

Indirect impact of the COVID-19 pandemic and its containment measures on social inequalities in hospital utilisation in Italy

Supplemental material

Supplemental table 1: average absolute number (N) and column percentage (%) of hospital volumes and timeliness of procedures indicators in 2018-19 by educational level and sex

		Men							Women							
		Educational level						Total	Educational level						Total	
		Low		Middle		High			Low		Middle		High			
		N	(%)	N	(%)	N	(%)	N	N	(%)	N	(%)	N	(%)	N	
2018-2019 average	Total accesses to Emergency room	Total	254671	28.3	373486	41.6	270579	30.1	898736	351487	37.1	316546	33.4	279223	29.5	947256
		30-64	36494	8.4	228500	52.7	168479	38.9	433473	34512	8.2	186186	44.2	200371	47.6	421069
		≥65	218177	46.9	144986	31.2	102100	21.9	465263	316975	60.2	130360	24.8	78852	15.0	526187
	Accesses to Emergency Room for life-threatening conditions	Total	8900	44.2	6982	34.7	4240	21.1	20122	11294	63.0	4084	22.8	2549	14.2	17927
		30-64	566	11.1	2888	56.9	1624	32.0	5078	339	12.2	1375	49.4	1070	38.4	2784
		≥65	8334	55.4	4094	27.2	2616	17.4	15044	10955	72.3	2709	17.9	1479	9.8	15143
	Access for ST-elevation myocardial infarction (STEMI)	Total	1214	27.5	1834	41.6	1362	30.9	4410	1146	57.4	527	26.4	322	16.1	1995
		30-64	142	8.9	866	54.5	582	36.6	1590	39	13.5	147	50.9	103	35.6	289
		≥65	1072	38.0	968	34.3	780	27.7	2820	1107	64.9	380	22.3	219	12.8	1706
	Access for ischaemic stroke	Total	2485	45.4	1805	33.0	1185	21.6	5475	3480	66.0	1130	21.4	663	12.6	5273
		30-64	93	10.4	501	56.1	299	33.5	893	52	12.4	217	51.9	149	35.6	418
		≥65	2392	52.2	1304	28.5	886	19.3	4582	3428	70.6	913	18.8	514	10.6	4855
	Access for femoral neck fracture	Total	1766	54.9	780	24.2	671	20.9	3217	6500	69.2	1736	18.5	1162	12.4	9398
		30-64	1098	39.1	1134	40.4	578	20.6	2810	3183	51.7	2010	32.6	968	15.7	6161
		≥65	44	10.3	277	64.7	107	25.0	428	131	17.7	407	54.9	204	27.5	742
	Access for knee replacement surgery	Total	1054	44.2	857	36.0	471	19.8	2382	3052	56.3	1603	29.6	764	14.1	5419
		30-64	1375	26.2	1931	36.7	1951	37.1	5257	2190	26.9	2789	34.3	3158	38.8	8137
		≥65	52	5.4	432	44.8	480	49.8	964	208	5.6	1426	38.6	2056	55.7	3690
	Access for prostatic hyperplasia surgery (M) or malignant breast cancer surgery (W)	Total	1323	30.8	1499	34.9	1471	34.3	4293	1982	44.6	1363	30.6	1102	24.8	4447
		30-64	328	33.6	374	38.4	273	28.0	975	209	33.5	230	36.9	185	29.6	624
≥65		13	8.7	87	58.0	50	33.3	150	12	7.1	85	50.0	73	42.9	170	
Access for malignant lung cancer surgery	Total	315	38.2	287	34.8	223	27.0	825	197	43.4	145	31.9	112	24.7	454	
	30-64	931	37.9	847	34.5	678	27.6	2456	1026	48.7	609	28.9	472	22.4	2107	
	≥65	37	8.2	233	51.8	180	40.0	450	34	8.7	183	46.9	173	44.4	390	
Access for malignant colorectal cancer surgery	Total	894	44.6	614	30.6	498	24.8	2006	992	57.8	426	24.8	299	17.4	1717	
	30-64	458	24.4	808	43.0	612	32.6	1878	325	53.3	192	31.5	93	15.2	610	
	≥65	69	8.7	432	54.8	288	36.5	789	16	14.2	62	54.9	35	31.0	113	
Percutaneous transluminal coronary angioplasty (PTCA) within 90' in STEMI	Total	389	35.7	376	34.5	324	29.8	1089	309	62.2	130	26.2	58	11.7	497	
	30-64	1076	54.3	481	24.3	424	21.4	1981	4426	68.1	1241	19.1	836	12.9	6503	
	≥65															

