	1338 (75.4)	839 (61.2)	1143 (54.2)	423 (49.9)	<0.001
	Yes, loop ileostomy	173 (9.8)	173 (12.6)	378 (17.9)	102 (12.0)	
	Yes, end ileostomy	47 (2.6)	55 (4.0)	80 (3.8)	31 (3.7)	
	Yes, loop colostomy	51 (2.9)	54 (3.9)	122 (5.8)	105 (12.4)	
	Yes, end colostomy	165 (9.3)	251 (18.3)	385 (18.3)	187 (22.1)	

Essential TNM Classification of Malignant Tumours (eTNM), as defined by the Union for International Cancer Control (UICC), for colorectal cancer:

L, Tumour contained within bowel wall with no nodal involvement (Stage I); A, Tumour through bowel wall with no nodal involvement (Stage II); R+, Regional lymph node involvement (Stage III); M+, Metastases present (Stage IV). ASA, American Society of Anesthesiologists operative risk grade; BMI, body mass index; ECOG, Eastern Cooperative Oncology Group; HIV, human immunodeficiency virus; SD, standard deviation. Data are n (%).

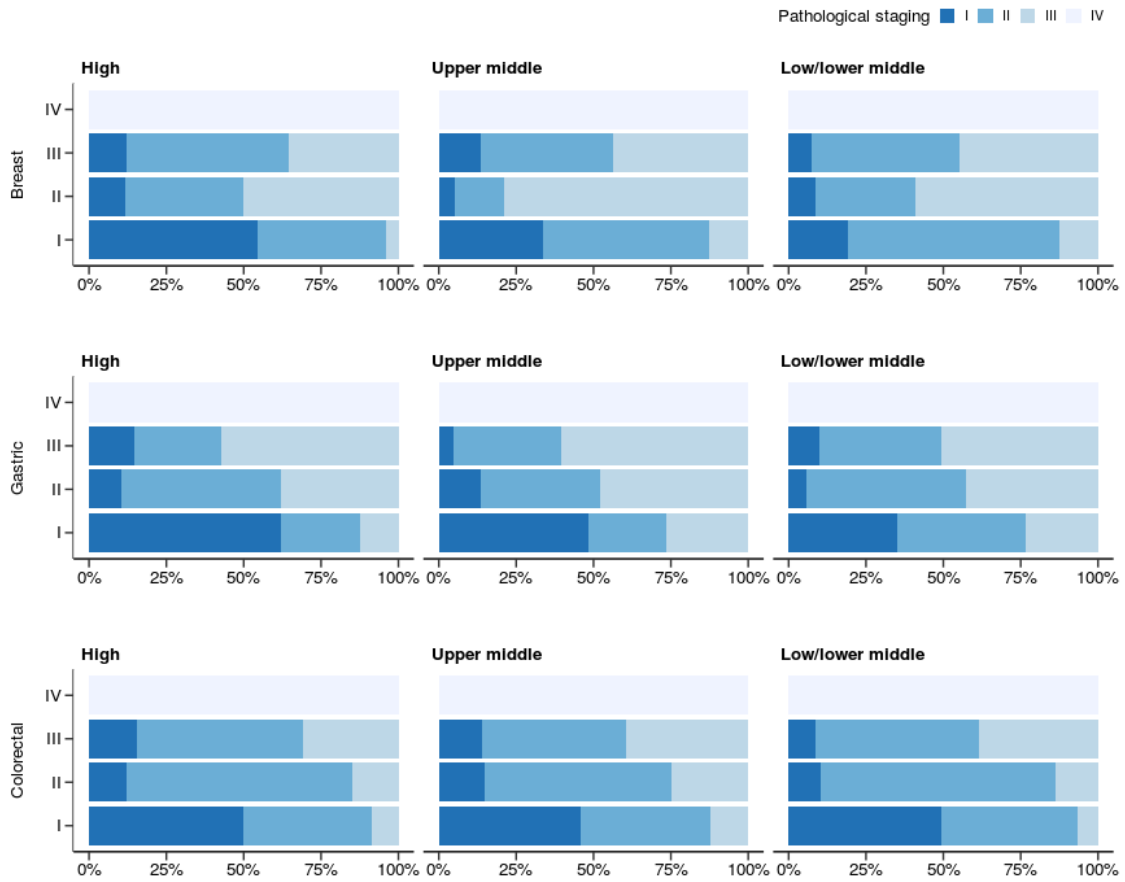
Table S3C. Cancer stage by other predictors (gastric).

		L N=450	A N=235	R+ N=505	M+ N=133	p
Age (years)	Mean (SD)	64.6 (14.4)	62.7 (14.2)	63.1 (13.0)	61.2 (13.8)	0.068
Sex	Male	251 (55.8)	152 (64.7)	317 (62.8)	86 (64.7)	0.048
	Female	199 (44.2)	83 (35.3)	188 (37.2)	47 (35.3)	
ASA	I	66 (15.0)	38 (16.3)	101 (20.4)	23 (17.7)	<0.001
	II	222 (50.5)	110 (47.2)	242 (48.8)	60 (46.2)	
	III	142 (32.3)	78 (33.5)	140 (28.2)	34 (26.2)	
	IV	10 (2.3)	7 (3.0)	12 (2.4)	10 (7.7)	
	V	0 (0.0)	0 (0.0)	1 (0.2)	3 (2.3)	
BMI	Normal weight (BMI 18.5 to 24.9)	203 (47.9)	107 (48.6)	263 (54.0)	69 (54.8)	<0.001
	Underweight (BMI < 18.5)	25 (5.9)	21 (9.5)	55 (11.3)	22 (17.5)	
	Overweight (BMI 25 to 30)	134 (31.6)	79 (35.9)	122 (25.1)	29 (23.0)	
	Obese (BMI >30)	62 (14.6)	13 (5.9)	47 (9.7)	6 (4.8)	
>10% weight loss	No	285 (70.2)	104 (48.4)	202 (43.0)	33 (26.6)	<0.001
	Yes	121 (29.8)	111 (51.6)	268 (57.0)	91 (73.4)	
ECOG performance status	0	241 (55.5)	103 (45.2)	216 (43.7)	42 (32.3)	<0.001
	1	117 (27.0)	85 (37.3)	176 (35.6)	44 (33.8)	
	2	53 (12.2)	27 (11.8)	70 (14.2)	23 (17.7)	
	3	20 (4.6)	12 (5.3)	27 (5.5)	19 (14.6)	
	4	3 (0.7)	1 (0.4)	5 (1.0)	2 (1.5)	
Smoking	No, never	241 (62.0)	124 (57.4)	269 (59.1)	65 (58.6)	0.948
	Stopped >6 weeks ago	86 (22.1)	55 (25.5)	106 (23.3)	26 (23.4)	
	Yes, current smoker	62 (15.9)	37 (17.1)	80 (17.6)	20 (18.0)	
Diabetes	No	376 (85.3)	196 (85.2)	417 (84.2)	108 (81.8)	0.962
	Diet	8 (1.8)	5 (2.2)	9 (1.8)	1 (0.8)	
	Medication (non-insulin)	41 (9.3)	20 (8.7)	50 (10.1)	16 (12.1)	
HIV tested	No	16 (3.6)	9 (3.9)	19 (3.8)	7 (5.3)	0.001
	Yes - Negative	363 (80.7)	162 (68.9)	364 (72.1)	85 (63.9)	
	Yes - Positive	86 (19.1)	73 (31.1)	140 (27.7)	47 (35.3)	
Distance to home (km)	< 10 km	1 (0.2)	0 (0.0)	1 (0.2)	1 (0.8)	0.002
	10-20 km	136 (32.9)	53 (24.5)	122 (25.7)	25 (20.7)	
	20-50 km	89 (21.5)	41 (19.0)	87 (18.4)	26 (21.5)	
	50-100 km	75 (18.1)	40 (18.5)	106 (22.4)	24 (19.8)	
	>100 km	51 (12.3)	26 (12.0)	40 (8.4)	10 (8.3)	
Mode of diagnosis	Symptomatic	63 (15.2)	56 (25.9)	119 (25.1)	36 (29.8)	<0.001
	Screening	340 (76.7)	221 (95.7)	475 (95.4)	130 (97.7)	
	Detected incidentally	31 (7.0)	1 (0.4)	7 (1.4)	1 (0.8)	
Urgency	Elective	72 (16.3)	9 (3.9)	16 (3.2)	2 (1.5)	<0.001
	Emergency	436 (96.9)	220 (93.6)	474 (93.9)	113 (85.0)	
Treatment intent	Palliative	14 (3.1)	15 (6.4)	31 (6.1)	20 (15.0)	<0.001
	Curative	17 (3.8)	23 (9.8)	65 (12.9)	89 (66.9)	
WHO checklist	No, not available in this hospital	433 (96.2)	212 (90.2)	440 (87.1)	44 (33.1)	0.114
	No, but available in this hospital	49 (11.3)	31 (13.4)	48 (9.8)	10 (7.9)	
	Yes	18 (4.1)	20 (8.7)	24 (4.9)	8 (6.3)	
Primary procedure	T309 Abdomen: Laparotomy with no other procedure	367 (84.6)	180 (77.9)	417 (85.3)	108 (85.7)	<0.001
	T43 Abdomen: Diagnostic laparoscopy with no other procedure	7 (1.6)	4 (1.7)	13 (2.6)	13 (9.8)	
	G27 Stomach: Total excision of stomach	7 (1.6)	6 (2.6)	9 (1.8)	5 (3.8)	
	G28 Stomach: Partial excision of stomach	131 (29.1)	93 (39.6)	214 (42.4)	30 (22.6)	
	G32 Stomach: Connection of stomach to jejunum	265 (58.9)	102 (43.4)	207 (41.0)	36 (27.1)	
	G38 Stomach: Other open operations on stomach	17 (3.8)	20 (8.5)	42 (8.3)	35 (26.3)	
	Open	23 (5.1)	10 (4.3)	20 (4.0)	14 (10.5)	
	Minimally invasive	280 (62.5)	182 (77.8)	413 (81.8)	117 (88.0)	
	Upper third (cardia/fundus)	168 (37.5)	52 (22.2)	92 (18.2)	16 (12.0)	
Site	Middle third (body)	87 (19.7)	39 (17.1)	109 (22.0)	25 (19.8)	0.125
	Distal third (antrum/pylorus)	104 (23.5)	39 (17.1)	90 (18.2)	20 (15.9)	
	Entire stomach	195 (44.1)	109 (47.8)	210 (42.4)	56 (44.4)	
Anastomosis	Entire stomach	56 (12.7)	41 (18.0)	86 (17.4)	25 (19.8)	<0.001
	Not performed	83 (18.9)	29 (12.8)	38 (7.7)	28 (21.7)	
	Handsewn	116 (26.4)	81 (35.7)	152 (30.9)	54 (41.9)	
D2 resection	Stapled	241 (54.8)	117 (51.5)	302 (61.4)	47 (36.4)	<0.001
	No	205 (49.0)	97 (43.3)	166 (34.2)	87 (69.6)	
Pre-op obstruction	Yes	213 (51.0)	127 (56.7)	320 (65.8)	38 (30.4)	<0.001
	No	409 (93.4)	200 (87.0)	421 (84.7)	71 (55.9)	
Pre-op perforation	Yes	29 (6.6)	30 (13.0)	76 (15.3)	56 (44.1)	0.001
	No	436 (98.9)	223 (96.5)	477 (95.8)	120 (91.6)	
	Yes	5 (1.1)	8 (3.5)	21 (4.2)	11 (8.4)	

Essential TNM Classification of Malignant Tumours (eTNM), as defined by the Union for International Cancer Control (UICC), for gastric cancer:

L, Tumour contained within stomach wall with no nodal involvement (Stage I); A, Tumour through stomach wall with no nodal involvement (Stage II); R+, Regional lymph node involvement (Stage III); M+, Metastases present (Stage IV). ASA, American Society of Anesthesiologists operative risk grade; BMI, body mass index; ECOG, Eastern Cooperative Oncology Group; HIV, human immunodeficiency virus; SD, standard deviation. Data are n (%).

Figure S6A. Comparison between preoperative clinical and postoperative final pathological staging.



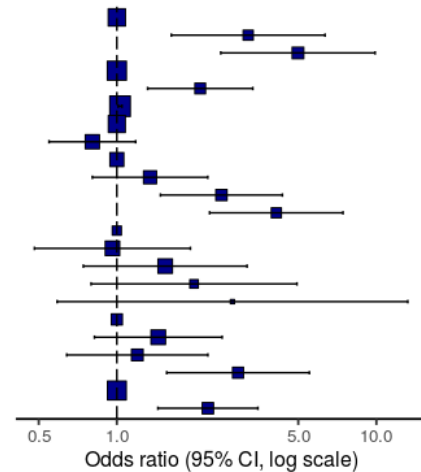
Preoperative clinical staging performed using Essential TNM Classification of Malignant Tumours (eTNM), as defined by the Union for International Cancer Control (UICC).

Figure S6B. Capacity to rescue from major complication: sensitivity analysis using postoperative final pathological staging. A, multilevel logistic regression model for predictors of death after major complication in colorectal and gastric cancer. B, proportion of 30-day mortality variation explained at the level of patient/disease, hospital, country, and country income group, in patients with colorectal or gastric cancer who died after major complication. The “variance explained” at each of the 4 levels of the model (marginal pseudo-R²) is expressed as a proportion of the total “variance explained” (conditional pseudo-R²).

Sensitivity analysis using pathological staging
Colorectal and gastric cancer

A. Predictors of death after major complication

WB income (tertile)	High	-
	Upper middle	3.21 (1.62-6.34, p=0.001)
	Low/lower middle	4.99 (2.51-9.89, p<0.001)
Cancer type	Colorectal	-
	Gastric	2.09 (1.31-3.34, p=0.002)
Age (years)	-	1.03 (1.01-1.05, p=0.001)
Sex	Male	-
	Female	0.80 (0.55-1.18, p=0.268)
ECOG performance status	0	-
	1	1.34 (0.80-2.24, p=0.260)
	2	2.53 (1.47-4.34, p=0.001)
	3/4	4.12 (2.28-7.44, p<0.001)
ASA	I	-
	II	0.96 (0.48-1.92, p=0.911)
	III	1.54 (0.74-3.17, p=0.247)
	IV	1.98 (0.80-4.94, p=0.142)
	V	2.79 (0.59-13.21, p=0.196)
Pathological stage	I	-
	II	1.44 (0.82-2.55, p=0.204)
	III	1.20 (0.64-2.24, p=0.570)
	IV	2.93 (1.56-5.52, p=0.001)
Urgency	Elective	-
	Emergency	2.24 (1.44-3.50, p<0.001)



B. Capacity to rescue from major complication

Components of variation

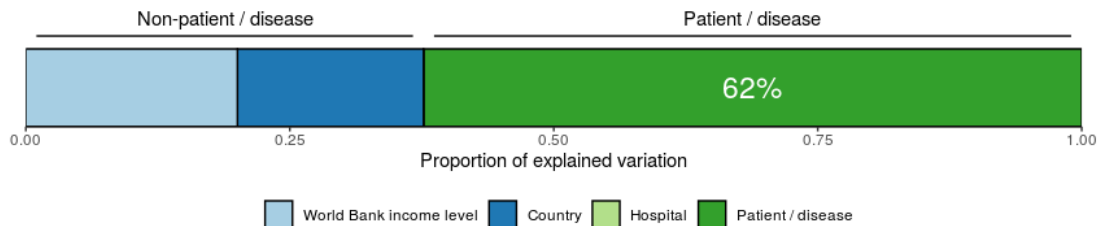


Table S4A. Surgical procedure (breast).

		High N=4220	Upper middle N=1319	Low/lower middle N=2867
Mode of diagnosis	Symptomatic	2073 (49.1)	935 (70.9)	2397 (83.6)
	Screening	1831 (43.4)	177 (13.4)	115 (4.0)
	Detected incidentally	243 (5.8)	196 (14.9)	338 (11.8)
	(Missing)	73 (1.7)	11 (0.8)	17 (0.6)
Urgency	Elective	4200 (99.5)	1309 (99.2)	2842 (99.1)
	Emergency	19 (0.5)	10 (0.8)	22 (0.8)
	(Missing)	1 (0.0)	0 (0.0)	3 (0.1)
Treatment intent	Palliative	50 (1.2)	70 (5.3)	126 (4.4)
	Curative	4168 (98.8)	1249 (94.7)	2738 (95.5)
	(Missing)	2 (0.0)	0 (0.0)	3 (0.1)
WHO checklist	No, not available in this hospital	191 (4.5)	91 (6.9)	314 (11.0)
	No, but available in this hospital	206 (4.9)	76 (5.8)	164 (5.7)
	Yes	3616 (85.7)	1138 (86.3)	2358 (82.2)
	(Missing)	207 (4.9)	14 (1.1)	31 (1.1)
Primary procedure	B27 Mastectomy	1257 (29.8)	869 (65.9)	1658 (57.8)
	B28 Partial mastectomy / wide local excision / lumpectomy	2766 (65.5)	370 (28.1)	1109 (38.7)
	B32 Open biopsy of breast	58 (1.4)	22 (1.7)	16 (0.6)
	B37 Other operations on breast	137 (3.2)	57 (4.3)	78 (2.7)
	(Missing)	2 (0.0)	1 (0.1)	6 (0.2)
SNLB	No, not available in this hospital	33 (0.8)	279 (21.2)	303 (10.6)
	No, but available in this hospital	1021 (24.2)	503 (38.1)	1690 (58.9)
	Yes, single technique	1656 (39.2)	301 (22.8)	504 (17.6)
	Yes, dual technique	1446 (34.3)	206 (15.6)	192 (6.7)
	(Missing)	64 (1.5)	30 (2.3)	178 (6.2)
Axillary lymph node dissection	No	3177 (75.3)	479 (36.3)	770 (26.9)
	Yes	998 (23.6)	820 (62.2)	1989 (69.4)
	(Missing)	45 (1.1)	20 (1.5)	108 (3.8)
Margin check	No, not available in this hospital	199 (4.7)	289 (21.9)	246 (8.6)
	No, but available in this hospital	1664 (39.4)	562 (42.6)	1840 (64.2)
	Yes, by x-ray	1412 (33.5)	17 (1.3)	58 (2.0)
	Yes, by frozen section	678 (16.1)	416 (31.5)	624 (21.8)
	(Missing)	267 (6.3)	35 (2.7)	99 (3.5)
Primary reconstruction	No, not available in this hospital	190 (4.5)	243 (18.4)	260 (9.1)
	No, but available in this hospital	3170 (75.1)	816 (61.9)	2256 (78.7)
	Yes, immediate - prosthesis	243 (5.8)	118 (8.9)	41 (1.4)
	Yes, immediate - flap	466 (11.0)	125 (9.5)	202 (7.0)
	Yes, planned at later stage	146 (3.5)	16 (1.2)	105 (3.7)
	(Missing)	5 (0.1)	1 (0.1)	3 (0.1)

WHO, World Health Organisation; SNLB, sentinel lymph node biopsy. Data are n (%).

Table S4B. Surgical procedure (colorectal).

