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Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
Belgian Health Care Knowledge Centre

REGIONAL DIFFERENCES IN THYROID CANCER INCIDENCE IN BELGIUM: ROLE OF DIAGNOSTIC AND THERAPEUTIC STRATEGIES FOR THYROID DISEASE

APPENDIX

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HEALTH SERVICES RESEARCH

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REGIONAL DIFFERENCES IN THYROID CANCER INCIDENCE IN BELGIUM: ROLE OF DIAGNOSTIC AND THERAPEUTIC STRATEGIES FOR THYROID DISEASE

APPENDIX

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COLOPHON

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	2004				2005				2006				2004-2006			
	N	%	ESR	95 % CI	N	%	ESR	95 % CI	N	%	ESR	95 % CI	N	%	ESR	95 % CI
Males																
Papillary carcinoma	100	64,94	1,80	[1,45 ; 2,16]	110	63,58	2,02	[1,64 ; 2,40]	116	66,67	2,11	[1,72 ; 2,50]	326	65,07	1,98	[1,76 ; 2,19]
Follicular carcinoma	28	18,18	0,47	[0,31 ; 0,68]	33	19,08	0,60	[0,39 ; 0,80]	33	18,97	0,56	[0,37 ; 0,75]	94	18,76	0,54	[0,43 ; 0,65]
Medullary carcinoma	9	5,84	0,16	[0,07 ; 0,31]	17	9,83	0,32	[0,19 ; 0,51]	16	9,20	0,27	[0,16 ; 0,44]	42	8,38	0,25	[0,17 ; 0,33]
Anaplastic carcinoma	5	3,25	0,08	[0,03 ; 0,18]	8	4,62	0,11	[0,05 ; 0,22]	2	1,15	0,03	[0,00 ; 0,10]	15	2,99	0,07	[0,04 ; 0,12]
Others	12	7,79	0,21	[0,11 ; 0,36]	5	2,89	0,09	[0,03 ; 0,20]	7	4,02	0,12	[0,05 ; 0,24]	24	4,79	0,14	[0,09 ; 0,20]
Females																
Papillary carcinoma	339	71,22	6,14	[5,48 ; 6,81]	376	74,31	6,69	[6,00 ; 7,38]	419	82,32	7,43	[6,71 ; 8,15]	1134	76,06	6,76	[6,36 ; 7,16]
Follicular carcinoma	86	18,07	1,45	[1,14 ; 1,77]	73	14,43	1,18	[0,90 ; 1,46]	54	10,61	0,93	[0,67 ; 1,18]	213	14,29	1,19	[1,02 ; 1,35]
Medullary carcinoma	24	5,04	0,40	[0,26 ; 0,59]	20	3,95	0,30	[0,18 ; 0,47]	15	2,95	0,24	[0,14 ; 0,40]	59	3,96	0,32	[0,23 ; 0,40]
Anaplastic carcinoma	13	2,73	0,13	[0,07 ; 0,22]	20	3,95	0,22	[0,13 ; 0,34]	8	1,57	0,09	[0,04 ; 0,18]	41	2,75	0,15	[0,10 ; 0,20]
Others	14	2,94	0,22	[0,12 ; 0,36]	17	3,36	0,22	[0,13 ; 0,35]	13	2,55	0,21	[0,11 ; 0,35]	44	2,95	0,21	[0,15 ; 0,28]
Total																
Papillary carcinoma	439	69,68	3,97	[3,59 ; 4,35]	486	71,58	4,36	[3,96 ; 4,75]	535	78,33	4,79	[4,38 ; 5,20]	1460	73,29	4,38	[4,15 ; 4,60]
Follicular carcinoma	114	18,10	0,96	[0,78 ; 1,14]	106	15,61	0,90	[0,73 ; 1,08]	87	12,74	0,74	[0,58 ; 0,90]	307	15,41	0,87	[0,77 ; 0,97]
Medullary carcinoma	33	5,24	0,28	[0,18 ; 0,38]	37	5,45	0,31	[0,21 ; 0,41]	31	4,54	0,26	[0,16 ; 0,35]	101	5,07	0,28	[0,23 ; 0,34]
Anaplastic carcinoma	18	2,86	0,11	[0,07 ; 0,18]	28	4,12	0,17	[0,12 ; 0,25]	10	1,46	0,06	[0,03 ; 0,12]	56	2,81	0,12	[0,08 ; 0,15]
Others	26	4,13	0,21	[0,14 ; 0,31]	22	3,24	0,16	[0,10 ; 0,24]	20	2,93	0,16	[0,10 ; 0,25]	68	3,41	0,18	[0,13 ; 0,22]

2. APPENDIX 2. FREQUENCY (%) AND INCIDENCE OF THYROID CANCER BY T CATEGORY (AND SIZE), BELGIUM 2004-2006

Belgium		2004					2005					2006					2004-2006				
		N	%	ESR	95% IC		N	%	ESR	95% IC		N	%	ESR	95% IC		N	%	ESR	95% IC	
Males																					
T1		58	45,31	1,05	[0,78	; 1,32]	60	44,78	1,10	[0,82	; 1,39]	74	51,03	1,35	[1,04	; 1,66]	192	47,17	1,17	[1,00	; 1,33]
	size ≤ 1cm	31		0,55	[0,36	; 0,75]	32		0,59	[0,38	; 0,80]	46		0,84	[0,60	; 1,09]	109		0,66	[0,54	; 0,79]
	1cm < size ≤ 2cm	10		0,19	[0,09	; 0,34]	18		0,34	[0,20	; 0,54]	20		0,38	[0,23	; 0,58]	48		0,30	[0,22	; 0,39]
	unknown size	17		0,31	[0,18	; 0,50]	10		0,17	[0,08	; 0,32]	8		0,13	[0,06	; 0,25]	35		0,20	[0,14	; 0,27]
T2		23	17,97	0,43	[0,27	; 0,64]	24	17,91	0,45	[0,29	; 0,67]	42	28,97	0,74	[0,51	; 0,96]	89	21,87	0,54	[0,43	; 0,65]
T3		32	25,00	0,54	[0,35	; 0,73]	39	29,10	0,71	[0,48	; 0,93]	25	17,24	0,45	[0,29	; 0,67]	96	23,59	0,57	[0,45	; 0,68]
T4		15	11,72	0,26	[0,14	; 0,42]	11	8,21	0,16	[0,08	; 0,29]	4	2,76	0,07	[0,02	; 0,17]	30	7,37	0,16	[0,11	; 0,23]
Females																					
T1		242	62,53	4,40	[3,84	; 4,96]	244	59,66	4,29	[3,74	; 4,84]	289	64,51	5,19	[4,59	; 5,80]	775	62,30	4,63	[4,30	; 4,96]
	size ≤ 1cm	154		2,83	[2,38	; 3,28]	136		2,37	[1,96	; 2,78]	194		3,44	[2,95	; 3,93]	484		2,88	[2,62	; 3,14]
	1cm < size ≤ 2cm	41		0,70	[0,48	; 0,92]	53		0,95	[0,69	; 1,21]	74		1,36	[1,05	; 1,67]	168		1,00	[0,85	; 1,16]
	unknown size	47		0,87	[0,62	; 1,12]	55		0,98	[0,72	; 1,24]	21		0,40	[0,25	; 0,61]	123		0,75	[0,61	; 0,88]
T2		73	18,86	1,33	[1,02	; 1,64]	62	15,16	1,12	[0,84	; 1,40]	78	17,41	1,35	[1,04	; 1,66]	213	17,12	1,27	[1,09	; 1,44]
T3		45	11,63	0,75	[0,52	; 0,97]	72	17,60	1,22	[0,93	; 1,51]	64	14,29	1,10	[0,83	; 1,38]	181	14,55	1,02	[0,87	; 1,18]
T4		27	6,98	0,36	[0,23	; 0,52]	31	7,58	0,40	[0,25	; 0,55]	17	3,79	0,23	[0,13	; 0,36]	75	6,03	0,33	[0,25	; 0,40]
Total																					
T1		300	58,37	2,73	[2,42	; 3,04]	304	55,99	2,71	[2,40	; 3,01]	363	61,21	3,27	[2,93	; 3,61]	967	58,61	2,91	[2,72	; 3,09]
	size ≤ 1cm	185		1,69	[1,45	; 1,94]	168		1,48	[1,26	; 1,71]	240		2,15	[1,88	; 2,43]	593		1,78	[1,63	; 1,92]
	1cm < size ≤ 2cm	51		0,45	[0,32	; 0,57]	71		0,65	[0,49	; 0,80]	94		0,86	[0,69	; 1,04]	216		0,65	[0,56	; 0,74]
	unknown size	64		0,59	[0,44	; 0,74]	65		0,58	[0,44	; 0,72]	29		0,26	[0,17	; 0,37]	158		0,48	[0,40	; 0,55]
T2		96	18,68	0,88	[0,70	; 1,06]	86	15,84	0,78	[0,62	; 0,95]	120	20,24	1,05	[0,85	; 1,24]	302	18,30	0,90	[0,80	; 1,01]
T3		77	14,98	0,64	[0,49	; 0,79]	111	20,44	0,96	[0,78	; 1,15]	89	15,01	0,78	[0,61	; 0,94]	277	16,79	0,79	[0,70	; 0,89]
T4		41	7,98	0,30	[0,20	; 0,39]	42	7,73	0,28	[0,19	; 0,37]	21	3,54	0,15	[0,09	; 0,23]	104	6,30	0,25	[0,20	; 0,29]

3. APPENDIX 3. INCIDENCE OF THYROID CANCER BY SEX AND BY REGION, 2004-2006

	2004			2005			2006			2004-2006		
	N	ESR	95 % CI	N	ESR	95 % CI	N	ESR	95 % CI	N	ESR	95 % CI
Males												
Brussels Capital Region	23	4,76	[3,02 ; 7,14]	15	3,29	[1,84 ; 5,43]	21	4,37	[2,71 ; 6,69]	59	4,14	[3,07 ; 5,21]
Walloon Region	69	3,87	[2,95 ; 4,79]	86	5,03	[3,96 ; 6,11]	73	4,18	[3,21 ; 5,14]	228	4,36	[3,79 ; 4,93]
Flemish Region	62	1,82	[1,36 ; 2,28]	72	2,13	[1,63 ; 2,63]	80	2,34	[1,82 ; 2,85]	214	2,09	[1,81 ; 2,38]
Belgium	154	2,72	[2,28 ; 3,15]	173	3,13	[2,66 ; 3,60]	174	3,09	[2,63 ; 3,55]	501	2,98	[2,72 ; 3,24]
Females												
Brussels Capital Region	79	15,30	[11,86 ; 18,75]	55	10,40	[7,58 ; 13,22]	63	11,84	[8,87 ; 14,82]	197	12,52	[10,74 ; 14,31]
Walloon Region	227	12,25	[10,62 ; 13,88]	220	11,90	[10,30 ; 13,51]	226	12,30	[10,66 ; 13,93]	673	12,15	[11,22 ; 13,09]
Flemish Region	170	5,12	[4,33 ; 5,92]	231	6,56	[5,68 ; 7,44]	220	6,55	[5,67 ; 7,44]	621	6,08	[5,59 ; 6,58]
Belgium	476	8,35	[7,58 ; 9,11]	506	8,61	[7,84 ; 9,38]	509	8,90	[8,12 ; 9,69]	1491	8,63	[8,18 ; 9,08]
Total												
Brussels Capital Region	102	10,12	[8,12 ; 12,13]	70	7,01	[5,34 ; 8,69]	84	8,10	[6,34 ; 9,85]	256	8,42	[7,37 ; 9,46]
Walloon Region	296	8,14	[7,19 ; 9,08]	306	8,51	[7,54 ; 9,48]	299	8,28	[7,33 ; 9,23]	901	8,31	[7,76 ; 8,86]
Flemish Region	232	3,45	[3,00 ; 3,91]	303	4,36	[3,85 ; 4,86]	300	4,44	[3,93 ; 4,95]	835	4,09	[3,81 ; 4,37]
Belgium	630	5,54	[5,10 ; 5,98]	679	5,90	[5,45 ; 6,35]	683	6,01	[5,55 ; 6,46]	1992	5,82	[5,56 ; 6,08]

4. APPENDIX 4. FREQUENCY (%) AND INCIDENCE BY SEX AND HISTOLOGICAL TYPE, 2004-2006

Histological type	Brussels Capital Region				Walloon Region				Flemish Region			
	N	%	ESR	95 % CI	N	%	ESR	95 % CI	N	%	ESR	95 % CI
Males												
Papillary carcinoma	42	71,19	2,95	[2,04 ; 3,85]	173	75,88	3,35	[2,85 ; 3,85]	111	51,87	1,13	[0,92 ; 1,34]
Follicular carcinoma	11	18,64	0,82	[0,41 ; 1,46]	31	13,60	0,56	[0,36 ; 0,76]	52	24,30	0,49	[0,35 ; 0,62]
Medullary carcinoma	3	5,08	0,19	[0,04 ; 0,54]	11	4,82	0,21	[0,10 ; 0,37]	28	13,08	0,28	[0,19 ; 0,41]
Anaplastic carcinoma	1	1,69	0,05	[0,00 ; 0,29]	4	1,75	0,07	[0,02 ; 0,19]	10	4,67	0,08	[0,04 ; 0,14]
Others	2	3,39	0,14	[0,02 ; 0,50]	9	3,95	0,16	[0,07 ; 0,31]	13	6,07	0,13	[0,07 ; 0,21]
Females												
Papillary carcinoma	163	82,74	10,44	[8,81 ; 12,07]	557	82,76	10,24	[9,37 ; 11,10]	414	66,67	4,28	[3,86 ; 4,70]
Follicular carcinoma	24	12,18	1,57	[1,01 ; 2,32]	63	9,36	1,10	[0,82 ; 1,38]	126	20,29	1,18	[0,97 ; 1,39]
Medullary carcinoma	3	1,52	0,16	[0,03 ; 0,47]	32	4,75	0,54	[0,35 ; 0,73]	24	3,86	0,22	[0,14 ; 0,32]
Anaplastic carcinoma	3	1,52	0,17	[0,04 ; 0,51]	8	1,19	0,10	[0,04 ; 0,20]	30	4,83	0,18	[0,12 ; 0,25]
Others	4	2,03	0,17	[0,05 ; 0,45]	13	1,93	0,18	[0,10 ; 0,31]	27	4,35	0,23	[0,15 ; 0,34]
Total												
Papillary carcinoma	205	80,08	6,77	[5,82 ; 7,71]	730	81,02	6,83	[6,33 ; 7,34]	525	62,87	2,69	[2,46 ; 2,93]
Follicular carcinoma	35	13,67	1,20	[0,80 ; 1,61]	94	10,43	0,84	[0,66 ; 1,01]	178	21,32	0,83	[0,71 ; 0,96]
Medullary carcinoma	6	2,34	0,17	[0,06 ; 0,37]	43	4,77	0,38	[0,26 ; 0,50]	52	6,23	0,25	[0,18 ; 0,31]
Anaplastic carcinoma	4	1,56	0,12	[0,03 ; 0,30]	12	1,33	0,09	[0,05 ; 0,16]	40	4,79	0,14	[0,09 ; 0,18]
Others	6	2,34	0,16	[0,06 ; 0,35]	22	2,44	0,17	[0,11 ; 0,25]	40	4,79	0,18	[0,12 ; 0,24]

5. APPENDIX 5. INCIDENCE OF THYROID CANCER BY T CATEGORY AND SIZE, 2004-2006

T category	Brussels Capital Region			Walloon Region			Flemish Region		
	N	ESR	95% CI	N	ESR	95% CI	N	ESR	95% CI
Males									
T1	21	1,51	[0,93 ; 2,31]	110	2,12	[1,72 ; 2,52]	61	0,62	[0,46 ; 0,78]
size ≤ 1cm	13	0,93	[0,49 ; 1,58]	73	1,40	[1,08 ; 1,73]	23	0,24	[0,15 ; 0,36]
1cm < size ≤ 2cm	6	0,43	[0,16 ; 0,93]	23	0,45	[0,29 ; 0,68]	19	0,20	[0,12 ; 0,31]
unknown size	2	0,15	[0,02 ; 0,56]	14	0,27	[0,15 ; 0,45]	19	0,18	[0,11 ; 0,29]
T2	11	0,80	[0,40 ; 1,44]	35	0,67	[0,44 ; 0,89]	43	0,43	[0,30 ; 0,56]
T3	15	1,04	[0,58 ; 1,71]	42	0,81	[0,56 ; 1,06]	39	0,38	[0,26 ; 0,51]
T4	2	0,13	[0,02 ; 0,48]	7	0,13	[0,05 ; 0,27]	21	0,18	[0,11 ; 0,28]
Females									
T1	117	7,53	[6,14 ; 8,92]	421	7,74	[6,99 ; 8,49]	237	2,45	[2,14 ; 2,77]
size ≤ 1cm	77	5,02	[3,88 ; 6,17]	294	5,37	[4,75 ; 5,99]	113	1,17	[0,95 ; 1,39]
1cm < size ≤ 2cm	26	1,61	[1,05 ; 2,37]	81	1,50	[1,17 ; 1,83]	61	0,63	[0,47 ; 0,79]
unknown size	14	0,90	[0,49 ; 1,51]	46	0,87	[0,61 ; 1,12]	63	0,66	[0,49 ; 0,82]
T2	31	1,94	[1,24 ; 2,65]	76	1,41	[1,09 ; 1,73]	106	1,09	[0,88 ; 1,31]
T3	21	1,36	[0,84 ; 2,08]	63	1,14	[0,85 ; 1,43]	97	0,92	[0,73 ; 1,11]
T4	5	0,31	[0,10 ; 0,73]	21	0,31	[0,19 ; 0,47]	49	0,35	[0,24 ; 0,45]
Total									
T1	138	4,58	[3,80 ; 5,36]	531	4,97	[4,54 ; 5,39]	298	1,53	[1,36 ; 1,71]
size ≤ 1cm	90	3,02	[2,38 ; 3,65]	367	3,41	[3,06 ; 3,77]	136	0,70	[0,58 ; 0,82]
1cm < size ≤ 2cm	32	1,03	[0,66 ; 1,39]	104	0,98	[0,79 ; 1,18]	80	0,41	[0,32 ; 0,50]
unknown size	16	0,53	[0,31 ; 0,87]	60	0,57	[0,42 ; 0,71]	82	0,42	[0,33 ; 0,51]
T2	42	1,40	[0,97 ; 1,83]	111	1,04	[0,85 ; 1,24]	149	0,76	[0,64 ; 0,88]
T3	36	1,20	[0,80 ; 1,60]	105	0,96	[0,78 ; 1,15]	136	0,66	[0,54 ; 0,77]
T4	7	0,23	[0,09 ; 0,48]	28	0,23	[0,15 ; 0,33]	70	0,27	[0,20 ; 0,33]

6. APPENDIX 6. FREQUENCY (%) AND INCIDENCE OF THYROID CANCER BY T CATEGORY AND HISTOLOGICAL TYPE, MALES & FEMALES, 2004-2006

T category	Papillary Ca				Follicular Ca				Medullary Ca				Anaplastic Ca				Others			
	N	%	ESR	95% CI	N	%	ESR	95% CI	N	%	ESR	95% CI	N	%	ESR	95% CI	N	%	ESR	95% CI
T1																				
Brussels	123	89,13	4,09	[3,36 ; 4,83]	11	7,97	0,40	[0,20 ; 0,72]	2	1,45	0,05	[0,01 ; 0,19]	0	0,00	0,00	[0,00 ; 0,00]	2	1,45	0,03	[0,00 ; 0,12]
Wallonia	494	93,03	4,62	[4,21 ; 5,03]	17	3,20	0,16	[0,10 ; 0,26]	16	3,01	0,14	[0,08 ; 0,23]	0	0,00	0,00	[0,00 ; 0,00]	4	0,75	0,04	[0,01 ; 0,10]
Flanders	260	87,25	1,35	[1,18 ; 1,51]	29	9,73	0,14	[0,09 ; 0,20]	7	2,35	0,04	[0,01 ; 0,07]	0	0,00	0,00	[0,00 ; 0,00]	2	0,67	0,01	[0,00 ; 0,03]
T2																				
Brussels	30	71,43	0,96	[0,65 ; 1,38]	10	23,81	0,37	[0,18 ; 0,68]	1	2,38	0,03	[0,00 ; 0,16]	0	0,00	0,00	[0,00 ; 0,00]	1	2,38	0,04	[0,00 ; 0,21]
Wallonia	73	65,77	0,68	[0,53 ; 0,84]	29	26,13	0,28	[0,19 ; 0,40]	7	6,31	0,06	[0,02 ; 0,12]	0	0,00	0,00	[0,00 ; 0,00]	2	1,80	0,02	[0,00 ; 0,07]
Flanders	105	70,47	0,55	[0,44 ; 0,65]	30	20,13	0,14	[0,09 ; 0,20]	10	6,71	0,05	[0,02 ; 0,09]	0	0,00	0,00	[0,00 ; 0,00]	4	2,68	0,02	[0,01 ; 0,05]
T3																				
Brussels	29	80,56	0,96	[0,64 ; 1,39]	5	13,89	0,17	[0,05 ; 0,05]	2	5,56	0,07	[0,01 ; 0,25]	0	0,00	0,00	[0,00 ; 0,00]	0	0,00	0,00	[0,00 ; 0,00]
Wallonia	75	72,12	0,70	[0,54 ; 0,86]	18	17,31	0,16	[0,10 ; 0,25]	6	5,77	0,06	[0,02 ; 0,13]	0	0,00	0,00	[0,00 ; 0,00]	5	4,81	0,04	[0,01 ; 0,08]
Flanders	71	52,21	0,36	[0,27 ; 0,44]	42	30,88	0,19	[0,13 ; 0,25]	15	11,03	0,07	[0,04 ; 0,11]	0	0,00	0,00	[0,00 ; 0,00]	8	5,88	0,04	[0,02 ; 0,08]
T4																				
Brussels	1	14,29	0,04	[0,00 ; 0,23]	2	28,57	0,07	[0,01 ; 0,27]	0	0,00	0,00	[0,00 ; 0,00]	4	57,14	0,12	[0,03 ; 0,30]	0	0,00	0,00	[0,00 ; 0,00]
Wallonia	10	34,48	0,09	[0,04 ; 0,16]	3	10,34	0,02	[0,01 ; 0,07]	1	3,45	0,01	[0,00 ; 0,05]	12	41,38	0,09	[0,05 ; 0,16]	3	10,34	0,02	[0,00 ; 0,06]
Flanders	10	14,29	0,04	[0,02 ; 0,08]	11	15,71	0,05	[0,02 ; 0,09]	1	1,43	0,00	[0,00 ; 0,02]	40	57,14	0,14	[0,09 ; 0,18]	8	11,43	0,04	[0,02 ; 0,07]