B. Women

		Deprivation quintile										Total	Percent change 2020 vs 2018-19	
		1 (less deprived)		2		3		4		5 (more deprived)				
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N		
		Population												
Total		1785509	20.6	1743921	20.1	1717738	19.8	1713345	19.8	1695694	19.6	8656207	na	
Age group	30-64	913063	19.6	931541	20.0	934931	20.0	949448	20.3	940256	20.1	4669239	na	
	≥65	872446	21.9	812380	20.4	782807	19.6	763897	19.2	755438	18.9	3986968	na	
Geographical area	Piedmont	294749	20.2	294862	20.2	295050	20.2	293596	20.1	282937	19.4	1461194	na	
	ATS Milan	249162	20.8	237432	19.8	237605	19.8	234780	19.6	239092	20.0	1198071	na	
	Emilia-Romagna	303937	21.5	288550	20.4	278306	19.7	271954	19.3	268283	19.0	1411030	na	
	Tuscany	226781	20.0	227569	20.1	224693	19.9	227410	20.1	224992	19.9	1131445	na	
	Rome	185032	20.8	182232	20.5	179862	20.2	174493	19.6	168379	18.9	889998	na	
	Puglia	269186	21.2	256448	20.2	252340	19.9	248210	19.5	244607	19.2	1270791	na	
	Sicily	256662	19.8	256828	19.9	249882	19.3	262902	20.3	267404	20.7	1293678	na	
Indicators of hospital volumes and timeliness of procedures														
2020	Total accesses to Emergency Room	Total	131909	18.8	131415	18.8	134547	19.2	140705	20.1	161444	23.1	700020	-39.4
		30-64	53826	17.3	56723	18.2	60225	19.3	64440	20.7	76391	24.5	311605	-39.7
		≥65	78083	20.1	74692	19.2	74322	19.1	76265	19.6	85053	21.9	388415	-39.1
	Accesses to Emergency Room for life-threatening conditions	Total	3916	20.1	3603	18.5	3689	18.9	3904	20.0	4392	22.5	19504	-12.1
		30-64	563	19.1	511	17.4	542	18.4	615	20.9	714	24.2	2945	-13.1
		≥65	3353	20.2	3092	18.7	3147	19.0	3289	19.9	3678	22.2	16559	-12.0
	Access for ST-elevation myocardial infarction (STEMI)	Total	504	18.0	546	19.5	559	20.0	557	19.9	628	22.5	2794	-13.5
		30-64	61	12.1	109	21.6	106	21.0	97	19.2	132	26.1	505	-0.4
		≥65	443	19.4	437	19.1	453	19.8	460	20.1	496	21.7	2289	-15.9
	Access for ischaemic stroke	Total	1605	20.1	1582	19.8	1588	19.9	1513	18.9	1708	21.4	7996	-11.7
		30-64	143	17.8	144	18.0	142	17.7	161	20.1	212	26.4	802	9.7
		≥65	1462	20.3	1438	20.0	1446	20.1	1352	18.8	1496	20.8	7194	-13.6
	Access for femoral neck fracture	Total	3577	22.5	3124	19.6	3059	19.2	3068	19.3	3080	19.4	15908	-7.4
		30-64	1593	20.8	1534	20.0	1521	19.9	1469	19.2	1542	20.1	7659	-31.0
		≥65	203	17.1	215	18.1	227	19.1	238	20.1	303	25.5	1186	-7.6
	Access for knee replacement surgery	Total	2496	21.3	2402	20.5	2342	20.0	2292	19.5	2196	18.7	11728	-15.4
		30-64	1207	20.3	1235	20.8	1143	19.3	1234	20.8	1113	18.8	5932	-7.0
		≥65	1289	22.2	1167	20.1	1199	20.7	1058	18.3	1083	18.7	5796	-22.5
	Access for malignant breast cancer surgery	Total	250	21.1	216	18.3	223	18.9	243	20.5	251	21.2	1183	-0.4
		30-64	76	19.9	64	16.8	69	18.1	88	23.0	85	22.3	382	11.4
		≥65	174	21.7	152	19.0	154	19.2	155	19.4	166	20.7	801	-5.2
