

Trends in proton pump inhibitor use in Sweden by sex and age - a drug utilisation study.

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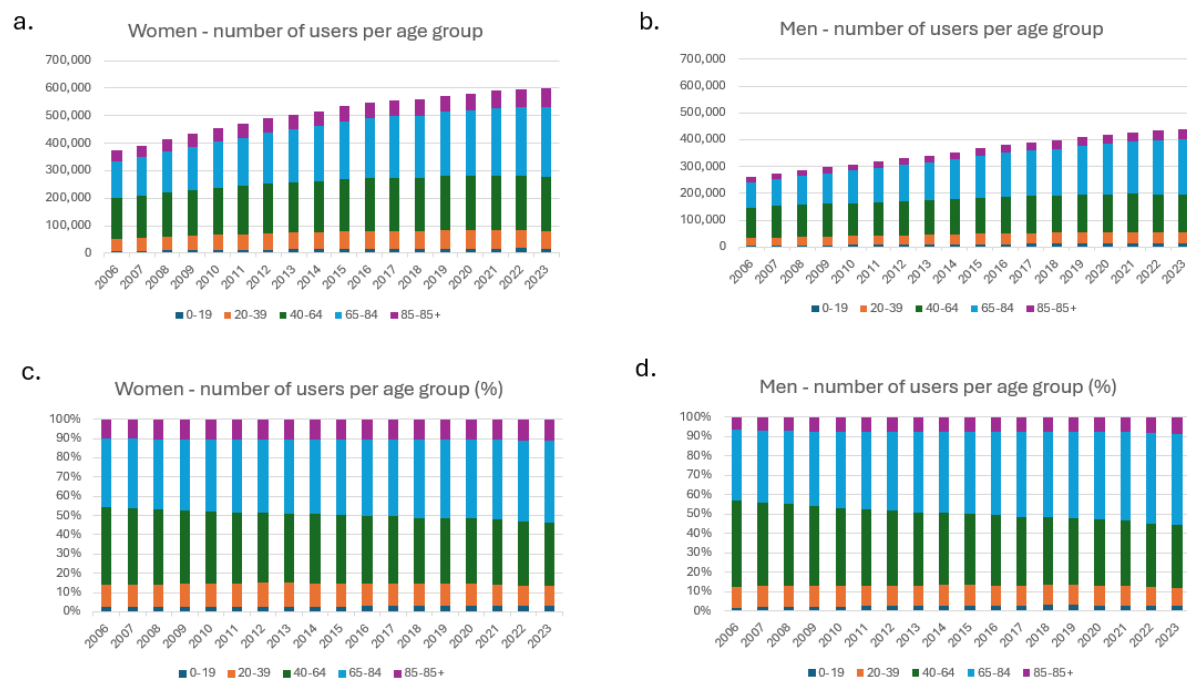
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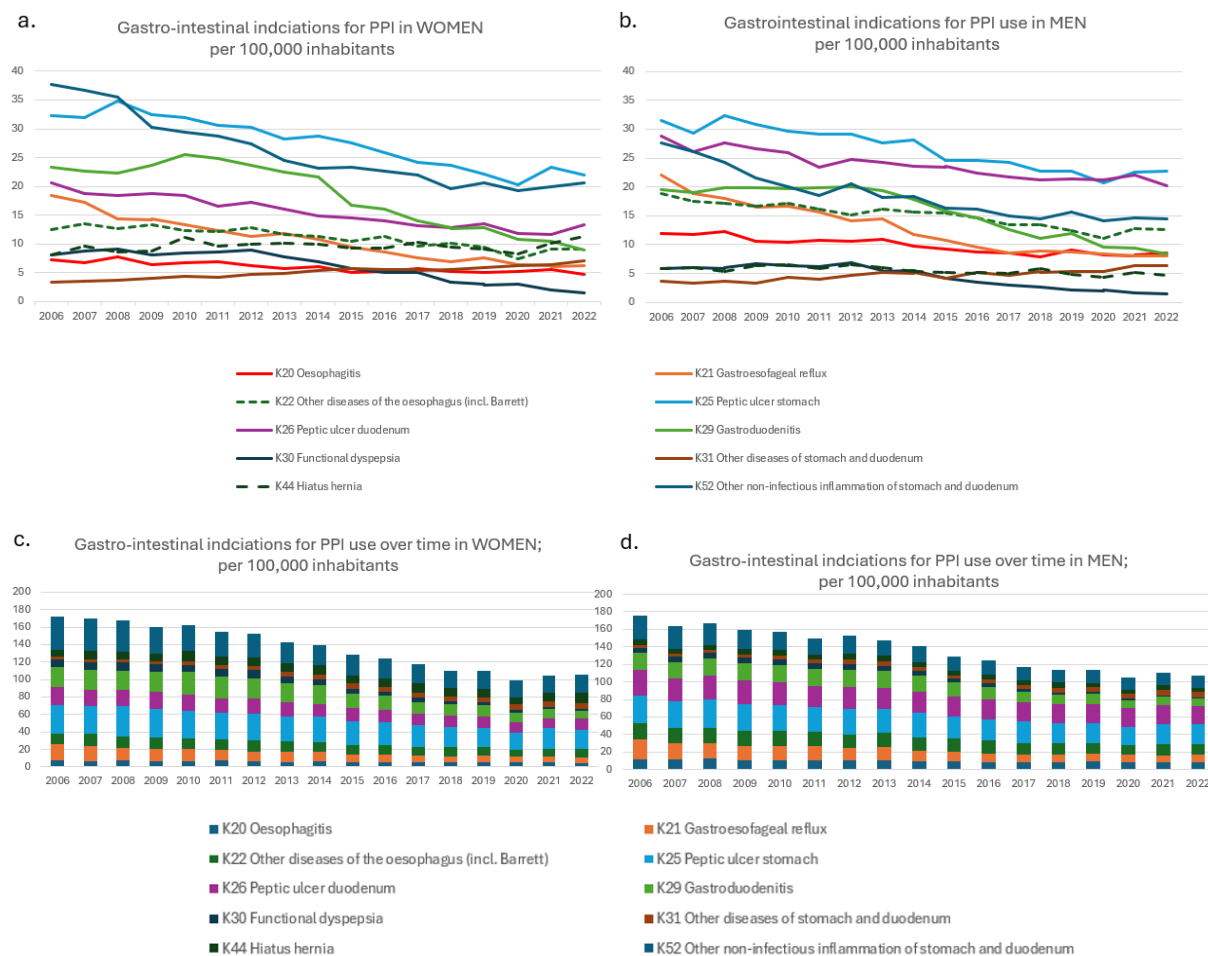
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