7. APPENDIX 7. INCIDENCE OF THYROID CANCER BY DISTRICT AND SEX, 2004-2006

	Males			Females			Total		
District	N	ESR	95%CI	N	ESR	95%CI	N	ESR	95%CI
Neufchâteau	10	11,65	[5,59 ; 21,43]	22	25,07	[15,72 ; 37,85]	32	18,40	[11,94 ; 24,85]
Philippeville	5	5,54	[1,80 ; 12,91]	25	23,20	[15,01 ; 34,34]	30	14,45	[9,75 ; 20,67]
Virton	6	7,73	[2,84 ; 16,84]	10	12,32	[5,91 ; 22,67]	16	10,09	[5,77 ; 16,35]
Marche	3	3,94	[0,81 ; 11,50]	13	16,35	[8,70 ; 27,95]	16	10,01	[5,72 ; 16,21]
Verviers	20	4,72	[2,88 ; 7,27]	60	14,30	[10,64 ; 17,96]	80	9,52	[7,41 ; 11,62]
Bastogne	0	0,00	[0,00 ; 0,00]	12	18,93	[9,79 ; 33,13]	12	9,37	[4,85 ; 16,41]
Nivelles	28	4,99	[3,32 ; 7,24]	79	13,30	[10,32 ; 16,28]	107	9,25	[7,48 ; 11,02]
Charleroi	24	3,89	[2,49 ; 5,75]	98	14,20	[11,33 ; 17,06]	122	9,08	[7,45 ; 10,72]
Dinant	5	3,20	[1,04 ; 7,45]	24	14,46	[9,27 ; 21,41]	29	8,95	[6,00 ; 12,89]
Namur	28	5,92	[3,94 ; 8,59]	55	11,96	[8,75 ; 15,18]	83	8,89	[6,94 ; 10,83]
Thuin	6	2,52	[0,92 ; 5,49]	34	14,89	[9,81 ; 19,97]	40	8,81	[6,05 ; 11,57]
Ieper	13	7,59	[4,04 ; 12,97]	17	10,24	[5,97 ; 16,39]	30	8,73	[5,89 ; 12,48]
Brussel	59	4,14	[3,07 ; 5,21]	197	12,52	[10,74 ; 14,31]	256	8,42	[7,37 ; 9,46]
Liège	44	4,76	[3,34 ; 6,19]	108	10,97	[8,84 ; 13,09]	152	7,88	[6,61 ; 9,16]
Huy	6	4,03	[1,48 ; 8,78]	18	11,05	[6,55 ; 17,46]	24	7,59	[4,86 ; 11,23]
Mons	14	3,87	[2,11 ; 6,50]	48	10,95	[7,73 ; 14,16]	62	7,59	[5,65 ; 9,52]
Arlon	4	5,15	[1,40 ; 13,17]	6	7,39	[2,71 ; 16,11]	10	6,12	[2,94 ; 11,26]
Brugge	13	2,62	[1,39 ; 4,48]	42	9,23	[6,32 ; 12,14]	55	5,88	[4,28 ; 7,49]
Halle-Vilvoorde	29	3,04	[2,03 ; 4,37]	82	8,49	[6,61 ; 10,37]	111	5,83	[4,72 ; 6,93]
Soignies	6	2,29	[0,84 ; 5,00]	26	8,97	[5,86 ; 13,18]	32	5,74	[3,74 ; 7,75]
Turnhout	19	2,58	[1,55 ; 4,03]	61	8,92	[6,66 ; 11,19]	80	5,70	[4,43 ; 6,96]
Waremme	4	3,45	[0,94 ; 8,82]	8	6,92	[2,98 ; 13,63]	12	5,28	[2,73 ; 9,24]
Mouscron	4	3,79	[1,03 ; 9,70]	7	6,63	[2,66 ; 13,66]	11	5,18	[2,58 ; 9,27]
Hasselt	16	2,54	[1,45 ; 4,12]	47	6,97	[4,94 ; 9,00]	63	4,75	[3,57 ; 5,94]
Leuven	24	2,92	[1,87 ; 4,32]	49	6,50	[4,65 ; 8,36]	73	4,64	[3,56 ; 5,73]
Aalst	9	2,00	[0,92 ; 3,80]	34	7,11	[4,60 ; 9,61]	43	4,59	[3,17 ; 6,01]
Diksmuide	2	2,85	[0,34 ; 10,29]	6	5,84	[2,14 ; 12,72]	8	4,51	[1,94 ; 8,89]
Ath	2	1,83	[0,22 ; 6,59]	8	6,68	[2,88 ; 13,15]	10	4,26	[2,05 ; 7,84]
Tournai	9	3,87	[1,77 ; 7,35]	12	4,39	[2,27 ; 7,68]	21	4,19	[2,59 ; 6,40]
Veurne	6	5,04	[1,85 ; 11,00]	5	2,47	[0,80 ; 5,76]	11	3,79	[1,89 ; 6,79]
Gent	13	1,66	[0,88 ; 2,84]	50	5,68	[4,05 ; 7,31]	63	3,72	[2,78 ; 4,66]
Maaseik	7	1,77	[0,71 ; 3,65]	19	5,67	[3,42 ; 8,85]	26	3,67	[2,39 ; 5,39]
Roeselare	2	0,93	[0,11 ; 3,37]	14	6,13	[3,34 ; 10,29]	16	3,54	[2,03 ; 5,74]
Mechelen	12	2,20	[1,14 ; 3,85]	29	4,66	[3,12 ; 6,71]	41	3,49	[2,37 ; 4,60]
Tongeren	2	0,59	[0,07 ; 2,12]	20	6,45	[3,94 ; 9,94]	22	3,49	[2,19 ; 5,27]
Oudenaarde	2	1,11	[0,13 ; 3,99]	10	5,66	[2,72 ; 10,41]	12	3,39	[1,75 ; 5,94]
Eeklo	1	0,85	[0,02 ; 4,76]	7	5,30	[2,13 ; 10,92]	8	3,11	[1,34 ; 6,12]
Kortrijk	9	1,81	[0,83 ; 3,43]	20	4,27	[2,61 ; 6,58]	29	3,01	[2,01 ; 4,33]
Oostende	3	1,07	[0,22 ; 3,13]	12	5,00	[2,58 ; 8,75]	15	3,00	[1,68 ; 4,96]
Sint-Niklaas	5	1,32	[0,43 ; 3,08]	18	4,50	[2,67 ; 7,11]	23	2,93	[1,86 ; 4,39]
Antwerpen	24	1,53	[0,98 ; 2,27]	63	4,05	[3,02 ; 5,09]	87	2,78	[2,19 ; 3,38]
Dendermonde	3	0,91	[0,19 ; 2,66]	12	3,21	[1,66 ; 5,62]	15	2,13	[1,19 ; 3,51]
Tielt	0	0,00	[0,00 ; 0,00]	4	2,19	[0,59 ; 5,60]	4	1,12	[0,31 ; 2,88]

8. APPENDIX 8. CASE AND INCIDENTAL FINDINGS

8.1. Nomenclature codes

Table 1. Nomenclature codes for procedures/tests under study (incidental and case findings of thyroid disease)

Nomenclature code	Category	LABEL_NL	LABEL_FR
257014	Surgery	Eenvoudige totale thyreoïdectomie of gedeeltelijke thyreoïdectomie	Thyroïdectomie totale simple ou thyroïdectomie partielle
257025	Surgery	Eenvoudige totale thyreoïdectomie of gedeeltelijke thyreoïdectomie	Thyroïdectomie totale simple ou thyroïdectomie partielle
257036	Surgery	Totale of subtotale tweezijdige thyreoïdectomie met dissectie van de nervi laryngei recurrentes en de bijschildklieren	Thyroïdectomie totale ou subtotale bilatérale avec dissection des nerfs récurrents et des glandes parathyroïdes
257040	Surgery	Totale of subtotale tweezijdige thyreoïdectomie met dissectie van de nervi laryngei recurrentes en de bijschildklieren	Thyroïdectomie totale ou subtotale bilatérale avec dissection des nerfs récurrents et des glandes parathyroïdes
434313	TSH	Doseren van schildklier-stimulerend hormoon (TSH) (Maximum 1) (Cumulregel 218, 311, 322) Klasse 13	Dosage de l'hormone thyréotrope (TSH) (Maximum 1) (Règle de cumul 218, 311, 322) Classe 13
434324	TSH	Doseren van schildklier-stimulerend hormoon (TSH) (Maximum 1) (Cumulregel 218, 311, 322) Klasse 13	Dosage de l'hormone thyréotrope (TSH) (Maximum 1) (Règle de cumul 218, 311, 322) Classe 13
442595	PET scan	Functionele scintigrafische test die twee opeenvolgende tomografische onderzoeken omvat, met verwerking op computer, die ten minste twee niet-parallelle reconstructievlakken omvat, met protocol en iconografische documenten, niet cumuleerbaar met de verstrekkingen 442411 - 442422, 442455 - 442466, 442610 - 442621 en 442632 - 442643 voor het onderzoek van een zelfde functie dat met een zelfde gemerkt produkt wordt verricht	Test scintigraphique fonctionnel comportant deux examens tomographiques successifs avec traitement par ordinateur comprenant au moins deux plans non parallèles de reconstruction, avec protocole et documents iconographiques, non cumulable avec les prestations 442411 - 442422, 442455 - 442466, 442610 - 442621 et 442632 - 442643 pour l'examen d'une même fonction effectué au moyen d'un même produit marqué

442606	PET scan	Functionele scintigrafische test die twee opeenvolgende tomografische onderzoeken omvat, met verwerking op computer, die ten minste twee niet-parallelle reconstructievlakken omvat, met protocol en iconografische documenten, niet cumuleerbaar met de verstrekkingen 442411 - 442422, 442455 - 442466, 442610 - 442621 en 442632 - 442643 voor het onderzoek van een zelfde functie dat met een zelfde gemerkt produkt wordt verricht	Test scintigraphique fonctionnel comportant deux examens tomographiques successifs avec traitement par ordinateur comprenant au moins deux plans non parallèles de reconstruction, avec protocole et documents iconographiques, non cumulable avec les prestations 442411 - 442422, 442455 - 442466, 442610 - 442621 et 442632 - 442643 pour l'examen d'une même fonction effectué au moyen d'un même produit marqué
442971	PET scan	Positronentomografisch onderzoek door coïncidentiedetectie met protocol en documenten, voor het geheel van het onderzoek	Tomographie à positrons par détection en coïncidence avec protocole et documents, pour l'ensemble de l'examen
442982	PET scan	Positronentomografisch onderzoek door coïncidentiedetectie met protocol en documenten, voor het geheel van het onderzoek	Tomographie à positrons par détection en coïncidence avec protocole et documents, pour l'ensemble de l'examen
458813	CT scan	Computergestuurde tomografie van de hals (weke delen) of van de thorax of van het abdomen, met en/of zonder contrastmiddel, met registreren en clichés, minimum 15 coupes, voor het hele onderzoek	Tomographie commandée par ordinateur, du cou (parties molles) ou du thorax, ou de l'abdomen,avec et/ou sans moyen de contraste, avec enregistrement et clichés, 15 coupes au minimum, pour l'ensemble de l'examen
458824	CT scan	Computergestuurde tomografie van de hals (weke delen) of van de thorax of van het abdomen, met en/of zonder contrastmiddel, met registreren en clichés, minimum 15 coupes, voor het hele onderzoek	Tomographie commandée par ordinateur, du cou (parties molles) ou du thorax, ou de l'abdomen,avec et/ou sans moyen de contraste, avec enregistrement et clichés, 15 coupes au minimum, pour l'ensemble de l'examen
459410	IRM	NMR-onderzoek van de hals of van de thorax of van het abdomen of van het bekken, minstens drie sequenties, met of zonder contrast, met registratie op optische of elektromagnetische drager	Examen d'IRM du cou ou du thorax ou de l'abdomen ou du bassin, minimum 3 séquences, avec ou sans contraste, avec enregistrement sur support soit optique, soit électromagnétique
459421	IRM	NMR-onderzoek van de hals of van de thorax of van het abdomen of van het bekken, minstens drie sequenties, met of zonder contrast, met registratie op optische of elektromagnetische drager	Examen d'IRM du cou ou du thorax ou de l'abdomen ou du bassin, minimum 3 séquences, avec ou sans contraste, avec enregistrement sur support soit optique, soit électromagnétique

459756	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis en kleurenduplexonderzoek van de diepliggende thoracale en/of abdominale en/of pelvische bloedvaten en/of bloedvaten van de ledematen	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales et examen duplex couleur des vaisseaux sanguins profonds thoraciques et/ou abdominaux et/ou pelviens et/ou des vaisseaux des membres
459760	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis en kleurenduplexonderzoek van de diepliggende thoracale en/of abdominale en/of pelvische bloedvaten en/of bloedvaten van de ledematen	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales et examen duplex couleur des vaisseaux sanguins profonds thoraciques et/ou abdominaux et/ou pelviens et/ou des vaisseaux des membres
459771	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis en echografie van één van de volgende streken : schedelinhoud (transfontanellair), thorax, borsten, lever-galblaas, pancreas-milt, nieren-blaas, retroperitoneum, grote abdominale vaten, totale bovenbuik, mannelijk of vrouwelijk bekken	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales et échographie d'une des régions suivantes : contenu du crâne (transfontanellaire), thorax, seins, foie-vésicule biliaire, pancréas-rate, reins-vessie, rétropéritoine, gros vaisseaux abdominaux, abdomen supérieur total, bassin masculin ou féminin
459782	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis en echografie van één van de volgende streken : schedelinhoud (transfontanellair), thorax, borsten, lever-galblaas, pancreas-milt, nieren-blaas, retroperitoneum, grote abdominale vaten, totale bovenbuik, mannelijk of vrouwelijk bekken	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales et échographie d'une des régions suivantes : contenu du crâne (transfontanellaire), thorax, seins, foie-vésicule biliaire, pancréas-rate, reins-vessie, rétropéritoine, gros vaisseaux abdominaux, abdomen supérieur total, bassin masculin ou féminin
460095	Echo Neck	Bidimensionele echografie met geschreven protocol en iconografische drager die ontstaat na digitale beeldverwerking van de gegevens, ongeacht het aantal echogrammen : Van de hals	Echographie bidimensionnelle avec protocole écrit et support iconographique issu d'un traitement digital des données, quel que soit le nombre d'échogrammes : Du cou
460106	Echo Neck	Bidimensionele echografie met geschreven protocol en iconografische drager die ontstaat na digitale beeldverwerking van de gegevens, ongeacht het aantal echogrammen : Van de hals	Echographie bidimensionnelle avec protocole écrit et support iconographique issu d'un traitement digital des données, quel que soit le nombre d'échogrammes : Du cou
460316	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis	Examen duplex couleur bilatéral des artères carotides
460320	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis	Examen duplex couleur bilatéral des artères carotides

460331	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebrales	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales
460342	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebrales	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales
469350	Echo Neck	Bidimensionele echografie met geschreven protocol en iconografische drager die ontstaat na digitale beeldverwerking van de gegevens ongeacht het aantal echogrammen : Van de hals	Echographie bidimensionnelle avec protocole écrit et support iconographique issu d'un traitement digital des données quel que soit le nombre d'échogrammes : Du cou
469361	Echo Neck	Bidimensionele echografie met geschreven protocol en iconografische drager die ontstaat na digitale beeldverwerking van de gegevens ongeacht het aantal echogrammen : Van de hals	Echographie bidimensionnelle avec protocole écrit et support iconographique issu d'un traitement digital des données quel que soit le nombre d'échogrammes : Du cou
469711	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis	Examen duplex couleur bilatéral des artères carotides
469722	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis	Examen duplex couleur bilatéral des artères carotides
469733	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales
469744	Duplex	Bilateraal kleurenduplexonderzoek van de arteria carotis en van de arteria vertebralis	Examen duplex couleur bilatéral des artères carotides et des artères vertébrales
546173	TSH	Doseren van schildklier stimulerend hormoon (TSH) (Maximum 1) (Cumulregel 218, 311, 322) Klasse 13	Dosage de l'hormone thyréotrope (TSH) (Maximum 1) (Règle de cumul 218, 311, 322) Classe 13
546184	TSH	Doseren van schildklier stimulerend hormoon (TSH) (Maximum 1) (Cumulregel 218, 311, 322) Klasse 13	Dosage de l'hormone thyréotrope (TSH) (Maximum 1) (Règle de cumul 218, 311, 322) Classe 13
698154	Dose ^{131}I	Radio-isotopen, radio-elementen en gemerkte moleculen : Oplossing van Na-Iodide ^{131}I	Radio-isotopes, radio-éléments et molécules marquée : Solution Iodure de Na ^{131}I

698165	Dose ^{131}I	Radio-isotopen, radio-elementen en gemerkte moleculen : Oplossing van Na-Iodide ^{131}I	Radio-isotopes, radio-éléments et molécules marquée : Solution Iodure de Na ^{131}I
698176	Dose ^{131}I	Radio-isotopen, radio-elementen en gemerkte moleculen : Capsules Na-Iodide ^{131}I	Radio-isotopes, radio-éléments et molécules marquées : Capsules Iodure de Na ^{131}I
698180	Dose ^{131}I	Radio-isotopen, radio-elementen en gemerkte moleculen : Capsules Na-Iodide ^{131}I	Radio-isotopes, radio-éléments et molécules marquées : Capsules Iodure de Na ^{131}I

8.2. Standardization methodology

Standardized rates were computed in order to take into account (to adjust for) the age and gender. The standard rate was calculated based on European Standard Population (see Table 2). Methods used were both, the direct and indirect standardization (standard population for indirect standardization = Belgian Population 2008).

Standardizations rules:

Let

d_i= ith stratum specific number of event in the study population

n_i= number of person-years of the ith stratum of the study population

ri =ith stratum-specific rate from the standard population

N_i = number of person-years of the ith stratum of the standard population

N = number of person-years of the standard population

D_i= ith stratum specific number of event in the standard population

R_i =ith stratum-specific rate from the standard population

Stratum	study pop Number of test	study pop number of person-years	rate	standard weight	adjusted rate for study pop
Strata 1: Male , <35	d_1	n_1	$\frac{d_1}{n_1}$	$\frac{N_1}{N}$	$\frac{d_1}{n_1} * \frac{N_1}{N}$
Strata 2: Female, <35					
Stratum k	d_k	n_k	$\frac{d_k}{n_k}$	$\frac{N_k}{N}$	$\frac{d_k}{n_k} * \frac{N_k}{N}$
	..	..			
Direct standardized rate					$\sum_k \frac{d_k}{n_k} * \frac{N_k}{N}$

Direct standardized rate = $\sum_k \frac{d_k}{n_k} * \frac{N_k}{N}$

Strata are defined as the combination of the gender and age category (10 years group).

Indirect standardized rate = $\frac{\sum_k d_k}{\sum_k R_k * n_k}$

Stratum	standard population Number of test Z	standard population: number of person-years	rate	study pop number of person-years	number of event in study pop	Adjusted number
Strata 1: Male , <35	D_1	N_1	$\frac{D_1}{N_1} = R_1$	n_1	d_1	$\frac{d_1}{R_1 n_1}$
Strata 2: Female, <35	xx	zz				
	xx	zz				
	xx	zz				
Strata k	D_k	N_k	$\frac{D_k}{N_k} = R_k$	n_k	d_k	$\frac{d_k}{R_k n_k}$
	..	..				
Indirect standardized rate						$\frac{\sum_k d_k}{\sum_k R_k * n_k}$

Table 2. European Standard Population

The European Standard population is a notional population of 2 million, which is commonly used to standardise rates. Its age sex composition is shown in the table.

Age band	Male	Female
0-4	8000	8000
5-9	7000	7000
10-14	7000	7000
15-19	7000	7000
20-24	7000	7000
25-29	7000	7000
30-34	7000	7000
35-39	7000	7000
40-44	7000	7000
45-49	7000	7000
50-54	7000	7000
55-59	6000	6000
60-64	5000	5000
65-69	4000	4000
70-74	3000	3000
75-79	2000	2000
80-84	1000	1000
85+	1000	1000

Source : http://www.wmpho.org.uk/localprofiles/metadata.aspx?id=META_EUROSTD

8.3. Statistical Analyses Results

8.3.1. Summary of Rates – All tests

Table 3. Overall Summary of Rates (period 2003-2008) – Global Population

Test performed	Region	Crude rate + 95% CI	European Standardized rate + 95%CI	Standardized rate + 95%CI - Standard population = Belgium 2008	Indirect standardized ratio + 95%CI - Standard population = Belgium 2008
TSH	Brussels	382.7 [375.5 ; 389.8]	359.7 [356.8 ; 362.7]	419.3 [416.2 ; 422.5]	43.88 [43.51 ; 44.24]
	Flanders	428.8 [426.0 ; 431.5]	366.3 [365.2 ; 367.5]	429.4 [428.2 ; 430.6]	44.95 [44.81 ; 45.09]
	Wallonia	459.1 [455.2 ; 463.1]	400.7 [399.0 ; 402.3]	465.8 [464.1 ; 467.5]	48.79 [48.59 ; 48.99]
	Belgium	434.2 [432.0 ; 436.4]	377.0 [376.1 ; 377.9]	440.4 [439.5 ; 441.3]	46.09 [45.98 ; 46.20]
Echo neck	Brussels	15.8 [14.4 ; 17.1]	15.8 [15.1 ; 16.4]	17.1 [16.5 ; 17.8]	62.60 [60.06 ; 65.15]
	Flanders	7.3 [7.0 ; 7.6]	6.8 [6.6 ; 7.0]	7.3 [7.1 ; 7.4]	27.03 [26.38 ; 27.68]
	Wallonia	20.6 [19.9 ; 21.4]	19.3 [19.0 ; 19.7]	20.6 [20.2 ; 20.9]	76.53 [75.06 ; 78.00]
	Belgium	12.4 [12.1 ; 12.7]	11.6 [11.5 ; 11.8]	12.4 [12.3 ; 12.6]	46.21 [45.56 ; 46.86]
Duplex	Brussels	19.3 [17.5 ; 21.2]	16.6 [16.0 ; 17.2]	22.4 [21.7 ; 23.1]	62.14 [59.85 ; 64.42]
	Flanders	16.1 [15.5 ; 16.7]	11.3 [11.1 ; 11.4]	16.2 [16.0 ; 16.5]	44.51 [43.79 ; 45.23]
	Wallonia	20.1 [19.2 ; 21.1]	15.0 [14.7 ; 15.3]	20.9 [20.6 ; 21.3]	57.56 [56.43 ; 58.68]
	Belgium	17.7 [17.2 ; 18.2]	12.9 [12.8 ; 13.1]	18.3 [18.1 ; 18.4]	50.14 [49.55 ; 50.73]
CT scan and/or PET scan and/or MRI	Brussels	80.6 [77.1 ; 84.1]	75.9 [74.6 ; 77.3]	92.8 [91.3 ; 94.3]	52.84 [51.89 ; 53.79]
	Flanders	63.5 [62.4 ; 64.6]	51.9 [51.5 ; 52.3]	63.4 [62.9 ; 63.8]	36.34 [36.04 ; 36.64]
	Wallonia	88.5 [86.7 ; 90.3]	74.9 [74.2 ; 75.6]	90.8 [90.0 ; 91.5]	52.05 [51.56 ; 52.53]
	Belgium	73.2 [72.3 ; 74.1]	61.2 [60.9 ; 61.5]	74.5 [74.2 ; 74.9]	42.75 [42.51 ; 43.00]
(CT scan or PET scan or MRI) with a TSH performed	Brussels	50.6 [47.8 ; 53.5]	46.2 [45.2 ; 47.2]	59.0 [57.8 ; 60.1]	53.53 [52.31 ; 54.74]
	Flanders	39.4 [38.5 ; 40.3]	30.8 [30.5 ; 31.1]	39.4 [39.1 ; 39.8]	36.05 [35.68 ; 36.43]

in the 4-month before or after the exam BUT without echo	Wallonia	55.0 [53.5 ; 56.5]	44.9 [44.4 ; 45.4]	56.6 [56.0 ; 57.2]	51.78 [51.17 ; 52.39]
	Belgium	45.5 [44.7 ; 46.2]	36.6 [36.3 ; 36.8]	46.5 [46.2 ; 46.8]	42.55 [42.24 ; 42.86]
Echo neck with a TSH performed in the 4-month before or after the exam	Brussels	12.1 [10.9 ; 13.3]	12.0 [11.5 ; 12.6]	13.3 [12.7 ; 13.9]	63.49 [60.55 ; 66.44]
	Flanders	5.3 [5.0 ; 5.6]	4.8 [4.7 ; 4.9]	5.3 [5.2 ; 5.5]	25.70 [24.97 ; 26.42]
	Wallonia	16.3 [15.6 ; 16.9]	15.1 [14.7 ; 15.4]	16.2 [15.9 ; 16.6]	78.67 [76.97 ; 80.38]
	Belgium	9.5 [9.2 ; 9.8]	8.8 [8.6 ; 8.9]	9.5 [9.4 ; 9.7]	46.15 [45.41 ; 46.90]