		High N=4174	Upper middle N=1113	Low/lower middle N=928
Mode of diagnosis	Symptomatic	2939 (70.4)	1012 (90.9)	887 (95.6)
	Screening	841 (20.1)	43 (3.9)	10 (1.1)
	Detected incidentally	334 (8.0)	52 (4.7)	26 (2.8)
	(Missing)	60 (1.4)	6 (0.5)	5 (0.5)
Urgency	Elective	3644 (87.3)	952 (85.5)	773 (83.3)
	Emergency	530 (12.7)	161 (14.5)	155 (16.7)
Treatment intent	Palliative	367 (8.8)	177 (15.9)	165 (17.8)
	Curative	3807 (91.2)	936 (84.1)	763 (82.2)
WHO checklist	No, not available in this hospital	241 (5.8)	293 (26.3)	148 (15.9)
	No, but available in this hospital	152 (3.6)	43 (3.9)	89 (9.6)
	Yes	3649 (87.4)	755 (67.8)	673 (72.5)
	(Missing)	132 (3.2)	22 (2.0)	18 (1.9)
Primary procedure	T309 Abdomen: Laparotomy with no other procedure	12 (0.3)	4 (0.4)	13 (1.4)
	T43 Abdomen: Diagnostic laparoscopy with no other procedure	4 (0.1)	0 (0.0)	1 (0.1)
	G74 Small bowel: Formation of ileostomy only	26 (0.6)	15 (1.3)	5 (0.5)
	H04 Colon: Total excision of colon and rectum	25 (0.6)	10 (0.9)	14 (1.5)
	H05 Colon: Total excision of colon	77 (1.8)	23 (2.1)	20 (2.2)
	H06 Colon: Extended excision of right hemicolon	207 (5.0)	37 (3.3)	81 (8.7)
	H07 Colon: Excision of right hemicolon	1240 (29.7)	197 (17.7)	157 (16.9)
	H08 Colon: Excision of transverse colon	45 (1.1)	13 (1.2)	12 (1.3)
	H09 Colon: Excision of left hemicolon	300 (7.2)	81 (7.3)	69 (7.4)
	H10 Colon: Excision of sigmoid colon	436 (10.4)	150 (13.5)	132 (14.2)
	H11 Colon: Other excision of colon	97 (2.3)	13 (1.2)	13 (1.4)
	H15 Colon: Formation of any colonic stoma	105 (2.5)	47 (4.2)	67 (7.2)
	H19 Colon: Other open operations on colon	49 (1.2)	32 (2.9)	7 (0.8)
	H331 Rectum: Abdominoperineal resection	260 (6.2)	97 (8.7)	114 (12.3)
	H332 Rectum: Resection with anastomosis of colon to anus	114 (2.7)	43 (3.9)	38 (4.1)
	H333 Rectum: Anterior resection with anastomosis	865 (20.7)	274 (24.6)	125 (13.5)
	H335 Rectum: Resection with closure of rectal stump (Hartmann's)	196 (4.7)	59 (5.3)	42 (4.5)
	Approach	H46 Rectum: Other open operations on rectum	115 (2.8)	17 (1.5)
(Missing)		1 (0.0)	1 (0.1)	2 (0.2)
Open		1729 (41.4)	681 (61.2)	654 (70.5)
Laparoscopic (+/- open specimen extraction)		2092 (50.1)	363 (32.6)	233 (25.1)
Laparoscopic converted to open		213 (5.1)	46 (4.1)	39 (4.2)
Robotic		113 (2.7)	22 (2.0)	0 (0.0)
Site	Robotic converted to open	2 (0.0)	0 (0.0)	0 (0.0)
	(Missing)	25 (0.6)	1 (0.1)	2 (0.2)
	Caecum	494 (11.8)	82 (7.4)	72 (7.8)
	Ascending colon	832 (19.9)	152 (13.7)	153 (16.5)
	Transverse colon	319 (7.6)	65 (5.8)	63 (6.8)
	Descending colon	273 (6.5)	77 (6.9)	80 (8.6)
	Sigmoid colon	830 (19.9)	274 (24.6)	212 (22.8)
	High rectum (>10 to 15 cm)	473 (11.3)	156 (14.0)	93 (10.0)
	Middle rectum (>5 to 10 cm)	411 (9.8)	134 (12.0)	70 (7.5)
	Low rectum (<=5 cm from anal verge)	505 (12.1)	158 (14.2)	173 (18.6)
	(Missing)	37 (0.9)	15 (1.3)	12 (1.3)
	Anastomosis	Not performed	872 (20.9)	293 (26.3)
Handsewn		664 (15.9)	222 (19.9)	296 (31.9)
Stapled		2555 (61.2)	575 (51.7)	319 (34.4)
(Missing)		83 (2.0)	23 (2.1)	48 (5.2)
Pre-op obstruction	No	3366 (80.6)	836 (75.1)	656 (70.7)
	Yes	653 (15.6)	260 (23.4)	242 (26.1)
	(Missing)	155 (3.7)	17 (1.5)	30 (3.2)
Pre-op perforation	No	3891 (93.2)	1028 (92.4)	852 (91.8)
	Yes	228 (5.5)	69 (6.2)	46 (5.0)
	(Missing)	55 (1.3)	16 (1.4)	30 (3.2)
Stoma formed	No	2750 (65.9)	561 (50.4)	460 (49.6)
	Yes, loop ileostomy	512 (12.3)	196 (17.6)	123 (13.3)
	Yes, end ileostomy	130 (3.1)	53 (4.8)	31 (3.3)
	Yes, loop colostomy	161 (3.9)	82 (7.4)	92 (9.9)
	Yes, end colostomy	597 (14.3)	204 (18.3)	193 (20.8)
	(Missing)	24 (0.6)	17 (1.5)	29 (3.1)

WHO, World Health Organisation. Data are n (%).

Table S4C. Surgical procedure (gastric).

		High N=712	Upper middle N=289	Low/lower middle N=336	
Mode of diagnosis	Symptomatic	577 (81.0)	272 (94.1)	326 (97.0)	
	Screening	35 (4.9)	5 (1.7)	1 (0.3)	
	Detected incidentally (Missing)	85 (11.9) 15 (2.1)	9 (3.1) 3 (1.0)	7 (2.1) 2 (0.6)	
Urgency	Elective	681 (95.6)	273 (94.5)	300 (89.3)	
	Emergency (Missing)	30 (4.2) 1 (0.1)	16 (5.5) 0 (0.0)	36 (10.7) 0 (0.0)	
	Treatment intent	Palliative Curative (Missing)	79 (11.1) 632 (88.8) 1 (0.1)	45 (15.6) 244 (84.4) 0 (0.0)	71 (21.1) 265 (78.9) 0 (0.0)
WHO checklist	No, not available in this hospital	65 (9.1)	38 (13.1)	35 (10.4)	
	No, but available in this hospital	32 (4.5)	3 (1.0)	37 (11.0)	
	Yes (Missing)	579 (81.3) 36 (5.1)	243 (84.1) 5 (1.7)	261 (77.7) 3 (0.9)	
	Primary procedure	T309 Abdomen: Laparotomy with no other procedure	12 (1.7)	11 (3.8)	14 (4.2)
T43 Abdomen: Diagnostic laparoscopy with no other procedure		14 (2.0)	8 (2.8)	6 (1.8)	
G27 Stomach: Total excision of stomach		269 (37.8)	117 (40.5)	84 (25.0)	
G28 Stomach: Partial excision of stomach		338 (47.5)	126 (43.6)	154 (45.8)	
G32 Stomach: Connection of stomach to jejunum		52 (7.3)	18 (6.2)	46 (13.7)	
G38 Stomach: Other open operations on stomach (Missing)		26 (3.7) 1 (0.1)	9 (3.1) 0 (0.0)	32 (9.5) 0 (0.0)	
Approach		Open	435 (61.1)	225 (77.9)	284 (84.5)
		Laparoscopic (+/- open specimen extraction)	242 (34.0)	49 (17.0)	28 (8.3)
	Laparoscopic converted to open	23 (3.2)	12 (4.2)	24 (7.1)	
	Robotic	8 (1.1)	3 (1.0)	0 (0.0)	
	Robotic converted to open (Missing)	0 (0.0) 4 (0.6)	0 (0.0) 0 (0.0)	0 (0.0) 0 (0.0)	
	Site	Upper third (cardia/fundus)	142 (19.9)	45 (15.6)	73 (21.7)
Middle third (body)		172 (24.2)	49 (17.0)	34 (10.1)	
Distal third (antrum/pylorus)		291 (40.9)	120 (41.5)	167 (49.7)	
Entire stomach (Missing)		95 (13.3) 12 (1.7)	67 (23.2) 8 (2.8)	49 (14.6) 13 (3.9)	
Anastomosis		Not performed	106 (14.9)	31 (10.7)	44 (13.1)
	Handsewn	146 (20.5)	86 (29.8)	172 (51.2)	
	Stapled (Missing)	448 (62.9) 12 (1.7)	162 (56.1) 10 (3.5)	106 (31.5) 14 (4.2)	
	D2 resection	No	309 (43.4)	92 (31.8)	156 (46.4)
Yes (Missing)		369 (51.8) 34 (4.8)	185 (64.0) 12 (4.2)	154 (45.8) 26 (7.7)	
Pre-op obstruction		No	619 (86.9)	254 (87.9)	239 (71.1)
	Yes (Missing)	81 (11.4) 12 (1.7)	29 (10.0) 6 (2.1)	83 (24.7) 14 (4.2)	
	Pre-op perforation	No	683 (95.9)	278 (96.2)	307 (91.4)
Yes (Missing)		24 (3.4) 5 (0.7)	8 (2.8) 3 (1.0)	14 (4.2) 15 (4.5)	

WHO, World Health Organisation. Data are n (%).

Table S5. Detailed outcomes stratified by cancer and country income level.

		Breast High	Breast Upper middle	Breast Low/lower middle	Colorectal High	Colorectal Upper middle	Colorectal Low/lower middle	Gastric High	Gastric Upper middle	Gastric Low/lower middle
30-day mortality	Alive	N=4220 4203 (99.6)	N=1319 1293 (98.0)	N=2867 2822 (98.4)	N=4174 4048 (97.0)	N=1113 1055 (94.8)	N=928 842 (90.7)	N=712 675 (94.8)	N=289 272 (94.1)	N=336 293 (87.2)
	Dead (Missing)	4 (0.1) 13 (0.3)	2 (0.2) 24 (1.8)	10 (0.3) 35 (1.2)	94 (2.3) 32 (0.8)	47 (4.2) 11 (1.0)	63 (6.8) 23 (2.5)	27 (3.8) 10 (1.4)	11 (3.8) 6 (2.1)	33 (9.8) 10 (3.0)
Minor complication (CD1)	No	3122 (74.0)	901 (68.3)	1897 (66.2)	2875 (68.9)	772 (69.4)	556 (59.9)	518 (72.8)	171 (59.2)	215 (64.0)
	Yes (Missing)	1069 (25.3) 29 (0.7)	392 (29.7) 26 (2.0)	923 (32.2) 47 (1.6)	1252 (30.0) 47 (1.1)	321 (28.8) 20 (1.8)	339 (36.5) 33 (3.6)	188 (26.4) 6 (0.8)	112 (38.8) 6 (2.1)	103 (30.7) 18 (5.4)
Minor complication (CD2)	No	3908 (92.6)	1137 (86.2)	2388 (83.3)	3106 (74.4)	884 (79.4)	601 (64.8)	538 (75.6)	202 (69.9)	237 (70.5)
	Yes (Missing)	283 (6.7) 29 (0.7)	156 (11.8) 26 (2.0)	426 (14.9) 53 (1.8)	1026 (24.6) 42 (1.0)	210 (18.9) 19 (1.7)	292 (31.5) 35 (3.8)	169 (23.7) 5 (0.7)	81 (28.0) 6 (2.1)	82 (24.4) 17 (5.1)
Re-intervention (CD3)	No	3990 (94.5)	1248 (94.6)	2571 (89.7)	3672 (88.0)	1016 (91.3)	777 (83.7)	632 (88.8)	267 (92.4)	292 (86.9)
	Yes, NOT under general anaesthetic Yes under general anaesthetic (Missing)	71 (1.7) 142 (3.4) 17 (0.4)	19 (1.4) 31 (2.4) 21 (1.6)	140 (4.9) 63 (2.2) 93 (3.2)	135 (3.2) 333 (8.0) 34 (0.8)	25 (2.2) 53 (4.8) 19 (1.7)	46 (5.0) 70 (7.5) 35 (3.8)	31 (4.4) 45 (6.3) 4 (0.6)	6 (2.1) 10 (3.5) 6 (2.1)	12 (3.6) 17 (5.1) 15 (4.5)
Life-threatening complication (CD4)	No	4195 (99.4)	1280 (97.0)	2803 (97.8)	3902 (93.5)	1042 (93.6)	818 (88.1)	662 (93.0)	264 (91.3)	289 (86.0)
	Yes, single organ failure Yes, multi organ failure (Missing)	3 (0.1) 3 (0.1) 19 (0.5)	14 (1.1) 3 (0.2) 22 (1.7)	5 (0.2) 3 (0.1) 56 (2.0)	138 (3.3) 95 (2.3) 39 (0.9)	24 (2.2) 30 (2.7) 17 (1.5)	40 (4.3) 40 (4.3) 30 (3.2)	23 (3.2) 24 (3.4) 3 (0.4)	9 (3.1) 10 (3.5) 6 (2.1)	16 (4.8) 15 (4.5) 16 (4.8)
Readmission	No	4034 (95.6)	1247 (94.5)	2778 (96.9)	3828 (91.7)	1012 (90.9)	799 (86.1)	661 (92.8)	252 (87.2)	295 (87.8)
	Yes (Missing)	171 (4.1) 15 (0.4)	52 (3.9) 20 (1.5)	42 (1.5) 47 (1.6)	310 (7.4) 36 (0.9)	86 (7.7) 15 (1.3)	99 (10.7) 30 (3.2)	47 (6.6) 4 (0.6)	31 (10.7) 6 (2.1)	25 (7.4) 16 (4.8)
Surgical site infection	No	3878 (91.9)	1144 (86.7)	2346 (81.8)	3562 (85.3)	893 (80.2)	615 (66.3)	637 (89.5)	221 (76.5)	271 (80.7)
	Yes, no treatment/wound opened only (CD 1) Yes, antibiotics only (CD 2) Yes, return to operating theatre (CD 3) Yes, requiring critical care admission (CD 4) Yes, resulting in death (CD 5) (Missing)	54 (1.3) 168 (4.0) 27 (0.6) 0 (0.0) 0 (0.0) 93 (2.2)	61 (4.6) 77 (5.8) 9 (0.7) 0 (0.0) 0 (0.0) 28 (2.1)	141 (4.9) 205 (7.2) 91 (3.2) 2 (0.1) 1 (0.0) 81 (2.8)	177 (4.2) 261 (6.3) 76 (1.8) 15 (0.4) 3 (0.1) 80 (1.9)	81 (7.3) 85 (7.6) 26 (2.3) 8 (0.7) 4 (0.4) 16 (1.4)	75 (8.1) 156 (16.8) 30 (3.2) 4 (0.4) 6 (0.6) 42 (4.5)	22 (3.1) 34 (4.8) 5 (0.7) 3 (0.4) 2 (0.3) 9 (1.3)	22 (7.6) 36 (12.5) 2 (0.7) 0 (0.0) 1 (0.3) 7 (2.4)	16 (4.8) 22 (6.5) 6 (1.8) 3 (0.9) 0 (0.0) 18 (5.4)
Abscess (OSI)	No	3857 (92.4)	1039 (93.4)	805 (86.7)	654 (91.9)	262 (90.7)	300 (89.3)	20 (0.5) 2 (0.2) 6 (0.6)	3 (1.0) 3 (1.0) 10 (3.5)	1 (0.3) 1 (0.3) 4 (1.2)
	Yes, no intervention (CD 1) Yes, antibiotics only (CD 2) Yes, surgical/radiological drainage (CD 3) Yes, critical care admission (CD 4) Yes, resulting in death (CD 5) (Missing)	78 (1.9) 114 (2.7) 22 (0.5) 12 (0.3) 71 (1.7)	19 (1.7) 22 (2.0) 5 (0.4) 4 (0.4) 4 (0.4)	14 (1.5) 21 (2.3) 4 (0.4) 4 (0.4) 3 (0.4)	14 (2.0) 28 (3.9) 2 (0.3) 3 (0.4) 9 (1.3)	14 (1.5) 28 (3.9) 5 (1.7) 1 (0.3) 8 (2.8)	14 (2.0) 5 (1.7) 2 (0.3) 1 (0.3) 24 (7.1)	10 (3.5) 5 (1.7) 1 (0.3) 0 (0.0) 8 (2.8)	4 (1.2) 6 (1.8) 1 (0.3) 0 (0.0) 24 (7.1)	
Anastomotic leak	No	3916 (93.8)	1052 (94.5)	836 (90.1)	670 (94.1)	271 (93.8)	292 (86.9)	18 (0.4) 8 (0.7) 24 (2.6)	4 (0.6) 1 (0.3) 10 (3.5)	5 (1.5) 2 (0.6) 2 (0.6)
	Yes, no intervention required (CD 1) Yes, drug treatment only (CD 2) Yes, intervention required (CD 3)	41 (1.0) 104 (2.5)	7 (0.6) 19 (1.7)	2 (0.2) 24 (2.6)	7 (1.0) 18 (2.5)	2 (0.7) 3 (1.0)	2 (0.6) 9 (2.7)	2 (0.6) 9 (2.7)		

	Yes, critical care admission &/or intervention (CD 4)				61 (1.5)	8 (0.7)	7 (0.8)	7 (1.0)	3 (1.0)	7 (2.1)
	Yes, resulting in death (CD 5)				11 (0.3)	5 (0.4)	3 (0.3)	3 (0.4)	2 (0.7)	0 (0.0)
	(Missing)				23 (0.6)	14 (1.3)	32 (3.4)	3 (0.4)	7 (2.4)	21 (6.2)
Post-operative bleed	No	4015 (95.1)	1208 (91.6)	2752 (96.0)	3941 (94.4)	1041 (93.5)	856 (92.2)	671 (94.2)	237 (82.0)	302 (89.9)
	Yes, no intervention required (CD 1)	102 (2.4)	74 (5.6)	45 (1.6)	56 (1.3)	35 (3.1)	17 (1.8)	8 (1.1)	27 (9.3)	5 (1.5)
	Yes, transfusion only (CD 2)	8 (0.2)	1 (0.1)	13 (0.5)	87 (2.1)	18 (1.6)	10 (1.1)	15 (2.1)	13 (4.5)	2 (0.6)
	Yes, surgical/radiological intervention required (CD 3)	61 (1.4)	12 (0.9)	17 (0.6)	38 (0.9)	5 (0.4)	7 (0.8)	5 (0.7)	0 (0.0)	2 (0.6)
	Yes, critical care admission &/or intervention (CD 4)	0 (0.0)	1 (0.1)	0 (0.0)	10 (0.2)	3 (0.3)	6 (0.6)	6 (0.8)	3 (1.0)	5 (1.5)
	Yes, resulting in death (CD 5)	0 (0.0)	0 (0.0)	1 (0.0)	4 (0.1)	2 (0.2)	3 (0.3)	3 (0.4)	1 (0.3)	2 (0.6)
	(Missing)	34 (0.8)	23 (1.7)	39 (1.4)	38 (0.9)	9 (0.8)	29 (3.1)	4 (0.6)	8 (2.8)	18 (5.4)
Seroma	No	3340 (79.1)	1039 (78.8)	2040 (71.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Yes, no intervention/aspiration only (CD 1)	653 (15.5)	206 (15.6)	552 (19.3)						
	Yes, antibiotic treatment only (CD 2)	45 (1.1)	33 (2.5)	35 (1.2)						
	Yes, intervention required (CD 3)	62 (1.5)	9 (0.7)	62 (2.2)						
	Yes, critical care admission &/or intervention (CD 4)	0 (0.0)	0 (0.0)	0 (0.0)						
	Yes, resulting in death (CD 5)	0 (0.0)	0 (0.0)	0 (0.0)						
	(Missing)	120 (2.8)	32 (2.4)	178 (6.2)						
Length of Stay (days)	Mean (SD)	1.8 (2.3)	3.1 (3.1)	2.7 (3.7)	10.1 (8.8)	8.9 (6.8)	9.0 (7.1)	12.0 (31.3)	9.9 (6.2)	10.3 (7.0)

CD, Clavien-Dindo complication grade. OSI, organ space infection.

Table S6A. Breast cancer logistic regression analyses: 30-day mortality.