	Access for malignant lung cancer surgery	Total	681	22.3	591	19.4	619	20.3	598	19.6	564	18.5	3053	-13.0
		30-64	139	20.2	109	15.8	149	21.7	150	21.8	141	20.5	688	7.5
≥65		542	22.9	482	20.4	470	19.9	448	18.9	423	17.9	2365	-17.6	
Percutaneous transluminal coronary angioplasty (PTCA) within 90' in STEMI	Total	85	17.0	92	18.4	106	21.2	97	19.4	120	24.0	500	-16.8	
	30-64	10	9.2	21	19.3	21	19.3	18	16.5	39	35.8	109	0.0	
	≥65	75	19.2	71	18.2	85	21.7	79	20.2	81	20.7	391	-20.5	
Replacement surgery within 48 hours in femoral neck fracture	Total	2400	22.5	2098	19.7	2100	19.7	2068	19.4	2007	18.8	10673	6.6	
	30-64	217951	18.9	216505	18.7	223822	19.4	232132	20.1	264848	22.9	1155258	na	
	≥65	89265	17.3	94940	18.4	100500	19.4	106860	20.7	125486	24.3	517051	na	
2018-2019 average	Total accesses to Emergency Room	Total	128686	20.2	121565	19.0	123322	19.3	125272	19.6	139362	21.8	638207	na
		30-64	4458	20.1	4124	18.6	4158	18.7	4393	19.8	5066	22.8	22199	na
		≥65	579	17.1	652	19.2	618	18.2	685	20.2	855	25.2	3389	na
	Accesses to Emergency room for life-threatening conditions	Total	3879	20.6	3472	18.5	3540	18.8	3708	19.7	4211	22.4	18810	na
		30-64	629	19.5	637	19.7	587	18.2	655	20.3	721	22.3	3229	na
		≥65	86	17.0	102	20.1	91	17.9	108	21.3	120	23.7	507	na
	Access for ST-elevation myocardial infarction (STEMI)	Total	543	19.9	535	19.7	496	18.2	547	20.1	601	22.1	2722	na
		30-64	1827	20.2	1823	20.1	1724	19.0	1801	19.9	1882	20.8	9057	na
		≥65	120	16.4	144	19.7	138	18.9	156	21.3	173	23.7	731	na
	Access for ischaemic stroke	Total	1707	20.5	1679	20.2	1586	19.0	1645	19.8	1709	20.5	8326	na
		30-64	3829	22.3	3396	19.8	3356	19.5	3246	18.9	3354	19.5	17181	na
		≥65	2258	20.3	2187	19.7	2211	19.9	2187	19.7	2253	20.3	11096	na
	Access for femoral neck fracture	Total	219	17.1	213	16.6	267	20.8	271	21.1	313	24.4	1283	na
		30-64	2039	20.8	1974	20.1	1944	19.8	1916	19.5	1940	19.8	9813	na
		≥65	2975	21.5	2803	20.2	2775	20.0	2744	19.8	2559	18.5	13856	na
	Access for malignant breast cancer surgery	Total	1293	20.3	1301	20.4	1280	20.1	1314	20.6	1188	18.6	6376	na
		30-64	1682	22.5	1502	20.1	1495	20.0	1430	19.1	1371	18.3	7480	na
		≥65	267	22.5	224	18.9	225	18.9	239	20.1	233	19.6	1188	na
	Access for malignant lung cancer surgery	Total	71	20.7	64	18.7	67	19.5	65	19.0	76	22.2	343	na
		30-64	196	23.2	160	18.9	158	18.7	174	20.6	157	18.6	845	na
		≥65	722	20.6	718	20.5	684	19.5	672	19.2	713	20.3	3509	na
	Access for malignant colorectal cancer surgery	Total	114	17.8	137	21.4	127	19.8	137	21.4	125	19.5	640	na
		30-64	608	21.2	581	20.3	557	19.4	535	18.6	588	20.5	2869	na
≥65		104	17.3	123	20.5	117	19.5	121	20.1	136	22.6	601	na	
Percutaneous transluminal coronary angioplasty (PTCA) within 90' in STEMI	Total	13	11.9	21	19.3	21	19.3	28	25.7	26	23.9	109	na	
	30-64	91	18.5	102	20.7	96	19.5	93	18.9	110	22.4	492	na	
	≥65	2549	22.3	2296	20.1	2250	19.7	2161	18.9	2177	19.0	11433	na	