Table 4. Overall Summary of Rates (period 2003-2008) – Restricted Population

Test performed	Region	Crude rate + 95% CI	European Standardized rate + 95%CI	Standardized rate + 95%CI - Standard population = Belgium 2008	Indirect standardized ratio + 95%CI - Standard population = Belgium 2008
TSH	Brussels	331.2 [324.2 ; 338.2]	320.6 [317.7 ; 323.4]	372.4 [369.4 ; 375.5]	46.48 [46.06 ; 46.90]
	Flanders	388.1 [385.4 ; 390.9]	338.3 [337.2 ; 339.4]	395.3 [394.1 ; 396.5]	49.49 [49.32 ; 49.65]
	Wallonia	388.7 [384.9 ; 392.6]	350.1 [348.6 ; 351.7]	406.8 [405.2 ; 408.5]	50.95 [50.71 ; 51.18]
	Belgium	382.9 [380.8 ; 385.1]	340.6 [339.8 ; 341.5]	397.1 [396.2 ; 398.0]	49.68 [49.55 ; 49.81]
Echo neck	Brussels	10.3 [9.2 ; 11.4]	10.5 [10.0 ; 11.1]	11.4 [10.9 ; 12.0]	68.69 [65.18 ; 72.21]
	Flanders	5.4 [5.1 ; 5.7]	5.1 [5.0 ; 5.3]	5.5 [5.3 ; 5.6]	33.81 [32.85 ; 34.77]
	Wallonia	12.9 [12.3 ; 13.5]	12.5 [12.2 ; 12.8]	13.3 [13.0 ; 13.6]	81.98 [79.92 ; 84.03]
	Belgium	8.2 [8.0 ; 8.5]	7.9 [7.8 ; 8.1]	8.4 [8.3 ; 8.6]	52.11 [51.19 ; 53.02]
Echo neck with a TSH performed in the 4-month	Brussels	7.5 [6.5 ; 8.5]	7.6 [7.2 ; 8.1]	8.5 [8.0 ; 9.0]	73.43 [69.02 ; 77.83]
	Flanders	3.6 [3.3 ; 3.8]	3.3 [3.2 ; 3.4]	3.7 [3.5 ; 3.8]	32.23 [31.11 ; 33.35]

before or after the exam	Wallonia	9.5 [8.9 ; 10.0]	9.1 [8.8 ; 9.3]	9.8 [9.6 ; 10.1]	87.12 [84.58 ; 89.66]
	Belgium	5.8 [5.6 ; 6.1]	5.5 [5.4 ; 5.6]	6.0 [5.9 ; 6.1]	53.09 [51.98 ; 54.21]
Duplex	Brussels	17.9 [15.9 ; 19.8]	16.0 [15.4 ; 16.6]	21.6 [20.9 ; 22.3]	68.70 [66.03 ; 71.38]
	Flanders	15.3 [14.7 ; 15.9]	11.0 [10.8 ; 11.2]	15.8 [15.6 ; 16.1]	49.53 [48.70 ; 50.36]
	Wallonia	18.5 [17.5 ; 19.5]	14.4 [14.1 ; 14.6]	20.0 [19.7 ; 20.4]	63.08 [61.76 ; 64.40]
	Belgium	16.5 [16.0 ; 17.1]	12.5 [12.3 ; 12.6]	17.6 [17.5 ; 17.8]	55.30 [54.62 ; 55.99]
CT scan and/or PET scan and/or MRI	Brussels	75.5 [71.9 ; 79.0]	73.2 [71.9 ; 74.5]	89.6 [88.1 ; 91.0]	57.14 [56.06 ; 58.22]
	Flanders	60.8 [59.7 ; 61.9]	50.5 [50.1 ; 50.9]	61.7 [61.2 ; 62.1]	39.78 [39.44 ; 40.11]
	Wallonia	81.9 [80.0 ; 83.7]	71.4 [70.7 ; 72.1]	86.5 [85.7 ; 87.2]	55.87 [55.32 ; 56.43]
	Belgium	68.8 [67.9 ; 69.8]	58.8 [58.5 ; 59.2]	71.7 [71.3 ; 72.0]	46.25 [45.96 ; 46.53]
(CT scan or PET scan or MRI) with a TSH performed in the 4-month before or after the exam BUT without echo	Brussels	45.7 [42.8 ; 48.6]	43.2 [42.2 ; 44.2]	55.3 [54.2 ; 56.5]	58.15 [56.74 ; 59.57]
	Flanders	36.7 [35.8 ; 37.6]	29.3 [29.0 ; 29.6]	37.5 [37.2 ; 37.9]	39.93 [39.50 ; 40.37]
	Wallonia	48.8 [47.3 ; 50.3]	41.3 [40.8 ; 41.8]	52.0 [51.5 ; 52.6]	55.48 [54.77 ; 56.19]
	Belgium	41.4 [40.6 ; 42.2]	34.1 [33.9 ; 34.4]	43.5 [43.2 ; 43.8]	46.28 [45.92 ; 46.65]

8.3.2. TSH dosage

8.3.2.1. Rates

Table 5. Rate of TSH per 1 000 person-years – Global Population (EPS)

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
2003	Brussels	373.8 [356.2 ; 391.4]	349.0 [341.9 ; 356.1]	407.1 [399.5 ; 414.8]	42.61 [41.73 ; 43.48]
	Flanders	381.8 [375.0 ; 388.6]	330.0 [327.3 ; 332.7]	387.9 [385.0 ; 390.7]	40.59 [40.26 ; 40.92]
	Wallonia	422.4 [412.7 ; 432.0]	370.9 [367.1 ; 374.7]	432.2 [428.1 ; 436.3]	45.30 [44.83 ; 45.78]
	Belgium	394.1 [388.8 ; 399.4]	345.1 [343.0 ; 347.2]	404.1 [401.8 ; 406.3]	42.29 [42.03 ; 42.55]
2004	Brussels	386.9 [369.0 ; 404.8]	362.8 [355.6 ; 370.1]	423.1 [415.3 ; 430.8]	44.20 [43.31 ; 45.09]
	Flanders	403.2 [396.3 ; 410.1]	345.9 [343.1 ; 348.6]	406.7 [403.8 ; 409.6]	42.58 [42.24 ; 42.92]
	Wallonia	446.1 [436.3 ; 455.9]	390.3 [386.3 ; 394.2]	454.8 [450.6 ; 459.0]	47.67 [47.19 ; 48.16]
	Belgium	415.5 [410.1 ; 420.8]	361.9 [359.7 ; 364.0]	423.8 [421.6 ; 426.1]	44.36 [44.10 ; 44.63]
2005	Brussels	369.1 [351.7 ; 386.6]	345.3 [338.2 ; 352.3]	403.0 [395.5 ; 410.6]	42.18 [41.31 ; 43.05]
	Flanders	421.5 [414.6 ; 428.4]	360.6 [357.8 ; 363.4]	423.0 [420.0 ; 425.9]	44.28 [43.94 ; 44.63]
	Wallonia	449.9 [440.2 ; 459.5]	392.3 [388.4 ; 396.2]	457.0 [452.9 ; 461.2]	47.87 [47.38 ; 48.35]
	Belgium	425.7 [420.4 ; 431.0]	369.7 [367.5 ; 371.8]	432.4 [430.1 ; 434.7]	45.25 [44.99 ; 45.52]
2006	Brussels	370.1 [353.0 ; 387.2]	347.4 [340.4 ; 354.4]	405.8 [398.3 ; 413.4]	42.47 [41.59 ; 43.34]
	Flanders	436.3 [429.6 ; 443.1]	372.5 [369.7 ; 375.3]	435.4 [432.4 ; 438.4]	45.61 [45.26 ; 45.95]
	Wallonia	461.9 [452.3 ; 471.5]	403.1 [399.2 ; 407.1]	467.3 [463.2 ; 471.5]	48.97 [48.48 ; 49.46]
	Belgium	438.3 [433.1 ; 443.6]	380.3 [378.1 ; 382.5]	443.3 [441.0 ; 445.6]	46.42 [46.15 ; 46.69]
2007	Brussels	387.5 [370.3 ; 404.7]	365.7 [358.5 ; 372.9]	426.3 [418.6 ; 434.1]	44.63 [43.74 ; 45.52]
	Flanders	454.6 [447.8 ; 461.4]	386.8 [383.9 ; 389.6]	451.9 [448.9 ; 454.9]	47.31 [46.96 ; 47.66]

	Wallonia	474.8 [465.3 ; 484.3]	412.7 [408.7 ; 416.7]	479.4 [475.2 ; 483.6]	50.20 [49.71 ; 50.69]
	Belgium	454.8 [449.5 ; 460.0]	393.3 [391.1 ; 395.6]	458.7 [456.3 ; 461.0]	48.01 [47.73 ; 48.28]
2008	Brussels	407.8 [390.2 ; 425.4]	387.4 [380.1 ; 394.8]	449.8 [441.9 ; 457.7]	47.11 [46.20 ; 48.03]
	Flanders	473.6 [466.8 ; 480.4]	400.4 [397.5 ; 403.3]	468.3 [465.3 ; 471.4]	49.03 [48.68 ; 49.39]
	Wallonia	498.8 [489.2 ; 508.4]	433.3 [429.2 ; 437.4]	502.0 [497.7 ; 506.3]	52.57 [52.07 ; 53.07]
	Belgium	475.4 [470.1 ; 480.7]	410.0 [407.7 ; 412.2]	477.7 [475.3 ; 480.1]	50.00 [49.72 ; 50.28]
2003-2008	Brussels	382.7 [375.5 ; 389.8]	359.7 [356.8 ; 362.7]	419.3 [416.2 ; 422.5]	43.88 [43.51 ; 44.24]
	Flanders	428.8 [426.0 ; 431.5]	366.3 [365.2 ; 367.5]	429.4 [428.2 ; 430.6]	44.95 [44.81 ; 45.09]
	Wallonia	459.1 [455.2 ; 463.1]	400.7 [399.0 ; 402.3]	465.8 [464.1 ; 467.5]	48.79 [48.59 ; 48.99]
	Belgium	434.2 [432.0 ; 436.4]	377.0 [376.1 ; 377.9]	440.4 [439.5 ; 441.3]	46.09 [45.98 ; 46.20]

Table 6. Rate of TSH per 1 000 person-years – Restricted Population

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
2003	Brussels	325.3 [308.3 ; 342.3]	310.3 [303.5 ; 317.1]	360.3 [353.0 ; 367.6]	45.12 [44.11 ; 46.13]
	Flanders	347.5 [340.8 ; 354.2]	305.2 [302.6 ; 307.8]	357.3 [354.5 ; 360.1]	44.70 [44.31 ; 45.09]
	Wallonia	363.3 [354.0 ; 372.7]	326.5 [322.8 ; 330.2]	380.1 [376.1 ; 384.0]	47.64 [47.09 ; 48.19]
	Belgium	350.5 [345.3 ; 355.6]	312.6 [310.6 ; 314.7]	365.0 [362.8 ; 367.2]	45.67 [45.37 ; 45.97]
2004	Brussels	334.0 [316.6 ; 351.4]	321.0 [314.0 ; 327.9]	373.3 [365.8 ; 380.7]	46.59 [45.57 ; 47.62]
	Flanders	366.4 [359.6 ; 373.1]	319.8 [317.2 ; 322.5]	375.0 [372.2 ; 377.9]	46.94 [46.54 ; 47.33]
	Wallonia	381.9 [372.3 ; 391.5]	343.3 [339.6 ; 347.1]	400.1 [396.0 ; 404.1]	50.11 [49.55 ; 50.67]
	Belgium	368.2 [363.0 ; 373.5]	327.6 [325.5 ; 329.6]	383.0 [380.8 ; 385.2]	47.91 [47.60 ; 48.21]
2005	Brussels	319.2 [302.1 ; 336.3]	307.9 [301.0 ; 314.7]	357.9 [350.6 ; 365.2]	44.63 [43.62 ; 45.64]
	Flanders	383.4 [376.6 ; 390.2]	334.1 [331.4 ; 336.8]	391.1 [388.2 ; 394.0]	48.95 [48.55 ; 49.36]
	Wallonia	383.4 [373.9 ; 392.8]	344.5 [340.7 ; 348.3]	401.4 [397.3 ; 405.4]	50.24 [49.67 ; 50.80]

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
	Belgium	377.4 [372.1 ; 382.6]	335.3 [333.2 ; 337.4]	391.7 [389.4 ; 393.9]	48.98 [48.67 ; 49.29]
2006	Brussels	321.3 [304.5 ; 338.2]	311.0 [304.2 ; 317.9]	362.4 [355.0 ; 369.8]	45.18 [44.16 ; 46.20]
	Flanders	394.6 [387.9 ; 401.2]	344.1 [341.3 ; 346.8]	400.6 [397.7 ; 403.6]	50.22 [49.81 ; 50.62]
	Wallonia	390.2 [380.8 ; 399.6]	352.1 [348.2 ; 355.9]	408.1 [404.0 ; 412.1]	51.12 [50.55 ; 51.69]
	Belgium	386.3 [381.1 ; 391.4]	343.8 [341.7 ; 345.9]	399.8 [397.5 ; 402.0]	50.06 [49.74 ; 50.37]
2007	Brussels	336.5 [319.5 ; 353.6]	328.6 [321.6 ; 335.7]	381.6 [374.0 ; 389.2]	47.58 [46.53 ; 48.62]
	Flanders	410.5 [403.8 ; 417.2]	357.0 [354.2 ; 359.8]	415.9 [413.0 ; 418.9]	52.10 [51.69 ; 52.51]
	Wallonia	399.5 [390.2 ; 408.9]	360.1 [356.2 ; 364.0]	418.2 [414.0 ; 422.3]	52.34 [51.76 ; 52.91]
	Belgium	400.1 [394.9 ; 405.3]	355.6 [353.4 ; 357.7]	413.8 [411.5 ; 416.1]	51.78 [51.46 ; 52.10]
2008	Brussels	350.6 [333.2 ; 368.0]	344.5 [337.3 ; 351.6]	399.2 [391.5 ; 406.9]	49.80 [48.73 ; 50.86]
	Flanders	425.9 [419.1 ; 432.6]	368.7 [365.8 ; 371.5]	429.8 [426.8 ; 432.8]	53.85 [53.43 ; 54.27]
	Wallonia	414.4 [404.9 ; 423.9]	374.3 [370.3 ; 378.2]	433.4 [429.2 ; 437.6]	54.28 [53.69 ; 54.87]
	Belgium	415.1 [409.9 ; 420.3]	368.4 [366.2 ; 370.6]	428.4 [426.1 ; 430.7]	53.63 [53.31 ; 53.96]
2003-2008	Brussels	331.2 [324.2 ; 338.2]	320.6 [317.7 ; 323.4]	372.4 [369.4 ; 375.5]	46.48 [46.06 ; 46.90]
	Flanders	388.1 [385.4 ; 390.9]	338.3 [337.2 ; 339.4]	395.3 [394.1 ; 396.5]	49.49 [49.32 ; 49.65]
	Wallonia	388.7 [384.9 ; 392.6]	350.1 [348.6 ; 351.7]	406.8 [405.2 ; 408.5]	50.95 [50.71 ; 51.18]
	Belgium	382.9 [380.8 ; 385.1]	340.6 [339.8 ; 341.5]	397.1 [396.2 ; 398.0]	49.68 [49.55 ; 49.81]

Table 7. Rate of TSH per 1 000 person-years By Strata – Global Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
				Brussels Capital Region				
Male	< 35 years	79.4 (475/5980)	82.2 (496/6036)	73.7 (440/5973)	86.0 (518/6021)	83.7 (507/6060)	88.4 (545/6165)	82.3 (2981/36234)
	35 - 44 years	195.8 (350/1788)	196.8 (361/1835)	193.2 (359/1858)	186.0 (354/1904)	200.3 (394/1967)	207.8 (416/2002)	196.8 (2234/11353)
	45 - 54 years	323.3 (438/1355)	330.7 (459/1388)	293.6 (404/1376)	306.9 (425/1385)	362.7 (506/1395)	355.8 (516/1450)	329.1 (2748/8349)
	55 - 64 years	527.9 (575/1089)	584.9 (655/1120)	544.0 (620/1140)	532.3 (603/1133)	562.0 (640/1139)	587.9 (688/1170)	556.8 (3781/6791)
	65 - 74 years	737.0 (1191/1616)	723.8 (1165/1610)	694.9 (1086/1563)	723.3 (1132/1565)	749.4 (1135/1515)	783.2 (1188/1517)	734.9 (6897/9385)
	75 - 84 years	821.7 (907/1104)	887.0 (979/1104)	810.4 (912/1125)	860.1 (944/1098)	866.9 (958/1105)	933.4 (1016/1089)	862.9 (5716/6624)
	>= 85 years	997.5 (269/270)	997.8 (260/261)	984.8 (259/263)	949.4 (286/301)	902.6 (298/330)	1054.6 (367/348)	981.0 (1739/1773)
Female	< 35 years	239.4 (1396/5832)	246.4 (1451/5889)	239.5 (1414/5904)	229.4 (1366/5955)	251.5 (1515/6025)	264.4 (1599/6048)	245.2 (8741/35653)
	35 - 44 years	456.7 (764/1673)	457.9 (766/1673)	459.0 (765/1667)	477.2 (805/1687)	482.4 (820/1700)	570.9 (1007/1764)	484.8 (4927/10163)
	45 - 54 years	572.7 (839/1465)	667.6 (1004/1504)	608.5 (921/1514)	599.0 (907/1514)	621.8 (933/1501)	674.2 (1010/1498)	624.1 (5614/8995)
	55 - 64 years	717.5 (818/1140)	707.6 (805/1138)	689.5 (793/1150)	667.6 (779/1167)	714.0 (851/1192)	745.9 (914/1225)	707.4 (4960/7012)
	65 - 74 years	841.0 (1704/2026)	854.9 (1756/2054)	833.0 (1642/1971)	859.8 (1646/1915)	873.2 (1617/1852)	902.1 (1641/1819)	859.9 (10006/11637)
	75 - 84 years	1002.0 (1965/1961)	1014.5 (1977/1949)	998.9 (1910/1912)	981.0 (1807/1842)	1003.5 (1809/1803)	1045.1 (1825/1746)	1007.1 (11293/11213)
	>= 85 years	963.4 (742/770)	1029.5 (792/769)	962.6 (774/804)	991.0 (842/850)	1132.2 (1015/897)	1068.5 (1007/942)	1027.8 (5172/5032)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
					Flemish Region			
Male	< 35 years	86.1 (2726/31669)	90.1 (2846/31579)	92.2 (2897/31435)	98.4 (3076/31270)	107.6 (3368/31307)	108.6 (3407/31385)	97.1 (18320/188645)
	35 - 44 years	207.2 (2458/11861)	229.8 (2702/11756)	241.1 (2818/11690)	253.6 (2927/11540)	261.9 (2983/11390)	264.3 (2949/11158)	242.6 (16837/69396)
	45 - 54 years	348.3 (3706/10642)	368.6 (4000/10851)	384.2 (4228/11004)	403.3 (4524/11217)	414.4 (4721/11393)	425.4 (4912/11546)	391.4 (26091/66653)
	55 - 64 years	524.0 (4387/8372)	559.6 (4798/8575)	575.5 (5036/8751)	599.6 (5415/9031)	622.7 (5795/9307)	658.3 (6263/9514)	591.9 (31694/53549)
	65 - 74 years	703.9 (9679/13750)	745.7 (10321/13842)	793.3 (10861/13691)	809.7 (10846/13395)	824.4 (10955/13289)	866.0 (11626/13425)	789.9 (64288/81391)
	75 - 84 years	829.7 (6418/7735)	876.1 (7062/8060)	914.8 (7608/8316)	954.3 (8165/8556)	997.6 (8751/8772)	1025.7 (9240/9008)	936.5 (47244/50448)
	>= 85 years	895.7 (1193/1332)	969.5 (1374/1417)	1007.7 (1631/1619)	998.9 (1832/1834)	1080.6 (2195/2031)	1140.5 (2511/2202)	1028.9 (10736/10435)
Female	< 35 years	200.8 (6110/30434)	207.2 (6282/30325)	219.6 (6644/30255)	236.8 (7152/30198)	244.7 (7420/30321)	255.8 (7789/30447)	227.5 (41397/181981)
	35 - 44 years	384.6 (4395/11428)	403.6 (4643/11505)	420.1 (4779/11376)	430.1 (4833/11236)	455.4 (5059/11108)	477.7 (5161/10804)	428.0 (28870/67456)
	45 - 54 years	510.9 (5253/10282)	529.2 (5497/10387)	568.5 (6045/10633)	563.3 (6131/10885)	577.5 (6369/11029)	600.5 (6750/11241)	559.2 (36045/64457)
	55 - 64 years	677.7 (5667/8362)	694.7 (5917/8517)	714.5 (6203/8682)	711.9 (6321/8879)	736.0 (6751/9173)	743.9 (6968/9367)	714.0 (37827/52979)
	65 - 74 years	853.0 (13370/15674)	891.7 (14072/15781)	907.6 (14051/15482)	933.7 (14158/15164)	961.0 (14284/14864)	984.8 (14636/14862)	921.0 (84571/91826)
	75 - 84 years	985.0 (11119/11288)	1027.7 (11913/11592)	1027.8 (12145/11816)	1053.5 (12586/11947)	1076.8 (13079/12146)	1126.7 (13806/12254)	1050.7 (74648/71044)
	>= 85 years	887.8 (3124/3519)	929.3 (3369/3626)	1002.0 (3883/3875)	986.9 (4103/4158)	1062.8 (4728/4449)	1129.3 (5382/4766)	1008.1 (24589/24392)

Walloon Region								
Male	< 35 years	88.2 (1588/18014)	94.8 (1713/18061)	96.5 (1733/17968)	105.3 (1887/17923)	101.3 (1811/17884)	105.2 (1883/17906)	98.5 (10615/107756)
	35 - 44 years	242.5 (1468/6054)	248.3 (1497/6030)	241.5 (1447/5992)	256.3 (1513/5903)	264.1 (1566/5929)	286.6 (1684/5876)	256.4 (9175/35784)
	45 - 54 years	380.4 (2209/5807)	409.4 (2394/5848)	421.2 (2480/5888)	423.0 (2527/5974)	424.5 (2565/6043)	441.4 (2671/6052)	416.9 (14846/35610)
	55 - 64 years	543.2 (2332/4293)	594.9 (2642/4441)	593.2 (2751/4638)	583.1 (2813/4824)	626.2 (3138/5011)	660.2 (3421/5182)	602.2 (17097/28389)
	65 - 74 years	772.6 (5252/6798)	811.4 (5458/6727)	816.7 (5413/6628)	838.1 (5414/6460)	874.5 (5477/6263)	903.3 (5665/6272)	834.8 (32679/39148)
	75 - 84 years	919.3 (3811/4145)	1006.3 (4328/4301)	999.5 (4327/4329)	1014.0 (4439/4378)	1027.3 (4572/4451)	1058.1 (4709/4450)	1005.1 (26186/26054)
	>= 85 years	895.5 (616/688)	966.5 (695/719)	1000.6 (807/806)	1047.4 (911/870)	1064.6 (1027/965)	1154.6 (1207/1045)	1033.3 (5263/5093)
Female	< 35 years	254.2 (4463/17557)	256.5 (4513/17596)	264.8 (4645/17544)	276.7 (4844/17504)	286.7 (5019/17507)	305.1 (5352/17544)	274.0 (28836/105252)
	35 - 44 years	465.6 (2865/6154)	500.6 (3045/6083)	497.7 (3022/6072)	526.9 (3157/5992)	518.9 (3119/6011)	565.8 (3389/5990)	512.3 (18597/36301)
	45 - 54 years	605.0 (3602/5954)	636.8 (3878/6090)	613.5 (3734/6086)	629.3 (3894/6188)	650.8 (4054/6229)	683.1 (4267/6247)	636.8 (23429/36794)
	55 - 64 years	712.8 (3242/4548)	741.3 (3405/4594)	755.1 (3609/4780)	757.1 (3797/5016)	777.1 (4019/5172)	798.9 (4291/5371)	758.6 (22363/29479)
	65 - 74 years	904.1 (7523/8321)	961.5 (7986/8306)	956.7 (7741/8091)	974.7 (7602/7800)	991.3 (7511/7577)	1017.7 (7630/7497)	966.4 (45993/47593)
	75 - 84 years	1024.6 (6957/6790)	1075.7 (7492/6964)	1076.9 (7538/7000)	1085.2 (7612/7015)	1120.0 (7844/7004)	1160.3 (8098/6979)	1090.8 (45541/41752)
	>= 85 years	1073.7 (2244/2090)	1038.2 (2185/2105)	1091.0 (2497/2289)	1052.0 (2585/2457)	1124.1 (2989/2659)	1166.3 (3244/2781)	1094.8 (15744/14381)