Dependent: 30-day mortality		Alive	Dead	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	4203 (99.9)	4 (0.1)	-	-	-	-
	Upper middle	1293 (99.8)	2 (0.2)	1.63 (0.23-8.34, p=0.575)	1.41 (0.17-8.66, p=0.721)	1.79 (0.24-9.76, p=0.518)	1.90 (0.07-50.90, p=0.702)
	Low/lower middle	2822 (99.6)	10 (0.4)	3.72 (1.24-13.58, p=0.026)	3.19 (0.75-15.53, p=0.127)	4.32 (1.18-18.27, p=0.033)	8.46 (0.66-108.04, p=0.100)
Age (years)	Mean (SD)	0.0 (1.0)	0.5 (1.0)	1.67 (1.02-2.77, p=0.042)	1.61 (0.88-3.09, p=0.138)	1.63 (0.92-2.99, p=0.105)	2.10 (1.03-4.28, p=0.041)
>10% weight loss	No	6815 (99.9)	10 (0.1)	-	-	-	-
	Yes	362 (99.5)	2 (0.5)	3.77 (0.58-14.35, p=0.088)	1.32 (0.17-6.34, p=0.758)	-	-
	(Missing)	1141 (99.7)	4 (0.3)	2.39 (0.65-7.16, p=0.142)	2.46 (0.53-8.65, p=0.192)	-	-
ECOG performance status	0	5276 (99.9)	4 (0.1)	-	-	-	-
	1	1688 (99.6)	6 (0.4)	4.69 (1.34-18.36, p=0.017)	2.79 (0.70-11.75, p=0.140)	3.55 (0.98-14.35, p=0.056)	4.34 (1.04-18.11, p=0.044)
	2	748 (99.9)	1 (0.1)	1.76 (0.09-11.94, p=0.612)	1.08 (0.05-7.79, p=0.946)	1.18 (0.06-8.37, p=0.883)	0.69 (0.05-9.63, p=0.782)
	3/4	172 (97.7)	4 (2.3)	30.67 (7.20-130.70, p<0.001)	11.02 (2.03-58.54, p=0.004)	11.16 (2.16-57.05, p=0.003)	15.38 (2.06-114.76, p=0.008)
Diabetes	No	6811 (99.8)	11 (0.2)	-	-	-	-
	Yes	1139 (99.7)	4 (0.3)	2.17 (0.60-6.37, p=0.184)	1.37 (0.35-4.44, p=0.617)	1.19 (0.32-3.71, p=0.775)	1.02 (0.24-4.39, p=0.975)
Urgency	Elective	8270 (99.8)	15 (0.2)	-	-	-	-
	Emergency	48 (98.0)	1 (2.0)	11.49 (0.63-58.43, p=0.019)	4.92 (0.23-33.88, p=0.179)	-	-
Treatment intent	Palliative	239 (98.4)	4 (1.6)	-	-	-	-
	Curative	8078 (99.9)	12 (0.1)	0.09 (0.03-0.32, p<0.001)	0.36 (0.08-1.90, p=0.196)	0.20 (0.06-0.83, p=0.016)	0.14 (0.03-0.63, p=0.011)
Stage	0	509 (99.8)	1 (0.2)	-	-	-	-
	I	4504 (99.9)	3 (0.1)	0.34 (0.04-6.86, p=0.349)	0.24 (0.03-4.97, p=0.226)	-	-
	II	134 (99.3)	1 (0.7)	3.80 (0.15-96.48, p=0.346)	1.39 (0.05-39.74, p=0.828)	-	-
	III	2859 (99.8)	6 (0.2)	1.07 (0.18-20.20, p=0.951)	0.66 (0.09-13.66, p=0.720)	-	-
	IV	271 (98.9)	3 (1.1)	5.63 (0.72-114.21, p=0.135)	1.03 (0.08-26.27, p=0.983)	-	-

OR, odds ratio; WB, World Bank; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S6B. Breast cancer logistic regression analyses: major complication.

Dependent: Major complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	3997 (94.8)	218 (5.2)	-	-	-	-
	Upper middle	1245 (95.3)	61 (4.7)	0.90 (0.67-1.19, p=0.470)	0.70 (0.50-0.97, p=0.038)	0.71 (0.51-0.97, p=0.038)	0.53 (0.31-0.90, p=0.018)
	Low/lower middle	2628 (92.4)	217 (7.6)	1.51 (1.25-1.84, p<0.001)	1.22 (0.93-1.60, p=0.147)	1.21 (0.94-1.56, p=0.134)	0.84 (0.53-1.35, p=0.479)
Age (years)	Mean (SD)	0.0 (1.0)	-0.1 (1.0)	0.94 (0.86-1.03, p=0.199)	0.90 (0.81-1.01, p=0.083)	0.91 (0.82-1.02, p=0.121)	0.92 (0.82-1.04, p=0.175)
BMI	Normal weight (BMI 18.5 to 24.9)	2633 (94.8)	145 (5.2)	-	-	-	-
	Underweight (BMI < 18.5)	154 (96.9)	5 (3.1)	0.59 (0.21-1.32, p=0.253)	0.49 (0.15-1.19, p=0.168)	0.51 (0.16-1.24, p=0.195)	0.53 (0.19-1.49, p=0.230)
	Overweight (BMI 25 to 30)	2689 (94.0)	171 (6.0)	1.15 (0.92-1.45, p=0.216)	1.18 (0.93-1.51, p=0.171)	1.18 (0.93-1.51, p=0.170)	1.23 (0.96-1.58, p=0.106)
	Obese (BMI >30)	1825 (92.7)	143 (7.3)	1.42 (1.12-1.81, p=0.004)	1.42 (1.09-1.85, p=0.008)	1.43 (1.10-1.85, p=0.007)	1.54 (1.16-2.04, p=0.003)
	(Missing)	569 (94.7)	32 (5.3)	1.02 (0.68-1.49, p=0.917)	1.43 (0.89-2.22, p=0.120)	1.38 (0.87-2.11, p=0.151)	1.48 (0.90-2.46, p=0.126)
>10% weight loss	No	6443 (94.0)	409 (6.0)	-	-	-	-
	Yes	340 (93.2)	25 (6.8)	1.16 (0.74-1.72, p=0.491)	1.26 (0.79-1.92, p=0.311)	-	-
	(Missing)	1087 (94.6)	62 (5.4)	0.90 (0.68-1.17, p=0.445)	0.94 (0.66-1.30, p=0.721)	-	-
ECOG performance status	0	4987 (94.1)	315 (5.9)	-	-	-	-
	1	1606 (94.6)	92 (5.4)	0.91 (0.71-1.15, p=0.423)	0.86 (0.66-1.11, p=0.255)	0.87 (0.67-1.12, p=0.293)	0.85 (0.65-1.12, p=0.253)
	2	706 (93.6)	48 (6.4)	1.08 (0.78-1.46, p=0.646)	0.91 (0.63-1.29, p=0.599)	0.91 (0.63-1.29, p=0.620)	1.02 (0.68-1.54, p=0.918)
	3/4	159 (90.3)	17 (9.7)	1.69 (0.98-2.75, p=0.044)	1.39 (0.74-2.44, p=0.274)	1.39 (0.74-2.40, p=0.270)	1.40 (0.74-2.65, p=0.296)
Smoking	No	6752 (93.9)	437 (6.1)	-	-	-	-
	Yes	684 (95.0)	36 (5.0)	0.81 (0.56-1.14, p=0.245)	0.99 (0.67-1.41, p=0.940)	-	-
	(Missing)	434 (95.0)	23 (5.0)	0.82 (0.52-1.23, p=0.363)	0.98 (0.56-1.61, p=0.946)	-	-
Diabetes	No	6463 (94.4)	381 (5.6)	-	-	-	-
	Yes	1062 (92.3)	89 (7.7)	1.42 (1.11-1.80, p=0.004)	1.40 (1.07-1.81, p=0.014)	1.38 (1.05-1.79, p=0.017)	1.29 (0.98-1.70, p=0.070)
Mode of diagnosis	Symptomatic	5014 (93.3)	359 (6.7)	-	-	-	-
	Screening	2011 (94.9)	109 (5.1)	0.76 (0.60-0.94, p=0.013)	0.99 (0.76-1.30, p=0.961)	0.99 (0.76-1.29, p=0.945)	0.95 (0.71-1.25, p=0.693)
	Detected incidentally	750 (97.0)	23 (3.0)	0.43 (0.27-0.64, p<0.001)	0.42 (0.25-0.67, p=0.001)	0.42 (0.25-0.67, p=0.001)	0.46 (0.28-0.77, p=0.003)
Urgency	Elective	7827 (94.1)	488 (5.9)	-	-	-	-
	Emergency	43 (84.3)	8 (15.7)	2.98 (1.29-6.04, p=0.005)	2.69 (1.08-5.80, p=0.020)	2.77 (1.12-5.94, p=0.015)	2.58 (1.07-6.19, p=0.034)
Treatment intent	Palliative	227 (93.4)	16 (6.6)	-	-	-	-
	Curative	7642 (94.1)	480 (5.9)	0.89 (0.55-1.55, p=0.661)	1.15 (0.65-2.19, p=0.640)	-	-
Primary procedure	B27 Mastectomy	3465 (92.2)	293 (7.8)	-	-	-	-
	B28 Partial mastectomy / wide local excision / lumpectomy	4051 (95.6)	187 (4.4)	0.55 (0.45-0.66, p<0.001)	0.56 (0.45-0.70, p<0.001)	0.56 (0.45-0.70, p<0.001)	0.54 (0.43-0.68, p<0.001)
	B32 Open biopsy of breast	93 (97.9)	2 (2.1)	0.25 (0.04-0.81, p=0.056)	0.31 (0.05-1.01, p=0.108)	0.31 (0.05-0.99, p=0.103)	0.33 (0.08-1.40, p=0.133)
	B37 Other operations on breast	257 (95.2)	13 (4.8)	0.60 (0.32-1.02, p=0.077)	0.71 (0.38-1.21, p=0.243)	0.69 (0.37-1.19, p=0.212)	0.77 (0.42-1.41, p=0.395)
Stage	0	491 (95.7)	22 (4.3)	-	-	-	-
	I	4270 (94.4)	252 (5.6)	1.32 (0.86-2.11, p=0.226)	1.15 (0.75-1.87, p=0.540)	-	-
	II	119 (88.1)	16 (11.9)	3.00 (1.51-5.86, p=0.001)	1.66 (0.75-3.50, p=0.193)	-	-
	III	2695 (93.7)	181 (6.3)	1.50 (0.97-2.42, p=0.080)	1.02 (0.64-1.69, p=0.936)	-	-

IV	253 (92.0)	22 (8.0)	1.94 (1.05-3.59, p=0.033)	1.25 (0.63-2.47, p=0.521)	-	-
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OR, odds ratio; WB, World Bank; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S6C. Breast cancer logistic regression analyses: all complications.

Dependent: Any complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	2869 (68.1)	1346 (31.9)	-	-	-	-
	Upper middle	829 (63.5)	477 (36.5)	1.23 (1.08-1.40, p=0.002)	0.98 (0.84-1.14, p=0.820)	0.99 (0.85-1.15, p=0.921)	1.13 (0.66-1.92, p=0.658)
	Low/lower middle	1644 (57.8)	1201 (42.2)	1.56 (1.41-1.72, p<0.001)	1.06 (0.93-1.22, p=0.377)	1.08 (0.94-1.24, p=0.288)	0.90 (0.54-1.51, p=0.688)
Age (years)	Mean (SD)	-0.0 (1.0)	0.0 (1.0)	1.06 (1.02-1.11, p=0.006)	1.09 (1.03-1.16, p=0.002)	1.09 (1.03-1.16, p=0.002)	1.07 (1.01-1.14, p=0.022)
ASA (>3)	No	5081 (64.6)	2784 (35.4)	-	-	-	-
	Yes	261 (52.1)	240 (47.9)	1.68 (1.40-2.01, p<0.001)	1.77 (1.33-2.35, p<0.001)	1.76 (1.32-2.32, p<0.001)	1.86 (1.30-2.66, p=0.001)
BMI	Normal weight (BMI 18.5 to 24.9)	1860 (67.0)	918 (33.0)	-	-	-	-
	Underweight (BMI < 18.5)	105 (66.0)	54 (34.0)	1.04 (0.74-1.45, p=0.811)	0.93 (0.64-1.34, p=0.709)	0.96 (0.66-1.37, p=0.824)	0.82 (0.55-1.21, p=0.322)
	Overweight (BMI 25 to 30)	1801 (63.0)	1059 (37.0)	1.19 (1.07-1.33, p=0.002)	1.09 (0.96-1.22, p=0.173)	1.08 (0.96-1.22, p=0.187)	1.16 (1.03-1.32, p=0.019)
	Obese (BMI >30)	1154 (58.6)	814 (41.4)	1.43 (1.27-1.61, p<0.001)	1.27 (1.11-1.44, p<0.001)	1.26 (1.10-1.43, p<0.001)	1.42 (1.22-1.65, p<0.001)
	(Missing)	422 (70.2)	179 (29.8)	0.86 (0.71-1.04, p=0.122)	0.82 (0.64-1.04, p=0.110)	0.80 (0.63-1.01, p=0.068)	1.07 (0.80-1.42, p=0.654)
>10% weight loss	No	4384 (64.0)	2468 (36.0)	-	-	-	-
	Yes	203 (55.6)	162 (44.4)	1.42 (1.15-1.75, p=0.001)	1.18 (0.93-1.49, p=0.163)	-	-
	(Missing)	755 (65.7)	394 (34.3)	0.93 (0.81-1.06, p=0.258)	0.88 (0.74-1.03, p=0.118)	-	-
ECOG performance status	0	3564 (67.2)	1738 (32.8)	-	-	-	-
	1	1007 (59.3)	691 (40.7)	1.41 (1.26-1.57, p<0.001)	1.21 (1.07-1.37, p=0.002)	1.22 (1.07-1.38, p=0.002)	1.26 (1.10-1.45, p=0.001)
	2	440 (58.4)	314 (41.6)	1.46 (1.25-1.71, p<0.001)	1.30 (1.10-1.55, p=0.003)	1.31 (1.10-1.56, p=0.002)	1.64 (1.32-2.04, p<0.001)
	3/4	83 (47.2)	93 (52.8)	2.30 (1.70-3.11, p<0.001)	1.74 (1.24-2.44, p=0.001)	1.75 (1.25-2.44, p=0.001)	1.82 (1.24-2.67, p=0.002)
Smoking	No	4588 (63.8)	2601 (36.2)	-	-	-	-
	Yes	461 (64.0)	259 (36.0)	0.99 (0.84-1.16, p=0.912)	1.23 (1.03-1.46, p=0.021)	1.23 (1.03-1.46, p=0.021)	1.32 (1.10-1.59, p=0.003)
	(Missing)	293 (64.1)	164 (35.9)	0.99 (0.81-1.20, p=0.899)	0.97 (0.74-1.24, p=0.785)	0.94 (0.73-1.21, p=0.631)	1.02 (0.77-1.36, p=0.869)
Diabetes	No	4506 (65.8)	2338 (34.2)	-	-	-	-
	Yes	672 (58.4)	479 (41.6)	1.37 (1.21-1.56, p<0.001)	1.14 (0.99-1.32, p=0.063)	1.15 (0.99-1.32, p=0.059)	1.05 (0.90-1.23, p=0.508)
Mode of diagnosis	Symptomatic	3292 (61.3)	2081 (38.7)	-	-	-	-
	Screening	1512 (71.3)	608 (28.7)	0.64 (0.57-0.71, p<0.001)	0.88 (0.77-1.00, p=0.047)	0.87 (0.76-0.99, p=0.040)	0.80 (0.69-0.92, p=0.002)
	Detected incidentally	468 (60.5)	305 (39.5)	1.03 (0.88-1.20, p=0.699)	1.00 (0.84-1.19, p=0.986)	1.00 (0.84-1.19, p=0.982)	0.87 (0.71-1.07, p=0.189)
Urgency	Elective	5316 (63.9)	2999 (36.1)	-	-	-	-
	Emergency	26 (51.0)	25 (49.0)	1.70 (0.98-2.96, p=0.058)	1.22 (0.67-2.20, p=0.503)	-	-
Treatment intent	Palliative	142 (58.4)	101 (41.6)	-	-	-	-
	Curative	5200 (64.0)	2922 (36.0)	0.79 (0.61-1.03, p=0.075)	1.04 (0.77-1.42, p=0.787)	-	-
Primary procedure	B27 Mastectomy	2077 (55.3)	1681 (44.7)	-	-	-	-
	B28 Partial mastectomy / wide local excision / lumpectomy	3004 (70.9)	1234 (29.1)	0.51 (0.46-0.56, p<0.001)	0.57 (0.52-0.64, p<0.001)	0.57 (0.52-0.64, p<0.001)	0.57 (0.51-0.64, p<0.001)
	B32 Open biopsy of breast	82 (86.3)	13 (13.7)	0.20 (0.10-0.34, p<0.001)	0.27 (0.14-0.48, p<0.001)	0.27 (0.14-0.47, p<0.001)	0.22 (0.11-0.42, p<0.001)
	B37 Other operations on breast	175 (64.8)	95 (35.2)	0.67 (0.52-0.87, p=0.002)	0.81 (0.62-1.07, p=0.143)	0.81 (0.62-1.07, p=0.145)	0.85 (0.62-1.17, p=0.317)
Stage	0	365 (71.2)	148 (28.8)	-	-	-	-
	I	3068 (67.8)	1454 (32.2)	1.17 (0.96-1.43, p=0.128)	1.01 (0.81-1.26, p=0.941)	1.01 (0.82-1.27, p=0.906)	0.98 (0.78-1.24, p=0.889)

II	68 (50.4)	67 (49.6)	2.43 (1.65-3.58, p<0.001)	1.37 (0.88-2.13, p=0.157)	1.39 (0.89-2.15, p=0.143)	1.29 (0.81-2.07, p=0.285)
III	1655 (57.5)	1221 (42.5)	1.82 (1.49-2.24, p<0.001)	1.27 (1.01-1.60, p=0.046)	1.28 (1.01-1.62, p=0.039)	1.31 (1.02-1.68, p=0.036)
IV	153 (55.6)	122 (44.4)	1.97 (1.45-2.67, p<0.001)	1.23 (0.87-1.75, p=0.238)	1.24 (0.89-1.73, p=0.208)	1.22 (0.85-1.75, p=0.278)

OR, odds ratio; WB, World Bank; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S7A. Colorectal cancer logistic regression analyses: mortality.