na = not applicable

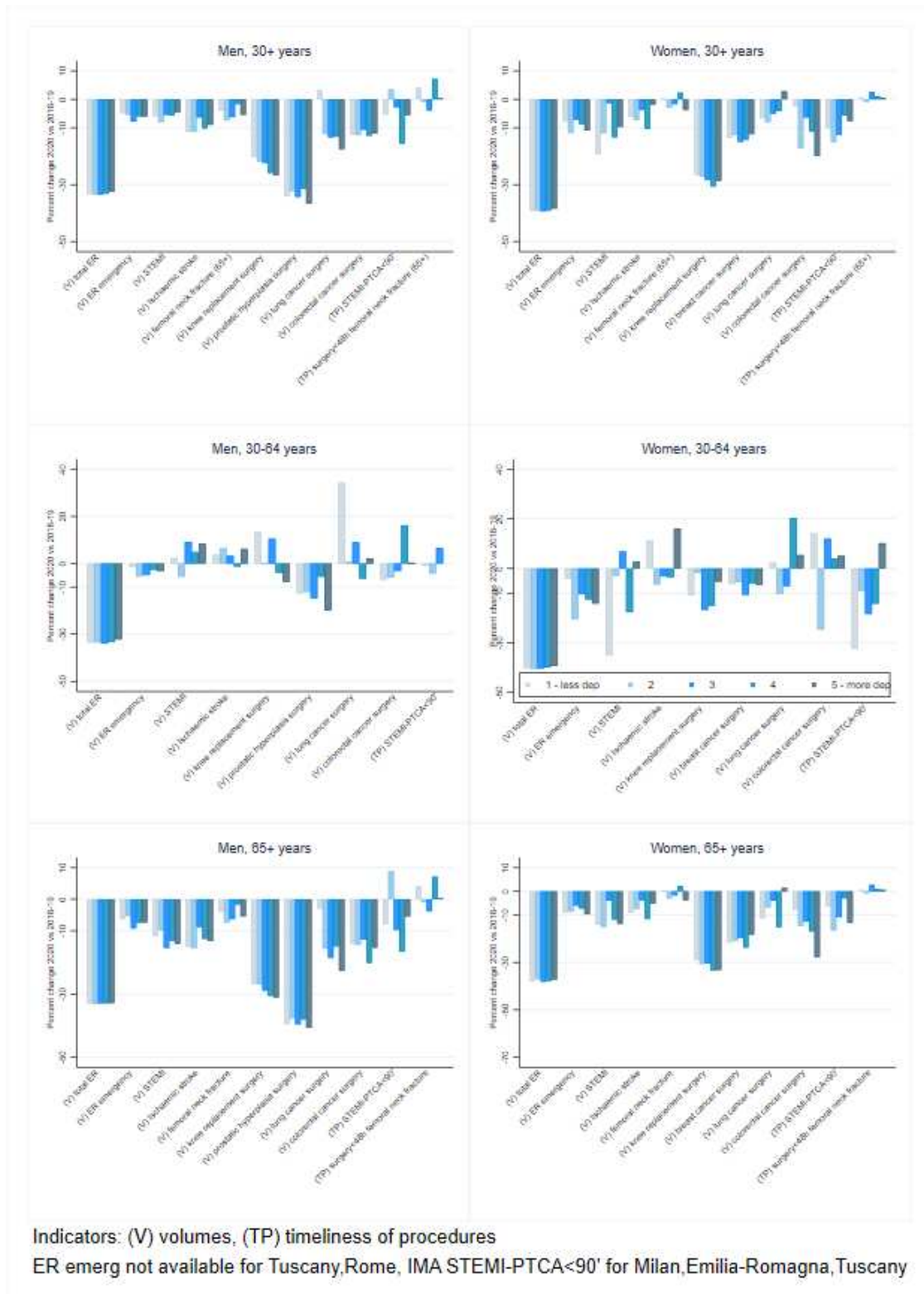
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Hospital access indicators	Age group	4						5 (more deprived)													
		Standardised rate/prevalence 2018-19		95% CI		Standardised rate/prevalence 2020		95% CI		relative percent change		Standardised rate/prevalence 2018-19		95% CI		Standardised rate/prevalence 2020		95% CI		relative percent change	
Men																					
Total accesses to Emergency Room	Total	13807	13768	13846	9227	9181	9273	-33.2	16057	16016	16099	10840	10790	10890	-32.5						
	30-64	11848	11800	11895	7892	7837	7948	-33.4	13988	13938	14038	9482	9422	9542	-32.2						
	≥65	17174	17106	17241	11521	11439	11602	-32.9	19612	19540	19685	13174	13086	13262	-32.8						
Accesses to Emergency Room for life-threatening conditions	Total	351	345	358	330	321	339	-5.9	419	412	426	394	384	404	-6.0						
	30-64	171	165	177	167	159	175	-2.6	217	211	224	210	201	220	-3.2						
	≥65	660	646	674	611	592	631	-7.4	766	750	781	709	688	731	-7.4						
Access for ST-elevation myocardial infarction (STEMI)	Total	95	92	99	90	85	95	-5.7	107	103	111	102	97	107	-4.5						
	30-64	63	59	66	66	60	71	4.9	73	69	76	79	73	84	8.4						
	≥65	152	145	159	132	123	141	-13.1	166	159	174	143	133	153	-14.2						
Access for ischaemic stroke	Total	110	106	113	99	94	103	-10.2	117	113	121	107	101	112	-8.9						
	30-64	36	33	39	36	32	39	-1.2	41	38	44	44	39	48	6.2						
	≥65	236	228	245	207	195	218	-12.5	247	238	256	215	203	227	-13.3						
Access for femoral fracture	Total	144	138	150	142	133	150	-1.6	156	149	162	147	138	157	-5.4						
	30-64	67	64	70	49	46	53	-25.9	64	61	67	47	43	50	-26.8						
	≥65	18	16	20	18	15	20	-3.9	19	17	21	17	15	20	-7.8						
Access for knee replacement surgery	Total	107	103	110	73	69	77	-31.5	103	99	106	65	61	69	-36.7						
	30-64	34	31	37	32	29	36	-5.6	31	29	34	25	22	28	-19.9						
	≥65	231	223	240	143	133	153	-38.0	225	216	234	133	123	143	-40.7						
Access for malignant lung cancer surgery	Total	24	22	26	21	18	23	-13.2	28	26	30	23	20	25	-17.5						
	30-64	8	6	9	7	5	9	-6.4	9	8	10	9	7	11	2.2						
	≥65	52	47	56	44	38	49	-14.9	60	55	64	46	40	52	-22.7						
Access for malignant colorectal cancer surgery	Total	49	46	51	43	39	46	-12.8	50	47	52	44	40	47	-12.0						
	30-64	16	14	18	18	16	21	16.2	17	15	19	17	14	19	0.0						
	≥65	106	100	112	85	77	92	-20.2	106	100	112	90	82	98	-15.3						
Percutaneous transluminal coronary angioplasty (PTCA) within 90' in STEMI	Total	59	57	62	50	46	54	-15.6	55	53	58	52	49	56	-5.5						