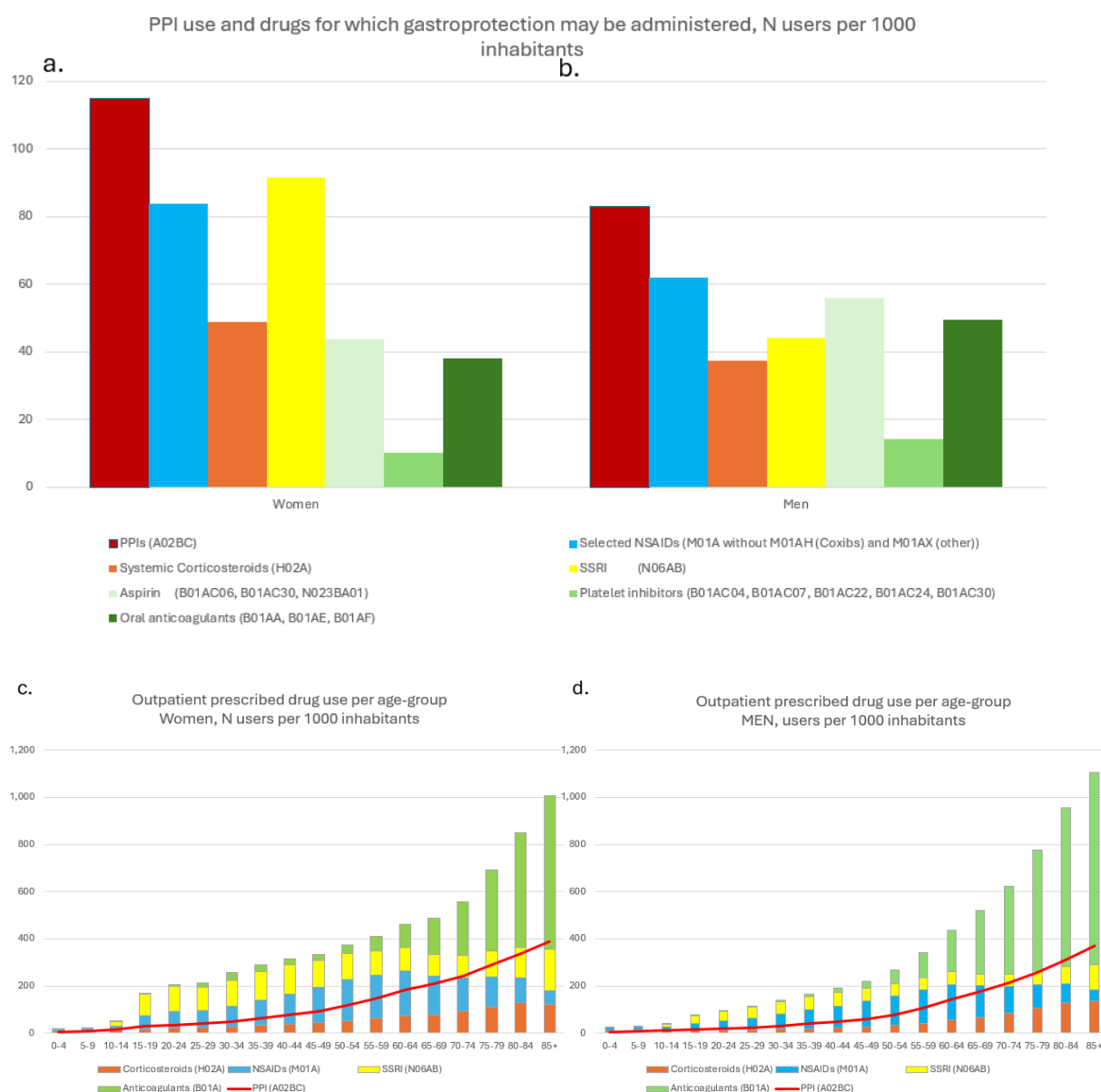
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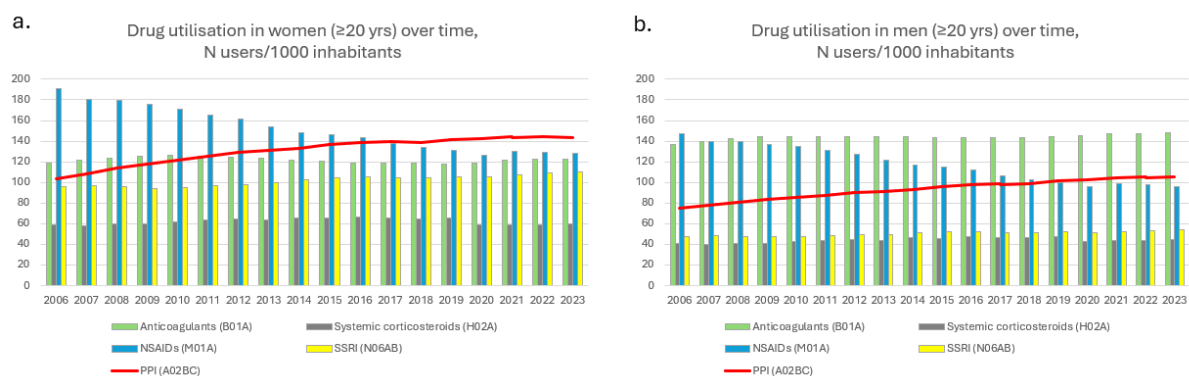