Dependent: 30-day mortality		Alive	Dead	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	4048 (97.7)	94 (2.3)	-	-	-	-
	Upper middle	1055 (95.7)	47 (4.3)	1.92 (1.33-2.73, p<0.001)	2.11 (1.35-3.28, p=0.001)	2.20 (1.42-3.37, p<0.001)	2.06 (1.11-3.83, p=0.021)
	Low/lower middle	842 (93.0)	63 (7.0)	3.22 (2.31-4.46, p<0.001)	3.46 (2.13-5.62, p<0.001)	3.75 (2.37-5.93, p<0.001)	4.59 (2.39-8.80, p<0.001)
Age (years)	Mean (SD)	-0.0 (1.0)	0.4 (1.1)	1.53 (1.31-1.79, p<0.001)	1.61 (1.33-1.96, p<0.001)	1.65 (1.37-1.99, p<0.001)	1.69 (1.39-2.07, p<0.001)
Sex	Male	3316 (96.5)	119 (3.5)	-	-	-	-
	Female	2622 (96.9)	84 (3.1)	0.89 (0.67-1.18, p=0.433)	0.65 (0.46-0.92, p=0.015)	0.67 (0.48-0.94, p=0.020)	0.68 (0.48-0.96, p=0.028)
ASA (>3)	No	5626 (97.2)	164 (2.8)	-	-	-	-
	Yes	319 (88.9)	40 (11.1)	4.30 (2.96-6.13, p<0.001)	1.82 (1.11-2.94, p=0.015)	1.82 (1.12-2.91, p=0.013)	2.03 (1.22-3.40, p=0.007)
BMI	Normal weight (BMI 18.5 to 24.9)	2386 (97.0)	75 (3.0)	-	-	-	-
	Underweight (BMI < 18.5)	250 (87.7)	35 (12.3)	4.45 (2.89-6.74, p<0.001)	2.33 (1.38-3.87, p=0.001)	2.51 (1.52-4.07, p<0.001)	2.51 (1.49-4.23, p=0.001)
	Overweight (BMI 25 to 30)	2015 (98.0)	42 (2.0)	0.66 (0.45-0.97, p=0.035)	0.78 (0.50-1.20, p=0.261)	0.79 (0.51-1.20, p=0.268)	0.81 (0.52-1.27, p=0.360)
	Obese (BMI >30)	977 (97.5)	25 (2.5)	0.81 (0.50-1.27, p=0.379)	0.96 (0.54-1.64, p=0.873)	0.92 (0.52-1.54, p=0.750)	0.98 (0.56-1.72, p=0.956)
	(Missing)	317 (92.2)	27 (7.8)	2.71 (1.69-4.22, p<0.001)	1.88 (0.94-3.62, p=0.065)	1.49 (0.78-2.70, p=0.208)	1.51 (0.79-2.90, p=0.215)
>10% weight loss	No	3660 (98.0)	76 (2.0)	-	-	-	-
	Yes	1555 (94.2)	96 (5.8)	2.97 (2.19-4.05, p<0.001)	1.23 (0.84-1.82, p=0.289)	-	-
	(Missing)	730 (95.8)	32 (4.2)	2.11 (1.37-3.18, p<0.001)	0.85 (0.45-1.52, p=0.591)	-	-
ECOG performance status	0	2959 (98.9)	33 (1.1)	-	-	-	-
	1	1690 (97.3)	47 (2.7)	2.49 (1.60-3.94, p<0.001)	1.67 (1.02-2.76, p=0.044)	1.70 (1.05-2.80, p=0.032)	1.64 (0.99-2.71, p=0.053)
	2	740 (93.8)	49 (6.2)	5.94 (3.81-9.37, p<0.001)	2.92 (1.75-4.94, p<0.001)	2.98 (1.81-4.98, p<0.001)	2.95 (1.75-4.98, p<0.001)
	3/4	299 (81.5)	68 (18.5)	20.39 (13.34-31.77, p<0.001)	6.71 (3.99-11.46, p<0.001)	7.07 (4.27-11.88, p<0.001)	6.98 (4.08-11.95, p<0.001)
Smoking	No	4638 (96.7)	157 (3.3)	-	-	-	-
	Yes	746 (97.4)	20 (2.6)	0.79 (0.48-1.24, p=0.333)	0.86 (0.48-1.47, p=0.601)	-	-
	(Missing)	561 (95.4)	27 (4.6)	1.42 (0.92-2.12, p=0.099)	0.90 (0.48-1.58, p=0.717)	-	-
Diabetes	No	4696 (97.0)	144 (3.0)	-	-	-	-
	Yes	1108 (95.6)	51 (4.4)	1.50 (1.07-2.06, p=0.015)	1.18 (0.79-1.74, p=0.405)	-	-
Mode of diagnosis	Symptomatic	4607 (96.2)	181 (3.8)	-	-	-	-
	Screening	877 (99.0)	9 (1.0)	0.26 (0.12-0.48, p<0.001)	1.00 (0.43-2.04, p=0.992)	-	-
	Detected incidentally	396 (96.8)	13 (3.2)	0.84 (0.45-1.42, p=0.538)	1.04 (0.47-2.07, p=0.914)	-	-
Urgency	Elective	5199 (97.7)	121 (2.3)	-	-	-	-
	Emergency	746 (90.0)	83 (10.0)	4.78 (3.57-6.38, p<0.001)	1.60 (1.00-2.57, p=0.049)	1.63 (1.03-2.58, p=0.038)	1.70 (1.05-2.75, p=0.032)
Treatment intent	Palliative	606 (87.8)	84 (12.2)	-	-	-	-

	Curative	5339 (97.8)	120 (2.2)	0.16 (0.12-0.22, p<0.001)	0.33 (0.22-0.52, p<0.001)	0.35 (0.23-0.54, p<0.001)	0.34 (0.21-0.53, p<0.001)
Approach	Open	3144 (94.9)	169 (5.1)	-	-	-	-
	Minimally invasive	2774 (98.8)	34 (1.2)	0.23 (0.15-0.33, p<0.001)	0.62 (0.40-0.95, p=0.032)	0.60 (0.38-0.91, p=0.019)	0.65 (0.41-1.02, p=0.063)
Operative site	Right-side	2121 (96.2)	84 (3.8)	-	-	-	-
	Left-side	1651 (95.7)	75 (4.3)	1.15 (0.83-1.58, p=0.398)	0.91 (0.62-1.32, p=0.610)	0.88 (0.60-1.27, p=0.483)	0.84 (0.57-1.24, p=0.378)
	High/mid rectum	1297 (97.7)	31 (2.3)	0.60 (0.39-0.91, p=0.018)	0.59 (0.35-0.97, p=0.042)	0.67 (0.41-1.08, p=0.107)	0.66 (0.40-1.09, p=0.105)
	Low rectum	818 (98.8)	10 (1.2)	0.31 (0.15-0.57, p<0.001)	0.43 (0.20-0.85, p=0.025)	0.42 (0.19-0.83, p=0.020)	0.42 (0.20-0.89, p=0.024)
Pre-op obstruction	No	4718 (97.9)	102 (2.1)	-	-	-	-
	Yes	1038 (91.5)	96 (8.5)	4.28 (3.21-5.70, p<0.001)	1.16 (0.73-1.82, p=0.533)	1.17 (0.75-1.82, p=0.488)	1.14 (0.72-1.82, p=0.576)
Pre-op perforation	No	5551 (97.1)	165 (2.9)	-	-	-	-
	Yes	303 (90.2)	33 (9.8)	3.66 (2.44-5.35, p<0.001)	1.63 (0.98-2.65, p=0.051)	1.66 (1.02-2.66, p=0.038)	1.75 (1.05-2.92, p=0.031)
Stage	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	1744 (97.6)	43 (2.4)	-	-	-	-
	II	1330 (96.9)	43 (3.1)	1.31 (0.85-2.02, p=0.215)	0.87 (0.51-1.47, p=0.593)	0.91 (0.55-1.51, p=0.704)	0.97 (0.57-1.63, p=0.896)
	III	2051 (97.1)	62 (2.9)	1.23 (0.83-1.83, p=0.311)	0.98 (0.60-1.61, p=0.935)	0.99 (0.62-1.61, p=0.978)	0.97 (0.59-1.59, p=0.900)
	IV	780 (93.4)	55 (6.6)	2.86 (1.91-4.32, p<0.001)	0.83 (0.46-1.50, p=0.540)	0.85 (0.48-1.52, p=0.587)	0.85 (0.47-1.55, p=0.599)

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S7B. Colorectal cancer logistic regression analyses: major complication.

Dependent: Major complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	3572 (85.8)	590 (14.2)	-	-	-	-
	Upper middle	982 (88.7)	125 (11.3)	0.77 (0.63-0.94, p=0.013)	0.71 (0.56-0.89, p=0.004)	0.73 (0.58-0.91, p=0.006)	0.70 (0.48-1.02, p=0.061)
	Low/lower middle	738 (80.9)	174 (19.1)	1.43 (1.18-1.72, p<0.001)	1.38 (1.07-1.77, p=0.012)	1.38 (1.08-1.74, p=0.008)	1.25 (0.84-1.86, p=0.276)
Age (years)	Mean (SD)	-0.0 (1.0)	0.1 (1.0)	1.14 (1.06-1.23, p<0.001)	1.15 (1.05-1.27, p=0.003)	1.13 (1.03-1.23, p=0.010)	1.14 (1.04-1.25, p=0.007)
Sex	Male	2920 (84.6)	531 (15.4)	-	-	-	-
	Female	2365 (86.9)	357 (13.1)	0.83 (0.72-0.96, p=0.012)	0.80 (0.68-0.94, p=0.008)	0.78 (0.67-0.92, p=0.003)	0.78 (0.67-0.92, p=0.003)
ASA (>3)	No	5034 (86.5)	785 (13.5)	-	-	-	-
	Yes	258 (71.3)	104 (28.7)	2.58 (2.03-3.28, p<0.001)	2.07 (1.52-2.81, p<0.001)	2.05 (1.52-2.74, p<0.001)	2.22 (1.64-3.01, p<0.001)
BMI	Normal weight (BMI 18.5 to 24.9)	2139 (86.5)	335 (13.5)	-	-	-	-
	Underweight (BMI < 18.5)	220 (75.6)	71 (24.4)	2.06 (1.53-2.74, p<0.001)	1.78 (1.27-2.46, p=0.001)	1.72 (1.24-2.36, p=0.001)	1.67 (1.20-2.32, p=0.002)
	Overweight (BMI 25 to 30)	1796 (87.0)	268 (13.0)	0.95 (0.80-1.13, p=0.582)	0.98 (0.81-1.18, p=0.813)	0.98 (0.81-1.18, p=0.838)	0.98 (0.81-1.19, p=0.870)
	Obese (BMI >30)	850 (84.7)	154 (15.3)	1.16 (0.94-1.42, p=0.167)	1.16 (0.91-1.47, p=0.222)	1.18 (0.94-1.48, p=0.152)	1.19 (0.95-1.51, p=0.136)
	(Missing)	287 (82.5)	61 (17.5)	1.36 (1.00-1.82, p=0.046)	1.04 (0.69-1.54, p=0.847)	0.93 (0.63-1.34, p=0.696)	0.92 (0.62-1.36, p=0.664)
>10% weight loss	No	3251 (86.7)	497 (13.3)	-	-	-	-
	Yes	1379 (83.1)	281 (16.9)	1.33 (1.14-1.56, p<0.001)	1.02 (0.84-1.24, p=0.835)	-	-
	(Missing)	662 (85.6)	111 (14.4)	1.10 (0.87-1.36, p=0.415)	0.83 (0.62-1.11, p=0.214)	-	-
ECOG performance status	0	2672 (89.0)	331 (11.0)	-	-	-	-
	1	1504 (86.0)	244 (14.0)	1.31 (1.10-1.56, p=0.003)	1.19 (0.98-1.44, p=0.079)	1.19 (0.99-1.44, p=0.069)	1.19 (0.98-1.45, p=0.078)
	2	640 (80.5)	155 (19.5)	1.96 (1.58-2.41, p<0.001)	1.55 (1.22-1.97, p<0.001)	1.57 (1.24-1.98, p<0.001)	1.54 (1.21-1.96, p<0.001)
	3/4	248 (67.2)	121 (32.8)	3.94 (3.08-5.03, p<0.001)	2.27 (1.68-3.05, p<0.001)	2.24 (1.67-2.99, p<0.001)	2.16 (1.59-2.91, p<0.001)
Smoking	No	4151 (86.1)	668 (13.9)	-	-	-	-
	Yes	643 (83.6)	126 (16.4)	1.22 (0.99-1.49, p=0.063)	1.26 (0.99-1.59, p=0.053)	-	-
	(Missing)	498 (84.0)	95 (16.0)	1.19 (0.93-1.49, p=0.155)	0.99 (0.73-1.33, p=0.967)	-	-
Diabetes	No	4207 (86.4)	661 (13.6)	-	-	-	-
	Yes	961 (82.6)	202 (17.4)	1.34 (1.12-1.59, p=0.001)	1.21 (0.99-1.46, p=0.060)	1.22 (1.01-1.47, p=0.041)	1.18 (0.98-1.44, p=0.085)
Mode of diagnosis	Symptomatic	4082 (84.9)	728 (15.1)	-	-	-	-
	Screening	806 (90.4)	86 (9.6)	0.60 (0.47-0.75, p<0.001)	0.85 (0.65-1.11, p=0.246)	-	-
Urgency	Detected incidentally	345 (83.7)	67 (16.3)	1.09 (0.82-1.42, p=0.541)	1.16 (0.84-1.58, p=0.363)	-	-
	Elective	4654 (87.1)	688 (12.9)	-	-	-	-
	Emergency	638 (76.0)	201 (24.0)	2.13 (1.78-2.54, p<0.001)	1.59 (1.20-2.10, p=0.001)	1.56 (1.24-1.95, p<0.001)	1.55 (1.23-1.96, p<0.001)
Treatment intent	Palliative	554 (79.0)	147 (21.0)	-	-	-	-
	Curative	4738 (86.5)	742 (13.5)	0.59 (0.49-0.72, p<0.001)	0.91 (0.69-1.20, p=0.482)	0.94 (0.74-1.19, p=0.592)	0.91 (0.71-1.16, p=0.439)
Approach	Open	2768 (83.0)	568 (17.0)	-	-	-	-
	Minimally invasive	2500 (88.7)	317 (11.3)	0.62 (0.53-0.72, p<0.001)	0.84 (0.71-1.00, p=0.053)	0.83 (0.70-0.98, p=0.027)	0.80 (0.67-0.96, p=0.017)
Operative site	Right-side	1932 (86.9)	290 (13.1)	-	-	-	-
	Left-side	1476 (85.0)	260 (15.0)	1.17 (0.98-1.41, p=0.082)	1.13 (0.92-1.38, p=0.238)	1.12 (0.92-1.36, p=0.260)	1.13 (0.92-1.38, p=0.243)
	High/mid rectum	1132 (84.9)	201 (15.1)	1.18 (0.97-1.44, p=0.090)	1.36 (1.09-1.70, p=0.006)	1.38 (1.11-1.71, p=0.003)	1.41 (1.13-1.75, p=0.002)
	Low rectum	703 (84.9)	125 (15.1)	1.18 (0.94-1.48, p=0.143)	1.51 (1.17-1.94, p=0.001)	1.48 (1.15-1.88, p=0.002)	1.53 (1.19-1.96, p=0.001)
Pre-op obstruction	No	4215 (87.1)	625 (12.9)	-	-	-	-

Pre-op perforation	Yes	915 (79.9)	230 (20.1)	1.70 (1.43-2.00, p<0.001)	0.94 (0.72-1.21, p=0.618)	-	-
	No	4974 (86.6)	768 (13.4)	-	-	-	-
	Yes	238 (69.6)	104 (30.4)	2.83 (2.21-3.60, p<0.001)	1.94 (1.45-2.57, p<0.001)	1.98 (1.49-2.61, p<0.001)	1.93 (1.45-2.57, p<0.001)
Stage	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	1579 (88.0)	216 (12.0)	-	-	-	-
	II	1162 (84.3)	216 (15.7)	1.36 (1.11-1.67, p=0.003)	1.14 (0.91-1.44, p=0.252)	-	-
	III	1814 (85.6)	305 (14.4)	1.23 (1.02-1.48, p=0.031)	1.09 (0.87-1.35, p=0.460)	-	-
	IV	700 (82.6)	147 (17.4)	1.54 (1.22-1.93, p<0.001)	1.08 (0.80-1.45, p=0.618)	-	-

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S7C. Colorectal cancer logistic regression analyses: all complications.

Dependent: Any complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	2188 (52.5)	1977 (47.5)	-	-	-	-
	Upper middle	660 (59.5)	449 (40.5)	0.75 (0.66-0.86, p<0.001)	0.67 (0.58-0.78, p<0.001)	0.68 (0.58-0.79, p<0.001)	0.84 (0.55-1.28, p=0.419)
	Low/lower middle	405 (44.4)	508 (55.6)	1.39 (1.20-1.60, p<0.001)	1.26 (1.04-1.52, p=0.019)	1.28 (1.07-1.54, p=0.007)	1.28 (0.83-1.98, p=0.265)
Age (years)	Mean (SD)	-0.0 (1.0)	0.0 (1.0)	1.10 (1.04-1.15, p<0.001)	1.12 (1.05-1.19, p=0.001)	1.11 (1.04-1.18, p=0.002)	1.15 (1.07-1.23, p<0.001)
Sex	Male	1773 (51.3)	1681 (48.7)	-	-	-	-
	Female	1474 (54.1)	1251 (45.9)	0.90 (0.81-0.99, p=0.031)	0.87 (0.77-0.97, p=0.014)	0.86 (0.77-0.96, p=0.009)	0.85 (0.75-0.96, p=0.010)
ASA (>3)	No	3094 (53.1)	2731 (46.9)	-	-	-	-
	Yes	159 (43.9)	203 (56.1)	1.45 (1.17-1.79, p=0.001)	1.13 (0.85-1.52, p=0.393)	1.16 (0.88-1.55, p=0.295)	1.33 (0.98-1.81, p=0.066)
BMI	Normal weight (BMI 18.5 to 24.9)	1333 (53.8)	1145 (46.2)	-	-	-	-
	Underweight (BMI < 18.5)	126 (43.3)	165 (56.7)	1.52 (1.19-1.95, p=0.001)	1.24 (0.94-1.64, p=0.126)	1.33 (1.02-1.75, p=0.039)	1.31 (0.97-1.76, p=0.076)
	Overweight (BMI 25 to 30)	1128 (54.6)	937 (45.4)	0.97 (0.86-1.09, p=0.576)	1.04 (0.92-1.19, p=0.519)	1.02 (0.89-1.16, p=0.800)	0.99 (0.86-1.14, p=0.864)
	Obese (BMI >30)	474 (47.2)	531 (52.8)	1.30 (1.13-1.51, p<0.001)	1.38 (1.17-1.64, p<0.001)	1.35 (1.15-1.59, p<0.001)	1.24 (1.03-1.48, p=0.021)
	(Missing)	192 (55.2)	156 (44.8)	0.95 (0.75-1.18, p=0.629)	0.77 (0.57-1.05, p=0.100)	0.74 (0.55-0.99, p=0.047)	0.80 (0.57-1.13, p=0.205)
>10% weight loss	No	2041 (54.4)	1708 (45.6)	-	-	-	-
	Yes	792 (47.7)	870 (52.3)	1.31 (1.17-1.47, p<0.001)	1.14 (0.99-1.31, p=0.078)	-	-
	(Missing)	420 (54.1)	356 (45.9)	1.01 (0.87-1.18, p=0.872)	0.98 (0.80-1.19, p=0.832)	-	-
ECOG performance status	0	1747 (58.2)	1257 (41.8)	-	-	-	-
	1	908 (51.9)	841 (48.1)	1.29 (1.14-1.45, p<0.001)	1.17 (1.03-1.34, p=0.017)	1.21 (1.06-1.37, p=0.004)	1.22 (1.06-1.42, p=0.007)
	2	351 (44.1)	445 (55.9)	1.76 (1.51-2.06, p<0.001)	1.48 (1.24-1.78, p<0.001)	1.54 (1.29-1.83, p<0.001)	1.53 (1.25-1.87, p<0.001)
	3/4	111 (30.0)	259 (70.0)	3.24 (2.57-4.11, p<0.001)	2.22 (1.70-2.93, p<0.001)	2.31 (1.78-3.02, p<0.001)	2.28 (1.70-3.06, p<0.001)
Smoking	No	2546 (52.8)	2278 (47.2)	-	-	-	-
	Yes	381 (49.5)	388 (50.5)	1.14 (0.98-1.33, p=0.096)	1.29 (1.08-1.53, p=0.004)	1.28 (1.08-1.52, p=0.004)	1.36 (1.13-1.64, p=0.001)
	(Missing)	326 (54.9)	268 (45.1)	0.92 (0.77-1.09, p=0.332)	0.83 (0.67-1.03, p=0.092)	0.84 (0.68-1.03, p=0.095)	0.91 (0.72-1.15, p=0.436)
Diabetes	No	2629 (54.0)	2242 (46.0)	-	-	-	-
	Yes	547 (46.9)	619 (53.1)	1.33 (1.17-1.51, p<0.001)	1.19 (1.03-1.38, p=0.019)	1.21 (1.05-1.39, p=0.010)	1.16 (1.00-1.36, p=0.056)
Mode of diagnosis	Symptomatic	2474 (51.4)	2340 (48.6)	-	-	-	-
	Screening	525 (58.8)	368 (41.2)	0.74 (0.64-0.86, p<0.001)	0.95 (0.80-1.13, p=0.585)	-	-
	Detected incidentally	218 (52.9)	194 (47.1)	0.94 (0.77-1.15, p=0.553)	1.00 (0.80-1.26, p=0.974)	-	-
Urgency	Elective	2924 (54.7)	2423 (45.3)	-	-	-	-
	Emergency	329 (39.2)	511 (60.8)	1.87 (1.62-2.18, p<0.001)	1.75 (1.40-2.19, p<0.001)	1.78 (1.44-2.22, p<0.001)	1.71 (1.35-2.18, p<0.001)
Treatment intent	Palliative	323 (46.1)	378 (53.9)	-	-	-	-
	Curative	2930 (53.4)	2556 (46.6)	0.75 (0.64-0.87, p<0.001)	1.10 (0.88-1.38, p=0.398)	-	-
Approach	Open	1554 (46.5)	1785 (53.5)	-	-	-	-
	Minimally invasive	1682 (59.6)	1138 (40.4)	0.59 (0.53-0.65, p<0.001)	0.67 (0.59-0.76, p<0.001)	0.65 (0.58-0.73, p<0.001)	0.56 (0.48-0.64, p<0.001)
Operative site	Right-side	1173 (52.7)	1051 (47.3)	-	-	-	-
	Left-side	967 (55.6)	772 (44.4)	0.89 (0.79-1.01, p=0.073)	0.88 (0.76-1.02, p=0.095)	0.88 (0.76-1.01, p=0.065)	0.89 (0.76-1.04, p=0.140)
	High/mid rectum	696 (52.2)	637 (47.8)	1.02 (0.89-1.17, p=0.759)	1.22 (1.04-1.44, p=0.013)	1.19 (1.02-1.38, p=0.028)	1.31 (1.11-1.54, p=0.002)
	Low rectum	393 (47.4)	436 (52.6)	1.24 (1.06-1.45, p=0.009)	1.47 (1.20-1.80, p<0.001)	1.48 (1.24-1.77, p<0.001)	1.66 (1.36-2.01, p<0.001)
Anastomosis	Not performed	661 (46.6)	757 (53.4)	-	-	-	-
	Handsewn	569 (48.4)	607 (51.6)	0.93 (0.80-1.09, p=0.369)	1.12 (0.93-1.36, p=0.237)	-	-