	30-64	72	68	76	61	55	67	-14.4	64	60	67	60	55	66	-5.6						
	≥65	51	48	55	43	38	48	-16.6	49	46	53	47	42	52	-5.4						
Replacement surgery within 48 hours in femoral neck fracture	≥65	59	57	61	63	60	66	7.2	59	57	61	59	56	62	0.4						
Women																					
Total accesses to Emergency Room	Total	12648	12612	12684	7710	7669	7751	-39.0	14696	14657	14734	9048	9004	9092	-38.4						
	30-64	11353	11308	11399	6819	6768	6870	-39.9	13423	13374	13472	8148	8093	8204	-39.3						
	≥65	14872	14814	14930	9241	9174	9308	-37.9	16883	16822	16945	10594	10522	10666	-37.3						
Accesses to Emergency Room for life-threatening conditions	Total	215	210	219	196	190	202	-8.7	262	257	267	233	226	240	-11.0						
	30-64	92	87	96	80	74	86	-12.5	117	112	122	100	94	107	-14.1						
	≥65	427	417	437	396	382	409	-7.3	511	500	522	461	447	476	-9.7						
Access for ST-elevation myocardial infarction (STEMI)	Total	30	28	32	26	24	28	-13.3	34	32	36	31	28	33	-9.7						
	30-64	12	10	13	10	8	12	-17.6	13	12	15	14	11	16	2.8						
	≥65	61	57	65	54	48	59	-11.9	70	65	74	60	54	66	-13.7						
Access for ischaemic stroke	Total	70	68	73	63	59	66	-10.4	76	73	78	74	70	78	-1.9						
	30-64	17	15	19	16	14	19	-3.6	19	17	21	22	19	25	16.2						
	≥65	161	155	167	143	134	151	-11.7	173	167	180	164	155	173	-5.2						
Access for femoral neck fracture	Total	285	278	293	292	281	303	2.3	305	297	313	294	282	305	-3.7						
	30-64	120	116	123	83	79	87	-30.6	126	122	129	90	85	94	-28.7						
	≥65	277	268	286	185	174	195	-33.4	286	277	295	191	180	202	-33.2						
Access for malignant breast cancer surgery	Total	160	156	165	137	132	143	-14.2	151	147	155	132	127	138	-12.2						
	30-64	136	131	141	128	120	135	-6.0	124	119	129	116	109	123	-6.6						
	≥65	202	195	210	154	145	164	-23.7	197	189	204	161	151	171	-18.3						
Access for malignant lung cancer surgery	Total	15	14	16	14	13	16	-4.2	15	13	16	15	13	17	2.9						
	30-64	7	6	9	9	7	11	20.4	8	7	9	9	7	10	5.4						
	≥65	28	25	31	24	20	28	-15.1	26	23	28	26	22	30	1.5						
Access for malignant colorectal cancer surgery	Total	34	32	36	30	28	33	-11.2	36	34	38	29	26	31	-19.9						
	30-64	15	13	16	15	13	18	4.0	14	12	15	14	12	17	5.2						
	≥65	68	64	72	56	51	62	-16.9	75	70	79	54	49	60	-27.7						
Percutaneous transluminal coronary angioplasty (PTCA) within 90' in STEMI	Total	42	38	46	40	34	45	-5.5	43	39	46	39	34	45	-7.7						
	30-64	58	49	67	50	35	65	-14.2	55	46	64	61	49	73	10.2						
	≥65	39	34	43	37	31	44	-2.9	40	36	44	35	29	41	-13.3						
Replacement surgery within 48 hours in femoral neck fracture	≥65	67	66	68	67	66	69	1.1	65	64	66	65	64	67	0.6						