Online Figure A.2. Trends in gastrointestinal indications for proton pump inhibitor (PPI) use over time (2006-2022), (a-b) for each indication, and (c-d) accumulated.



Online Figure A.3. Potential ulcerogenic drugs for which proton pump inhibitors (PPI) may be administered for gastroprotection: (a-b) overall; (c-d) cumulative per age group for both sexes.

NSAIDs, non-steroidal anti-inflammatory drugs; PPI, proton pump inhibitors; SSRI, selective serotonin-reuptake inhibitors



Online Figure A.4. Prescribed proton pump inhibitor (PPI) and ulcerogenic drug use over time in adults (≥ 20 years) over time for (a) women and (b) men.

NSAIDs, non-steroidal anti-inflammatory drugs; PPI, proton pump inhibitors; SSRI, selective serotonin-reuptake inhibitors

Online Table A.1: Different types of Proton Pump Inhibitors (PPIs), when they were approved in Sweden, and which dosages are currently available.

		Prescription		Over the counter (OTC)	
		Approved	Dosages	Approved	Dosages
Omeprazole	A02BC01	1988	10, 20 & 40 mg	1999	10 & 20 mg
Pantoprazole	A02BC02	1998	20 & 40 mg	2011	20 mg
Lansoprazole	A02BC03	2003	15 & 30 mg	2011	15 & 30 mg
Rabeprazole	A02BC04	1999	10 & 20 mg	NA	NA
Esomeprazole	A02BC05	2000	10, 20 & 40 mg	2013	20 mg

Source: <https://www.lakemedelsverket.se/en/permission-approval-and-control/marketing-authorisation/non-prescription-medicinal-products>; <https://www.lakemedelsverket.se/sv/sok-lakemedelsfakta/lakemedel/>; www.janusinfo.se

Online Table A.2. List of potential indications for which proton pump inhibitor use could be considered, based on the 10th version of the International Coding of Diseases

B98 Other specified infectious organisms as cause of disease (incl. *H. pylori*)
 C15-C26 Gastro-intestinal tumours
 D56 Thalassemia
 E16 Other disorders of the internal secretion of the pancreas (incl. Zollinger Ellison)
 F50 Eating disorders
 J02 Acute pharyngitis
 J04 Acute laryngitis/tracheitis
 K14 Diseases of the tongue (incl. burning mouth syndrome)
K20 Oesophagitis*
K21 Gastro-oesophageal reflux (with/without oesophagitis)*
K22 Other diseases of the oesophagus (incl. Barrett, ulcers; strictures, stenosis, perforation etc.)*
K23 Changes in oesophagus in diseases classified elsewhere
K25 Peptic ulcer stomach*
K26 Peptic ulcer duodenum*
 K27 Peptic ulcer in stomach or duodenum, not specified
 K28 Recurring peptic ulcer after gastroenterostomy
K29 Gastroduodenitis*
K30 Functional dyspepsia*
K31 Other diseases of stomach and duodenum (incl. pylorus stenosis, pylorus spasm, achlorhydria)*
K44 Hiatus hernia*
K52 Other non-infectious inflammation of stomach and duodenum (incl. eosinophilic gastritis or gastroenteritis)*
 K58 Irritable bowel syndrome
 K59 Other functional bowel diseases
 M05-M14 Inflammatory polyarthritis
 M30-M36 Systemic inflammatory diseases
 Q38-Q45 Other congenital malformations of the gastrointestinal tract
 >Q39 Congenital malformations oesophagus (incl. oesophageal atresia)
 >Q43 Other congenital bowel malformations
 >Q79 Congenital malformations of muscles/bones not classified elsewhere (incl. diaphragmatic Hernia)
 R05 Cough (incl. Chronic cough)
*** Ten most commonly reported potential gastrointestinal indications (based on 2022 Swedish Patient Registry data) for proton pump inhibitor use (all ages).**

Online Table A.3. Proton pump inhibitor (PPI) use per age-group and by sex, expressed as number of users and number of prescriptions per 1000 inhabitants (in 2023).

Age, in years	Users/1000 inhabitants		Prescriptions/1000 inhabitants	
	Women	Men	Women	Men
0-4	5.3	6.0	13.1	15.1
5-9	8.0	7.5	14.6	15.0
10-14	15.5	12.2	24.6	21.3
15-19	30.7	14.5	49.9	26.5
20-24	35.5	18.0	63.7	35.8
25-29	40.5	23.2	86.1	52.8
30-34	49.8	30.6	112.8	75.0
35-39	63.6	40.6	152.2	103.2
40-44	77.6	49.7	203.0	137.3
45-49	93.3	61.6	259.5	180.9
50-54	119.1	79.9	364.0	255.9
55-59	147.5	107.2	485.5	379.5
60-64	185.8	144.8	637.7	544.6
65-69	211.6	177.6	781.7	724.2
70-74	244.1	212.1	1,003.1	938.8
75-79	290.4	255.6	1,443.7	1,303.7
80-84	339.0	312.2	2,255.8	1,969.8
85+	388.7	369.9	4,511.8	3,508.2

Online Table A.4. Potential indications for proton pump inhibitors (PPIs) by age and for female (F) and male (M) individuals separately.