	Stapled	1946 (56.5)	1497 (43.5)	0.67 (0.59-0.76, p<0.001)	0.93 (0.79-1.10, p=0.414)	-	-
Pre-op obstruction	No	2609 (53.9)	2235 (46.1)	-	-	-	-
	Yes	542 (47.3)	604 (52.7)	1.30 (1.14-1.48, p<0.001)	0.85 (0.70-1.02, p=0.088)	0.82 (0.68-0.99, p=0.041)	0.93 (0.75-1.14, p=0.480)
Pre-op perforation	No	3082 (53.6)	2666 (46.4)	-	-	-	-
	Yes	121 (35.4)	221 (64.6)	2.11 (1.69-2.66, p<0.001)	1.73 (1.33-2.26, p<0.001)	1.67 (1.29-2.17, p<0.001)	1.65 (1.24-2.19, p=0.001)
Stage	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	979 (54.5)	818 (45.5)	-	-	-	-
	II	726 (52.6)	653 (47.4)	1.08 (0.94-1.24, p=0.305)	0.93 (0.79-1.10, p=0.409)	0.96 (0.82-1.12, p=0.587)	1.06 (0.89-1.27, p=0.504)
	III	1118 (52.7)	1003 (47.3)	1.07 (0.95-1.22, p=0.269)	0.95 (0.82-1.11, p=0.536)	0.97 (0.84-1.12, p=0.684)	1.00 (0.85-1.17, p=0.968)
	IV	407 (48.0)	441 (52.0)	1.30 (1.10-1.53, p=0.002)	1.03 (0.83-1.28, p=0.769)	1.03 (0.85-1.25, p=0.735)	1.04 (0.84-1.28, p=0.709)

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S8A. Gastric cancer logistic regression analyses: mortality.

Dependent: 30-day mortality		Alive	Dead	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	675 (96.2)	27 (3.8)	-	-	-	-
	Upper middle	272 (96.1)	11 (3.9)	1.01 (0.47-2.01, p=0.976)	1.06 (0.40-2.60, p=0.897)	1.12 (0.44-2.66, p=0.807)	1.12 (0.46-2.74, p=0.807)
	Low/lower middle	293 (89.9)	33 (10.1)	2.82 (1.67-4.80, p<0.001)	2.84 (1.21-6.84, p=0.018)	3.72 (1.72-8.28, p=0.001)	3.72 (1.70-8.16, p=0.001)
Age (years)	Mean (SD)	-0.0 (1.0)	0.5 (1.0)	1.74 (1.33-2.30, p<0.001)	2.08 (1.39-3.21, p=0.001)	2.02 (1.39-3.02, p<0.001)	2.02 (1.38-2.98, p<0.001)
Sex	Male	752 (93.8)	50 (6.2)	-	-	-	-
	Female	488 (95.9)	21 (4.1)	0.65 (0.38-1.08, p=0.102)	0.80 (0.38-1.62, p=0.545)	-	-
ASA (>3)	No	1192 (95.7)	54 (4.3)	-	-	-	-
	Yes	48 (73.8)	17 (26.2)	7.82 (4.13-14.28, p<0.001)	2.55 (0.99-6.24, p=0.045)	2.38 (0.94-5.70, p=0.057)	2.38 (0.97-5.83, p=0.057)
BMI	Normal weight (BMI 18.5 to 24.9)	604 (94.5)	35 (5.5)	-	-	-	-
	Underweight (BMI < 18.5)	112 (92.6)	9 (7.4)	1.39 (0.61-2.85, p=0.399)	0.56 (0.19-1.47, p=0.259)	0.49 (0.18-1.23, p=0.148)	0.49 (0.19-1.29, p=0.148)
	Overweight (BMI 25 to 30)	348 (95.6)	16 (4.4)	0.79 (0.42-1.43, p=0.454)	1.17 (0.51-2.54, p=0.705)	1.05 (0.49-2.17, p=0.895)	1.05 (0.50-2.20, p=0.895)
	Obese (BMI >30)	121 (96.0)	5 (4.0)	0.71 (0.24-1.70, p=0.489)	0.83 (0.18-2.79, p=0.782)	0.76 (0.17-2.43, p=0.674)	0.76 (0.21-2.76, p=0.674)
	(Missing)	55 (90.2)	6 (9.8)	1.88 (0.69-4.38, p=0.173)	0.96 (0.18-3.94, p=0.957)	0.77 (0.15-3.07, p=0.728)	0.77 (0.17-3.42, p=0.728)
ECOG performance status	0	595 (98.7)	8 (1.3)	-	-	-	-
	1	395 (95.0)	21 (5.0)	3.95 (1.80-9.58, p=0.001)	4.08 (1.50-13.15, p=0.010)	3.10 (1.22-8.96, p=0.024)	3.10 (1.16-8.25, p=0.024)
	2	150 (87.7)	21 (12.3)	10.41 (4.69-25.45, p<0.001)	8.73 (3.10-28.92, p<0.001)	6.94 (2.71-20.32, p<0.001)	6.94 (2.57-18.74, p<0.001)
	3/4	64 (77.1)	19 (22.9)	22.08 (9.60-55.43, p<0.001)	8.41 (2.45-32.09, p=0.001)	7.08 (2.33-23.37, p=0.001)	7.08 (2.27-22.09, p=0.001)
Smoking	No	927 (95.5)	44 (4.5)	-	-	-	-
	Yes	182 (92.9)	14 (7.1)	1.62 (0.84-2.95, p=0.128)	3.00 (1.35-6.53, p=0.006)	2.70 (1.27-5.55, p=0.008)	2.70 (1.30-5.62, p=0.008)
	(Missing)	131 (91.0)	13 (9.0)	2.09 (1.06-3.88, p=0.025)	2.93 (1.05-7.59, p=0.032)	3.00 (1.16-7.24, p=0.018)	3.00 (1.21-7.43, p=0.018)
Diabetes	No	1032 (95.1)	53 (4.9)	-	-	-	-
	Yes	189 (93.6)	13 (6.4)	1.34 (0.69-2.43, p=0.360)	0.82 (0.35-1.79, p=0.636)	-	-
Mode of diagnosis	Symptomatic	1088 (94.4)	65 (5.6)	-	-	-	-
	Screening	40 (97.6)	1 (2.4)	0.42 (0.02-1.97, p=0.393)	1.64 (0.08-9.90, p=0.654)	1.76 (0.09-9.99, p=0.601)	1.76 (0.21-14.61, p=0.601)
	Detected incidentally	96 (97.0)	3 (3.0)	0.52 (0.13-1.44, p=0.280)	0.69 (0.09-3.02, p=0.663)	0.62 (0.09-2.62, p=0.566)	0.62 (0.12-3.18, p=0.566)
Urgency	Elective	1180 (95.8)	52 (4.2)	-	-	-	-
	Emergency	60 (75.9)	19 (24.1)	7.19 (3.93-12.75, p<0.001)	3.26 (1.33-7.61, p=0.008)	2.63 (1.14-5.81, p=0.019)	2.63 (1.17-5.92, p=0.019)
Treatment intent	Palliative	158 (84.5)	29 (15.5)	-	-	-	-
	Curative	1082 (96.3)	42 (3.7)	0.21 (0.13-0.35, p<0.001)	1.23 (0.48-3.29, p=0.666)	-	-
Approach	Open	926 (94.1)	58 (5.9)	-	-	-	-
	Minimally invasive	311 (96.0)	13 (4.0)	0.67 (0.35-1.20, p=0.197)	1.06 (0.43-2.39, p=0.895)	-	-
Site	Upper third (cardia/fundus)	243 (94.2)	15 (5.8)	-	-	-	-
	Middle third (body)	244 (96.8)	8 (3.2)	0.53 (0.21-1.25, p=0.157)	0.47 (0.15-1.35, p=0.173)	-	-
	Distal third (antrum/pylorus)	533 (93.8)	35 (6.2)	1.06 (0.58-2.04, p=0.846)	0.62 (0.28-1.44, p=0.256)	-	-
	Entire stomach	197 (94.7)	11 (5.3)	0.90 (0.40-2.00, p=0.806)	1.13 (0.40-3.07, p=0.811)	-	-
D2 resection	No	500 (91.7)	45 (8.3)	-	-	-	-
	Yes	683 (96.7)	23 (3.3)	0.37 (0.22-0.62, p<0.001)	0.82 (0.40-1.67, p=0.584)	0.82 (0.43-1.58, p=0.561)	0.82 (0.43-1.58, p=0.561)
Pre-op obstruction	No	1062 (96.4)	40 (3.6)	-	-	-	-

Pre-op perforation	Yes	159 (85.0)	28 (15.0)	4.68 (2.78-7.76, p<0.001)	2.06 (0.93-4.46, p=0.071)	1.81 (0.89-3.61, p=0.093)	1.81 (0.91-3.63, p=0.093)
	No	1190 (95.0)	63 (5.0)	-	-	-	-
Stage	Yes	37 (84.1)	7 (15.9)	3.57 (1.41-7.88, p=0.003)	2.49 (0.75-7.36, p=0.114)	2.41 (0.77-6.75, p=0.110)	2.41 (0.82-7.06, p=0.110)
	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	427 (96.6)	15 (3.4)	-	-	-	-
	II	221 (96.1)	9 (3.9)	1.16 (0.48-2.65, p=0.731)	0.93 (0.29-2.81, p=0.903)	0.83 (0.27-2.37, p=0.731)	0.83 (0.28-2.41, p=0.731)
	III	473 (95.4)	23 (4.6)	1.38 (0.72-2.74, p=0.337)	1.05 (0.43-2.62, p=0.923)	1.11 (0.49-2.60, p=0.806)	1.11 (0.48-2.54, p=0.806)
IV	108 (83.1)	22 (16.9)	5.80 (2.93-11.77, p<0.001)	3.26 (1.06-10.25, p=0.041)	2.60 (1.03-6.77, p=0.046)	2.60 (1.02-6.63, p=0.046)	

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S8B. Gastric cancer logistic regression analyses: major complication.

Dependent: Major complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	604 (85.2)	105 (14.8)	-	-	-	-
	Upper middle	258 (90.8)	26 (9.2)	0.58 (0.36-0.90, p=0.018)	0.60 (0.35-1.00, p=0.058)	0.60 (0.36-0.98, p=0.046)	0.55 (0.30-1.02, p=0.057)
	Low/lower middle	267 (81.4)	61 (18.6)	1.31 (0.93-1.85, p=0.123)	1.16 (0.68-1.97, p=0.587)	1.29 (0.80-2.06, p=0.293)	1.25 (0.71-2.22, p=0.436)
Age (years)	Mean (SD)	-0.0 (1.0)	0.3 (0.9)	1.49 (1.27-1.77, p<0.001)	1.49 (1.19-1.88, p=0.001)	1.51 (1.22-1.88, p<0.001)	1.53 (1.21-1.92, p<0.001)
Sex	Male	677 (84.1)	128 (15.9)	-	-	-	-
	Female	452 (87.6)	64 (12.4)	0.75 (0.54-1.03, p=0.079)	0.88 (0.59-1.30, p=0.515)	-	-
ASA (>3)	No	1088 (86.7)	167 (13.3)	-	-	-	-
	Yes	41 (62.1)	25 (37.9)	3.97 (2.33-6.66, p<0.001)	1.85 (0.90-3.74, p=0.090)	2.63 (1.39-4.89, p=0.003)	3.15 (1.57-6.31, p=0.001)
BMI	Normal weight (BMI 18.5 to 24.9)	546 (85.0)	96 (15.0)	-	-	-	-
	Underweight (BMI < 18.5)	105 (84.7)	19 (15.3)	1.03 (0.59-1.72, p=0.916)	0.64 (0.32-1.21, p=0.182)	0.60 (0.31-1.09, p=0.106)	0.61 (0.32-1.18, p=0.141)
	Overweight (BMI 25 to 30)	312 (85.2)	54 (14.8)	0.98 (0.68-1.41, p=0.932)	1.04 (0.67-1.60, p=0.852)	1.10 (0.73-1.65, p=0.647)	1.07 (0.70-1.65, p=0.746)
	Obese (BMI >30)	113 (88.3)	15 (11.7)	0.75 (0.41-1.31, p=0.343)	0.77 (0.37-1.49, p=0.458)	0.80 (0.41-1.48, p=0.494)	0.74 (0.38-1.47, p=0.394)
	(Missing)	53 (86.9)	8 (13.1)	0.86 (0.37-1.77, p=0.699)	0.54 (0.16-1.51, p=0.277)	0.77 (0.26-1.94, p=0.600)	0.77 (0.27-2.18, p=0.616)
ECOG performance status	0	557 (92.4)	46 (7.6)	-	-	-	-
	1	346 (82.4)	74 (17.6)	2.59 (1.76-3.85, p<0.001)	2.34 (1.49-3.70, p<0.001)	2.31 (1.51-3.57, p<0.001)	2.40 (1.52-3.78, p<0.001)
	2	139 (79.9)	35 (20.1)	3.05 (1.88-4.91, p<0.001)	2.24 (1.26-3.93, p=0.005)	2.16 (1.26-3.67, p=0.005)	2.10 (1.18-3.72, p=0.011)
	3/4	55 (64.0)	31 (36.0)	6.82 (3.99- 11.62, p<0.001)	3.73 (1.76-7.82, p<0.001)	4.02 (2.10-7.63, p<0.001)	3.97 (1.97-8.01, p<0.001)
Smoking	No	842 (86.1)	136 (13.9)	-	-	-	-
	Yes	163 (82.3)	35 (17.7)	1.33 (0.87-1.98, p=0.171)	1.85 (1.13-2.98, p=0.012)	1.78 (1.12-2.79, p=0.013)	1.68 (1.04-2.72, p=0.036)
	(Missing)	124 (85.5)	21 (14.5)	1.05 (0.62-1.69, p=0.852)	1.08 (0.53-2.05, p=0.830)	0.81 (0.42-1.49, p=0.522)	0.80 (0.41-1.56, p=0.507)
Diabetes	No	944 (86.3)	150 (13.7)	-	-	-	-
	Yes	168 (82.8)	35 (17.2)	1.31 (0.87-1.94, p=0.188)	0.97 (0.59-1.57, p=0.911)	-	-
Mode of diagnosis	Symptomatic	991 (85.3)	171 (14.7)	-	-	-	-
	Screening	34 (82.9)	7 (17.1)	1.19 (0.48-2.58, p=0.676)	1.45 (0.46-3.77, p=0.484)	1.53 (0.53-3.79, p=0.386)	1.63 (0.58-4.57, p=0.351)
	Detected incidentally	90 (90.0)	10 (10.0)	0.64 (0.31-1.20, p=0.200)	0.60 (0.24-1.33, p=0.236)	0.48 (0.19-1.04, p=0.081)	0.51 (0.21-1.22, p=0.130)
Urgency	Elective	1081 (87.2)	159 (12.8)	-	-	-	-
	Emergency	48 (59.3)	33 (40.7)	4.67 (2.89-7.48, p<0.001)	3.62 (1.93-6.74, p<0.001)	3.70 (2.07-6.56, p<0.001)	4.06 (2.17-7.60, p<0.001)
Treatment intent	Palliative	145 (76.3)	45 (23.7)	-	-	-	-
	Curative	984 (87.0)	147 (13.0)	0.48 (0.33-0.71, p<0.001)	1.16 (0.62-2.23, p=0.643)	0.95 (0.57-1.63, p=0.857)	0.99 (0.56-1.74, p=0.961)
Approach	Open	843 (85.1)	148 (14.9)	-	-	-	-
	Minimally invasive	284 (86.9)	43 (13.1)	0.86 (0.59-1.23, p=0.427)	1.03 (0.65-1.62, p=0.890)	-	-
Site	Upper third (cardia/fundus)	220 (84.6)	40 (15.4)	-	-	-	-
	Middle third (body)	214 (84.6)	39 (15.4)	1.00 (0.62-1.62, p=0.992)	1.09 (0.62-1.92, p=0.758)	0.99 (0.58-1.69, p=0.966)	0.96 (0.55-1.70, p=0.899)
	Distal third (antrum/pylorus)	497 (86.9)	75 (13.1)	0.83 (0.55-1.27, p=0.379)	0.59 (0.35-0.99, p=0.045)	0.64 (0.40-1.02, p=0.059)	0.62 (0.38-1.02, p=0.060)
	Entire stomach	174 (82.9)	36 (17.1)	1.14 (0.69-1.86, p=0.607)	1.45 (0.81-2.59, p=0.209)	1.39 (0.81-2.38, p=0.233)	1.42 (0.80-2.54, p=0.235)
Anastomosis	Not performed	158 (88.8)	20 (11.2)	-	-	-	-
	Handsewn	337 (85.1)	59 (14.9)	1.38 (0.82-2.43, p=0.240)	1.76 (0.88-3.66, p=0.119)	-	-
	Stapled	607 (85.0)	107 (15.0)	1.39 (0.85-2.37, p=0.202)	1.88 (0.99-3.74, p=0.061)	-	-
D2 resection	No	459 (83.3)	92 (16.7)	-	-	-	-

Pre-op obstruction	Yes	614 (86.8)	93 (13.2)	0.76 (0.55-1.03, p=0.079)	1.06 (0.70-1.62, p=0.776)	-	-
	No	973 (87.7)	136 (12.3)	-	-	-	-
Pre-op perforation	Yes	139 (73.2)	51 (26.8)	2.62 (1.81-3.77, p<0.001)	1.81 (1.07-3.04, p=0.025)	-	-
	No	1084 (86.0)	177 (14.0)	-	-	-	-
Stage	Yes	34 (73.9)	12 (26.1)	2.16 (1.06-4.14, p=0.026)	1.50 (0.63-3.42, p=0.341)	-	-
	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	392 (87.9)	54 (12.1)	-	-	-	-
	II	203 (87.9)	28 (12.1)	1.00 (0.61-1.62, p=0.996)	0.79 (0.43-1.43, p=0.445)	0.83 (0.47-1.44, p=0.511)	0.90 (0.50-1.63, p=0.723)
	III	423 (84.6)	77 (15.4)	1.32 (0.91-1.93, p=0.144)	1.03 (0.64-1.65, p=0.916)	1.15 (0.75-1.78, p=0.529)	1.30 (0.81-2.08, p=0.279)
	IV	100 (76.3)	31 (23.7)	2.25 (1.36-3.67, p=0.001)	1.52 (0.73-3.12, p=0.262)	1.53 (0.78-2.95, p=0.208)	1.75 (0.86-3.57, p=0.126)

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S8C. Gastric cancer logistic regression analyses: all complications.