Table 8. Rate of TSH per 1 000 person-years By Strata – Restricted Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
				Brussels Capital Region				
Male	< 35 years	77.2 (461/5975)	78.4 (473/6030)	70.7 (422/5966)	84.2 (506/6011)	81.3 (492/6048)	83.5 (513/6147)	79.2 (2867/36178)
	35 - 44 years	189.3 (337/1781)	184.2 (336/1824)	187.3 (346/1847)	176.9 (334/1889)	189.9 (370/1949)	194.7 (386/1983)	187.1 (2109/11272)
	45 - 54 years	304.9 (410/1345)	312.0 (429/1375)	280.6 (381/1358)	290.4 (395/1360)	354.7 (486/1370)	341.2 (485/1422)	314.2 (2586/8230)
	55 - 64 years	469.8 (500/1064)	517.4 (562/1086)	485.2 (535/1103)	490.0 (538/1098)	513.5 (565/1100)	540.1 (608/1126)	503.0 (3308/6577)
	65 - 74 years	682.2 (1075/1576)	675.8 (1056/1563)	653.8 (989/1513)	668.2 (1009/1510)	701.2 (1018/1452)	728.5 (1056/1450)	684.5 (6203/9063)
	75 - 84 years	768.7 (820/1067)	815.6 (861/1056)	723.4 (773/1069)	799.1 (832/1041)	816.0 (850/1042)	877.1 (894/1019)	799.3 (5030/6293)
	>= 85 years	955.3 (249/261)	957.9 (241/252)	936.5 (235/251)	892.6 (250/280)	866.4 (268/309)	985.1 (317/322)	931.7 (1560/1674)
Female	< 35 years	221.0 (1275/5770)	223.4 (1297/5806)	212.7 (1235/5808)	206.4 (1208/5853)	228.5 (1352/5916)	238.4 (1415/5936)	221.8 (7782/35090)
	35 - 44 years	391.9 (631/1610)	407.9 (654/1603)	411.8 (656/1593)	422.1 (675/1599)	426.8 (685/1605)	509.4 (843/1655)	428.7 (4144/9665)
	45 - 54 years	477.2 (657/1377)	552.3 (761/1378)	517.3 (712/1376)	501.8 (683/1361)	517.8 (696/1344)	548.9 (730/1330)	519.1 (4239/8166)
	55 - 64 years	583.8 (616/1055)	571.9 (594/1039)	587.2 (606/1032)	568.6 (592/1041)	606.2 (637/1051)	618.6 (659/1065)	589.5 (3704/6283)
	65 - 74 years	722.0 (1339/1854)	723.0 (1335/1846)	705.3 (1231/1745)	735.5 (1225/1665)	753.3 (1191/1581)	763.7 (1171/1533)	732.6 (7492/10226)
	75 - 84 years	852.4 (1510/1771)	877.8 (1511/1721)	875.2 (1459/1667)	857.8 (1364/1590)	870.8 (1351/1552)	918.0 (1357/1478)	874.5 (8552/9780)
	>= 85 years	826.9 (585/707)	901.1 (619/687)	801.4 (567/708)	867.5 (640/738)	961.0 (727/757)	920.8 (729/792)	881.3 (3867/4388)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
Flemish Region								
Male	< 35 years	84.3 (2668/31646)	88.4 (2789/31550)	90.1 (2830/31399)	96.5 (3015/31231)	105.2 (3290/31268)	106.8 (3348/31347)	95.2 (17940/188441)
	35 - 44 years	203.8 (2413/11839)	224.8 (2635/11721)	236.1 (2749/11645)	247.2 (2841/11491)	252.6 (2862/11331)	257.0 (2848/11081)	236.6 (16348/69107)
	45 - 54 years	333.8 (3525/10559)	353.1 (3793/10743)	370.0 (4031/10893)	389.4 (4323/11101)	402.0 (4532/11273)	410.8 (4690/11415)	377.3 (24894/65983)
	55 - 64 years	505.1 (4182/8279)	534.7 (4518/8450)	554.6 (4771/8603)	578.4 (5122/8856)	597.7 (5446/9111)	632.8 (5876/9286)	568.9 (29915/52585)
	65 - 74 years	667.5 (9021/13516)	708.6 (9597/13543)	759.8 (10139/13345)	767.8 (9991/13013)	784.7 (10110/12885)	827.1 (10744/12990)	751.7 (59602/79291)
	75 - 84 years	790.8 (5999/7586)	834.8 (6562/7861)	869.4 (7007/8060)	900.0 (7414/8237)	936.5 (7854/8387)	965.6 (8297/8593)	885.3 (43133/48723)
	>= 85 years	850.5 (1113/1309)	904.6 (1243/1374)	967.8 (1514/1564)	944.7 (1673/1771)	1021.1 (1990/1949)	1048.1 (2191/2090)	966.9 (9724/10057)
Female	< 35 years	188.6 (5708/30268)	193.7 (5833/30114)	203.3 (6103/30017)	220.1 (6588/29934)	226.2 (6792/30022)	236.9 (7133/30113)	211.4 (38157/180468)
	35 - 44 years	344.0 (3843/11171)	359.2 (4016/11179)	377.2 (4153/11011)	386.4 (4194/10853)	406.4 (4347/10697)	422.7 (4379/10359)	382.0 (24932/65270)
	45 - 54 years	447.4 (4428/9898)	463.0 (4587/9907)	500.1 (5038/10074)	489.6 (5025/10262)	507.2 (5250/10351)	522.2 (5489/10511)	488.8 (29817/61004)
	55 - 64 years	600.5 (4744/7900)	616.9 (4906/7953)	633.7 (5097/8044)	626.6 (5101/8140)	650.1 (5435/8360)	648.5 (5501/8482)	629.8 (30784/48879)
	65 - 74 years	756.2 (11110/14692)	801.1 (11694/14598)	814.9 (11569/14197)	833.9 (11494/13784)	851.9 (11415/13400)	872.9 (11601/13291)	820.4 (68883/83961)
	75 - 84 years	882.3 (9310/10552)	923.1 (9860/10681)	932.6 (10045/10771)	941.1 (10159/10794)	968.6 (10516/10857)	1007.8 (10905/10821)	942.9 (60795/64476)
	>= 85 years	787.7 (2627/3335)	844.1 (2854/3381)	907.2 (3241/3572)	872.1 (3303/3788)	958.5 (3862/4029)	1009.0 (4321/4282)	902.6 (20208/22388)
Walloon Region								
Male	< 35	85.0	90.8	92.3	100.3	97.1	99.3	94.1

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years	(1529/17982)	(1635/18014)	(1653/17904)	(1790/17852)	(1728/17802)	(1769/17811)	(10104/107365)
	35 - 44 years	226.4 (1361/6012)	232.8 (1389/5968)	223.8 (1325/5921)	236.7 (1377/5817)	246.6 (1438/5832)	267.3 (1543/5773)	238.7 (8433/35322)
	45 - 54 years	355.6 (2035/5723)	379.6 (2176/5732)	391.7 (2252/5749)	387.6 (2256/5820)	394.1 (2312/5866)	406.4 (2384/5866)	386.0 (13415/34755)
	55 - 64 years	517.1 (2182/4219)	554.7 (2401/4328)	559.2 (2515/4497)	539.3 (2510/4654)	576.5 (2768/4801)	603.8 (2976/4929)	559.7 (15352/27429)
	65 - 74 years	717.6 (4718/6575)	754.1 (4865/6452)	760.5 (4805/6318)	778.1 (4763/6121)	808.5 (4769/5899)	832.3 (4886/5871)	773.6 (28806/37235)
	75 - 84 years	847.3 (3369/3976)	941.1 (3858/4100)	927.0 (3787/4085)	936.7 (3832/4091)	957.9 (3965/4139)	980.4 (4021/4101)	932.2 (22832/24492)
	>= 85 years	831.7 (558/671)	908.1 (627/690)	917.5 (709/773)	979.0 (808/825)	983.0 (890/905)	1054.0 (1018/966)	954.3 (4610/4831)
Female	< 35 years	225.4 (3898/17292)	226.6 (3911/17262)	233.1 (4000/17158)	241.7 (4126/17068)	248.1 (4225/17030)	262.0 (4456/17006)	239.4 (24616/102817)
	35 - 44 years	390.2 (2278/5838)	416.9 (2364/5670)	418.5 (2344/5601)	432.3 (2371/5485)	426.4 (2322/5446)	466.2 (2506/5375)	424.5 (14185/33415)
	45 - 54 years	492.4 (2689/5461)	509.5 (2776/5449)	478.6 (2567/5363)	496.4 (2679/5397)	518.3 (2792/5387)	532.0 (2846/5350)	504.5 (16349/32406)
	55 - 64 years	567.9 (2305/4058)	611.4 (2455/4016)	625.6 (2573/4113)	631.9 (2675/4233)	640.8 (2754/4298)	645.7 (2826/4376)	621.2 (15588/25095)
	65 - 74 years	762.2 (5632/7389)	816.7 (5875/7194)	803.7 (5528/6878)	820.7 (5358/6529)	832.6 (5191/6235)	840.9 (5104/6069)	811.2 (32688/40294)
	75 - 84 years	891.2 (5445/6110)	930.9 (5681/6103)	934.9 (5623/6014)	931.4 (5483/5887)	951.2 (5468/5749)	977.5 (5505/5632)	935.5 (33205/35494)
	>= 85 years	937.0 (1785/1905)	914.0 (1708/1869)	965.6 (1919/1987)	913.8 (1922/2103)	981.8 (2205/2246)	996.2 (2290/2299)	953.2 (11829/12409)

8.3.2.2. Statistical Analyses Results

Table 9. TSH dosage Result - Global Population

Model Information	
Data Set	WORK.DATA_EPS
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight
Offset Variable	l_n_personyears
Number of Observations Read	3612
Number of Observations Used	3612
Sum of Weights	2838

Class Level Information		
Class	Levels	Values
age_cat	7	< 35 years 35 - 44 years 45 - 54 years 55 - 64 years 65 - 74 years 75 - 84 years >= 85 years
PP0020	2	Male Female
Region	3	Brussels Flanders Wallonia
yearclss	6	2003 2004 2005 2006 2007 2008
arrondissement	43	Brussels Antwerpen Mechelen Turnhout Halle/Vilvoorde Leuven Brugge Diksmuide Ieper Kortrijk Oostende Roeselare Tielt Veurne Aalst Dendermonde Eeklo Gent Oudenaarde St Niklaas Hasselt Maaseik Tongeren Nivelles Ath Charleroi Mons Mouscron Soignies Thuin ...

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3601	3790.2403	1.0526
Scaled Deviance	3601	3790.2403	1.0526
Pearson Chi-Square	3601	3811.3276	1.0584
Scaled Pearson X2	3601	3811.3276	1.0584
Log Likelihood		4680311.5379	

Algorithm converged.

Analysis Of Initial Parameter Estimates

Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept		1	-69.2580	4.0517	-77.1992	-61.3168	292.19	<.0001
age_cat	< 35 years	1	-1.8339	0.0144	-1.8621	-1.8058	16300.3	<.0001
age_cat	35 - 44 years	1	-1.0841	0.0145	-1.1126	-1.0557	5574.92	<.0001
age_cat	45 - 54 years	1	-0.7312	0.0143	-0.7593	-0.7031	2599.67	<.0001
age_cat	55 - 64 years	1	-0.4311	0.0143	-0.4591	-0.4031	910.29	<.0001
age_cat	65 - 74 years	1	-0.1386	0.0158	-0.1695	-0.1077	77.40	<.0001
age_cat	75 - 84 years	1	0.0149	0.0158	-0.0161	0.0459	0.89	0.3466
age_cat	>= 85 years	0	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	1	-0.3865	0.0070	-0.4002	-0.3729	3085.17	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	1	-0.1243	0.0211	-0.1656	-0.0830	34.82	<.0001
Region	Flanders	1	-0.0654	0.0070	-0.0792	-0.0516	86.34	<.0001
Region	Wallonia	0	0.0000	0.0000	0.0000	0.0000	.	.
year		1	0.0347	0.0020	0.0307	0.0386	294.48	<.0001
Dispersion		1	0.0262	0.0008	0.0247	0.0278		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information

Correlation Structure	AR(1)
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Correlation Matrix Dimension	6
Maximum Cluster Size	6
Minimum Cluster Size	6

Algorithm converged.

Analysis Of GEE Parameter Estimates

Empirical Standard Error Estimates

Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-72.8971	2.6510	-78.0930	-67.7013	-27.50	<.0001
age_cat	< 35 years	-1.8433	0.0400	-1.9217	-1.7650	-46.11	<.0001
age_cat	35 - 44 years	-1.0933	0.0315	-1.1550	-1.0315	-34.69	<.0001
age_cat	45 - 54 years	-0.7418	0.0298	-0.8002	-0.6834	-24.88	<.0001
age_cat	55 - 64 years	-0.4399	0.0321	-0.5028	-0.3771	-13.72	<.0001
age_cat	65 - 74 years	-0.1458	0.0330	-0.2105	-0.0812	-4.42	<.0001
age_cat	75 - 84 years	0.0107	0.0343	-0.0564	0.0779	0.31	0.7538
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-0.4445	0.0173	-0.4784	-0.4107	-25.75	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	-0.1147	0.0634	-0.2389	0.0095	-1.81	0.0703
Region	Flanders	-0.0710	0.0177	-0.1056	-0.0364	-4.02	<.0001
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.
year		0.0365	0.0013	0.0339	0.0391	27.61	<.0001

Score Statistics For Type 3 GEE Analysis

Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	449.06	<.0001
PP0020	1	241.73	<.0001
Region	2	16.29	0.0003
year	1	279.75	<.0001

Contrast Estimate Results							
Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-0.0710	0.0177	0.05	-0.1056	-0.0364	16.15	<.0001
Exp(Flemish Region vs Walloon Region)	0.9315	0.0165	0.05	0.8998	0.9643		
Brussels Capital Region vs Walloon Region	-0.1147	0.0634	0.05	-0.2389	0.0095	3.28	0.0703
Exp(Brussels Capital Region vs Walloon Region)	0.8917	0.0565	0.05	0.7875	1.0095		
Flemish Region vs Brussels Capital Region	0.0437	0.0628	0.05	-0.0793	0.1667	0.49	0.4861
Exp(Flemish Region vs Brussels Capital Region)	1.0447	0.0656	0.05	0.9238	1.1814		

Table 10. TSH dosage Result – Restricted Population

Model Information	
Data Set	WORK.DATA_EPS_RES
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight
Offset Variable	l_n_personyears
Number of Observations Read	3612
Number of Observations Used	3612
Sum of Weights	2838

Class Level Information		
Class	Levels	Values
age_cat	7	< 35 years 35 - 44 years 45 - 54 years 55 - 64 years 65 - 74 years 75 - 84 years >= 85 years
PP0020	2	Male Female
Region	3	Brussels Flanders Wallonia
yearclss	6	2003 2004 2005 2006 2007 2008
arrondissement	43	Brussels Antwerpen Mechelen Turnhout Halle/Vilvoorde Leuven Brugge Diksmuide Ieper Kortrijk Oostende Roeselare Tielt Veurne Aalst Dendermonde Eeklo Gent Oudenaarde St Niklaas Hasselt Maaseik Tongeren Nivelles Ath Charleroi Mons Mouscron Soignies Thuin ...

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3601	3760.1445	1.0442
Scaled Deviance	3601	3760.1445	1.0442
Pearson Chi-Square	3601	3747.5903	1.0407
Scaled Pearson X2	3601	3747.5903	1.0407
Log Likelihood		3802515.9989	

Algorithm converged.

Analysis Of Initial Parameter Estimates

Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept		1	-64.0094	4.1110	-72.0668	-55.9519	242.43	<.0001
age_cat	< 35 years	1	-1.8064	0.0146	-1.8349	-1.7778	15384.3	<.0001
age_cat	35 - 44 years	1	-1.0845	0.0148	-1.1134	-1.0555	5396.84	<.0001
age_cat	45 - 54 years	1	-0.7484	0.0146	-0.7770	-0.7198	2632.09	<.0001
age_cat	55 - 64 years	1	-0.4360	0.0145	-0.4645	-0.4075	899.79	<.0001
age_cat	65 - 74 years	1	-0.1474	0.0160	-0.1787	-0.1161	85.40	<.0001
age_cat	75 - 84 years	1	0.0134	0.0160	-0.0179	0.0448	0.70	0.4012
age_cat	>= 85 years	0	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	1	-0.3039	0.0071	-0.3177	-0.2901	1857.39	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	1	-0.1096	0.0212	-0.1511	-0.0681	26.80	<.0001
Region	Flanders	1	-0.0170	0.0072	-0.0310	-0.0030	5.65	0.0174
Region	Wallonia	0	0.0000	0.0000	0.0000	0.0000	.	.
year		1	0.0320	0.0020	0.0280	0.0360	243.26	<.0001
Dispersion		1	0.0263	0.0008	0.0247	0.0278		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information	
Correlation Structure	AR(1)
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Correlation Matrix Dimension	6
Maximum Cluster Size	6
Minimum Cluster Size	6

Algorithm converged.

Analysis Of GEE Parameter Estimates

Empirical Standard Error Estimates

Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-67.5281	2.6579	-72.7374	-62.3188	-25.41	<.0001
age_cat	< 35 years	-1.8090	0.0387	-1.8849	-1.7331	-46.71	<.0001
age_cat	35 - 44 years	-1.0884	0.0298	-1.1468	-1.0299	-36.51	<.0001
age_cat	45 - 54 years	-0.7530	0.0282	-0.8083	-0.6977	-26.70	<.0001
age_cat	55 - 64 years	-0.4401	0.0306	-0.5001	-0.3801	-14.37	<.0001
age_cat	65 - 74 years	-0.1510	0.0309	-0.2116	-0.0905	-4.89	<.0001
age_cat	75 - 84 years	0.0141	0.0318	-0.0482	0.0763	0.44	0.6580
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-0.3555	0.0178	-0.3905	-0.3205	-19.92	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.

Region	Brussels	-0.0987	0.0658	-0.2277	0.0303	-1.50	0.1338
Region	Flanders	-0.0188	0.0182	-0.0546	0.0169	-1.03	0.3024
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.
year		0.0337	0.0013	0.0311	0.0363	25.46	<.0001

Score Statistics For Type 3 GEE Analysis

Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	446.89	<.0001
PP0020	1	188.68	<.0001
Region	2	2.72	0.2564
year	1	261.85	<.0001

Contrast Estimate Results

Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-0.0188	0.0182	0.05	-0.0546	0.0169	1.06	0.3024
Exp(Flemish Region vs Walloon Region)	0.9814	0.0179	0.05	0.9469	1.0171		
Brussels Capital Region vs Walloon Region	-0.0987	0.0658	0.05	-0.2277	0.0303	2.25	0.1338
Exp(Brussels Capital Region vs Walloon Region)	0.9060	0.0596	0.05	0.7963	1.0308		
Flemish Region vs Brussels Capital Region	0.0799	0.0653	0.05	-0.0480	0.2078	1.50	0.2210
Exp(Flemish Region vs Brussels Capital Region)	1.0832	0.0707	0.05	0.9531	1.2310		

8.3.3. US neck

8.3.3.1. Rates

Table 11. Rate of US neck per 1 000 person-years – Global Population

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
2003	Brussels	15.2 [12.1 ; 18.3]	15.1 [13.6 ; 16.6]	16.2 [14.7 ; 17.8]	59.95 [53.81 ; 66.08]
	Flanders	6.8 [6.0 ; 7.6]	6.4 [6.0 ; 6.8]	6.8 [6.4 ; 7.2]	25.36 [23.81 ; 26.92]
	Wallonia	18.8 [17.0 ; 20.6]	17.6 [16.8 ; 18.5]	18.8 [17.9 ; 19.7]	69.88 [66.40 ; 73.35]
	Belgium	11.5 [10.7 ; 12.3]	10.8 [10.4 ; 11.2]	11.6 [11.2 ; 12.0]	42.88 [41.33 ; 44.43]
2004	Brussels	14.4 [11.3 ; 17.6]	14.3 [12.8 ; 15.8]	15.7 [14.2 ; 17.3]	57.11 [51.15 ; 63.06]
	Flanders	6.7 [5.9 ; 7.5]	6.2 [5.8 ; 6.6]	6.7 [6.3 ; 7.1]	24.78 [23.25 ; 26.31]
	Wallonia	19.8 [18.0 ; 21.7]	18.7 [17.8 ; 19.6]	19.8 [18.9 ; 20.7]	73.77 [70.21 ; 77.32]
	Belgium	11.7 [10.9 ; 12.5]	11.0 [10.6 ; 11.4]	11.7 [11.3 ; 12.1]	43.53 [41.97 ; 45.08]
2005	Brussels	14.9 [11.8 ; 18.0]	14.8 [13.3 ; 16.3]	16.0 [14.5 ; 17.6]	58.97 [52.91 ; 65.03]
	Flanders	7.2 [6.4 ; 8.0]	6.8 [6.4 ; 7.2]	7.2 [6.8 ; 7.6]	26.61 [25.02 ; 28.19]
	Wallonia	20.1 [18.4 ; 21.9]	18.8 [17.9 ; 19.7]	20.1 [19.2 ; 21.0]	74.75 [71.18 ; 78.32]
	Belgium	12.1 [11.3 ; 12.9]	11.4 [11.0 ; 11.8]	12.1 [11.7 ; 12.5]	45.06 [43.48 ; 46.64]
2006	Brussels	15.4 [12.2 ; 18.7]	15.4 [13.9 ; 17.0]	16.7 [15.1 ; 18.3]	61.33 [55.16 ; 67.51]
	Flanders	7.5 [6.7 ; 8.3]	6.9 [6.5 ; 7.3]	7.5 [7.1 ; 7.9]	27.83 [26.21 ; 29.44]
	Wallonia	21.3 [19.5 ; 23.1]	19.9 [19.0 ; 20.8]	21.2 [20.2 ; 22.1]	78.82 [75.16 ; 82.48]
	Belgium	12.7 [11.9 ; 13.5]	11.9 [11.5 ; 12.3]	12.7 [12.3 ; 13.1]	47.30 [45.69 ; 48.91]
2007	Brussels	16.7 [13.3 ; 20.2]	16.9 [15.3 ; 18.5]	18.3 [16.7 ; 20.0]	66.82 [60.38 ; 73.25]
	Flanders	7.6 [6.8 ; 8.4]	7.0 [6.6 ; 7.4]	7.5 [7.1 ; 7.9]	27.91 [26.30 ; 29.52]
	Wallonia	21.7 [19.9 ; 23.6]	20.3 [19.4 ; 21.2]	21.6 [20.7 ; 22.6]	80.49 [76.81 ; 84.18]

	Belgium	13.0 [12.2 ; 13.8]	12.2 [11.8 ; 12.6]	13.0 [12.6 ; 13.4]	48.35 [46.72 ; 49.97]
2008	Brussels	17.8 [14.4 ; 21.2]	17.9 [16.3 ; 19.5]	19.6 [17.9 ; 21.3]	71.29 [64.67 ; 77.90]
	Flanders	8.0 [7.2 ; 8.8]	7.5 [7.0 ; 7.9]	8.0 [7.5 ; 8.4]	29.61 [27.96 ; 31.26]
	Wallonia	22.0 [20.2 ; 23.8]	20.6 [19.7 ; 21.6]	21.8 [20.9 ; 22.8]	81.26 [77.57 ; 84.95]
	Belgium	13.4 [12.6 ; 14.2]	12.6 [12.2 ; 13.0]	13.4 [13.0 ; 13.9]	50.00 [48.35 ; 51.65]
2003-2008	Brussels	15.8 [14.4 ; 17.1]	15.8 [15.1 ; 16.4]	17.1 [16.5 ; 17.8]	62.60 [60.06 ; 65.15]
	Flanders	7.3 [7.0 ; 7.6]	6.8 [6.6 ; 7.0]	7.3 [7.1 ; 7.4]	27.03 [26.38 ; 27.68]
	Wallonia	20.6 [19.9 ; 21.4]	19.3 [19.0 ; 19.7]	20.6 [20.2 ; 20.9]	76.53 [75.06 ; 78.00]
	Belgium	12.4 [12.1 ; 12.7]	11.6 [11.5 ; 11.8]	12.4 [12.3 ; 12.6]	46.21 [45.56 ; 46.86]