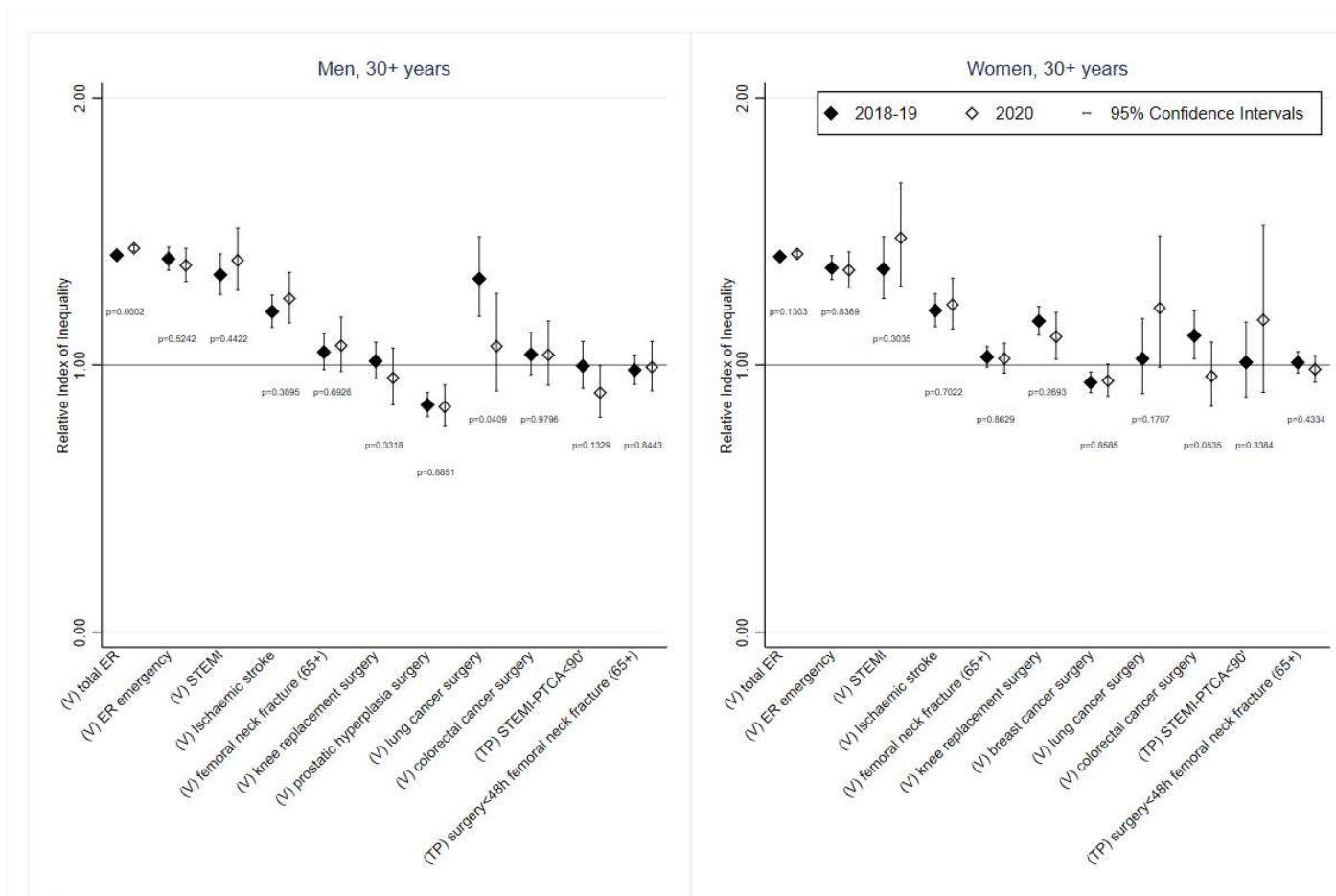
Supplemental table 5: Relative Index of Inequality (RII), 95% confidence intervals (95%CI) and p-value for interaction (between deprivation and period) by deprivation index, type of hospital indicators (volumes or timeliness of procedures), period, sex, and areas included in the analysis (all – 7 areas – and only those included in the analysis by educational level – 4 areas), all ages