Dependent: Any complication		No	Yes	OR (univariable)	OR (multivariable)	OR (multivariable reduced)	OR (multilevel)
WB income (tertile)	High	398 (56.1)	311 (43.9)	-	-	-	-
	Upper middle	142 (50.0)	142 (50.0)	1.28 (0.97-1.69, p=0.080)	1.33 (0.96-1.84, p=0.089)	1.34 (0.99-1.81, p=0.059)	1.71 (0.85-3.43, p=0.130)
	Low/lower middle	169 (51.5)	159 (48.5)	1.20 (0.93-1.57, p=0.166)	1.18 (0.81-1.71, p=0.388)	1.21 (0.86-1.69, p=0.281)	1.05 (0.57-1.92, p=0.881)
Age (years)	Mean (SD)	-0.1 (1.0)	0.1 (1.0)	1.16 (1.04-1.30, p=0.008)	1.11 (0.97-1.28, p=0.138)	1.10 (0.96-1.25, p=0.178)	1.13 (0.96-1.33, p=0.129)
Sex	Male	421 (52.3)	384 (47.7)	-	-	-	-
	Female	288 (55.8)	228 (44.2)	0.87 (0.69-1.08, p=0.211)	0.92 (0.71-1.19, p=0.505)	-	-
ASA (>3)	No	681 (54.3)	574 (45.7)	-	-	-	-
	Yes	28 (42.4)	38 (57.6)	1.61 (0.98-2.68, p=0.062)	1.36 (0.72-2.61, p=0.350)	1.36 (0.76-2.46, p=0.308)	1.65 (0.83-3.27, p=0.154)
BMI	Normal weight (BMI 18.5 to 24.9)	338 (52.6)	304 (47.4)	-	-	-	-
	Underweight (BMI < 18.5)	67 (54.0)	57 (46.0)	0.95 (0.64-1.39, p=0.777)	0.86 (0.55-1.35, p=0.522)	0.79 (0.52-1.21, p=0.288)	0.93 (0.57-1.52, p=0.774)
	Overweight (BMI 25 to 30)	193 (52.7)	173 (47.3)	1.00 (0.77-1.29, p=0.979)	0.92 (0.68-1.23, p=0.563)	0.97 (0.74-1.29, p=0.854)	1.01 (0.73-1.40, p=0.943)
	Obese (BMI >30)	73 (57.0)	55 (43.0)	0.84 (0.57-1.23, p=0.364)	0.73 (0.46-1.14, p=0.172)	0.75 (0.49-1.13, p=0.173)	0.78 (0.48-1.27, p=0.312)
	(Missing)	38 (62.3)	23 (37.7)	0.67 (0.39-1.15, p=0.151)	0.45 (0.20-0.95, p=0.041)	0.44 (0.21-0.87, p=0.023)	0.39 (0.17-0.88, p=0.024)
>10% weight loss	No	342 (54.7)	283 (45.3)	-	-	-	-
	Yes	310 (52.7)	278 (47.3)	1.08 (0.86-1.36, p=0.485)	0.85 (0.63-1.13, p=0.262)	-	-
	(Missing)	57 (52.8)	51 (47.2)	1.08 (0.72-1.63, p=0.708)	0.99 (0.59-1.66, p=0.963)	-	-
ECOG performance status	0	362 (60.0)	241 (40.0)	-	-	-	-
	1	217 (51.7)	203 (48.3)	1.41 (1.09-1.81, p=0.008)	1.40 (1.05-1.88, p=0.022)	1.36 (1.03-1.79, p=0.029)	1.57 (1.13-2.20, p=0.008)
	2	86 (49.4)	88 (50.6)	1.54 (1.10-2.16, p=0.013)	1.47 (0.98-2.20, p=0.064)	1.37 (0.93-2.01, p=0.108)	1.51 (0.96-2.38, p=0.077)
	3/4	30 (34.9)	56 (65.1)	2.80 (1.76-4.54, p<0.001)	2.24 (1.21-4.21, p=0.011)	2.64 (1.50-4.75, p=0.001)	3.66 (1.87-7.17, p<0.001)
Smoking	No	517 (52.9)	461 (47.1)	-	-	-	-
	Yes	112 (56.6)	86 (43.4)	0.86 (0.63-1.17, p=0.341)	1.07 (0.75-1.51, p=0.705)	-	-
	(Missing)	80 (55.2)	65 (44.8)	0.91 (0.64-1.29, p=0.603)	0.87 (0.55-1.39, p=0.574)	-	-
Diabetes	No	612 (55.9)	482 (44.1)	-	-	-	-
	Yes	86 (42.4)	117 (57.6)	1.73 (1.28-2.34, p<0.001)	1.69 (1.19-2.41, p=0.003)	1.76 (1.26-2.47, p=0.001)	1.61 (1.09-2.37, p=0.017)
Mode of diagnosis	Symptomatic	623 (53.6)	539 (46.4)	-	-	-	-
	Screening	21 (51.2)	20 (48.8)	1.10 (0.59-2.06, p=0.763)	1.31 (0.64-2.67, p=0.454)	-	-
	Detected incidentally	56 (56.0)	44 (44.0)	0.91 (0.60-1.37, p=0.646)	1.07 (0.66-1.74, p=0.776)	-	-
Urgency	Elective	679 (54.8)	561 (45.2)	-	-	-	-
	Emergency	30 (37.0)	51 (63.0)	2.06 (1.30-3.31, p=0.002)	2.06 (1.17-3.67, p=0.013)	1.95 (1.17-3.31, p=0.012)	2.27 (1.23-4.19, p=0.009)
Treatment intent	Palliative	97 (51.1)	93 (48.9)	-	-	-	-
	Curative	612 (54.1)	519 (45.9)	0.88 (0.65-1.20, p=0.434)	0.87 (0.55-1.40, p=0.574)	-	-
Approach	Open	515 (52.0)	476 (48.0)	-	-	-	-
	Minimally invasive	192 (58.7)	135 (41.3)	0.76 (0.59-0.98, p=0.034)	0.84 (0.62-1.14, p=0.261)	-	-
Site	Upper third (cardia/fundus)	134 (51.5)	126 (48.5)	-	-	-	-
	Middle third (body)	144 (56.9)	109 (43.1)	0.81 (0.57-1.14, p=0.222)	0.90 (0.61-1.33, p=0.590)	0.89 (0.61-1.29, p=0.533)	0.81 (0.52-1.25, p=0.342)
	Distal third (antrum/pylorus)	318 (55.6)	254 (44.4)	0.85 (0.63-1.14, p=0.277)	0.83 (0.59-1.16, p=0.272)	0.77 (0.56-1.07, p=0.124)	0.63 (0.43-0.93, p=0.019)

	Entire stomach	99 (47.1)	111 (52.9)	1.19 (0.83-1.72, p=0.344)	1.26 (0.84-1.90, p=0.270)	1.21 (0.82-1.79, p=0.348)	0.99 (0.62-1.59, p=0.970)
Anastomosis	Not performed	113 (63.5)	65 (36.5)	-	-	-	-
	Handsewn	210 (53.0)	186 (47.0)	1.54 (1.07-2.22, p=0.020)	1.92 (1.21-3.07, p=0.006)	1.79 (1.19-2.72, p=0.006)	2.37 (1.45-3.89, p=0.001)
	Stapled	374 (52.4)	340 (47.6)	1.58 (1.13-2.23, p=0.008)	2.00 (1.31-3.10, p=0.002)	1.79 (1.23-2.62, p=0.002)	2.16 (1.38-3.38, p=0.001)
D2 resection	No	297 (53.9)	254 (46.1)	-	-	-	-
	Yes	380 (53.7)	327 (46.3)	1.01 (0.80-1.26, p=0.957)	0.96 (0.72-1.27, p=0.756)	-	-
Pre-op obstruction	No	595 (53.7)	514 (46.3)	-	-	-	-
	Yes	100 (52.6)	90 (47.4)	1.04 (0.76-1.42, p=0.794)	0.78 (0.52-1.18, p=0.240)	-	-
Pre-op perforation	No	678 (53.8)	583 (46.2)	-	-	-	-
	Yes	22 (47.8)	24 (52.2)	1.27 (0.70-2.30, p=0.428)	0.92 (0.44-1.91, p=0.824)	-	-
Stage	0	0 (NaN)	0 (NaN)	-	-	-	-
	I	248 (55.6)	198 (44.4)	-	-	-	-
	II	125 (54.1)	106 (45.9)	1.06 (0.77-1.46, p=0.711)	0.91 (0.62-1.32, p=0.610)	-	-
	III	265 (53.0)	235 (47.0)	1.11 (0.86-1.44, p=0.422)	0.88 (0.64-1.21, p=0.439)	-	-
	IV	65 (49.6)	66 (50.4)	1.27 (0.86-1.88, p=0.227)	1.03 (0.60-1.75, p=0.927)	-	-

OR, odds ratio; WB, World Bank; ASA, American Society of Anesthesiologists operative risk grade; BMI, Body Mass Index; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

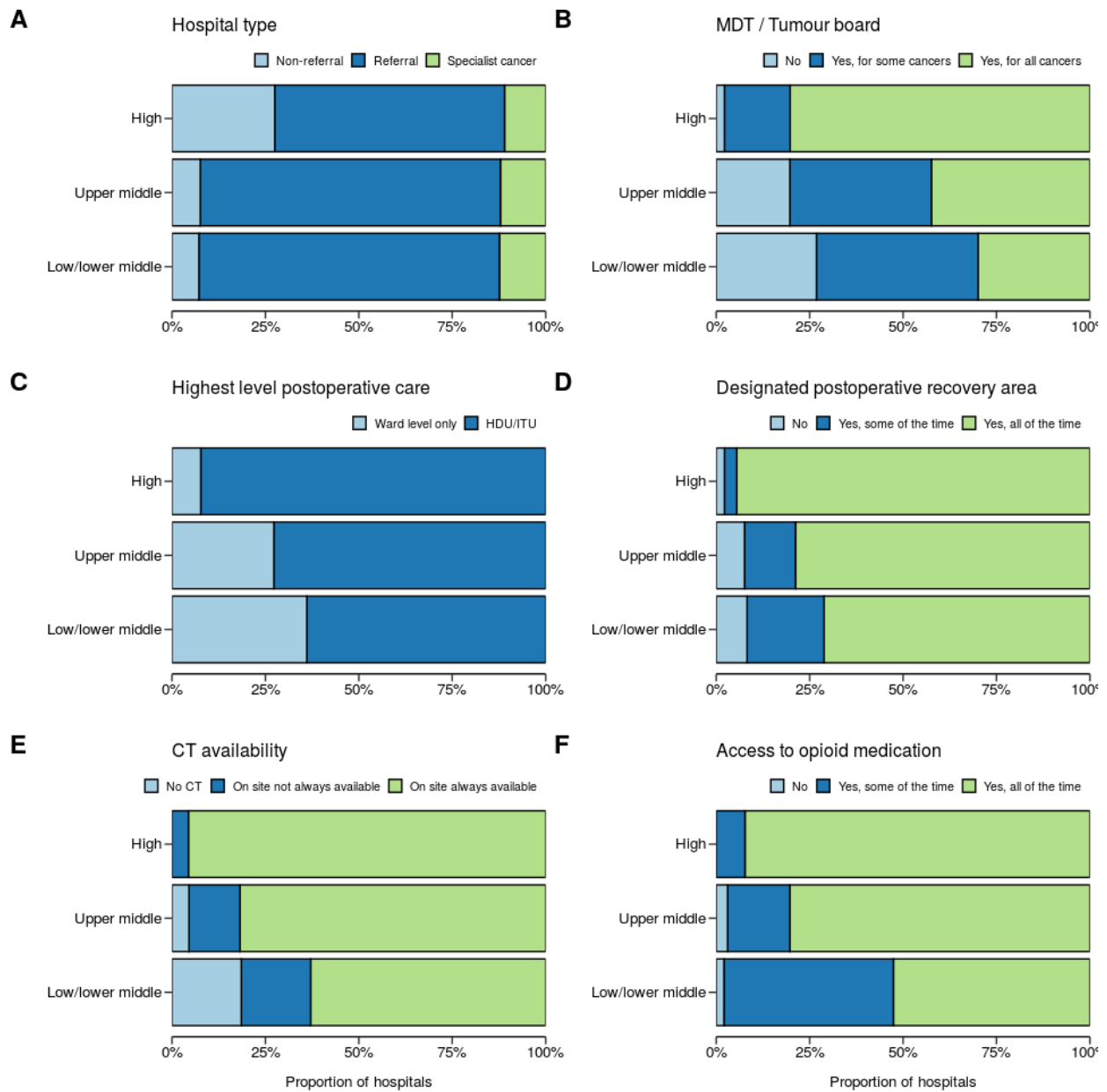
Table S9. Complications in patients who died.

			High	Upper middle	Low/lower middle
Breast	Minor complication (CD1)	Yes	1 (25.0)	0 (0.0)	1 (16.7)
	Minor complication (CD2)	Yes	1 (25.0)	0 (0.0)	2 (33.3)
	Reintervention (CD3)	No	2 (50.0)	2 (100.0)	6 (100.0)
		Yes, NOT under general anaesthetic	1 (25.0)	0 (0.0)	0 (0.0)
		Yes under general anaesthetic	1 (25.0)	0 (0.0)	0 (0.0)
	Life-threatening complication (CD4)	No	2 (50.0)	0 (0.0)	2 (33.3)
		Yes, single organ failure	1 (25.0)	0 (0.0)	2 (33.3)
		Yes, multi organ failure	1 (25.0)	2 (100.0)	2 (33.3)
	Any complication	Yes	4 (100.0)	2 (100.0)	10 (100.0)
	Readmission	Yes	1 (25.0)	0 (0.0)	2 (40.0)
	Surgical site infection	No	4 (100.0)	2 (100.0)	3 (50.0)
		Yes, no treatment/wound opened only (CD 1)	0 (0.0)	0 (0.0)	1 (16.7)
		Yes, antibiotics only (CD 2)	0 (0.0)	0 (0.0)	1 (16.7)
		Yes, return to operating theatre (CD 3)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, requiring critical care admission (CD 4)	0 (0.0)	0 (0.0)	1 (16.7)
		Yes, resulting in death (CD 5)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, surgical/radiological intervention required (CD 3)	0 (0.0)	0 (0.0)	0 (0.0)
	Post-op bleed	No	4 (100.0)	2 (100.0)	6 (85.7)
		Yes, no intervention required (CD 1)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, transfusion only (CD 2)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, critical care admission &/or intervention (CD 4)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, resulting in death (CD 5)	0 (0.0)	0 (0.0)	1 (14.3)
	Seroma	No	4 (100.0)	2 (100.0)	4 (66.7)
Yes, no intervention/aspiration only (CD 1)		0 (0.0)	0 (0.0)	2 (33.3)	
Yes, antibiotic treatment only (CD 2)		0 (0.0)	0 (0.0)	0 (0.0)	
Yes, intervention required (CD 3)		0 (0.0)	0 (0.0)	0 (0.0)	
Yes, critical care admission &/or intervention (CD 4)		0 (0.0)	0 (0.0)	0 (0.0)	
Gastric	Minor complication (CD1)	Yes	10 (37.0)	2 (18.2)	9 (32.1)
		Yes	14 (51.9)	3 (27.3)	13 (44.8)
	Reintervention (CD3)	No	17 (63.0)	6 (54.5)	24 (77.4)
		Yes, NOT under general anaesthetic	0 (0.0)	2 (18.2)	0 (0.0)
		Yes, under general anaesthetic	10 (37.0)	3 (27.3)	7 (22.6)
	Life-threatening complication (CD4)	No	9 (33.3)	2 (18.2)	15 (48.4)
		Yes, single organ failure	3 (11.1)	3 (27.3)	3 (9.7)
		Yes, multi organ failure	15 (55.6)	6 (54.5)	13 (41.9)
	Any complication	Yes	27 (100.0)	11 (100.0)	33 (100.0)
	Readmission	Yes	2 (7.4)	2 (18.2)	6 (20.0)
	Surgical site infection	No	18 (72.0)	9 (81.8)	22 (78.6)
		Yes, no treatment/wound opened only (CD 1)	1 (4.0)	0 (0.0)	1 (3.6)
		Yes, antibiotics only (CD 2)	2 (8.0)	1 (9.1)	4 (14.3)
		Yes, return to operating theatre (CD 3)	1 (4.0)	0 (0.0)	0 (0.0)
		Yes, requiring critical care admission (CD 4)	1 (4.0)	0 (0.0)	1 (3.6)
		Yes, resulting in death (CD 5)	2 (8.0)	1 (9.1)	0 (0.0)
		Yes, surgical/radiological drainage (CD 3)	2 (7.7)	1 (9.1)	1 (4.0)
	Abscess (OSI)	No	18 (69.2)	10 (90.9)	24 (96.0)
		Yes, no intervention (CD 1)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, antibiotics only (CD 2)	1 (3.8)	0 (0.0)	0 (0.0)
		Yes, critical care admission (CD 4)	2 (7.7)	0 (0.0)	0 (0.0)
		Yes, resulting in death (CD 5)	3 (11.5)	0 (0.0)	0 (0.0)
	Anastomotic leak	No	20 (74.1)	7 (63.6)	23 (82.1)
Yes, no intervention required (CD 1)		0 (0.0)	0 (0.0)	0 (0.0)	
Yes, drug treatment only (CD 2)		0 (0.0)	0 (0.0)	0 (0.0)	
Yes, intervention required (CD 3)		1 (3.7)	1 (9.1)	3 (10.7)	
Yes, critical care admission &/or intervention (CD 4)		3 (11.1)	1 (9.1)	2 (7.1)	
Post-op bleed	Yes, resulting in death (CD 5)	3 (11.1)	2 (18.2)	0 (0.0)	
	No	23 (85.2)	8 (80.0)	23 (82.1)	

		Yes, no intervention required (CD 1)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, transfusion only (CD 2)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, surgical/radiological intervention required (CD 3)	0 (0.0)	0 (0.0)	1 (3.6)
		Yes, critical care admission &/or intervention (CD 4)	1 (3.7)	1 (10.0)	2 (7.1)
		Yes, resulting in death (CD 5)	3 (11.1)	1 (10.0)	2 (7.1)
Colorectal	Minor complication (CD1)	Yes	30 (32.3)	10 (22.7)	26 (47.3)
	Minor complication (CD2)	Yes	36 (39.1)	13 (29.5)	32 (57.1)
	Reintervention (CD3)	No	63 (67.0)	33 (73.3)	35 (61.4)
		Yes, NOT under general anaesthetic	4 (4.3)	0 (0.0)	5 (8.8)
		Yes, under general anaesthetic	27 (28.7)	12 (26.7)	17 (29.8)
	Life-threatening complication (CD4)	No	32 (34.4)	16 (34.8)	12 (20.3)
		Yes, single organ failure	13 (14.0)	5 (10.9)	11 (18.6)
		Yes, multi organ failure	48 (51.6)	25 (54.3)	36 (61.0)
	Any complication	Yes	94 (100.0)	47 (100.0)	63 (100.0)
	Readmission	Yes	9 (9.7)	9 (20.0)	16 (27.6)
	Surgical site infection	No	70 (77.8)	26 (60.5)	27 (50.9)
		Yes, no treatment/wound opened only (CD 1)	2 (2.2)	4 (9.3)	4 (7.5)
		Yes, antibiotics only (CD 2)	7 (7.8)	3 (7.0)	8 (15.1)
		Yes, return to operating theatre (CD 3)	6 (6.7)	1 (2.3)	5 (9.4)
		Yes, requiring critical care admission (CD 4)	2 (2.2)	5 (11.6)	3 (5.7)
		Yes, resulting in death (CD 5)	3 (3.3)	4 (9.3)	6 (11.3)
	Abscess (OSI)	No	72 (80.0)	31 (70.5)	34 (70.8)
		Yes, no intervention (CD 1)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, antibiotics only (CD 2)	3 (3.3)	4 (9.1)	3 (6.2)
		Yes, surgical/radiological drainage (CD 3)	3 (3.3)	2 (4.5)	4 (8.3)
		Yes, critical care admission (CD 4)	0 (0.0)	3 (6.8)	3 (6.2)
		Yes, resulting in death (CD 5)	12 (13.3)	4 (9.1)	4 (8.3)
	Anastomotic leak	No	77 (85.6)	32 (74.4)	40 (76.9)
		Yes, no intervention required (CD 1)	0 (0.0)	1 (2.3)	2 (3.8)
		Yes, drug treatment only (CD 2)	0 (0.0)	0 (0.0)	0 (0.0)
		Yes, intervention required (CD 3)	2 (2.2)	1 (2.3)	4 (7.7)
		Yes, critical care admission &/or intervention (CD 4)	0 (0.0)	4 (9.3)	3 (5.8)
		Yes, resulting in death (CD 5)	11 (12.2)	5 (11.6)	3 (5.8)
	Post-op bleed	No	81 (88.0)	42 (93.3)	43 (76.8)
		Yes, no intervention required (CD 1)	1 (1.1)	0 (0.0)	0 (0.0)
		Yes, transfusion only (CD 2)	3 (3.3)	0 (0.0)	3 (5.4)
		Yes, surgical/radiological intervention required (CD 3)	3 (3.3)	0 (0.0)	2 (3.6)
		Yes, critical care admission &/or intervention (CD 4)	0 (0.0)	1 (2.2)	5 (8.9)
		Yes, resulting in death (CD 5)	4 (4.3)	2 (4.4)	3 (5.4)

CD, Clavien-Dindo complication grade; OSI, organ space infection. Data are n (%).