Table 12. Rate of US neck per 1 000 person-years – Restricted Population

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
2003	Brussels	11.0 [8.2 ; 13.7]	11.1 [9.8 ; 12.4]	11.9 [10.6 ; 13.3]	72.16 [63.36 ; 80.96]
	Flanders	5.3 [4.6 ; 6.1]	5.1 [4.7 ; 5.4]	5.4 [5.0 ; 5.7]	33.39 [31.05 ; 35.72]
	Wallonia	12.4 [10.9 ; 13.9]	11.9 [11.2 ; 12.7]	12.7 [12.0 ; 13.5]	78.56 [73.67 ; 83.44]
	Belgium	8.1 [7.4 ; 8.8]	7.8 [7.5 ; 8.1]	8.3 [8.0 ; 8.6]	51.26 [49.03 ; 53.49]
2004	Brussels	9.6 [7.0 ; 12.2]	9.7 [8.4 ; 10.9]	10.6 [9.3 ; 11.9]	63.33 [55.09 ; 71.57]
	Flanders	5.0 [4.3 ; 5.7]	4.7 [4.4 ; 5.1]	5.0 [4.7 ; 5.4]	31.12 [28.87 ; 33.37]
	Wallonia	12.8 [11.3 ; 14.4]	12.5 [11.7 ; 13.3]	13.2 [12.5 ; 14.0]	81.46 [76.47 ; 86.45]
	Belgium	7.9 [7.2 ; 8.6]	7.6 [7.3 ; 7.9]	8.1 [7.8 ; 8.4]	49.95 [47.75 ; 52.15]
2005	Brussels	10.1 [7.5 ; 12.8]	10.3 [9.0 ; 11.6]	11.1 [9.8 ; 12.5]	67.24 [58.71 ; 75.76]
	Flanders	5.4 [4.7 ; 6.2]	5.2 [4.9 ; 5.6]	5.5 [5.1 ; 5.9]	33.99 [31.63 ; 36.34]
	Wallonia	12.6 [11.1 ; 14.0]	12.1 [11.3 ; 12.8]	12.9 [12.2 ; 13.7]	79.77 [74.82 ; 84.73]

	Belgium	8.1 [7.5 ; 8.8]	7.8 [7.5 ; 8.2]	8.3 [8.0 ; 8.7]	51.40 [49.17 ; 53.64]
2006	Brussels	9.2 [6.6 ; 11.8]	9.3 [8.1 ; 10.5]	10.0 [8.8 ; 11.3]	61.18 [53.04 ; 69.32]
	Flanders	5.6 [4.9 ; 6.3]	5.3 [4.9 ; 5.7]	5.7 [5.3 ; 6.0]	34.93 [32.55 ; 37.32]
	Wallonia	13.4 [11.8 ; 14.9]	13.0 [12.2 ; 13.8]	13.8 [13.0 ; 14.6]	85.13 [80.00 ; 90.26]
	Belgium	8.4 [7.7 ; 9.1]	8.1 [7.7 ; 8.4]	8.6 [8.3 ; 8.9]	53.06 [50.79 ; 55.33]
2007	Brussels	10.5 [7.6 ; 13.3]	10.9 [9.5 ; 12.2]	11.7 [10.4 ; 13.1]	69.97 [61.26 ; 78.68]
	Flanders	5.4 [4.7 ; 6.1]	5.1 [4.8 ; 5.5]	5.4 [5.1 ; 5.8]	33.63 [31.29 ; 35.96]
	Wallonia	13.6 [12.0 ; 15.1]	13.1 [12.4 ; 13.9]	14.0 [13.2 ; 14.8]	86.54 [81.36 ; 91.72]
	Belgium	8.4 [7.7 ; 9.1]	8.1 [7.8 ; 8.5]	8.6 [8.3 ; 9.0]	53.44 [51.16 ; 55.72]
2008	Brussels	11.6 [8.8 ; 14.5]	12.0 [10.6 ; 13.3]	13.1 [11.7 ; 14.6]	78.26 [69.08 ; 87.45]
	Flanders	5.7 [5.0 ; 6.4]	5.4 [5.1 ; 5.8]	5.8 [5.4 ; 6.1]	35.79 [33.39 ; 38.20]
	Wallonia	12.6 [11.2 ; 14.0]	12.3 [11.6 ; 13.1]	13.0 [12.3 ; 13.8]	80.47 [75.47 ; 85.47]
	Belgium	8.4 [7.8 ; 9.1]	8.2 [7.8 ; 8.5]	8.7 [8.3 ; 9.0]	53.54 [51.26 ; 55.81]
2003-2008	Brussels	10.3 [9.2 ; 11.4]	10.5 [10.0 ; 11.1]	11.4 [10.9 ; 12.0]	68.69 [65.18 ; 72.21]
	Flanders	5.4 [5.1 ; 5.7]	5.1 [5.0 ; 5.3]	5.5 [5.3 ; 5.6]	33.81 [32.85 ; 34.77]
	Wallonia	12.9 [12.3 ; 13.5]	12.5 [12.2 ; 12.8]	13.3 [13.0 ; 13.6]	81.98 [79.92 ; 84.03]
	Belgium	8.2 [8.0 ; 8.5]	7.9 [7.8 ; 8.1]	8.4 [8.3 ; 8.6]	52.11 [51.19 ; 53.02]

Table 13. Rate of US neck per 1 000 person-years By Strata – Global Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
				Brussels Capital Region				
Male	< 35 years	3.8 (23/5980)	1.3 (8/6036)	3.2 (19/5973)	3.7 (22/6021)	2.6 (16/6060)	5.7 (35/6165)	3.4 (123/36234)
	35 - 44 years	3.9 (7/1788)	5.5 (10/1835)	3.8 (7/1858)	4.2 (8/1904)	8.1 (16/1967)	7.0 (14/2002)	5.5 (62/11353)
	45 - 54 years	6.6 (9/1355)	3.6 (5/1388)	5.8 (8/1376)	5.8 (8/1385)	8.6 (12/1395)	12.4 (18/1450)	7.2 (60/8349)
	55 - 64 years	19.3 (21/1089)	14.3 (16/1120)	11.4 (13/1140)	9.7 (11/1133)	11.4 (13/1139)	15.4 (18/1170)	13.5 (92/6791)
	65 - 74 years	19.8 (32/1616)	16.2 (26/1610)	14.7 (23/1563)	19.2 (30/1565)	17.2 (26/1515)	28.3 (43/1517)	19.2 (180/9385)
	75 - 84 years	10.9 (12/1104)	10.0 (11/1104)	16.0 (18/1125)	10.0 (11/1098)	18.1 (20/1105)	23.0 (25/1089)	14.6 (97/6624)
	>= 85 years	7.4 (2/270)	3.8 (1/261)	7.6 (2/263)	13.3 (4/301)	15.1 (5/330)	8.6 (3/348)	9.6 (17/1773)
Female	< 35 years	14.2 (83/5832)	10.7 (63/5889)	12.2 (72/5904)	11.9 (71/5955)	12.4 (75/6025)	11.2 (68/6048)	12.1 (432/35653)
	35 - 44 years	18.5 (31/1673)	25.1 (42/1673)	27.0 (45/1667)	31.4 (53/1687)	31.8 (54/1700)	30.0 (53/1764)	27.4 (278/10163)
	45 - 54 years	38.9 (57/1465)	45.2 (68/1504)	41.6 (63/1514)	43.6 (66/1514)	42.0 (63/1501)	48.7 (73/1498)	43.4 (390/8995)
	55 - 64 years	37.7 (43/1140)	43.1 (49/1138)	40.9 (47/1150)	43.7 (51/1167)	62.1 (74/1192)	46.5 (57/1225)	45.8 (321/7012)
	65 - 74 years	37.0 (75/2026)	38.9 (80/2054)	39.1 (77/1971)	36.6 (70/1915)	36.7 (68/1852)	40.7 (74/1819)	38.2 (444/11637)
	75 - 84 years	30.1 (59/1961)	27.7 (54/1949)	27.7 (53/1912)	26.1 (48/1842)	25.0 (45/1803)	35.5 (62/1746)	28.6 (321/11213)
	>= 85 years	7.8 (6/770)	15.6 (12/769)	7.5 (6/804)	17.7 (15/850)	20.1 (18/897)	14.9 (14/942)	14.1 (71/5032)

Flemish Region							
Male	< 35 years	2.1 (66/31669)	2.6 (81/31579)	2.7 (84/31435)	2.9 (91/31270)	2.7 (85/31307)	3.1 (96/31385)	2.7 (503/188645)
	35 - 44 years	3.2 (38/11861)	2.1 (25/11756)	2.3 (27/11690)	3.1 (36/11540)	2.4 (27/11390)	2.6 (29/11158)	2.6 (182/69396)
	45 - 54 years	4.2 (45/10642)	6.6 (72/10851)	4.4 (48/11004)	3.7 (42/11217)	4.8 (55/11393)	4.9 (56/11546)	4.8 (318/66653)
	55 - 64 years	6.1 (51/8372)	5.4 (46/8575)	6.4 (56/8751)	7.1 (64/9031)	5.2 (48/9307)	6.2 (59/9514)	6.1 (324/53549)
	65 - 74 years	7.1 (97/13750)	7.3 (101/13842)	6.4 (88/13691)	6.5 (87/13395)	7.4 (99/13289)	7.7 (104/13425)	7.1 (576/81391)
	75 - 84 years	5.4 (42/7735)	6.5 (52/8060)	5.8 (48/8316)	6.7 (57/8556)	6.6 (58/8772)	6.2 (56/9008)	6.2 (313/50448)
	>= 85 years	3.8 (5/1332)	7.1 (10/1417)	7.4 (12/1619)	4.9 (9/1834)	7.4 (15/2031)	4.5 (10/2202)	5.8 (61/10435)
Female	< 35 years	4.6 (141/30434)	4.6 (138/30325)	5.7 (171/30255)	4.6 (139/30198)	5.6 (169/30321)	5.7 (174/30447)	5.1 (932/181981)
	35 - 44 years	13.8 (158/11428)	10.9 (125/11505)	12.1 (138/11376)	12.4 (139/11236)	13.1 (145/11108)	15.3 (165/10804)	12.9 (870/67456)
	45 - 54 years	14.4 (148/10282)	13.6 (141/10387)	15.0 (160/10633)	18.2 (198/10885)	16.3 (180/11029)	18.1 (204/11241)	16.0 (1031/64457)
	55 - 64 years	16.4 (137/8362)	14.3 (122/8517)	16.9 (147/8682)	17.1 (152/8879)	16.9 (155/9173)	15.5 (145/9367)	16.2 (858/52979)
	65 - 74 years	11.5 (181/15674)	12.2 (193/15781)	13.8 (213/15482)	15.0 (228/15164)	16.3 (243/14864)	17.4 (258/14862)	14.3 (1316/91826)
	75 - 84 years	10.7 (121/11288)	11.6 (135/11592)	11.1 (131/11816)	13.2 (158/11947)	11.3 (137/12146)	11.9 (146/12254)	11.7 (828/71044)
	>= 85 years	8.0 (28/3519)	6.3 (23/3626)	5.2 (20/3875)	6.0 (25/4158)	6.7 (30/4449)	7.8 (37/4766)	6.7 (163/24392)
Walloon Region							

Male	< 35 years	3.9 (70/18014)	4.2 (75/18061)	3.5 (62/17968)	4.5 (81/17923)	5.4 (97/17884)	4.7 (84/17906)	4.4 (469/107756)
	35 - 44 years	7.4 (45/6054)	7.3 (44/6030)	8.2 (49/5992)	7.5 (44/5903)	8.9 (53/5929)	9.4 (55/5876)	8.1 (290/35784)
	45 - 54 years	12.7 (74/5807)	11.3 (66/5848)	13.1 (77/5888)	12.9 (77/5974)	14.1 (85/6043)	10.9 (66/6052)	12.5 (445/35610)
	55 - 64 years	12.1 (52/4293)	15.5 (69/4441)	14.7 (68/4638)	17.2 (83/4824)	17.0 (85/5011)	19.3 (100/5182)	16.1 (457/28389)
	65 - 74 years	16.0 (109/6798)	19.2 (129/6727)	14.5 (96/6628)	15.8 (102/6460)	17.9 (112/6263)	18.8 (118/6272)	17.0 (666/39148)
	75 - 84 years	19.1 (79/4145)	15.6 (67/4301)	15.5 (67/4329)	14.6 (64/4378)	16.2 (72/4451)	14.4 (64/4450)	15.9 (413/26054)
	>= 85 years	10.2 (7/688)	13.9 (10/719)	9.9 (8/806)	10.3 (9/870)	16.6 (16/965)	13.4 (14/1045)	12.6 (64/5093)
Female	< 35 years	13.6 (238/17557)	15.7 (276/17596)	16.7 (293/17544)	17.3 (302/17504)	16.9 (296/17507)	18.9 (331/17544)	16.5 (1736/105252)
	35 - 44 years	39.5 (243/6154)	39.0 (237/6083)	42.5 (258/6072)	41.1 (246/5992)	42.4 (255/6011)	42.1 (252/5990)	41.1 (1491/36301)
	45 - 54 years	46.5 (277/5954)	50.1 (305/6090)	44.0 (268/6086)	49.1 (304/6188)	48.5 (302/6229)	48.3 (302/6247)	47.8 (1758/36794)
	55 - 64 years	46.0 (209/4548)	45.3 (208/4594)	46.7 (223/4780)	49.6 (249/5016)	50.9 (263/5172)	51.0 (274/5371)	48.4 (1426/29479)
	65 - 74 years	38.7 (322/8321)	42.0 (349/8306)	45.2 (366/8091)	49.0 (382/7800)	42.6 (323/7577)	48.8 (366/7497)	44.3 (2108/47593)
	75 - 84 years	22.8 (155/6790)	23.4 (163/6964)	28.4 (199/7000)	29.2 (205/7015)	32.0 (224/7004)	27.5 (192/6979)	27.3 (1138/41752)
	>= 85 years	10.5 (22/2090)	13.8 (29/2105)	14.4 (33/2289)	13.4 (33/2457)	16.5 (44/2659)	14.7 (41/2781)	14.0 (202/14381)

Table 14. Rate of US neck per 1 000 person-years By Strata – Restricted Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
Brussels Capital Region								
Male	< 35 years	3.3 (20/5975)	1.3 (8/6030)	2.7 (16/5966)	3.7 (22/6011)	2.6 (16/6048)	5.4 (33/6147)	3.2 (115/36178)
	35 - 44 years	3.4 (6/1781)	3.8 (7/1824)	3.8 (7/1847)	3.7 (7/1889)	6.2 (12/1949)	4.5 (9/1983)	4.3 (48/11272)
	45 - 54 years	4.5 (6/1345)	3.6 (5/1375)	5.2 (7/1358)	5.1 (7/1360)	7.3 (10/1370)	9.8 (14/1422)	6.0 (49/8230)
	55 - 64 years	16.9 (18/1064)	9.2 (10/1086)	7.3 (8/1103)	4.6 (5/1098)	8.2 (9/1100)	13.3 (15/1126)	9.9 (65/6577)
	65 - 74 years	17.1 (27/1576)	14.1 (22/1563)	11.9 (18/1513)	10.6 (16/1510)	9.0 (13/1452)	17.9 (26/1450)	13.5 (122/9063)
	75 - 84 years	10.3 (11/1067)	8.5 (9/1056)	11.2 (12/1069)	7.7 (8/1041)	14.4 (15/1042)	15.7 (16/1019)	11.3 (71/6293)
	>= 85 years	7.7 (2/261)	4.0 (1/252)	8.0 (2/251)	10.7 (3/280)	12.9 (4/309)	9.3 (3/322)	9.0 (15/1674)
Female	< 35 years	10.6 (61/5770)	8.3 (48/5806)	9.0 (52/5808)	7.5 (44/5853)	7.6 (45/5916)	7.2 (43/5936)	8.4 (293/35090)
	35 - 44 years	11.8 (19/1610)	16.8 (27/1603)	20.7 (33/1593)	17.5 (28/1599)	22.4 (36/1605)	21.2 (35/1655)	18.4 (178/9665)
	45 - 54 years	24.7 (34/1377)	28.3 (39/1378)	21.8 (30/1376)	22.8 (31/1361)	26.8 (36/1344)	30.8 (41/1330)	25.8 (211/8166)
	55 - 64 years	27.5 (29/1055)	21.2 (22/1039)	28.1 (29/1032)	22.1 (23/1041)	32.4 (34/1051)	20.6 (22/1065)	25.3 (159/6283)
	65 - 74 years	26.4 (49/1854)	26.0 (48/1846)	25.8 (45/1745)	22.2 (37/1665)	24.0 (38/1581)	26.1 (40/1533)	25.1 (257/10226)
	75 - 84 years	21.5 (38/1771)	19.8 (34/1721)	19.2 (32/1667)	15.1 (24/1590)	14.8 (23/1552)	27.7 (41/1478)	19.6 (192/9780)
	>= 85 years	5.7 (4/707)	11.6 (8/687)	7.1 (5/708)	16.3 (12/738)	9.3 (7/757)	10.1 (8/792)	10.0 (44/4388)
Flemish Region								
Male	< 35 years	2.0 (63/31646)	2.5 (78/31550)	2.5 (79/31399)	2.8 (87/31231)	2.4 (76/31268)	2.8 (87/31347)	2.5 (470/188441)
	35 - 44	3.0 (35/11839)	1.7 (20/11721)	1.9 (22/11645)	2.5 (29/11491)	1.9 (22/11331)	2.1 (23/11081)	2.2 (151/69107)

	years							
	45 - 54 years	3.7 (39/10559)	4.9 (53/10743)	3.7 (40/10893)	3.0 (33/11101)	4.5 (51/11273)	3.9 (44/11415)	3.9 (260/65983)
	55 - 64 years	5.6 (46/8279)	4.7 (40/8450)	5.2 (45/8603)	5.9 (52/8856)	4.0 (36/9111)	5.2 (48/9286)	5.1 (267/52585)
	65 - 74 years	5.9 (80/13516)	5.6 (76/13543)	5.2 (70/13345)	5.0 (65/13013)	5.7 (73/12885)	5.4 (70/12990)	5.5 (434/79291)
	75 - 84 years	4.5 (34/7586)	5.6 (44/7861)	5.1 (41/8060)	5.7 (47/8237)	6.0 (50/8387)	5.7 (49/8593)	5.4 (265/48723)
	>= 85 years	3.8 (5/1309)	4.4 (6/1374)	7.0 (11/1564)	3.4 (6/1771)	7.2 (14/1949)	3.8 (8/2090)	5.0 (50/10057)
Female	< 35 years	3.9 (117/30268)	3.9 (117/30114)	4.9 (147/30017)	3.6 (109/29934)	4.1 (124/30022)	4.3 (129/30113)	4.1 (743/180468)
	35 - 44 years	11.1 (124/11171)	7.2 (81/11179)	9.2 (101/11011)	9.0 (98/10853)	9.8 (105/10697)	10.8 (112/10359)	9.5 (621/65270)
	45 - 54 years	10.5 (104/9898)	9.3 (92/9907)	9.7 (98/10074)	13.3 (136/10262)	10.4 (108/10351)	11.2 (118/10511)	10.8 (656/61004)
	55 - 64 years	10.6 (84/7900)	9.1 (72/7953)	11.2 (90/8044)	11.8 (96/8140)	10.0 (84/8360)	10.0 (85/8482)	10.5 (511/48879)
	65 - 74 years	8.7 (128/14692)	8.9 (130/14598)	9.9 (141/14197)	9.9 (136/13784)	10.1 (136/13400)	12.0 (159/13291)	9.9 (830/83961)
	75 - 84 years	7.3 (77/10552)	8.0 (85/10681)	7.3 (79/10771)	9.4 (101/10794)	7.8 (85/10857)	8.7 (94/10821)	8.1 (521/64476)
	>= 85 years	6.3 (21/3335)	5.6 (19/3381)	4.5 (16/3572)	3.4 (13/3788)	5.5 (22/4029)	6.3 (27/4282)	5.3 (118/22388)
Walloon Region								
Male	< 35 years	3.4 (61/17982)	3.6 (65/18014)	3.1 (55/17904)	4.0 (71/17852)	4.7 (84/17802)	3.9 (70/17811)	3.8 (406/107365)
	35 - 44 years	5.7 (34/6012)	5.7 (34/5968)	6.6 (39/5921)	6.4 (37/5817)	7.5 (44/5832)	7.6 (44/5773)	6.6 (232/35322)
	45 - 54 years	8.9 (51/5723)	7.5 (43/5732)	9.9 (57/5749)	8.6 (50/5820)	8.9 (52/5866)	6.8 (40/5866)	8.4 (293/34755)
	55 - 64 years	10.9 (46/4219)	12.2 (53/4328)	11.6 (52/4497)	13.1 (61/4654)	13.5 (65/4801)	12.6 (62/4929)	12.4 (339/27429)
	65 - 74	12.0 (79/6575)	14.6 (94/6452)	11.2 (71/6318)	10.9 (67/6121)	14.1 (83/5899)	13.6 (80/5871)	12.7 (474/37235)

	years							
	75 - 84 years	15.3 (61/3976)	12.2 (50/4100)	12.5 (51/4085)	11.5 (47/4091)	13.0 (54/4139)	10.2 (42/4101)	12.5 (305/24492)
	>= 85 years	8.9 (6/671)	10.1 (7/690)	7.8 (6/773)	9.7 (8/825)	14.4 (13/905)	6.2 (6/966)	9.5 (46/4831)
Female	< 35 years	9.2 (159/17292)	10.8 (187/17262)	11.1 (191/17158)	11.4 (195/17068)	11.1 (189/17030)	11.9 (202/17006)	10.9 (1123/102817)
	35 - 44 years	27.2 (159/5838)	25.9 (147/5670)	25.0 (140/5601)	24.2 (133/5485)	27.2 (148/5446)	20.1 (108/5375)	25.0 (835/33415)
	45 - 54 years	27.1 (148/5461)	27.7 (151/5449)	23.3 (125/5363)	29.3 (158/5397)	27.5 (148/5387)	26.9 (144/5350)	27.0 (874/32406)
	55 - 64 years	26.9 (109/4058)	29.4 (118/4016)	25.0 (103/4113)	29.5 (125/4233)	26.3 (113/4298)	26.7 (117/4376)	27.3 (685/25095)
	65 - 74 years	25.7 (190/7389)	25.0 (180/7194)	28.1 (193/6878)	29.3 (191/6529)	25.0 (156/6235)	26.4 (160/6069)	26.6 (1070/40294)
	75 - 84 years	17.0 (104/6110)	15.7 (96/6103)	20.9 (126/6014)	21.1 (124/5887)	22.3 (128/5749)	18.3 (103/5632)	19.2 (681/35494)
	>= 85 years	6.3 (12/1905)	12.3 (23/1869)	10.6 (21/1987)	9.5 (20/2103)	11.6 (26/2246)	10.9 (25/2299)	10.2 (127/12409)

8.3.3.2. Statistical Analyses Results

Table 15. US neck Result – Global Population

Model Information	
Data Set	WORK.DATA_EPS
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight
Offset Variable	l_n_personyears
Number of Observations Read	3612
Number of Observations Used	3370
Sum of Weights	2690.5
Missing Values	242

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3359	3458.0298	1.0295
Scaled Deviance	3359	3458.0298	1.0295
Pearson Chi-Square	3359	3878.8959	1.1548
Scaled Pearson X2	3359	3878.8959	1.1548
Log Likelihood		38407.0258	

Class Level Information		
Class	Levels	Values
age_cat	7	< 35 years 35 - 44 years 45 - 54 years 55 - 64 years 65 - 74 years 75 - 84 years >= 85 years
PP0020	2	Male Female
Region	3	Brussels Flanders Wallonia
yearclss	6	2003 2004 2005 2006 2007 2008
arrondissement	43	Brussels Antwerpen Mechelen Turnhout Halle/Vilvoorde Leuven Brugge Diksmuide Ieper Kortrijk Oostende Roeselare Tielt Veurne Aalst Dendermonde Eeklo Gent Oudenaarde St Niklaas Hasselt Maaseik Tongeren Nivelles Ath Charleroi Mons Mouscron Soignies Thuin ...