Diagnosis (ICD-10)	0-4 yrs		5-9 yrs		10-14 yrs		15-19 yrs		20-39 yrs		40-64 yrs		65-85 yrs		85+		All	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
B98 Other specified infectious organisms as cause of disease (incl. <i>H. pylori</i>)	0.0	0.3	0.0	0.3	1.0	0.6	2.1	0.6	1.0	0.1	0.4	0.2	0.9	0.8	0.6	1.0	0.0	0.0
C15-C26 Gastro-intestinal tumours	0.4	1.0	0.7	0.0	0.7	1.2	3.8	1.3	10.9	12.4	148.8	181.5	684.5	947.0	844.3	1,224.2	114.9	137.2
D56 Thalassemia	33.9	32.8	24.9	26.0	20.2	24.3	22.9	14.2	9.3	5.1	6.2	3.4	1.8	0.3	0.0	0.0	0.3	0.3
E16 Other disorders of the internal secretion of the pancreas (incl. Zollinger Ellison)	37.5	35.1	19.9	23.8	12.7	11.4	16.1	13.8	14.6	8.9	21.6	16.6	38.2	59.9	88.1	124.2	5.7	6.5
F50 Eating disorders	13.2	20.3	23.6	28.8	389.1	44.3	1,092.7	54.7	205.0	10.7	38.4	3.2	2.9	1.2	1.2	1.0	20.0	1.1
J02 Acute pharyngitis	42.1	43.9	20.9	20.9	18.3	22.8	57.1	34.8	35.5	23.8	15.8	13.3	14.1	13.6	7.5	11.8	1.4	1.8
J04 Acute laryngitis/tracheitis	29.6	38.8	7.3	12.5	8.2	11.7	9.6	2.9	15.2	7.8	17.5	10.2	16.7	14.4	11.0	14.8	2.8	2.5
K14 Diseases of the tongue (incl. burning mouth syndrome)	12.1	18.6	4.0	5.9	4.6	3.4	4.1	3.5	10.0	8.9	25.1	14.4	36.6	22.7	21.4	18.7	0.2	0.2
K20 Oesophagitis*	3.6	8.1	10.6	21.9	10.1	26.8	13.7	48.0	15.3	33.8	28.4	53.5	56.7	90.0	71.3	92.7	<u>4.7</u>	<u>8.6</u>
K21 Gastro-oesophageal reflux*	156.3	209.0	57.4	77.2	59.4	69.5	68.4	59.6	75.0	74.1	169.3	133.1	239.2	218.9	141.4	128.1	<u>6.3</u>	<u>8.0</u>
K22 Other diseases of the oesophagus (incl. Barrett)*	8.2	9.5	3.0	6.9	3.3	5.8	9.2	11.9	15.3	18.1	34.1	55.2	116.8	205.9	104.9	160.7	<u>9.1</u>	<u>12.6</u>
K23 Changes in oesophagus in diseases classified elsewhere	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
K25 Peptic ulcer stomach*	0.0	0.7	0.7	0.0	0.7	0.0	3.4	6.1	13.2	12.0	51.8	41.7	127.3	137.5	182.0	227.7	<u>21.9</u>	<u>22.8</u>
K26 Peptic ulcer duodenum*	0.4	0.7	0.7	0.9	0.3	1.5	2.1	7.4	5.5	12.4	14.1	22.7	53.6	89.6	123.4	177.4	<u>13.4</u>	<u>20.2</u>
K27 Peptic ulcer in stomach or duodenum, not specified	0.0	0.7	0.0	0.3	0.3	0.6	0.0	1.3	1.4	1.3	2.4	4.5	9.4	12.3	20.9	18.7	2.0	2.2
K28 Recurring peptic ulcer after gastroenterostomy	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	1.0	0.1	3.5	1.2	1.8	1.0	0.0	1.0	0.9	0.3
K29 Gastroduodenitis*	6.8	6.1	17.6	19.4	49.3	34.2	112.2	47.0	107.3	64.6	130.5	97.5	217.4	189.7	165.7	206.0	<u>9.0</u>	<u>8.4</u>
K30 Functional dyspepsia*	1.8	2.4	15.9	11.3	41.1	28.0	91.0	31.9	73.4	44.9	79.8	45.4	81.9	50.3	55.1	40.4	<u>1.6</u>	<u>1.4</u>
K31 Other diseases of stomach and duodenum*	2.9	1.7	1.3	1.3	3.3	2.5	10.3	3.5	14.4	7.4	41.1	30.1	110.8	101.1	103.1	99.6	<u>7.1</u>	<u>6.3</u>
K44 Hiatus hernia*	1.8	2.4	0.3	0.6	0.3	0.0	9.9	9.3	52.7	41.7	136.2	95.0	388.1	245.4	297.3	249.4	<u>11.4</u>	<u>4.7</u>
K52 Other non-infectious inflammation of stomach and duodenum (incl. eosinophilic gastritis or gastroenteritis)*	298.4	305.9	66.4	78.2	56.8	56.3	62.9	62.8	90.4	66.3	141.1	75.1	274.2	154.3	230.1	179.4	<u>20.7</u>	<u>14.6</u>
K58 Irritable bowel syndrome	3.9	5.1	20.6	18.1	75.4	77.8	144.7	70.8	76.1	32.3	61.2	22.2	52.4	16.1	20.9	9.9	1.1	0.6
K59 Other functional bowel diseases	2,240.7	1,908.6	1,383.5	1,147.8	693.8	605.5	362.3	185.2	201.8	101.0	229.4	129.9	507.1	431.4	987.4	1,144.4	43.5	33.1
M05-M14 Inflammatory polyarthritis	105.6	121.5	151.7	155.4	181.7	108.3	274.7	126.6	312.1	108.3	790.6	351.4	1,671.8	1,061.5	1,246.5	1,245.9	19.5	25.2