Hospital access indicators	Period	Men (7 areas)			Men (4 areas)			Women (7 areas)			Women (4 areas)						
		RII	95% CI	p-value	RII	95% CI	p-value	RII	95% CI	p-value	RII	95% CI	p-value				
Total accesses to Emergency Room	2018-19	1.36	1.36	1.37	0.000	1.40	1.39	1.41	0.005	1.38	1.38	1.39	0.131	1.40	1.39	1.40	0.780
	2020	1.39	1.38	1.40		1.42	1.41	1.43		1.39	1.38	1.40		1.39	1.38	1.41	
Accesses to Emergency Room for life-threatening conditions	2018-19	1.35	1.31	1.40	0.525	1.35	1.31	1.40	0.333	1.36	1.32	1.40	0.837	1.35	1.30	1.40	0.766
	2020	1.33	1.27	1.39		1.31	1.25	1.38		1.35	1.29	1.42		1.36	1.28	1.44	
Access for ST-elevation myocardial infarction	2018-19	1.35	1.27	1.43	0.442	1.36	1.26	1.46	0.481	1.35	1.24	1.47	0.304	1.34	1.20	1.49	0.249
	2020	1.40	1.29	1.52		1.42	1.28	1.59		1.46	1.29	1.67		1.51	1.27	1.79	
Access for ischaemic stroke	2018-19	1.20	1.14	1.26	0.390	1.14	1.07	1.22	0.672	1.21	1.15	1.27	0.702	1.17	1.09	1.25	0.040
	2020	1.25	1.16	1.35		1.17	1.06	1.30		1.23	1.14	1.33		1.33	1.20	1.47	
Access for femoral neck fracture	2018-19	1.05	0.98	1.12	0.692	1.04	0.95	1.14	0.901	1.03	0.99	1.07	0.863	1.03	0.98	1.09	0.554
	2020	1.07	0.98	1.18		1.05	0.93	1.19		1.02	0.97	1.08		1.01	0.94	1.08	
Access for knee replacement surgery	2018-19	1.02	0.95	1.09	0.332	0.98	0.89	1.08	0.312	1.17	1.12	1.23	0.270	1.19	1.12	1.27	0.088
	2020	0.96	0.86	1.07		0.89	0.77	1.04		1.11	1.03	1.21		1.07	0.97	1.19	
Access for prostatic hyperplasia surgery (men) / breast cancer surgery (women)	2018-19	0.86	0.81	0.90	0.885	0.90	0.84	0.96	0.782	0.93	0.89	0.97	0.859	0.94	0.89	0.99	0.549
	2020	0.85	0.77	0.93		0.88	0.78	0.99		0.94	0.88	1.00		0.91	0.84	0.99	
Access for malignant lung cancer surgery	2018-19	1.32	1.18	1.48	0.041	1.39	1.19	1.63	0.217	1.02	0.88	1.16	0.170	1.01	0.83	1.23	0.478
	2020	1.07	0.90	1.27		1.17	0.93	1.47		1.20	0.98	1.47		1.14	0.87	1.49	
Access for malignant colorectal cancer surgery	2018-19	1.04	0.97	1.12	0.980	1.05	0.95	1.16	0.881	1.11	1.03	1.21	0.054	1.07	0.96	1.19	0.177
	2020	1.04	0.93	1.17		1.04	0.89	1.20		0.96	0.85	1.09		0.94	0.80	1.10	
PTCA within 90' in ST-elevation myocardial infarction	2018-19	0.93	0.79	1.10	0.418	1.01	0.93	1.10	0.133	0.99	0.77	1.27	0.913	1.01	0.88	1.16	0.340
	2020	0.84	0.69	1.03		0.90	0.81	1.00		1.11	0.77	1.59		1.17	0.90	1.52	
Replacement surgery within 48 hours in femoral neck fracture	2018-19	0.98	0.88	1.08	0.651	0.98	0.91	1.06	0.309	1.00	0.90	1.12	0.935	1.02	0.97	1.08	0.312
	2020	0.99	0.90	1.09		1.06	0.94	1.19		0.98	0.91	1.07		0.98	0.92	1.04	

Supplemental figure 1: relative percent changes of age-standardised rates for the volume indicators and age-standardised prevalence for the timeliness of procedures indicators by deprivation index, sex, and age groups