Algorithm converged.

Analysis Of Initial Parameter Estimates							
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits	Chi-Square	Pr > ChiSq
Intercept		1	-68.7100	12.1437	-92.5111 -44.9088	32.01	<.0001
age_cat	< 35 years	1	-0.5029	0.0607	-0.6218 -0.3839	68.67	<.0001
age_cat	35 - 44 years	1	0.2502	0.0615	0.1296 0.3708	16.54	<.0001
age_cat	45 - 54 years	1	0.5179	0.0608	0.3987 0.6370	72.56	<.0001
age_cat	55 - 64 years	1	0.6128	0.0611	0.4930 0.7326	100.53	<.0001
age_cat	65 - 74 years	1	0.5819	0.0621	0.4602 0.7036	87.80	<.0001
age_cat	75 - 84 years	1	0.3399	0.0638	0.2149 0.4649	28.41	<.0001
age_cat	>= 85 years	0	0.0000	0.0000	0.0000 0.0000	.	.
PP0020	Male	1	-1.0258	0.0218	-1.0685 -0.9832	2222.29	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000 0.0000	.	.
Region	Brussels	1	-0.1688	0.0475	-0.2620 -0.0756	12.61	0.0004
Region	Flanders	1	-0.9353	0.0213	-0.9771 -0.8935	1920.92	<.0001
Region	Wallonia	0	0.0000	0.0000	0.0000 0.0000	.	.
year		1	0.0324	0.0061	0.0205 0.0443	28.64	<.0001
Dispersion		1	0.1013	0.0060	0.0896 0.1130		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information	
Correlation Structure	Exchangeable
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Clusters With Missing Values	101
Correlation Matrix Dimension	6

Maximum Cluster Size	6
Minimum Cluster Size	0

Algorithm converged.

Exchangeable Working Correlation	
Correlation	0.364887874

Analysis Of GEE Parameter Estimates							
Empirical Standard Error Estimates							
Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-69.5211	11.0955	-91.2678	-47.7743	-6.27	<.0001
age_cat	< 35 years	-0.4885	0.0943	-0.6732	-0.3037	-5.18	<.0001
age_cat	35 - 44 years	0.2570	0.1040	0.0532	0.4608	2.47	0.0135
age_cat	45 - 54 years	0.5249	0.0963	0.3362	0.7135	5.45	<.0001
age_cat	55 - 64 years	0.6224	0.0944	0.4373	0.8074	6.59	<.0001
age_cat	65 - 74 years	0.5994	0.0946	0.4139	0.7849	6.33	<.0001
age_cat	75 - 84 years	0.3525	0.0972	0.1619	0.5431	3.63	0.0003
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-1.0947	0.0405	-1.1740	-1.0154	-27.05	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	-0.1891	0.0757	-0.3374	-0.0408	-2.50	0.0125
Region	Flanders	-0.9478	0.0433	-1.0327	-0.8629	-21.88	<.0001
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.
year		0.0328	0.0055	0.0220	0.0437	5.93	<.0001

Score Statistics For Type 3 GEE Analysis			
Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	139.18	<.0001
PP0020	1	189.29	<.0001
Region	2	156.65	<.0001
year	1	31.29	<.0001

Contrast Estimate Results							
Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-0.9478	0.0433	0.05	-1.0327	-0.8629	478.86	<.0001
Exp(Flemish Region vs Walloon Region)	0.3876	0.0168	0.05	0.3561	0.4219		
Brussels Capital Region vs Walloon Region	-0.1891	0.0757	0.05	-0.3374	-0.0408	6.24	0.0125
Exp(Brussels Capital Region vs Walloon Region)	0.8277	0.0626	0.05	0.7136	0.9601		
Flemish Region vs Brussels Capital Region	-0.7587	0.0742	0.05	-0.9042	-0.6133	104.54	<.0001
Exp(Flemish Region vs Brussels Capital Region)	0.4683	0.0347	0.05	0.4049	0.5416		

Table 16. US neck Result – Restricted Population

Model Information	
Data Set	WORK.DATA_EPS_RES
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight
Offset Variable	l_n_personyears
Number of Observations Read	602
Number of Observations Used	598
Sum of Weights	471
Missing Values	4

Class Level Information		
Class	Levels	Values
age_cat	7	< 35 years 35 - 44 years 45 - 54 years 55 - 64 years 65 - 74 years 75 - 84 years >= 85 years
PP0020	2	Male Female
Region	3	Brussels Flanders Wallonia
yearclss	1	3000
arrondissement	43	Brussels Antwerpen Mechelen Turnhout Halle/Vilvoorde Leuven Brugge Diksmuide Ieper Kortrijk Oostende Roeselare Tielt Veurne Aalst Dendermonde Eeklo Gent Oudenaarde St Niklaas Hasselt Maaseik Tongeren Nivelles Ath Charleroi Mons Mouscron Soignies Thuin ...

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3228	3269.9695	1.0130
Scaled Deviance	3228	3269.9695	1.0130
Pearson Chi-Square	3228	3561.3338	1.1033
Scaled Pearson X2	3228	3561.3338	1.1033
Log Likelihood		16224.3091	

Algorithm converged.

Analysis Of Initial Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept		1	-3.9963	0.0606	-4.1151	-3.8775	4346.96	<.0001
age_cat	< 35 years	1	-0.5916	0.0640	-0.7171	-0.4662	85.40	<.0001
age_cat	35 - 44 years	1	0.0729	0.0655	-0.0554	0.2012	1.24	0.2655
age_cat	45 - 54 years	1	0.2577	0.0649	0.1305	0.3849	15.76	<.0001
age_cat	55 - 64 years	1	0.3720	0.0654	0.2439	0.5001	32.38	<.0001
age_cat	65 - 74 years	1	0.3456	0.0654	0.2174	0.4737	27.95	<.0001
age_cat	75 - 84 years	1	0.2085	0.0671	0.0771	0.3400	9.66	0.0019
age_cat	>= 85 years	0	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	1	-0.8189	0.0223	-0.8626	-0.7751	1346.74	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	1	-0.1582	0.0443	-0.2451	-0.0713	12.73	0.0004
Region	Flanders	1	-0.8221	0.0222	-0.8656	-0.7786	1372.82	<.0001
Region	Wallonia	0	0.0000	0.0000	0.0000	0.0000	.	.
Dispersion		1	0.0683	0.0058	0.0569	0.0798		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information	
Correlation Structure	Exchangeable
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Clusters With Missing Values	166
Correlation Matrix Dimension	6

Maximum Cluster Size	6
Minimum Cluster Size	0

Algorithm converged.

Exchangeable Working Correlation	
Correlation	0.2596447442

Analysis Of GEE Parameter Estimates

Empirical Standard Error Estimates

Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-3.9372	0.0893	-4.1122	-3.7623	-44.11	<.0001
age_cat	< 35 years	-0.6274	0.0944	-0.8125	-0.4423	-6.64	<.0001
age_cat	35 - 44 years	0.0391	0.1070	-0.1706	0.2489	0.37	0.7146
age_cat	45 - 54 years	0.2209	0.0981	0.0287	0.4132	2.25	0.0243
age_cat	55 - 64 years	0.3365	0.0968	0.1469	0.5262	3.48	0.0005
age_cat	65 - 74 years	0.3115	0.0958	0.1237	0.4993	3.25	0.0012
age_cat	75 - 84 years	0.1747	0.0980	-0.0174	0.3667	1.78	0.0747
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-0.8749	0.0383	-0.9500	-0.7998	-22.84	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.

Region	Brussels	-0.1785	0.0679	-0.3116	-0.0454	-2.63	0.0086
Region	Flanders	-0.8258	0.0407	-0.9056	-0.7461	-20.30	<.0001
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.

Score Statistics For Type 3 GEE Analysis

Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	122.84	<.0001
PP0020	1	161.27	<.0001
Region	2	138.19	<.0001

Contrast Estimate Results

Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-0.8258	0.0407	0.05	-0.9056	-0.7461	411.92	<.0001
Exp(Flemish Region vs Walloon Region)	0.4379	0.0178	0.05	0.4043	0.4742		
Brussels Capital Region vs Walloon Region	-0.1785	0.0679	0.05	-0.3116	-0.0454	6.91	0.0086
Exp(Brussels Capital Region vs Walloon Region)	0.8365	0.0568	0.05	0.7323	0.9557		
Flemish Region vs Brussels Capital Region	-0.6473	0.0651	0.05	-0.7749	-0.5198	98.99	<.0001
Exp(Flemish Region vs Brussels Capital Region)	0.5234	0.0341	0.05	0.4608	0.5946		

8.3.4. US neck combined with TSH within a 4-months period

Table 17. Rate of US neck combined with TSH per 1 000 person-years – Global Population (EPS)

year	region	crude rate	European Standardized Rate	Belgium Standardized Rate (Std = Belgium 2008)	Indirect Standardized Ratio (Std = Belgium 2008)
2003	Brussels	12.2 [9.4 ; 15.1]	12.1 [10.7 ; 13.5]	13.2 [11.8 ; 14.6]	63.74 [56.47 ; 71.00]
	Flanders	4.9 [4.2 ; 5.6]	4.5 [4.1 ; 4.8]	4.9 [4.6 ; 5.3]	23.69 [21.97 ; 25.40]
	Wallonia	14.4 [12.8 ; 16.0]	13.3 [12.6 ; 14.1]	14.4 [13.6 ; 15.2]	69.71 [65.75 ; 73.67]
	Belgium	8.6 [7.9 ; 9.3]	8.0 [7.7 ; 8.4]	8.7 [8.4 ; 9.1]	42.14 [40.39 ; 43.90]
2004	Brussels	11.1 [8.3 ; 13.9]	10.9 [9.6 ; 12.2]	12.3 [10.9 ; 13.6]	58.01 [51.11 ; 64.91]
	Flanders	4.9 [4.2 ; 5.6]	4.4 [4.1 ; 4.7]	4.9 [4.6 ; 5.2]	23.54 [21.84 ; 25.24]
	Wallonia	15.5 [13.9 ; 17.1]	14.4 [13.7 ; 15.2]	15.5 [14.7 ; 16.3]	75.15 [71.05 ; 79.25]
	Belgium	8.9 [8.2 ; 9.6]	8.2 [7.9 ; 8.5]	9.0 [8.6 ; 9.3]	43.29 [41.52 ; 45.06]
2005	Brussels	11.5 [8.7 ; 14.4]	11.4 [10.1 ; 12.7]	12.7 [11.3 ; 14.0]	60.31 [53.27 ; 67.36]
	Flanders	5.1 [4.4 ; 5.8]	4.7 [4.3 ; 5.0]	5.1 [4.8 ; 5.5]	24.66 [22.93 ; 26.40]
	Wallonia	16.0 [14.4 ; 17.6]	14.8 [14.0 ; 15.6]	16.0 [15.2 ; 16.8]	77.55 [73.40 ; 81.71]
	Belgium	9.2 [8.5 ; 9.9]	8.5 [8.2 ; 8.9]	9.3 [8.9 ; 9.6]	44.91 [43.11 ; 46.70]
2006	Brussels	11.7 [8.8 ; 14.5]	11.6 [10.3 ; 12.9]	12.7 [11.4 ; 14.1]	61.27 [54.18 ; 68.36]
	Flanders	5.5 [4.8 ; 6.2]	4.9 [4.5 ; 5.2]	5.4 [5.1 ; 5.8]	26.25 [24.46 ; 28.03]
	Wallonia	16.9 [15.3 ; 18.5]	15.7 [14.9 ; 16.5]	16.8 [16.0 ; 17.6]	81.66 [77.41 ; 85.91]
	Belgium	9.7 [9.0 ; 10.4]	9.0 [8.6 ; 9.3]	9.8 [9.4 ; 10.1]	47.24 [45.40 ; 49.08]
2007	Brussels	12.9 [9.8 ; 16.0]	12.9 [11.5 ; 14.3]	14.2 [12.7 ; 15.6]	67.87 [60.41 ; 75.33]
	Flanders	5.6 [4.9 ; 6.3]	5.0 [4.7 ; 5.4]	5.6 [5.2 ; 5.9]	26.89 [25.09 ; 28.69]
	Wallonia	17.6 [15.9 ; 19.2]	16.2 [15.3 ; 17.0]	17.5 [16.7 ; 18.3]	84.73 [80.42 ; 89.05]
	Belgium	10.1 [9.4 ; 10.9]	9.3 [9.0 ; 9.7]	10.2 [9.8 ; 10.5]	49.16 [47.29 ; 51.03]

2008	Brussels	13.2 [10.2 ; 16.2]	13.2 [11.8 ; 14.6]	14.8 [13.3 ; 16.3]	69.69 [62.17 ; 77.21]
	Flanders	6.0 [5.3 ; 6.8]	5.5 [5.1 ; 5.8]	6.0 [5.6 ; 6.4]	29.02 [27.15 ; 30.88]
	Wallonia	17.2 [15.6 ; 18.9]	15.9 [15.1 ; 16.7]	17.1 [16.3 ; 17.9]	82.93 [78.68 ; 87.19]
	Belgium	10.3 [9.6 ; 11.0]	9.5 [9.2 ; 9.9]	10.3 [10.0 ; 10.7]	50.00 [48.12 ; 51.88]
2003-2008	Brussels	12.1 [10.9 ; 13.3]	12.0 [11.5 ; 12.6]	13.3 [12.7 ; 13.9]	63.49 [60.55 ; 66.44]
	Flanders	5.3 [5.0 ; 5.6]	4.8 [4.7 ; 4.9]	5.3 [5.2 ; 5.5]	25.70 [24.97 ; 26.42]
	Wallonia	16.3 [15.6 ; 16.9]	15.1 [14.7 ; 15.4]	16.2 [15.9 ; 16.6]	78.67 [76.97 ; 80.38]
	Belgium	9.5 [9.2 ; 9.8]	8.8 [8.6 ; 8.9]	9.5 [9.4 ; 9.7]	46.15 [45.41 ; 46.90]

Table 18. Rate of US neck combined with TSH per 1 000 person-years – Restricted Population

year	region	crude rate	European Rate	Standardized Belgium (Std = Belgium 2008)	Standardized Rate Indirect (Std = Belgium 2008)	Standardized Ratio
2003	Brussels	8.5 [6.0 ; 11.0]	8.6 [7.4 ; 9.8]	9.4 [8.1 ; 10.6]	81.84 [70.50 ; 93.18]	
	Flanders	3.5 [2.9 ; 4.2]	3.3 [3.0 ; 3.6]	3.6 [3.3 ; 3.9]	31.69 [28.96 ; 34.42]	
	Wallonia	8.9 [7.6 ; 10.3]	8.4 [7.8 ; 9.1]	9.2 [8.6 ; 9.9]	81.65 [75.67 ; 87.64]	
	Belgium	5.7 [5.1 ; 6.3]	5.4 [5.1 ; 5.7]	5.9 [5.6 ; 6.2]	52.01 [49.32 ; 54.70]	
2004	Brussels	7.0 [4.6 ; 9.3]	7.0 [5.9 ; 8.0]	7.9 [6.8 ; 9.0]	67.58 [57.27 ; 77.89]	
	Flanders	3.3 [2.7 ; 3.9]	3.0 [2.7 ; 3.3]	3.4 [3.1 ; 3.6]	29.53 [26.90 ; 32.16]	
	Wallonia	9.4 [8.1 ; 10.8]	9.0 [8.4 ; 9.7]	9.8 [9.1 ; 10.4]	86.36 [80.18 ; 92.54]	
	Belgium	5.6 [5.0 ; 6.2]	5.2 [5.0 ; 5.5]	5.8 [5.5 ; 6.0]	50.83 [48.17 ; 53.50]	
2005	Brussels	7.3 [4.9 ; 9.8]	7.4 [6.3 ; 8.5]	8.3 [7.2 ; 9.5]	71.29 [60.65 ; 81.93]	
	Flanders	3.5 [2.9 ; 4.1]	3.3 [3.0 ; 3.6]	3.6 [3.3 ; 3.9]	31.51 [28.80 ; 34.23]	
	Wallonia	9.4 [8.1 ; 10.7]	8.9 [8.2 ; 9.5]	9.7 [9.0 ; 10.3]	85.96 [79.78 ; 92.14]	

	Belgium	5.7 [5.1 ; 6.3]	5.4 [5.1 ; 5.7]	5.9 [5.6 ; 6.2]	52.13 [49.43 ; 54.83]
2006	Brussels	6.5 [4.3 ; 8.8]	6.6 [5.6 ; 7.6]	7.3 [6.3 ; 8.4]	64.09 [53.98 ; 74.19]
	Flanders	3.7 [3.1 ; 4.3]	3.4 [3.1 ; 3.6]	3.7 [3.4 ; 4.0]	32.88 [30.10 ; 35.65]
	Wallonia	9.9 [8.6 ; 11.3]	9.6 [8.9 ; 10.2]	10.3 [9.7 ; 11.0]	91.52 [85.13 ; 97.92]
	Belgium	5.9 [5.3 ; 6.5]	5.6 [5.3 ; 5.9]	6.1 [5.8 ; 6.4]	53.99 [51.24 ; 56.74]
2007	Brussels	7.8 [5.2 ; 10.4]	8.1 [7.0 ; 9.3]	8.9 [7.7 ; 10.1]	77.12 [66.02 ; 88.22]
	Flanders	3.6 [3.0 ; 4.3]	3.3 [3.1 ; 3.6]	3.7 [3.4 ; 4.0]	32.73 [29.97 ; 35.49]
	Wallonia	10.2 [8.8 ; 11.6]	9.7 [9.0 ; 10.3]	10.6 [9.9 ; 11.3]	93.80 [87.31 ; 100.28]
	Belgium	6.1 [5.5 ; 6.7]	5.7 [5.5 ; 6.0]	6.3 [6.0 ; 6.6]	55.67 [52.88 ; 58.46]
2008	Brussels	7.9 [5.5 ; 10.4]	8.2 [7.0 ; 9.3]	9.3 [8.1 ; 10.5]	78.62 [67.44 ; 89.79]
	Flanders	3.9 [3.3 ; 4.5]	3.6 [3.3 ; 3.9]	4.0 [3.7 ; 4.3]	35.03 [32.18 ; 37.89]
	Wallonia	9.0 [7.8 ; 10.3]	8.7 [8.1 ; 9.4]	9.4 [8.8 ; 10.1]	83.55 [77.43 ; 89.68]
	Belgium	5.9 [5.3 ; 6.5]	5.6 [5.3 ; 5.9]	6.1 [5.8 ; 6.4]	53.94 [51.19 ; 56.68]
2003-2008	Brussels	7.5 [6.5 ; 8.5]	7.6 [7.2 ; 8.1]	8.5 [8.0 ; 9.0]	73.43 [69.02 ; 77.83]
	Flanders	3.6 [3.3 ; 3.8]	3.3 [3.2 ; 3.4]	3.7 [3.5 ; 3.8]	32.23 [31.11 ; 33.35]
	Wallonia	9.5 [8.9 ; 10.0]	9.1 [8.8 ; 9.3]	9.8 [9.6 ; 10.1]	87.12 [84.58 ; 89.66]
	Belgium	5.8 [5.6 ; 6.1]	5.5 [5.4 ; 5.6]	6.0 [5.9 ; 6.1]	53.09 [51.98 ; 54.21]

Table 19. Rate of US neck combined with TSH per 1 000 person-years By Strata – Global Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
				Brussels Capital Region				
Male	< 35 years	1.3 (8/5980)	0.8 (5/6036)	1.0 (6/5973)	0.8 (5/6021)	1.2 (7/6060)	1.6 (10/6165)	1.1 (41/36234)
	35 - 44 years	1.7 (3/1788)	3.8 (7/1835)	2.2 (4/1858)	3.7 (7/1904)	6.1 (12/1967)	5.0 (10/2002)	3.8 (43/11353)
	45 - 54 years	3.7 (5/1355)	3.6 (5/1388)	3.6 (5/1376)	4.3 (6/1385)	5.0 (7/1395)	9.7 (14/1450)	5.0 (42/8349)
	55 - 64 years	14.7 (16/1089)	10.7 (12/1120)	9.7 (11/1140)	8.8 (10/1133)	8.8 (10/1139)	11.1 (13/1170)	10.6 (72/6791)
	65 - 74 years	16.1 (26/1616)	13.0 (21/1610)	11.5 (18/1563)	14.7 (23/1565)	13.9 (21/1515)	21.8 (33/1517)	15.1 (142/9385)
	75 - 84 years	7.2 (8/1104)	10.0 (11/1104)	13.3 (15/1125)	7.3 (8/1098)	13.6 (15/1105)	19.3 (21/1089)	11.8 (78/6624)
	>= 85 years	7.4 (2/270)	3.8 (1/261)	7.6 (2/263)	10.0 (3/301)	15.1 (5/330)	2.9 (1/348)	7.9 (14/1773)
Female	< 35 years	11.5 (67/5832)	6.6 (39/5889)	7.8 (46/5904)	8.9 (53/5955)	9.8 (59/6025)	7.3 (44/6048)	8.6 (308/35653)
	35 - 44 years	16.1 (27/1673)	18.5 (31/1673)	22.2 (37/1667)	23.1 (39/1687)	21.2 (36/1700)	25.5 (45/1764)	21.2 (215/10163)
	45 - 54 years	34.8 (51/1465)	35.2 (53/1504)	34.4 (52/1514)	37.0 (56/1514)	34.0 (51/1501)	38.0 (57/1498)	35.6 (320/8995)
	55 - 64 years	34.2 (39/1140)	36.9 (42/1138)	37.4 (43/1150)	33.4 (39/1167)	50.3 (60/1192)	38.4 (47/1225)	38.5 (270/7012)
	65 - 74 years	31.6 (64/2026)	30.2 (62/2054)	33.5 (66/1971)	27.7 (53/1915)	30.8 (57/1852)	35.7 (65/1819)	31.5 (367/11637)
	75 - 84	27.5 (54/1961)	24.6 (48/1949)	25.6 (49/1912)	23.3 (43/1842)	20.5 (37/1803)	27.5 (48/1746)	24.9 (279/11213)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years							
	>= 85 years	6.5 (5/770)	15.6 (12/769)	6.2 (5/804)	15.3 (13/850)	19.0 (17/897)	12.7 (12/942)	12.7 (64/5032)
				Flemish Region				
Male	< 35 years	0.5 (16/31669)	0.6 (20/31579)	0.6 (19/31435)	0.8 (24/31270)	1.0 (30/31307)	1.2 (38/31385)	0.8 (147/188645)
	35 - 44 years	2.3 (27/11861)	1.2 (14/11756)	1.6 (19/11690)	1.6 (19/11540)	1.6 (18/11390)	1.7 (19/11158)	1.7 (116/69396)
	45 - 54 years	3.4 (36/10642)	4.1 (45/10851)	3.1 (34/11004)	2.5 (28/11217)	3.7 (42/11393)	3.1 (36/11546)	3.3 (221/66653)
	55 - 64 years	4.3 (36/8372)	4.4 (38/8575)	4.1 (36/8751)	4.9 (44/9031)	3.7 (34/9307)	4.3 (41/9514)	4.3 (229/53549)
	65 - 74 years	5.3 (73/13750)	5.9 (81/13842)	4.7 (64/13691)	4.9 (66/13395)	4.9 (65/13289)	5.7 (77/13425)	5.2 (426/81391)
	75 - 84 years	3.5 (27/7735)	5.5 (44/8060)	4.2 (35/8316)	5.4 (46/8556)	5.0 (44/8772)	4.3 (39/9008)	4.7 (235/50448)
	>= 85 years	3.8 (5/1332)	7.1 (10/1417)	5.6 (9/1619)	3.8 (7/1834)	7.4 (15/2031)	4.5 (10/2202)	5.4 (56/10435)
Female	< 35 years	3.0 (92/30434)	3.0 (92/30325)	3.6 (109/30255)	2.9 (87/30198)	3.5 (106/30321)	3.9 (118/30447)	3.3 (604/181981)
	35 - 44 years	8.9 (102/11428)	8.4 (97/11505)	9.1 (104/11376)	9.9 (111/11236)	9.7 (108/11108)	12.3 (133/10804)	9.7 (655/67456)
	45 - 54 years	11.8 (121/10282)	10.4 (108/10387)	12.2 (130/10633)	15.1 (164/10885)	13.0 (143/11029)	15.0 (169/11241)	13.0 (835/64457)
	55 - 64 years	13.5 (113/8362)	11.7 (100/8517)	13.5 (117/8682)	13.7 (122/8879)	14.6 (134/9173)	13.3 (125/9367)	13.4 (711/52979)
	65 - 74	9.3 (146/15674)	10.4	11.2	12.3	14.4	14.7 (219/14862)	12.0