Figure S7. Hospital type and facilities for centres treating colorectal and gastric cancer, stratified by country income group.



MDT, multidisciplinary team.

Table S10. Summary of hospital care services for centres treating gastric and colon cancer stratified by country income group.

WB income (tertile)		High	Upper middle	Low/lower middle	Total
		N=232	N=72	N=95	N=399
Hospital type	Non-referral hospital	25 (10.8)	5 (6.9)	7 (7.4)	37 (9.3)
	Referral hospital	54 (23.3)	47 (65.3)	70 (73.7)	171 (42.9)
	Specialist cancer hospital (Not sampled)	9 (3.9) 144 (62.1)	7 (9.7) 13 (18.1)	11 (11.6) 7 (7.4)	27 (6.8) 164 (41.1)
Hospital catchment	< 50 000	5 (2.2)	9 (12.5)	22 (23.2)	36 (9.0)
	50 000 - 199 999	31 (13.4)	12 (16.7)	7 (7.4)	50 (12.5)
	200 000 - 499 999	29 (12.5)	2 (2.8)	7 (7.4)	38 (9.5)
	500 000 - 999 999	13 (5.6)	11 (15.3)	12 (12.6)	36 (9.0)
	1 000 000 - 1 999 999	6 (2.6)	11 (15.3)	10 (10.5)	27 (6.8)
	Over 2 000 000 (Not sampled)	4 (1.7) 144 (62.1)	14 (19.4) 13 (18.1)	30 (31.6) 7 (7.4)	48 (12.0) 164 (41.1)
MDT / Tumour board	None	2 (0.9)	12 (16.7)	23 (24.2)	37 (9.3)
	Yes, for some cancers	16 (6.9)	22 (30.6)	39 (41.1)	77 (19.3)
	Yes, for all cancers (Not sampled)	70 (30.2) 144 (62.1)	25 (34.7) 13 (18.1)	26 (27.4) 7 (7.4)	121 (30.3) 164 (41.1)
	Oncologist	6 (2.6)	11 (15.3)	24 (25.3)	41 (10.3)
Palliative care specialist	Available in hospital (Not sampled)	82 (35.3) 144 (62.1)	40 (55.6) 21 (29.2)	57 (60.0) 14 (14.7)	179 (44.9) 179 (44.9)
	Not available	23 (9.9)	32 (44.4)	52 (54.7)	107 (26.8)
	Available in hospital (Not sampled)	65 (28.0) 144 (62.1)	27 (37.5) 13 (18.1)	36 (37.9) 7 (7.4)	128 (32.1) 164 (41.1)
CT scan	No CT scan	0 (0.0)	3 (4.2)	17 (17.9)	20 (5.0)
	On site, not always available	4 (1.7)	7 (9.7)	16 (16.8)	27 (6.8)
	On site, always available (Not sampled)	84 (36.2) 144 (62.1)	49 (68.1) 13 (18.1)	55 (57.9) 7 (7.4)	188 (47.1) 164 (41.1)
	Access to opioid medication	0 (0.0)	1 (1.4)	2 (2.1)	3 (0.8)
Designated perioperative recovery area	Yes, some of the time	7 (3.0)	11 (15.3)	39 (41.1)	57 (14.3)
	Yes, all of the time (Not sampled)	81 (34.9) 144 (62.1)	47 (65.3) 13 (18.1)	47 (49.5) 7 (7.4)	175 (43.9) 164 (41.1)
	No	2 (0.9)	5 (6.9)	7 (7.4)	14 (3.5)
	Yes, some of the time	3 (1.3)	8 (11.1)	17 (17.9)	28 (7.0)
Highest level of postoperative care	Yes, all of the time (Not sampled)	83 (35.8) 144 (62.1)	46 (63.9) 13 (18.1)	64 (67.4) 7 (7.4)	193 (48.4) 164 (41.1)
	Ward level only	7 (3.0)	16 (22.2)	30 (31.6)	53 (13.3)
	ICU/HDU (Not sampled)	81 (34.9) 144 (62.1)	43 (59.7) 13 (18.1)	58 (61.1) 7 (7.4)	182 (45.6) 164 (41.1)
Pathology services	Not available	0 (0.0)	1 (1.4)	3 (3.2)	4 (1.0)
	Available at another hospital	8 (3.4)	7 (9.7)	16 (16.8)	31 (7.8)
	On site, not always available	16 (6.9)	4 (5.6)	9 (9.5)	29 (7.3)
	On site, always available (Not sampled)	64 (27.6) 144 (62.1)	47 (65.3) 13 (18.1)	60 (63.2) 7 (7.4)	171 (42.9) 164 (41.1)
	Radiotherapy	1 (0.4)	2 (2.8)	16 (16.8)	19 (4.8)
Radiotherapy	> 50 km from hospital	15 (6.5)	6 (8.3)	19 (20.0)	40 (10.0)
	10 - 50 km from hospital	12 (5.2)	8 (11.1)	12 (12.6)	32 (8.0)
	Within 10 km from hospital	19 (8.2)	16 (22.2)	10 (10.5)	45 (11.3)
	Radiotherapy on site (Not sampled)	41 (17.7) 144 (62.1)	27 (37.5) 13 (18.1)	31 (32.6) 7 (7.4)	99 (24.8) 164 (41.1)
	Chemotherapy	0 (0.0)	2 (2.8)	2 (2.1)	4 (1.0)
	> 50 km from hospital	0 (0.0)	1 (1.4)	11 (11.6)	12 (3.0)
	10 - 50 km from hospital	2 (0.9)	4 (5.6)	8 (8.4)	14 (3.5)
Chemotherapy	Within 10 km from hospital	11 (4.7)	9 (12.5)	7 (7.4)	27 (6.8)
	Chemotherapy on site (Not sampled)	75 (32.3) 144 (62.1)	43 (59.7) 13 (18.1)	60 (63.2) 7 (7.4)	178 (44.6) 164 (41.1)
	Postoperative care infrastructure	12 (5.2)	26 (36.1)	55 (57.9)	93 (23.3)
	Absent	76 (32.8)	33 (45.8)	33 (34.7)	142 (35.6)
Cancer care pathway	Present (Not sampled)	47 (20.3) 144 (62.1)	32 (44.4) 13 (18.1)	57 (60.0) 7 (7.4)	136 (34.1) 164 (41.1)
	Absent	41 (17.7)	25 (34.7)	30 (31.6)	96 (24.1)
	Present (Not sampled)	41 (17.7) 144 (62.1)	25 (34.7) 15 (20.8)	30 (31.6) 8 (8.4)	96 (24.1) 167 (41.9)

Table S11. 30-day mortality in patients who sustained a major complication. Capacity to rescue models. Figure 5A uses the multilevel model. Figure 5C and 5D use the multivariable and multivariable including postoperative care infrastructure models.

Dependent: 30-day mortality		Alive	Dead	OR (univariable)	OR (multivariable)	OR (multivariable including postoperative care infrastructure)	OR (multilevel)
WB income (tertile)	High	572 (82.5)	121 (17.5)	-	-	-	-
	Upper middle	93 (61.6)	58 (38.4)	2.95 (2.01-4.31, p<0.001)	3.64 (2.29-5.78, p<0.001)	3.04 (1.84-4.99, p<0.001)	3.89 (2.08-7.29, p<0.001)
	Low/lower middle	137 (58.8)	96 (41.2)	3.31 (2.39-4.59, p<0.001)	5.28 (3.34-8.41, p<0.001)	4.46 (2.74-7.31, p<0.001)	6.15 (3.26-11.59, p<0.001)
Age (years)	Mean (SD)	66.0 (12.7)	70.2 (14.8)	1.03 (1.01-1.04, p<0.001)	1.03 (1.02-1.05, p<0.001)	1.03 (1.02-1.05, p<0.001)	1.03 (1.01-1.05, p<0.001)
Sex	Male	488 (74.3)	169 (25.7)	-	-	-	-
	Female	314 (74.9)	105 (25.1)	0.97 (0.73-1.28, p=0.808)	0.80 (0.57-1.13, p=0.218)	0.82 (0.58-1.16, p=0.267)	0.80 (0.56-1.15, p=0.237)
Cancer type	Colorectal	682 (77.0)	204 (23.0)	-	-	-	-
	Gastric	120 (62.8)	71 (37.2)	1.98 (1.41-2.75, p<0.001)	1.75 (1.16-2.63, p=0.008)	1.79 (1.18-2.69, p=0.006)	1.81 (1.17-2.78, p=0.007)
ECOG performance status	0	335 (89.1)	41 (10.9)	-	-	-	-
	1	249 (78.5)	68 (21.5)	2.23 (1.47-3.42, p<0.001)	1.65 (1.04-2.63, p=0.033)	1.64 (1.04-2.61, p=0.036)	1.67 (1.03-2.71, p=0.037)
	2	118 (62.8)	70 (37.2)	4.85 (3.14-7.57, p<0.001)	2.87 (1.74-4.77, p<0.001)	2.86 (1.73-4.75, p<0.001)	3.01 (1.77-5.13, p<0.001)
	3/4	65 (42.8)	87 (57.2)	10.94 (6.98-17.42, p<0.001)	4.89 (2.88-8.38, p<0.001)	4.63 (2.72-7.98, p<0.001)	5.02 (2.83-8.91, p<0.001)
ASA	I	85 (81.7)	19 (18.3)	-	-	-	-
	II	349 (80.2)	86 (19.8)	1.10 (0.65-1.96, p=0.729)	1.05 (0.57-2.00, p=0.877)	1.04 (0.56-1.98, p=0.906)	1.02 (0.53-1.97, p=0.958)
	III	297 (72.4)	113 (27.6)	1.70 (1.01-3.00, p=0.055)	1.48 (0.77-2.91, p=0.244)	1.51 (0.79-2.98, p=0.220)	1.48 (0.73-2.98, p=0.274)
	IV	47 (51.6)	44 (48.4)	4.19 (2.23-8.13, p<0.001)	2.35 (1.06-5.29, p=0.037)	2.35 (1.06-5.33, p=0.037)	2.45 (1.03-5.82, p=0.042)
	V	5 (41.7)	7 (58.3)	6.26 (1.81-23.26, p=0.004)	2.19 (0.52-10.30, p=0.294)	2.09 (0.49-9.97, p=0.331)	2.67 (0.55-12.88, p=0.221)
Stage	I	212 (78.5)	58 (21.5)	-	-	-	-
	II	190 (78.5)	52 (21.5)	1.00 (0.65-1.53, p=0.999)	0.88 (0.53-1.44, p=0.608)	0.85 (0.51-1.40, p=0.519)	0.88 (0.52-1.47, p=0.614)
	III	297 (77.7)	85 (22.3)	1.05 (0.72-1.53, p=0.815)	0.87 (0.56-1.36, p=0.544)	0.85 (0.54-1.33, p=0.463)	0.84 (0.52-1.34, p=0.458)
	IV	100 (56.5)	77 (43.5)	2.81 (1.86-4.28, p<0.001)	1.84 (1.09-3.09, p=0.022)	1.80 (1.07-3.03, p=0.027)	1.80 (1.04-3.12, p=0.036)
Urgency	Elective	673 (79.6)	173 (20.4)	-	-	-	-
	Emergency	129 (55.8)	102 (44.2)	3.08 (2.26-4.19, p<0.001)	2.18 (1.49-3.20, p<0.001)	2.21 (1.50-3.25, p<0.001)	2.40 (1.59-3.62, p<0.001)
Postoperative care infrastructure	Absent	126 (57.5)	93 (42.5)	-	-	-	-
	Present	676 (78.8)	182 (21.2)	0.36 (0.27-0.50, p<0.001)	-	0.64 (0.41-0.98, p=0.040)	-

OR, odds ratio. ASA, American Society of Anesthesiologists operative risk grade; ECOG, Eastern Cooperative Oncology Group; SD, standard deviation. Data are n (%) and OR (95% confidence interval, p-value). Multilevel model includes hospital and country as random intercepts.

Table S12. 3-way mediation decomposition of proportion of effect of country income group on 30-day mortality mediated by the absence of postoperative care infrastructure. No significant exposure-mediator interaction was seen so a two-way decomposition is presented. Variables in the Table S11 multivariable model were included as covariates. Given that the potential mediator in this case is a hospital-level factor, it was assumed that there was no causal relationship between this and covariates at the patient level. Similarly, no mediator-outcome confounders were specified. These models therefore represent the change in country income group coefficients on the introduction of the postoperative care infrastructure variable. Uncertainty was determined using bootstrap resampling (5000 draws) and confidence intervals constructed using percentiles.

Low/lower middle	median	lower 95% CI	upper 95% CI	p
Total natural effect	5.50	3.36	8.97	
Total natural direct effect	4.62	2.78	7.83	
Total natural indirect effect	1.19	1.01	1.42	0.040
Proportion of total effect which is indirect	0.10	0.002	0.22	0.040

Upper middle	median	lower 95% CI	upper 95% CI	p
Total natural effect	3.75	2.27	5.81	
Total natural direct effect	3.15	1.89	5.15	
Total natural indirect effect	1.19	1.01	1.42	0.040
Proportion of total effect which is indirect	0.14	0.003	0.32	0.040

Table S13. Absolute risk difference for 30-day mortality after major complication in the presence of consistently available postoperative care infrastructure. Probabilities are predicted from multivariable model in table S11 at fixed covariate levels as indicated. Confidence intervals and two-sided p-values are generated from bootstrap resampling (5000 replications).

WB income (tertile)	Age (years)	Sex	Cancer type	ECOG performance status	ASA	Stage	Urgency	Postoperative care infrastructure	Predicted probability of death	Absolute difference (95% confidence interval, p-value)	Number needed to treat (benefit) (95% confidence interval)
Low/lower middle	55	Male	Gastric	1	II	II	Elective	Present	0.287 (0.155 to 0.440)	-	-
Low/lower middle	55	Male	Gastric	1	II	II	Elective	Absent	0.383 (0.234 to 0.556)	0.096 (0.002 to 0.199, p=0.048)	10 (581 to 5, p=0.048)
Upper middle	55	Male	Gastric	1	II	II	Elective	Present	0.213 (0.097 to 0.375)	-	-
Upper middle	55	Male	Gastric	1	II	II	Elective	Absent	0.298 (0.146 to 0.486)	0.081 (0.002 to 0.177, p=0.045)	12 (540 to 6, p=0.045)
High	55	Male	Gastric	1	II	II	Elective	Present	0.082 (0.037 to 0.147)	-	-
High	55	Male	Gastric	1	II	II	Elective	Absent	0.123 (0.052 to 0.228)	0.038 (-0.000 to 0.104, p=0.052)	26 (-2623 to ∞ to 10, p=0.052)
Low/lower middle	55	Male	Colorectal	1	II	II	Elective	Present	0.182 (0.099 to 0.291)	-	-
Low/lower middle	55	Male	Colorectal	1	II	II	Elective	Absent	0.259 (0.153 to 0.377)	0.075 (-0.001 to 0.153, p=0.051)	13 (-1608 to ∞ to 7, p=0.051)
Upper middle	55	Male	Colorectal	1	II	II	Elective	Present	0.132 (0.059 to 0.233)	-	-
Upper middle	55	Male	Colorectal	1	II	II	Elective	Absent	0.192 (0.098 to 0.321)	0.057 (0.000 to 0.133, p=0.050)	17 (27205 to 7, p=0.050)
High	55	Male	Colorectal	1	II	II	Elective	Present	0.048 (0.023 to 0.080)	-	-
High	55	Male	Colorectal	1	II	II	Elective	Absent	0.073 (0.034 to 0.126)	0.024 (0.001 to 0.063, p=0.044)	42 (1661 to 16, p=0.044)
Low/lower middle	55	Female	Gastric	1	II	II	Elective	Present	0.246 (0.128 to 0.398)	-	-
Low/lower middle	55	Female	Gastric	1	II	II	Elective	Absent	0.339 (0.196 to 0.506)	0.090 (0.001 to 0.188, p=0.049)	11 (1384 to 5, p=0.049)
Upper middle	55	Female	Gastric	1	II	II	Elective	Present	0.182 (0.083 to 0.333)	-	-
Upper middle	55	Female	Gastric	1	II	II	Elective	Absent	0.259 (0.125 to 0.438)	0.073 (-0.001 to 0.166, p=0.051)	14 (-1278 to ∞ to 6, p=0.051)
High	55	Female	Gastric	1	II	II	Elective	Present	0.068 (0.029 to 0.127)	-	-
High	55	Female	Gastric	1	II	II	Elective	Absent	0.103 (0.043 to 0.197)	0.032 (-0.000 to 0.090, p=0.052)	31 (-4042 to ∞ to 11, p=0.052)
Low/lower middle	55	Female	Colorectal	1	II	II	Elective	Present	0.155 (0.080 to 0.250)	-	-
Low/lower middle	55	Female	Colorectal	1	II	II	Elective	Absent	0.223 (0.123 to 0.335)	0.066 (-0.001 to 0.141, p=0.051)	15 (-1725 to ∞ to 7, p=0.051)
Upper middle	55	Female	Colorectal	1	II	II	Elective	Present	0.111 (0.050 to 0.200)	-	-

Upper middle	55	Female	Colorectal	1	II	II	Elective	Absent	0.163 (0.083 to 0.278)	0.049 (0.001 to 0.118, p=0.046)	20 (1368 to 8, p=0.046)
High	55	Female	Colorectal	1	II	II	Elective	Present	0.039 (0.018 to 0.068)	-	-
High	55	Female	Colorectal	1	II	II	Elective	Absent	0.060 (0.027 to 0.109)	0.019 (0.000 to 0.053, p=0.048)	52 (4332 to 19, p=0.048)

Case ascertainment

Case ascertainment was performed by independent validators in contributing hospitals to determine the proportion of patients meeting the inclusion criteria who were actually enrolled. Validators were asked to provide this information prior to receiving patient-level information for later validation steps. Case ascertainment was performed in a random sample of 265 hospitals (high 156, upper middle 48, low/lower middle 61, as defined by the World Bank country income groups) in 69 countries representing 1060 hospital-weeks of data collection. The validation cohort were representative of the primary data collected by 838 mini-teams (Figure S6).