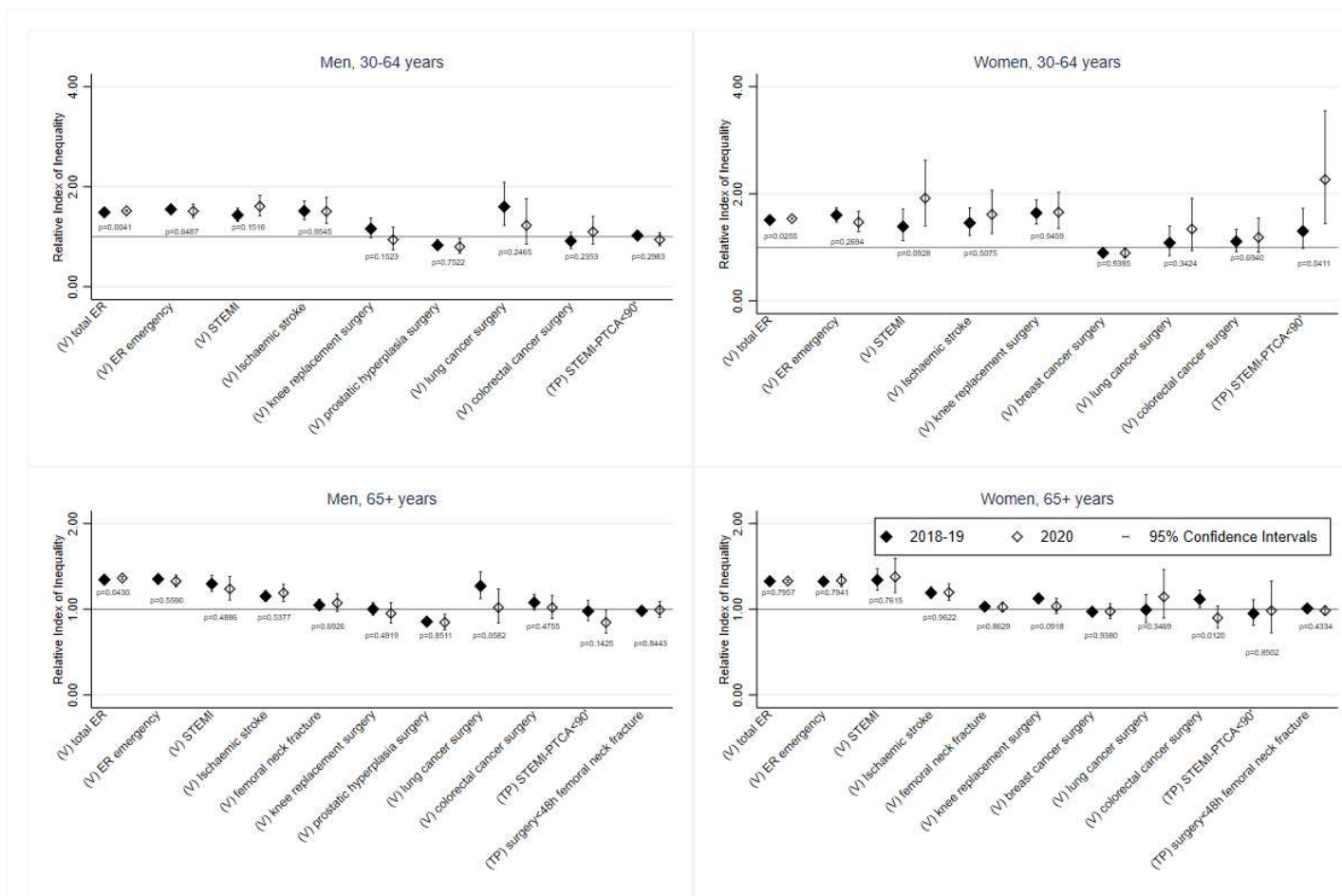
Supplemental figure 2: Relative Index of Inequality and 95% confidence intervals by deprivation index, hospital volumes and timeliness of procedures indicators and period, and sex, all ages



Indicators: (V) volumes, (TP) timeliness of procedures; p: p-value for interaction

ER emergency not available for Tuscany, Rome; IMA STEMI-PTCA <90' for Milan, Emilia-Romagna, Tuscany

Supplemental figure 3: Relative Index of Inequality and 95% confidence intervals by deprivation index, hospital volumes and timeliness of procedures indicators, period, sex, and age group



Indicators: (V) volumes, (TP) timeliness of procedures; p: p-value for interaction

ER emergency not available for Tuscany, Rome; IMA STEMI-PTCA<90' for Milan, Emilia-Romagna, Tuscany