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years		(164/15781)	(174/15482)	(186/15164)	(214/14864)		(1103/91826)
	75 - 84 years	8.9 (100/11288)	10.8 (125/11592)	9.6 (114/11816)	11.0 (132/11947)	9.7 (118/12146)	9.8 (120/12254)	10.0 (709/71044)
	>= 85 years	7.7 (27/3519)	5.0 (18/3626)	4.4 (17/3875)	5.5 (23/4158)	5.8 (26/4449)	7.8 (37/4766)	6.1 (148/24392)
Walloon Region								
Male	< 35 years	1.3 (24/18014)	1.8 (32/18061)	1.6 (29/17968)	2.3 (41/17923)	2.3 (41/17884)	2.0 (35/17906)	1.9 (202/107756)
	35 - 44 years	5.6 (34/6054)	4.8 (29/6030)	5.3 (32/5992)	4.7 (28/5903)	6.2 (37/5929)	6.6 (39/5876)	5.6 (199/35784)
	45 - 54 years	8.8 (51/5807)	7.2 (42/5848)	9.2 (54/5888)	9.9 (59/5974)	10.9 (66/6043)	7.6 (46/6052)	8.9 (318/35610)
	55 - 64 years	8.6 (37/4293)	12.6 (56/4441)	10.6 (49/4638)	12.2 (59/4824)	14.6 (73/5011)	16.8 (87/5182)	12.7 (361/28389)
	65 - 74 years	12.2 (83/6798)	16.1 (108/6727)	12.4 (82/6628)	13.0 (84/6460)	15.3 (96/6263)	15.9 (100/6272)	14.1 (553/39148)
	75 - 84 years	17.4 (72/4145)	13.5 (58/4301)	13.2 (57/4329)	12.3 (54/4378)	13.5 (60/4451)	11.7 (52/4450)	13.5 (353/26054)
	>= 85 years	10.2 (7/688)	11.1 (8/719)	8.7 (7/806)	6.9 (6/870)	14.5 (14/965)	13.4 (14/1045)	11.0 (56/5093)
Female	< 35 years	9.9 (173/17557)	12.0 (212/17596)	12.7 (223/17544)	13.7 (239/17504)	13.1 (229/17507)	13.6 (238/17544)	12.5 (1314/105252)
	35 - 44 years	31.4 (193/6154)	30.2 (184/6083)	34.6 (210/6072)	30.7 (184/5992)	34.9 (210/6011)	34.7 (208/5990)	32.8 (1189/36301)
	45 - 54 years	36.8 (219/5954)	40.9 (249/6090)	36.6 (223/6086)	41.4 (256/6188)	42.2 (263/6229)	39.4 (246/6247)	39.6 (1456/36794)
	55 - 64	38.0 (173/4548)	37.2 (171/4594)	39.5 (189/4780)	43.7 (219/5016)	41.2 (213/5172)	41.1 (221/5371)	40.2

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years							(1186/29479)
	65 - 74 years	31.2 (260/8321)	35.4 (294/8306)	39.1 (316/8091)	41.5 (324/7800)	38.1 (289/7577)	42.0 (315/7497)	37.8 (1798/47593)
	75 - 84 years	18.7 (127/6790)	20.2 (141/6964)	24.4 (171/7000)	24.7 (173/7015)	28.3 (198/7004)	23.5 (164/6979)	23.3 (974/41752)
	>= 85 years	10.0 (21/2090)	11.4 (24/2105)	11.8 (27/2289)	10.2 (25/2457)	14.7 (39/2659)	11.9 (33/2781)	11.8 (169/14381)

Table 20. Rate of US neck combined with TSH per 1 000 person-years By Strata – Restricted Population

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
				Brussels Capital Region				
Male	< 35 years	0.8 (5/5975)	0.8 (5/6030)	0.5 (3/5966)	0.8 (5/6011)	1.2 (7/6048)	1.3 (8/6147)	0.9 (33/36178)
	35 - 44 years	1.1 (2/1781)	2.7 (5/1824)	2.2 (4/1847)	3.2 (6/1889)	4.1 (8/1949)	2.5 (5/1983)	2.7 (30/11272)
	45 - 54 years	3.0 (4/1345)	3.6 (5/1375)	2.9 (4/1358)	3.7 (5/1360)	5.1 (7/1370)	7.0 (10/1422)	4.3 (35/8230)
	55 - 64 years	12.2 (13/1064)	5.5 (6/1086)	5.4 (6/1103)	3.6 (4/1098)	5.5 (6/1100)	9.8 (11/1126)	7.0 (46/6577)
	65 - 74 years	13.3 (21/1576)	10.9 (17/1563)	8.6 (13/1513)	6.6 (10/1510)	6.9 (10/1452)	14.5 (21/1450)	10.2 (92/9063)
	75 - 84 years	6.6 (7/1067)	8.5 (9/1056)	9.4 (10/1069)	4.8 (5/1041)	12.5 (13/1042)	13.7 (14/1019)	9.2 (58/6293)
	>= 85 years	7.7 (2/261)	4.0 (1/252)	8.0 (2/251)	7.1 (2/280)	12.9 (4/309)	3.1 (1/322)	7.2 (12/1674)
Fem	< 35	8.8 (51/5770)	4.3 (25/5806)	5.2 (30/5808)	5.3 (31/5853)	6.1 (36/5916)	3.9 (23/5936)	5.6 (196/35090)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
ale	years							
	35 - 44 years	9.3 (15/1610)	11.9 (19/1603)	16.3 (26/1593)	11.3 (18/1599)	14.3 (23/1605)	17.5 (29/1655)	13.4 (130/9665)
	45 - 54 years	22.5 (31/1377)	22.5 (31/1378)	18.2 (25/1376)	20.6 (28/1361)	22.3 (30/1344)	24.8 (33/1330)	21.8 (178/8166)
	55 - 64 years	23.7 (25/1055)	18.3 (19/1039)	24.2 (25/1032)	16.3 (17/1041)	25.7 (27/1051)	14.1 (15/1065)	20.4 (128/6283)
	65 - 74 years	22.1 (41/1854)	19.5 (36/1846)	22.3 (39/1745)	18.6 (31/1665)	20.2 (32/1581)	23.5 (36/1533)	21.0 (215/10226)
	75 - 84 years	19.2 (34/1771)	16.8 (29/1721)	18.6 (31/1667)	14.5 (23/1590)	11.6 (18/1552)	22.3 (33/1478)	17.2 (168/9780)
	>= 85 years	4.2 (3/707)	11.6 (8/687)	5.7 (4/708)	13.6 (10/738)	7.9 (6/757)	8.8 (7/792)	8.7 (38/4388)
				Flemish Region				
Male	< 35 years	0.4 (13/31646)	0.5 (17/31550)	0.5 (15/31399)	0.7 (21/31231)	0.8 (25/31268)	1.1 (34/31347)	0.7 (125/188441)
	35 - 44 years	2.0 (24/11839)	0.8 (9/11721)	1.2 (14/11645)	1.0 (12/11491)	1.1 (13/11331)	1.3 (14/11081)	1.2 (86/69107)
	45 - 54 years	2.9 (31/10559)	2.5 (27/10743)	2.5 (27/10893)	1.9 (21/11101)	3.5 (39/11273)	2.1 (24/11415)	2.6 (169/65983)
	55 - 64 years	3.7 (31/8279)	3.8 (32/8450)	2.9 (25/8603)	3.6 (32/8856)	2.6 (24/9111)	3.2 (30/9286)	3.3 (174/52585)
	65 - 74 years	4.1 (56/13516)	4.4 (59/13543)	3.6 (48/13345)	3.5 (45/13013)	3.5 (45/12885)	3.5 (46/12990)	3.8 (299/79291)
	75 - 84 years	2.6 (20/7586)	4.7 (37/7861)	3.6 (29/8060)	4.7 (39/8237)	4.4 (37/8387)	3.8 (33/8593)	4.0 (195/48723)
	>= 85	3.8 (5/1309)	4.4 (6/1374)	5.1 (8/1564)	2.3 (4/1771)	7.2 (14/1949)	3.8 (8/2090)	4.5 (45/10057)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years							
Female	< 35 years	2.3 (71/30268)	2.4 (73/30114)	2.9 (87/30017)	1.9 (58/29934)	2.3 (69/30022)	2.6 (79/30113)	2.4 (437/180468)
	35 - 44 years	6.8 (76/11171)	5.0 (56/11179)	6.4 (71/11011)	7.1 (77/10853)	6.8 (73/10697)	8.0 (83/10359)	6.7 (436/65270)
	45 - 54 years	8.1 (80/9898)	6.6 (65/9907)	7.6 (77/10074)	10.3 (106/10262)	7.4 (77/10351)	8.4 (88/10511)	8.1 (493/61004)
	55 - 64 years	8.1 (64/7900)	6.8 (54/7953)	8.1 (65/8044)	9.1 (74/8140)	8.4 (70/8360)	8.3 (70/8482)	8.1 (397/48879)
	65 - 74 years	6.6 (97/14692)	7.3 (107/14598)	7.8 (111/14197)	7.5 (103/13784)	8.4 (113/13400)	9.8 (130/13291)	7.9 (661/83961)
	75 - 84 years	5.6 (59/10552)	7.4 (79/10681)	5.9 (64/10771)	7.1 (77/10794)	6.5 (71/10857)	6.6 (71/10821)	6.5 (421/64476)
	>= 85 years	6.0 (20/3335)	4.4 (15/3381)	3.6 (13/3572)	2.9 (11/3788)	5.0 (20/4029)	6.3 (27/4282)	4.7 (106/22388)
Walloon Region								
Male	< 35 years	0.9 (17/17982)	1.3 (23/18014)	1.3 (24/17904)	1.7 (31/17852)	1.7 (31/17802)	1.3 (24/17811)	1.4 (150/107365)
	35 - 44 years	3.8 (23/6012)	3.5 (21/5968)	3.9 (23/5921)	4.0 (23/5817)	5.0 (29/5832)	5.0 (29/5773)	4.2 (148/35322)
	45 - 54 years	5.6 (32/5723)	4.4 (25/5732)	6.3 (36/5749)	6.0 (35/5820)	6.1 (36/5866)	4.4 (26/5866)	5.5 (190/34755)
	55 - 64 years	7.3 (31/4219)	9.5 (41/4328)	8.0 (36/4497)	8.4 (39/4654)	11.5 (55/4801)	10.1 (50/4929)	9.2 (252/27429)
	65 - 74 years	8.8 (58/6575)	11.6 (75/6452)	9.3 (59/6318)	8.7 (53/6121)	12.0 (71/5899)	10.9 (64/5871)	10.2 (380/37235)
	75 - 84	13.6 (54/3976)	10.5 (43/4100)	10.3 (42/4085)	9.0 (37/4091)	10.1 (42/4139)	8.0 (33/4101)	10.2 (251/24492)

Sex	Age	2003	2004	2005	2006	2007	2008	2003-2008
	years							
	>= 85 years	8.9 (6/671)	7.2 (5/690)	6.5 (5/773)	6.1 (5/825)	14.4 (13/905)	6.2 (6/966)	8.3 (40/4831)
Female	< 35 years	6.0 (103/17292)	7.7 (133/17262)	7.8 (133/17158)	8.5 (145/17068)	7.6 (129/17030)	7.7 (131/17006)	7.5 (774/102817)
	35 - 44 years	21.4 (125/5838)	20.1 (114/5670)	20.0 (112/5601)	17.0 (93/5485)	21.7 (118/5446)	16.4 (88/5375)	19.5 (650/33415)
	45 - 54 years	21.4 (117/5461)	21.3 (116/5449)	18.3 (98/5363)	23.5 (127/5397)	21.9 (118/5387)	20.6 (110/5350)	21.2 (686/32406)
	55 - 64 years	20.9 (85/4058)	22.9 (92/4016)	20.4 (84/4113)	25.3 (107/4233)	20.2 (87/4298)	20.3 (89/4376)	21.7 (544/25095)
	65 - 74 years	20.4 (151/7389)	20.0 (144/7194)	23.7 (163/6878)	24.5 (160/6529)	22.3 (139/6235)	21.1 (128/6069)	22.0 (885/40294)
	75 - 84 years	13.7 (84/6110)	13.9 (85/6103)	17.6 (106/6014)	17.8 (105/5887)	19.8 (114/5749)	14.9 (84/5632)	16.3 (578/35494)
	>= 85 years	5.8 (11/1905)	10.2 (19/1869)	9.1 (18/1987)	6.7 (14/2103)	10.2 (23/2246)	8.3 (19/2299)	8.4 (104/12409)

Table 21. US neck combined with TSH within 4-months Result – Global Population

Model Information	
Data Set	WORK.DATA_EPS
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight

Offset Variable	l_n_personyears
Number of Observations Read	3612
Number of Observations Used	3290
Sum of Weights	2630
Missing Values	322

Class Level Information

Class	Levels	Values
age_cat	7	< 35 years 35 - 44 years 45 - 54 years 55 - 64 years 65 - 74 years 75 - 84 years >= 85 years
PP0020	2	Male Female
Region	3	Brussels Flanders Wallonia
yearclss	6	2003 2004 2005 2006 2007 2008
arrondissement	43	Brussels Antwerpen Mechelen Turnhout Halle/Vilvoorde Leuven Brugge Diksmuide Ieper Kortrijk Oostende Roeselare Tielt Veurne Aalst Dendermonde Eeklo Gent Oudenaarde St Niklaas Hasselt Maaseik Tongeren Nivelles Ath Charleroi Mons Mouscron Soignies Thuin ...

Criteria For Assessing Goodness Of Fit

Criterion	DF	Value	Value/DF
Deviance	3279	3389.9928	1.0338
Scaled Deviance	3279	3389.9928	1.0338
Pearson Chi-Square	3279	4069.2425	1.2410
Scaled Pearson X2	3279	4069.2425	1.2410
Log Likelihood		26123.5064	

Algorithm converged.

Analysis Of Initial Parameter Estimates

Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept		1	-76.0993	14.0475	-103.632	-48.5667	29.35	<.0001
age_cat	< 35 years	1	-0.9351	0.0690	-1.0704	-0.7998	183.42	<.0001
age_cat	35 - 44 years	1	0.0727	0.0693	-0.0630	0.2085	1.10	0.2936
age_cat	45 - 54 years	1	0.3823	0.0682	0.2486	0.5160	31.41	<.0001
age_cat	55 - 64 years	1	0.5054	0.0685	0.3711	0.6397	54.40	<.0001
age_cat	65 - 74 years	1	0.5058	0.0697	0.3692	0.6424	52.67	<.0001
age_cat	75 - 84 years	1	0.2851	0.0714	0.1451	0.4252	15.93	<.0001
age_cat	>= 85 years	0	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	1	-1.2044	0.0256	-1.2545	-1.1543	2217.99	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	1	-0.2144	0.0544	-0.3209	-0.1078	15.55	<.0001
Region	Flanders	1	-1.0164	0.0247	-1.0647	-0.9680	1696.28	<.0001
Region	Wallonia	0	0.0000	0.0000	0.0000	0.0000	.	.
year		1	0.0361	0.0070	0.0224	0.0498	26.55	<.0001
Dispersion		1	0.1306	0.0078	0.1153	0.1459		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information	
Correlation Structure	Unstructured
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Clusters With Missing Values	135
Correlation Matrix Dimension	6
Maximum Cluster Size	6
Minimum Cluster Size	0

Analysis Of GEE Parameter Estimates

Empirical Standard Error Estimates

Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-78.9101	13.1557	-104.695	-53.1253	-6.00	<.0001
age_cat	< 35 years	-0.9462	0.1136	-1.1688	-0.7235	-8.33	<.0001
age_cat	35 - 44 years	0.0624	0.1130	-0.1591	0.2840	0.55	0.5807
age_cat	45 - 54 years	0.3781	0.1079	0.1667	0.5895	3.51	0.0005
age_cat	55 - 64 years	0.4963	0.1058	0.2890	0.7037	4.69	<.0001
age_cat	65 - 74 years	0.5108	0.1082	0.2987	0.7229	4.72	<.0001
age_cat	75 - 84 years	0.2868	0.1112	0.0689	0.5048	2.58	0.0099
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-1.2918	0.0448	-1.3795	-1.2041	-28.86	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.

Region	Brussels	-0.2316	0.0867	-0.4015	-0.0618	-2.67	0.0075
Region	Flanders	-1.0334	0.0481	-1.1276	-0.9391	-21.49	<.0001
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.
year		0.0375	0.0066	0.0247	0.0504	5.72	<.0001

Score Statistics For Type 3 GEE Analysis

Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	144.02	<.0001
PP0020	1	189.36	<.0001
Region	2	151.44	<.0001
year	1	27.97	<.0001

Contrast Estimate Results

Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-1.0334	0.0481	0.05	-1.1276	-0.9391	461.79	<.0001
Exp(Flemish Region vs Walloon Region)	0.3558	0.0171	0.05	0.3238	0.3910		
Brussels Capital Region vs Walloon Region	-0.2316	0.0867	0.05	-0.4015	-0.0618	7.14	0.0075
Exp(Brussels Capital Region vs Walloon Region)	0.7932	0.0687	0.05	0.6693	0.9401		
Flemish Region vs Brussels Capital Region	-0.8018	0.0858	0.05	-0.9699	-0.6336	87.36	<.0001
Exp(Flemish Region vs Brussels Capital Region)	0.4485	0.0385	0.05	0.3791	0.5307		

Table 22. US neck combined with TSH within 4-months Result – Restricted Population

Model Information	
Data Set	WORK.DATA_EPS_RES
Distribution	Negative Binomial
Link Function	Log
Dependent Variable	Frequency
Scale Weight Variable	weight
Offset Variable	l_n_personyears
Number of Observations Read	3612
Number of Observations Used	3082
Sum of Weights	2467
Missing Values	530

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	3071	3089.6487	1.0061
Scaled Deviance	3071	3089.6487	1.0061
Pearson Chi-Square	3071	3648.2617	1.1880
Scaled Pearson X2	3071	3648.2617	1.1880
Log Likelihood		8773.1334	

Algorithm converged.

Analysis Of Initial Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept		1	-29.2515	14.8057	-58.2701	-0.2329	3.90	0.0482
age_cat	< 35 years	1	-1.0607	0.0728	-1.2033	-0.9180	212.37	<.0001
age_cat	35 - 44 years	1	-0.0992	0.0733	-0.2430	0.0445	1.83	0.1761
age_cat	45 - 54 years	1	0.1215	0.0724	-0.0205	0.2635	2.81	0.0936
age_cat	55 - 64 years	1	0.2471	0.0728	0.1044	0.3899	11.51	0.0007
age_cat	65 - 74 years	1	0.2701	0.0727	0.1276	0.4127	13.79	0.0002
age_cat	75 - 84 years	1	0.1649	0.0745	0.0189	0.3109	4.90	0.0269
age_cat	>= 85 years	0	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	1	-1.0137	0.0269	-1.0664	-0.9610	1421.73	<.0001
PP0020	Female	0	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	1	-0.2010	0.0509	-0.3006	-0.1013	15.61	<.0001
Region	Flanders	1	-0.9278	0.0262	-0.9792	-0.8765	1254.71	<.0001
Region	Wallonia	0	0.0000	0.0000	0.0000	0.0000	.	.
year		1	0.0126	0.0074	-0.0019	0.0270	2.90	0.0883
Dispersion		1	0.0860	0.0077	0.0709	0.1012		

Note: The negative binomial dispersion parameter was estimated by maximum likelihood.

GEE Model Information	
Correlation Structure	Unstructured
Within-Subject Effect	yearclss (6 levels)
Subject Effect	age_ca*PP0020*arrond (602 levels)
Number of Clusters	602
Clusters With Missing Values	225

Correlation Matrix Dimension	6
Maximum Cluster Size	6
Minimum Cluster Size	0

Algorithm converged.

Analysis Of GEE Parameter Estimates

Empirical Standard Error Estimates

Parameter		Estimate	Standard Error	95% Confidence Limits		Z	Pr > |Z|
Intercept		-30.7888	13.5290	-57.3053	-4.2724	-2.28	0.0229
age_cat	< 35 years	-1.1036	0.1159	-1.3309	-0.8764	-9.52	<.0001
age_cat	35 - 44 years	-0.1418	0.1208	-0.3786	0.0949	-1.17	0.2403
age_cat	45 - 54 years	0.0676	0.1123	-0.1524	0.2877	0.60	0.5468
age_cat	55 - 64 years	0.2036	0.1116	-0.0152	0.4224	1.82	0.0682
age_cat	65 - 74 years	0.2383	0.1120	0.0187	0.4578	2.13	0.0335
age_cat	75 - 84 years	0.1251	0.1158	-0.1019	0.3520	1.08	0.2802
age_cat	>= 85 years	0.0000	0.0000	0.0000	0.0000	.	.
PP0020	Male	-1.1004	0.0439	-1.1865	-1.0144	-25.07	<.0001
PP0020	Female	0.0000	0.0000	0.0000	0.0000	.	.
Region	Brussels	-0.2190	0.0821	-0.3800	-0.0581	-2.67	0.0076
Region	Flanders	-0.9337	0.0455	-1.0228	-0.8446	-20.54	<.0001
Region	Wallonia	0.0000	0.0000	0.0000	0.0000	.	.
year		0.0134	0.0067	0.0002	0.0266	1.98	0.0472

Score Statistics For Type 3 GEE Analysis

Source	DF	Chi-Square	Pr > ChiSq
age_cat	6	133.09	<.0001
PP0020	1	168.05	<.0001
Region	2	138.02	<.0001
year	1	3.85	0.0497

Contrast Estimate Results							
Label	Estimate	Standard Error	Alpha	Confidence Limits		Chi-Square	Pr > ChiSq
Flemish Region vs Walloon Region	-0.9337	0.0455	0.05	-1.0228	-0.8446	421.87	<.0001
Exp(Flemish Region vs Walloon Region)	0.3931	0.0179	0.05	0.3596	0.4297		
Brussels Capital Region vs Walloon Region	-0.2190	0.0821	0.05	-0.3800	-0.0581	7.12	0.0076
Exp(Brussels Capital Region vs Walloon Region)	0.8033	0.0660	0.05	0.6839	0.9435		
Flemish Region vs Brussels Capital Region	-0.7146	0.0802	0.05	-0.8719	-0.5573	79.31	<.0001
Exp(Flemish Region vs Brussels Capital Region)	0.4894	0.0393	0.05	0.4182	0.5727		

9. APPENDIX 9. DATA SELECTION AND EXPLORATION OF DATABASES

9.1. Data selection

9.1.1. All cases

In order to target patients with a (benign or malignant) thyroid disease, 5 procedures for diagnosis or treatment were selected in the IMA-databases (Strumazol, surgery, FNAC, ^{131}I and lymph node dissection). Nomenclature codes for these procedures are presented in Table 23. All patients undergoing one of these procedures between 01/01/2003 and 31/12/2008 were selected. For each selected patient, we received all procedures that were recorded for this period in the final database.

Table 23. Nomenclature codes for the selection of patients with thyroid disease for the period 2003-2008

Procedure	Nomenclature code
Strumazol	83725
Strumazol	718015
Surgery	257014
Surgery	257025
Surgery	257036
Surgery	257040
FNAC	355596
FNAC	355600
FNAC	355611
FNAC	355622
FNAC*	257596
FNAC*	257600
Dose ^{131}I	698154
Dose ^{131}I	698165
Dose ^{131}I	698176
Dose ^{131}I	698180
Lymph node dissection	258370
Lymph node dissection	258381
Lymph node dissection	258392
Lymph node dissection	258403
Lymph node dissection	258554
Lymph node dissection	258565
Lymph node dissection	312572
Lymph node dissection	312583
Lymph node dissection	312594
Lymph node dissection	312605
Lymph node dissection	312970
Lymph node dissection	312981

**These codes, classified as FNAC in this study, are actually codes for thyroid biopsy. However, given the small number of cases they cover (0.14% of patients with at least once one of 6 codes defined as FNAC), they were grouped with FNAC.*

For most of the analyses, all cases were analysed. However, some specific questions concerned only thyroid cancer patients. Therefore, a selection of cancer cases was made based on the data of the Belgian Cancer Registry. Health insurance data were selected for 2003-2008. As a consequence, treatment information might not be complete for patients who were treated in the beginning of 2003 or at the end of 2008, since investigations or treatments might have started in 2002 or continued in 2009. However, the error for the patients who were treated in the beginning of 2003 is compensated by the error for the patients who were treated at the end of 2008.