In primary data collection for the main study, there were 3669 patients included across hospitals selected for validation. Validators identified 3805 cases that fulfilled inclusion criteria for the validation period, equating to a case ascertainment rate of 96.4% (3669/3805). There was no difference in case ascertainment rates between World Bank country income groups (chi-squared statistic 1.04, df 2, $p=0.595$).

There was little variability in case ascertainment across all hospitals (min 30%, lower quartile 100%, median 100%, upper quartile 100%, max 100%) (Figure S7).

Figure S8. Distribution of patients enrolled per hospital in validation sample.

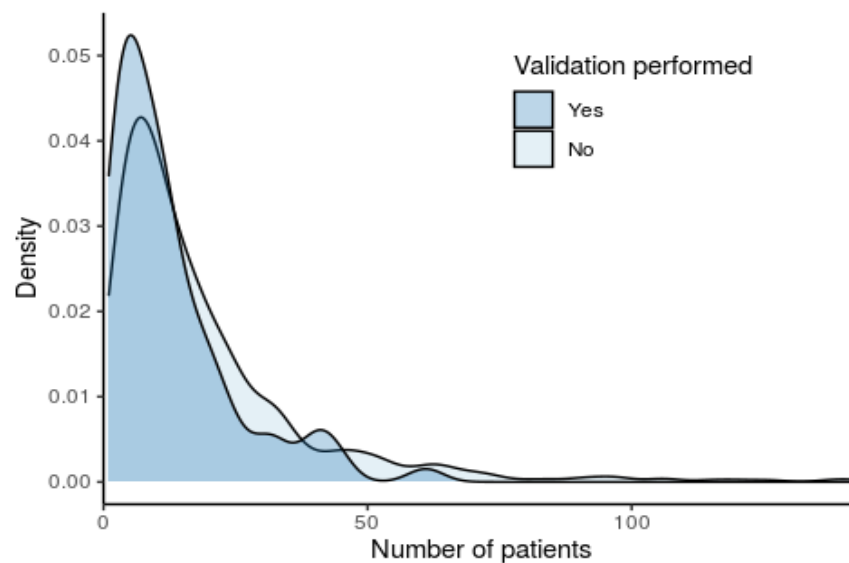
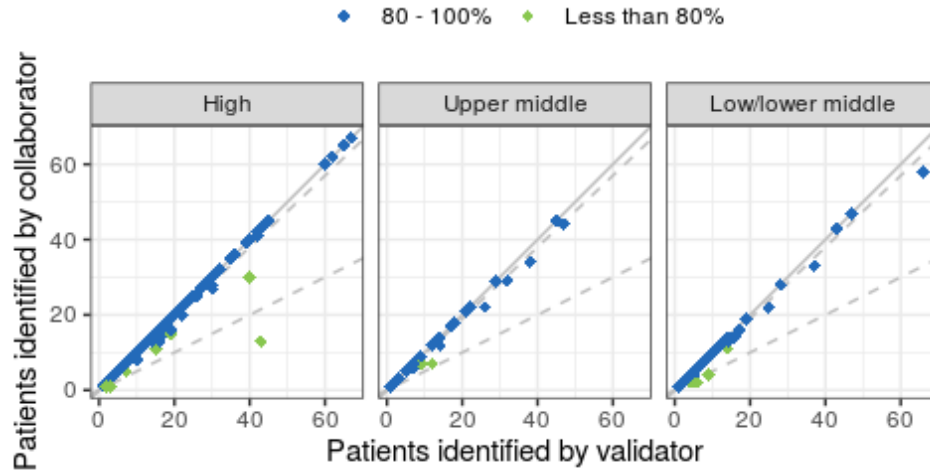


Figure S9. Case ascertainment. Correlation of number of patients fulfilling inclusion criteria identified by validators against those included in primary data collection. Dotted lines represent 50% and 95% concordance.



Data accuracy

A subset of variables was re-collected by data validators who were independent of the primary data collection process. Following case ascertainment (above), validators were provided with the following patient variables: hospital ID, age, gender, date of admission, date of operation, cancer type and primary operation name. These data were complete in the primary dataset. Using this information, validators were asked to confirm the following variables from the patient's paper or electronic notes: two patient variables (age and gender), one disease-specific variable (pathological stage), two operation variables (urgency and operative intent), and two outcome measures (30-day major complication and 30-day mortality).

Availability of sampled variables is detailed in table S16. Overall availability of variables for validation was good (Table S16). However, there was some difficulty in low/lower middle-income countries, with some validators commenting about on the lack of availability of reliable written notes. This pattern was reflected particularly in operation records. The ability of validators to identify outcome measures was lower across all countries (30-day major complication available, high 87.9%, upper middle 86.6%, low/lower middle 79.6% World Bank income group; Table S16).

Table S14. Availability of sampled variables to validators by country income group.

		World Bank income group			p*
		High N=2569	Upper middle N=536	Low/lower middle N=564	
Pathological staging available	No	128 (5.0)	13 (2.4)	79 (14.0)	<0.001
	Yes	2441 (95.0)	523 (97.6)	485 (86.0)	
Urgency available	No	32 (1.2)	5 (0.9)	7 (1.2)	0.854
	Yes	2537 (98.8)	531 (99.1)	557 (98.8)	
Operative intent	No	175 (6.8)	5 (0.9)	52 (9.2)	<0.001
	Yes	2393 (93.2)	531 (99.1)	512 (90.8)	
30-day major complication available	No	312 (12.1)	72 (13.4)	115 (20.4)	<0.001
	Yes	2256 (87.9)	464 (86.6)	448 (79.6)	
30-day mortality available	No	158 (6.2)	19 (3.5)	79 (14.0)	<0.001
	Yes	2410 (93.8)	517 (96.5)	485 (86.0)	

*Chi-squared or Fisher's exact test where expected cell count <5. Data are n (%).

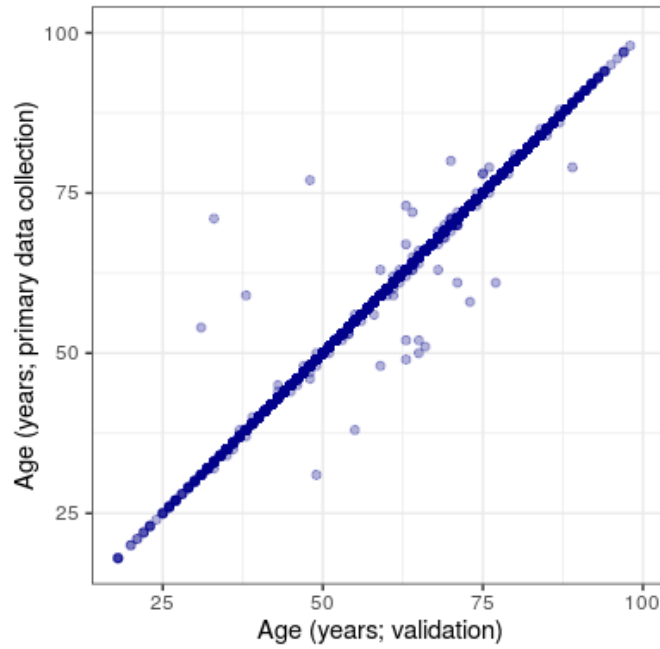
Data accuracy: continuous data

Age was the only continuous variable which was validated. Validator versus primary data were highly correlated (Pearson correlation coefficient 0.997, 95% CI 0.996 to 0.997) (Table S17; Figure S8).

Table S15. Validation study for continuous variable

	Primary data	Validation data	Pearson correlation coefficient (95% CI)
Age; mean (standard deviation)	62.2 (14.0)	62.3 (14.0)	0.997 (0.996 to 0.997)

Figure S10. Correlation of patient age in validation vs primary datasets (n=4520)



Data accuracy: categorical data

For categorical variables, agreement between validation and primary data is described using the Cohen’s kappa coefficient. Guidelines on the interpretation of agreement with the kappa coefficient are poor (<0.20), fair (0.20 to 0.40), moderate (0.41 to 0.60), good (0.61 to 0.80), and very good (0.80 to 1.00).¹

There was good or very good agreement between validation and primary data for patient (gender, kappa coefficient 0.99), operative (urgency 0.77; intent 0.75) and cancer staging (pT stage 0.93; pN stage 0.67) variables (Table S18). Agreement for 30-day mortality (0.89) was also excellent, however, for 30-day major complication (0.63) the agreement was lower.

Table S16. Validation study for categorical variables

	Primary data	Validation data					Kappa
	Sex	Female Male	Female 2564 6		Male 1 1093		
Pathological T stage	T0	139	20	6	4	1	0.93
	T1	9	707	29	12	4	
	T2	9	41	709	34	6	
	T3	4	12	19	798	11	
	T4	2	3	5	18	371	
Pathological N stage	N0	1326	131	54	15	0.67	
	N1	177	482	66	17		
	N2	71	67	243	37		
	N3	3	4	3	34		
Urgency	Elective	Elective		Emergency		0.77	
	Emergency	3270 55		71 229			
Intent	Curative	Curative		Palliative		0.75	
	Palliative	3066 61		77 231			
30-day major complication	No	No		Yes		0.63	
	Yes	2639 96		119 220			
30-day mortality	Alive	Alive		Died		0.89	
	Died	3321 4		9 55			

Data are counts.

1. Altman DG. Practical Statistics for Medical Research. Chapman and Hall; 2020. 650 p.

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 MLAA: Study design, data collection, data analysis, data interpretation, and writing.
 SWA-S: Data collection, data interpretation, and writing.
 ISA-S: Data collection, data interpretation, and writing.
 MivBH: Study design, data collection, data analysis, data interpretation, and writing.
 AB: Study design, data collection, data interpretation, and writing.
 BMB: Study design, and writing.
 PB: Study design, data collection, data analysis, data interpretation, and writing.
 KMC: Study design, data collection, data interpretation, and writing.
 AC-C: Study design, data collection, data interpretation, and writing.
 AJD: Data collection, data interpretation, and writing.
 TMD: Study design, data interpretation, and writing.
 ME: Data collection, data interpretation, writing, and revision.
 CJF: Study design, data collection, and data interpretation.
 JEF: Study design, data collection, data analysis, data interpretation, and writing.
 DNG: Data analysis, Data interpretation, and writing.
 JG: Study design, data collection, data interpretation, and writing.
 JCAI: Study design, data interpretation, and writing.
 TPK: Study design, data interpretation, and writing.
 SRK: Study design, data collection, data analysis, data interpretation, and writing.
 MCML: Study design, data collection, data interpretation, and writing.
 IL: Study design, data collection, data interpretation, and writing.
 BL: Data collection, data interpretation, writing, and revision.
 RJL: Study design, data interpretation, and writing.
 JM: Study design and data interpretation.
 KAM: Study design, data collection, data analysis, data interpretation, and writing.
 RLM: Data collection
 DM: Study design, data interpretation, and writing.
 DN: Study design, data collection, data interpretation, and writing.
 LN: Data analysis and data interpretation.
 FN: Data collection, data interpretation, and writing.
 FP: Study design, data collection, data analysis, data interpretation, and writing.

TDP: Data collection, data interpretation, and writing.
RP: Study design, data analysis, data interpretation, and writing.
AUQ: Study design, data collection, and manuscript revisions.
ARM: Study design, data collection, data analysis, data interpretation, and writing.
AMR: Data analysis and data interpretation.
CAS: Study design, data analysis, data interpretation, and writing.
JS: Data interpretation and writing.
NJS: Study design, data collection, data analysis, data interpretation, and writing.
RTS: Study design, data collection, and data interpretation.
ST: Study design, data collection, data analysis, data interpretation, and writing.
HST: Study design, data collection, data analysis, data interpretation, and writing.
TGW: Study design, data collection, data analysis, data interpretation, and writing.
MAW: Data interpretation, writing and critical review.
JW: Data collection and revisions.

Conflicts of interest

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Italy: Margherita Pinto (Azienda Ospedaliera Regionale 'San Carlo'); Fabrizio Perrone (Azienda Ospedaliero Universitaria Consorziale Policlinico Di Bari); Francesca Paola Tropeano (Federico II University of Naples); Francesca Troilo (Hospital G.Bernabeo); Daniela Bossi (ICS Maugeri); Dario Scala (Istituto Nazionale Tumori Fondazione, Pascale-I.R.C.C.S.); Lucrezia Pulitanò (Mater Domini University Hospital); Marcella Carella (Ospedale Generale Regionale F. Miulli); Andrea Pietrabissa (Policlinico San Matteo); Alice Gori (S.Orsola-Malpighi Hospital); Giorgio Giraudo (Santa Croce and Carle Hospital); Veronica De Simone (Santa Rita Clinic, Vercelli); Alfio Alessandro Russo (Treviglio Hospital); Bartolomeo Braccio (Università della Campania 'Luigi Vanvitelli', Naples).

Jordan: Raed Al-Taher (Jordan University Hospital); Sarah Athamneh (King Abdullah University Hospital).

Kenya: Andrea Parker (Tenwek Hospital).

Libya: Adnan Sawiee (Alkhadra Hospital); Amina Kattia (Misurata Cancer Center); Malik Salem (National cancer institute); Osama Tababa (New Bridge Hospital); Zuhour Shaeab (Tripoli Central Hospital).

Lithuania: Vilius Syminas (Klaipeda Republic Hospital); Jonas Jurgaitis (Klaipeda University Hospital); Gytė Damulevičienė (Lithuanian University of Health Sciences Kaunas Clinical Hospital); Saulius Svagzdys (Lithuanian University of Health Sciences Kaunas Clinics); Tomas Poskus (Vilnius University Hospital).

Madagascar: Narindra Njarasoa Mihaja Razafimanjato (Joseph Ravoahangy Andrianavalona Hospital).

Malaysia: Ling Chieng Loo (Hospital Sib); Ing Ching Tiong (Hospital Sultanah Bahiyah); Wan Farahiyah Wan Muhmad (Hospital Tuanku Ja'afar); Harinthiran Vijeyan (Hospital Universiti Sains Malaysia); Teoh Li Ying (University Malaya Medical Centre).

Malta: Gabriella Grech (Mater Dei Hospital).

Mexico: Rodrigo Arrangoiz (ABC Medical Center); Vania Brickelia Jimenez Ley (ANKER Oncologia Global Especializada); Daniel Arizpe (Hospital Angeles Puebla); Vania Brickelia Jimenez Ley (Hospital de Especialidades, CMNO-IMSS); Elizabeth Lagunes Lara (Hospital Español Veracruz); Elizabeth Victoria Castro López (Hospital Regional de Alta Especialidad); Jose Eaazim (Instituto Nacional de Ciencias Médicas y Nutrición 'Salvador Zubirán').

Netherlands: Marije Gordinou de Gouberville (Amsterdam UMC VUm); Vivian Bastiaenen (Amsterdam UMC, University of Amsterdam); Simone Rottier (Tergooi Hospital).

New Zealand: Fouad Nahab (North Shore Hospital); Maria Yeonhee Ji (Taranaki Base Hospital).

Nigeria: Mohammed Seyoji (Ahmadu Bello University Teaching Hospital); Callistus Nwachukwu (Aminu Kano Teaching Hospital); Okechukwu Emeghara (Babcock University Teaching Hospital); Sayyid Egbunu Muhammed (Barau Dikko Teaching Hospital); Ayodeji Idowu (Ekiti State University Teaching Hospital); Olamiposi Sowemimo (Obafemi Awolowo University Teaching Hospitals Complex); Olakayode Ogundoyin (University College Hospital); Oluwatosin Akande (University of Ilorin Teaching Hospital).

Norway: Alexander Lott (University Hospital Of North Norway).

Pakistan: Maliha Nadeem (Ganga Ram Hospital); Ahsan Ali Laghari (Liaquat University of Medical & Health Sciences); Asif Loya (Shaukat Khanam Memorial Cancer Hospital and Research Centre); Hassan Mushtaq (Sindh Institute of Urology and Transplantation); Muhammad Tariq Abdullah (The Pakistan Institute of Medical Sciences).

Palestine: Baseel Abuhilal (Al Makassed Islamic Charitable Society Hospital Jerusalem); Mohammad Atawneh (Al-Ahli Hospital); Hamdan Hamdan (Beit Jala Governmental Hospital (Al Hussein)); Belal Alhabil (Indonesian Hospital); Abedelrahman Srour (Palestine Medical Complex); Ibrahim Mousa (Rafidia Hospital).

Paraguay: Luis Da Silva Medina (Hospital de Clínicas, II Cátedra de Clínica Quirúrgica, Universidad Nacional de Asunción).

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Poland: Katarzyna Bartosiak (Military Institute Of Medicine).

Portugal: Pedro Ferreira (Centro Hospitalar de Setúbal); Vítor Francisco (Centro Hospitalar do Baixo Vouga); Ricardo Lemos (Centro Hospitalar do Medio Ave); Luísa Frutuoso (Centro Hospitalar Entre o Douro e Vouga); Sara Fernandes (Centro Hospitalar Lisboa Norte); Telma Fonseca (Centro Hospitalar Sao Joao); Jorge Pereira (Centro Hospitalar Tondela-Viseu); Juan Rachadell (Centro Hospitalar Universitario do Algarve); Ana Torre (Centro Hospitalar Vila Nova de Gaia/Espinho); Filipe Madeira Martins (Hospital da Horta, E.P.E.); Ana Cristina Carvalho (Hospital da Senhora da Oliveira); Joana Rodrigues Ferreira (Hospital de Egas Moniz); Bruno Ribeiro da Silva (Hospital de Santa Luzia); Helena Devesa (Hospital de Santarem); Ana Vieira (Hospital de Santo Espirito da ilha Terceira); Inês Mónica (Hospital Distrital da Figueira da Foz); Margarida Amaro (Hospital do Espirito Santo); Diogo Sousa (Hospital do Litoral Alentejano); Marta Reia (Hospital Doutor José Maria Grande); João Louro (Hospital Geral - Centro Hospitalar de Coimbra);

Ana Martins (Hospital Prof. Doutor Fernando Fonseca, E.P.E.); Joaquina Dominguez (Hospital Santa Luzia Elvas); Inês Santos (Hospital Sao Francisco Xavier); Nuno Miguel Freitas Oliveira (Hospital Vila Franca de Xira); José Carlos Pereira (IPO Porto); Pedro Silva-Vaz (Unidade Local de Saúde de Castelo Branco); Ligia Freire (Unidade Local de Saude de Matosinhos - Hospital Pedro Hispano); Ricardo Escrevente (Unidade Local de Saude do Baixo Alentejo).

Romania: Valentina Madalina Negoita (Emergency Clinical Hospital Bucharest).

Russian Federation: Dmitry Shakhmatov (State Scientific Centre of Coloproctology).

Rwanda: Yves Nezerwa (Rwanda Military Hospital).

Serbia: Radosav Radulovic (Zvezdara University Medical Center).

South Africa: Rachel Moore (Chris Hani Baragwanath Academic Hospital); Gareth Obery (Groote Schuur Hospital); Francois Viljoen (Inkosi Albert Luthuli Central Hospital); Tome Mendes (Mitchell's Plain District Hospital).

Spain: Antonio Suarez (12 de Octubre University Hospital); Enrique Moncada (Álvaro Cunqueiro Hospital); Maria Fernandez-Hevia (Central University Hospital Of Asturias); Carolina Curtis Martínez (Hospital General Universitario de Elche); Julia Maria Gil Garcia (Hospital Universitari de Girona Dr. Josep Trueta); Mariana González Zunzarren (Infanta Sofia University Hospital).

Sudan: Tarig Idris (Ibrahim Malik Teaching Hospital).

Sweden: Karolina Eklöv (South General Hospital); Oskar Grahn, Leila Amin (Umea University Hospital); Malin Blomqvist (Vrinnevi Hospital).

Switzerland: Costanza Ajani (Ente Ospedaliero Cantonale); Rebecca Kraus (Kantonsspital Graubunden); Nico Seeger (Kantonsspital Winterthur); Melissa Willemin (Lausanne University Hospital CHUV).

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Tunisia: Skander Slim (Institut Salah Azaiez).

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Ukraine: Andrii Diachenko (Dnepropetrovsk Regional Clinical Oncology Center); Vladislav Hordoskiy (Kyiv Regional Clinical Hospital).

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