M30-M36 Systemic inflammatory diseases	30.0	31.1	33.5	28.5	45.3	25.8	89.6	28.3	179.8	38.8	378.7	103.7	745.5	389.1	445.0	334.2	22.1	13.1
Q38-Q45 Other congenital malformations of the gastrointestinal tract	436.5	724.2	58.4	135.4	36.5	53.5	27.0	34.5	5.8	7.9	6.6	4.5	8.5	7.1	5.2	2.0	3.4	4.6
Q39 Congenital malformations oesophagus (incl. atresia)	13.6	16.2	8.6	8.8	3.6	4.6	3.4	5.8	0.3	0.6	0.3	0.1	0.5	1.0	1.2	0.0	0.4	0.3
Q43 Other congenital bowel malformations	23.2	27.3	7.3	18.4	9.5	14.2	5.1	9.0	1.3	1.3	0.8	1.5	0.7	0.9	0.6	1.0	1.2	1.8
Q79 Congenital malformations incl. diaphragmatic Hernia	28.9	37.8	13.6	19.1	15.3	12.6	23.3	8.7	22.2	4.2	19.9	1.8	4.1	0.4	0.6	0.0	17.0	6.3
R05 Cough (incl. Chronic cough)	948.7	1,159.1	245.2	322.4	77.6	104.0	66.4	58.9	76.4	50.4	150.2	108.0	207.4	207.4	225.4	279.9	2.2	2.5

* Ten most commonly reported potential gastrointestinal indications (based on 2022 Swedish Patient Registry data) for proton pump inhibitor use (all ages).

Online Table A.5. Number of users of prescribed proton pump inhibitors and potential ulcerogenic drugs, expressed as number of users per 1000 inhabitants (2023), and for female (F) and male (M) users separately.

Patients per 1,000 inhabitants	Age group (years)	PPIs (A02BC)		Selected NSAIDs (M01A without M01AH (Coxibs) and M01AX (other))		Systemic Corticosteroids (H02A)		SSRI (N06AB)		Aspirin (B01AC06, B01AC30, N023BA01)		Platelet inhibitors (B01AC04, B01AC07, B01AC22, B01AC24, B01AC30)		Oral anticoagulants (B01AA, B01AE, B01AF)	
		F	M	F	M	F	M	F	M	F	M	F	M	F	M
	0-4	5.28	5.98	9.60	11.21	8.12	11.36	0.00	0.01	0.26	0.36	0.00	0.01	0.11	0.15
	5-9	7.99	7.53	9.40	10.77	10.16	14.62	0.75	1.24	0.35	0.42	0.00	0.01	0.05	0.09
	10-14	15.46	12.22	18.31	11.14	11.15	14.30	19.09	13.25	0.34	0.47	0.01	0.01	0.10	0.13
	15-19	30.72	14.48	52.19	24.38	17.77	15.06	92.07	32.20	0.67	0.60	0.02	0.01	0.67	0.54
	20-39	48.06	28.59	74.26	50.05	27.57	17.12	108.38	49.32	11.49	1.48	0.20	0.31	2.14	2.40
	40-64	123.62	87.27	131.54	98.53	54.38	36.24	109.21	54.03	20.79	39.83	4.72	10.55	14.89	26.56
	65-84	263.69	228.90	100.92	84.47	100.61	92.49	102.75	55.43	136.29	213.92	34.06	54.22	119.29	188.93
	85+	388.72	369.89	40.41	34.34	122.85	136.67	175.47	104.81	278.18	340.48	69.60	90.17	330.11	443.74
	0-85+	114.78	82.97	83.74	62.10	48.85	37.38	91.63	44.00	43.79	55.75	10.12	14.31	38.16	49.58