9.1.2. Cancer cases

In June 2010, a selection was made from the Belgian Cancer Registry (BCR) database, in order to send INSZ / NISS codes for the linkage with the IMA data.

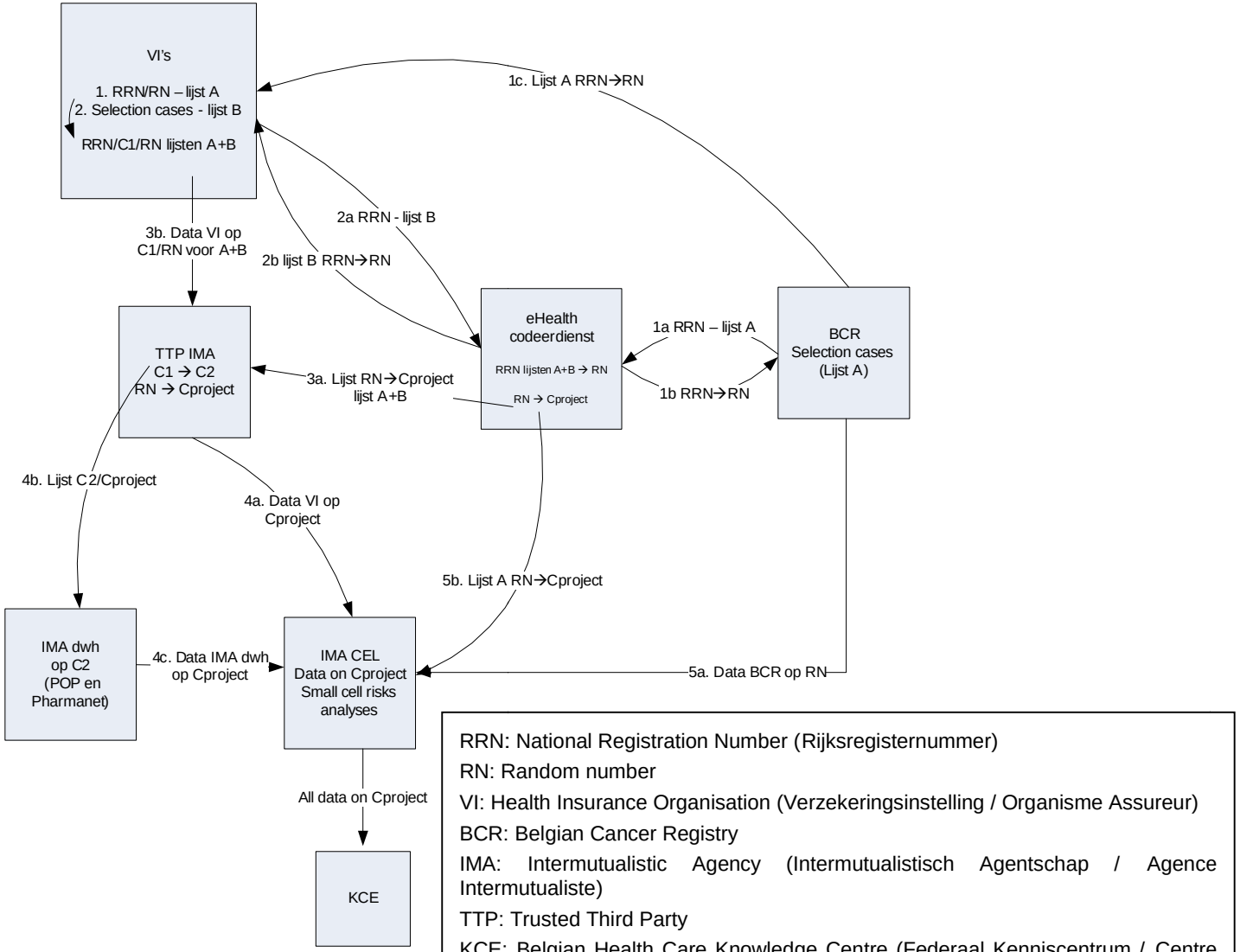
All invasive thyroid cancer records were selected based on the following criteria:

- ICD-10: C73
- Incidence date between 01/01/2004 and 31/12/2006

This selection resulted in 2 003 records, representing a total of 2 002 patients. These cases were not limited to carcinoma but concerned all histological types. Therefore, a small number of sarcomas is included (0.16%).

The data were then sent to the IMA and the e-Health platform for linkage with the IMA databases for the period 2003-2008 (Figure 1).

Figure 1. Overview of the primary selection process for thyroid cancer cases



RRN: National Registration Number (Rijksregisternummer)

RN: Random number

VI: Health Insurance Organisation (Verzekeringsinstelling / Organisme Assureur)

BCR: Belgian Cancer Registry

IMA: Intermutualistic Agency (Intermutualistisch Agentschap / Agence Intermutualiste)

TTP: Trusted Third Party

KCE: Belgian Health Care Knowledge Centre (Federaal Kenniscentrum / Centre Fédéral d'Expertise)

9.2. Exploration and check of BCR data

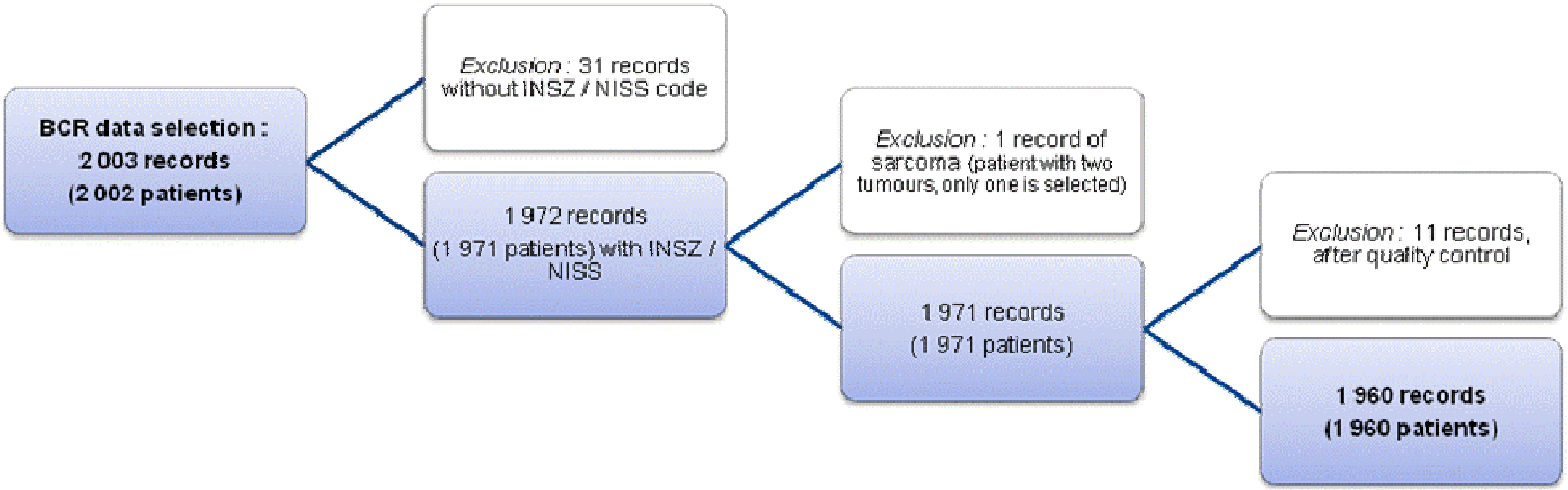
The Belgian Cancer Registry database contains 2 003 records corresponding to 2 003 tumours in 2 002 patients:

- 31 records (31 patients) without INSZ / NISS.
- 1 972 records (1 971 patients) with INSZ / NISS. One patient presented 2 thyroid tumours with the same incidence time (one follicular carcinoma and one sarcoma); for the analysis only the follicular carcinoma was selected.

Consequently, 1 971 INSZ / NISS codes were sent to IMA for the linkage between BCR database and IMA databases.

While the procedure of linkage was ongoing, the BCR database continued to be updated; quality control and checking the protocols were also done. Therefore, 11 cases were excluded because they did not fulfil the selection criteria. The final BCR database contains 1 960 patients (Figure 2).

Figure 2. BCR data selection scheme



9.3. Data linkage

The data linkage between different databases was done in two steps:

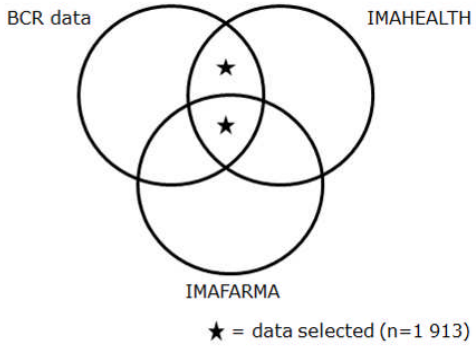
1. for the cancer cases with incidence date between 2004 and 2006, linkage was done between the BCR database and different IMA databases
2. for the other cases, linkage was done between different IMA databases. The other cases correspond to all the cases excluding the cancer cases diagnosed between 2004 and 2006.

A final database with all cases of thyroid (benign or malignant) disease was created by merging databases obtained after the linkages for cancer cases and other cases. The database with cancer cases only was used for specific analyses on thyroid cancer patients.

9.3.1. Cancer cases

The BCR data (incidence years 2004-2006) were linked to the IMA data (period 2003-2008). From the 1 960 selected BCR records, 47 could not be found in IMAHEALTH database. Only patients that were present in both the BCR data and the IMAHEALTH file were kept for further analyses (n=1 913, 97.6%). In the final database, we have the data for the 1 913 cancer patients diagnosed between 01/01/2004 and 31/12/2006, with all procedures recorded for these patients between 01/01/2003 and 31/12/2008 (Figure 3). The patient characteristics for this patient group (age at diagnosis, sex and region) could directly be retrieved from the BCR dataset variables.

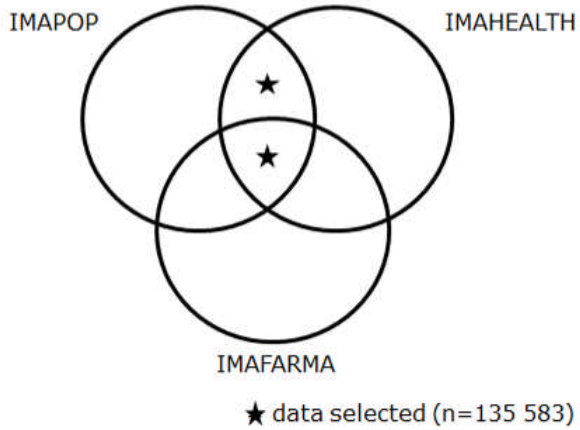
Figure 3. Matching scheme between IMA and BCR data for cancer cases



9.3.2. Other cases

Cancer cases 2004-2006 excluded, data from the IMAHEALTH file were coupled with IMAPOP and IMAFARMA files according to the following scheme (Figure 4).

Figure 4. Scheme of match between IMA data for other cases



From the 136 204 patients in the IMAHEALTH file, 136 047 were also found in the IMAPOP file. For these patients, most important characteristics (age at diagnosis, sex and region) were retrieved from the IMAPOP file as follows:

- Age: In the available IMAPOP files, only the year of birth was provided. The age at diagnosis was arbitrarily set on 31/12/2005, being the middle of the studied period (2003-2008). Calculation of the age at diagnosis resulted in a negative age for 24 patients (14 patients with year of birth 2006, 6 patients with year of birth in 2007 and 4 patients with year of birth in 2008). For these patients, age was arbitrarily put to 0.
- Sex: For one patient, both sexes were recorded. This patient was arbitrarily considered as a man.
- Region: For 2 606 patients, more than one region was recorded in the IMAPOP database. An arbitrary decision tree was set up to assign one region per patient. The following order of priority was applied : Brussels-Capital Region, followed by the Flemish Region, and finally the Walloon Region. After application of these arbitrary choices, 464 patients for whom no region was found in the IMAPOP database were left. These patients needed to be left out for further analyses, bringing the total number of studied patients on 136 047-464=135 583 patients. The distribution by region for these patients is as follows:
  - Brussels-Capital Region: n=13 109 (9.7%)
  - Flemish Region: n=79 704 (58.8%)
  - Walloon Region: n=42 770 (31.5%)

9.4. IMAHEALTH and IMAFARMA: limits of use

When interpreting results from studies that used administrative data from health insurance companies, one should be aware of the associated limitations. Nomenclature was designed to charge clinical acts. Each nomenclature code has a brief description and a value assigned, as is published on the website of the NIHDI (RIZIV/INAMI). To perform historical research on these data, one has to keep several limitations in mind:

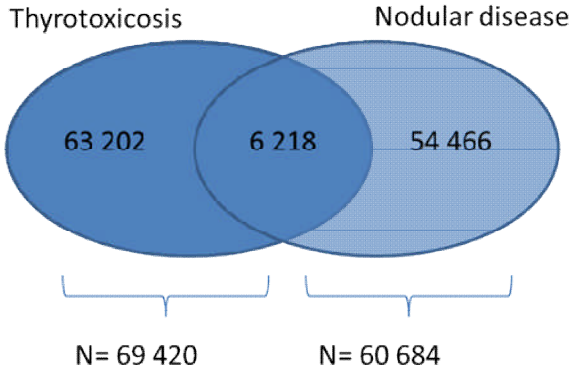
- only charged clinical acts will appear in the health insurance data. Acts that are for one reason or another not charged or patients that are treated in the framework of a clinical study protocol cannot be retrieved from the health insurance data. The same is true for drugs that are not reimbursed or given in off-label use.
- the information on the history of the used codes is limited, and historical lists that are carefully kept up-to-date are needed.
- the description provided with the nomenclature codes is not always specific or adequate. As an example, only one nomenclature code exists for MRI of the neck, thorax, abdomen or pelvis (instead of separate codes per anatomical site). In the research questions 2 and 3, this limitation was negligible because most of the used codes were specific for thyroid such as Strumazol, iodine ^{131}, surgery (thyroidectomy), and FNAC.
- the nomenclature codes are not directly linked to a diagnosis. As a consequence, a specific procedure (e.g. FNAC) can potentially be performed for different diagnoses. When a diagnosis date is available (e.g. incidence date for cancers), time frames can be defined around this date to relate a medical act with this diagnosis with an acceptable degree of certainty.

10. APPENDIX 10. CHARACTERISTICS OF ALL PATIENTS

10.1. General description

The final database concerning the observed period from 2003 to 2008 represented a total number of 137 496 patients, including 1 913 patients with thyroid cancer diagnosed between 2004-2006. Among these 137 496 patients, 69 420 patients had thyrotoxicosis, 60 684 patients had nodular disease, and 6 218 patients could be classified in both groups (Figure 5). It should be noted that both thyrotoxicosis and nodular disease were defined according to the treatments charged to these patients. As untreated patients or patients for whom treatment was not charged could not be retrieved, the prevalence of thyrotoxicosis and nodular disease in the current study is possibly underestimated. The 13 610 remaining patients could neither be within the thyrotoxicosis group nor in the nodular disease group. The majority of these patients were selected based only on the codes for lymph node dissection, consequently they did not fulfil the defined criteria for thyrotoxicosis or nodular disease. In alignment with this observation, the codes for lymph node dissection are not specific for thyroid disease.

Figure 5. Overview of thyrotoxic patients and patients with nodular disease



10.2. Patient characteristics

10.2.1. All patients

Table 24. Characteristics of all patients

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**137 496 (100%)**	**13 342 (100%)**	**80 506 (100%)**	**43 648 (100%)**
By sex				
males	100 149 (72.8%)	3 459 (25.9%)	21 767 (27.0%)	12 121 (27.8%)
females	37 347 (27.2%)	9 883 (74.1%)	58 739 (73.0%)	31 527 (72.2%)
By age				
0-39 years	22 990 (16.7%)	3 133 (23.5%)	12 401 (15.4%)	7 456 (17.1%)
40-69 years	74 287 (54.0%)	6 957 (52.1%)	41 668 (51.8%)	25 662 (58.8%)
70+ years	40 219 (29.3%)	3 252 (24.4%)	26 437 (32.8%)	10 530 (24.1%)

10.2.2. Thyrotoxic patients

10.2.2.1.Patients characteristics

Table 25. Characteristics of thyrotoxic patients

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**69 420 (100%)**	**5 465 (100%)**	**48 127 (100%)**	**15 828 (100%)**
By sex				
males	18 250 (26.3%)	1 381 (25.3%)	12 479 (25.9%)	4 390 (27.7%)
females	51 170 (73.7%)	4 084 (74.7%)	35 648 (74.1%)	11 438 (72.3%)
By age				
0-39 years	9 156 (13.2%)	1 209 (22.1%)	5 745 (11.9%)	2 202 (13.9%)
40-69 years	31 533 (45.4%)	2 340 (42.8%)	21 940 (45.6%)	7 253 (45.8%)
70+ years	28 731 (41.4%)	1 916 (35.1%)	20 442 (42.5%)	6 373 (40.3%)

10.2.2.2. Diagnostic and therapeutic procedures

Table 26. Thyrotoxic patients: diagnostic and therapeutic procedures by sex, age and region

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
STRUMAZOL				
TOTAL	**55 717 (100%)**	**4 471 (100%)**	**40 305 (100%)**	**10 941 (100%)**
By sex				
males	14 978 (26.9%)	1 161 (26.0%)	10 712 (26.6%)	3 105 (28.4%)
females	40 739 (73.1%)	3 310 (74.0%)	29 593 (73.4%)	7 836 (71.6%)
By age				
0-39 years	8 278 (14.9%)	1 127 (25.2%)	5 307 (13.2%)	1 844 (16.9%)
40-69 years	23 718 (42.6%)	1 823 (40.8%)	17 140 (42.5%)	4 755 (43.5%)
70+ years	23 721 (42.6%)	1 521 (34.0%)	17 858 (44.3%)	4 342 (39.7%)
IODE ^{131}I				
TOTAL	**21 839 (100%)**	**1 465 (100%)**	**14 254 (100%)**	**6 120 (100%)**
By sex				
males	5 160 (23.6%)	336 (22.9%)	3 226 (22.6%)	1 598 (26.1%)
females	16 679 (76.4%)	1 129 (77.1%)	11 028 (77.4%)	4 522 (73.9%)
By age				
0-39 years	1 453 (6.7%)	129 (8.8%)	875 (6.1%)	449 (7.3%)
40-69 years	12 328 (56.4%)	760 (51.9%)	8 425 (59.1%)	3 143 (51.4%)
70+ years	8 058 (36.9%)	576 (39.3%)	4 954 (34.8%)	2 528 (41.3%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
SURGERY				
TOTAL	**3 917 (100%)**	**404 (100%)**	**2 204 (100%)**	**1 309 (100%)**
By sex				
males	847 (21.6%)	86 (21.3%)	456 (20.7%)	305 (23.3%)
females	3 070 (78.4%)	318 (78.7%)	1 748 (79.3%)	1 004 (76.7%)
By age				
0-39 years	1 028 (26.2%)	162 (40.1%)	550 (25.0%)	316 (24.1%)
40-69 years	2 310 (59.0%)	204 (50.5%)	1 289 (58.5%)	817 (62.4%)
70+ years	579 (14.8%)	38 (9.4%)	365 (16.6%)	176 (13.5%)
FNAC				
TOTAL	**2 900 (100%)**	**310 (100%)**	**2 201 (100%)**	**389 (100%)**
By sex				
males	585 (20.2%)	61 (19.7%)	426 (19.4%)	98 (25.2%)
females	2 315 (79.8%)	249 (80.3%)	1 775 (80.7%)	291 (74.8%)
By age				
0-39 years	250 (8.6%)	36 (11.6%)	172 (7.8%)	42 (10.8%)
40-69 years	1 783 (61.5%)	171 (55.2%)	1 378 (62.6%)	234 (60.2%)
70+ years	867 (29.9%)	103 (33.2%)	651 (29.6%)	113 (29.1%)
LYMPH NODE DISSECTION				
TOTAL	**144 (100%)**	**27 (100%)**	**75 (100%)**	**42 (100%)**
By sex				
males	60 (41.7%)	8 (29.6%)	28 (37.3%)	24 (57.1%)
females	84 (58.3%)	19 (70.4%)	47 (62.7%)	18 (42.9%)
By age				
0-39 years	23 (16.0%)	8 (29.6%)	11 (14.7%)	4 (9.5%)
40-69 years	82 (56.9%)	14 (51.9%)	36 (48.0%)	32 (76.2%)
70+ years	39 (27.1%)	5 (18.5%)	28 (37.3%)	6 (14.3%)

10.2.3. Patients with nodular disease

10.2.3.1. Patient characteristics

Table 27. Characteristics of patients with nodular disease

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**60 684 (100%)**	**7 265 (100%)**	**28 388 (100%)**	**25 031 (100%)**
By sex				
males	13 562 (22.3%)	1 585 (21.8%)	6 363 (22.4%)	5 614 (22.4%)
females	47 122 (77.7%)	5 680 (78.2%)	22 025 (77.6%)	19 417 (77.6%)
By age				
0-39 years	13 445 (22.2%)	1 902 (26.2%)	6 385 (22.5%)	5 158 (20.6%)
40-69 years	38 830 (64.0%)	4 265 (58.7%)	17 939 (63.2%)	16 626 (66.4%)
70+ years	8 409 (13.9%)	1 098 (15.1%)	4 064 (14.3%)	3 247 (13.0%)

10.2.3.2. Diagnostic and therapeutic procedures

Table 28. Patients with nodular disease: diagnostic and therapeutic procedures by sex, age, and region

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
STRUMAZOL				
Total	**4 776 (100%)**	**468 (100%)**	**3 031 (100%)**	**1 277 (100%)**
By sex				
males	1 028 (21.5%)	105 (22.4%)	636 (21.0%)	287 (22.5%)
females	3 748 (78.5%)	363 (77.6%)	2 395 (79.0%)	990 (77.5%)
By age				
0-39 years	1 035 (21.7%)	155 (33.1%)	584 (19.3%)	296 (23.2%)
40-69 years	2 731 (57.2%)	237 (50.6%)	1 713 (56.5%)	781 (61.2%)
70+ years	1 010 (21.1%)	76 (16.2%)	734 (24.2%)	200 (15.7%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
IODE ^{131}I				
Total	**2 165 (100%)**	**227 (100%)**	**1 529 (100%)**	**409 (100%)**
By sex				
males	451 (20.8%)	38 (16.7%)	307 (20.1%)	106 (25.9%)
females	1 714 (79.2%)	189 (83.3%)	1 222 (79.9%)	303 (74.1%)
By age				
0-39 years	192 (8.9%)	31 (13.7%)	111 (7.3%)	50 (12.2%)
40-69 years	1 421 (65.6%)	127 (56.0%)	1 031 (67.4%)	263 (64.3%)
70+ years	552 (25.5%)	69 (30.4%)	387 (25.3%)	96 (23.5%)
SURGERY				
Total	**34 435 (100%)**	**3 474 (100%)**	**13 553 (100%)**	**17 408 (100%)**
By sex				
males	7 400 (21.5%)	733 (21.1%)	2 834 (20.9%)	3 833 (22.0%)
females	27 035 (78.5%)	2 741 (78.9%)	10 719 (79.1%)	13 575 (78.0%)
By age				
0-39 years	8 197 (23.8%)	1 043 (30.0%)	3 439 (25.4%)	3 715 (21.3%)
40-69 years	22 302 (64.8%)	2 064 (59.4%)	8 542 (63.0%)	11 696 (67.2%)
70+ years	3 936 (11.4%)	367 (10.6%)	1 572 (11.6%)	1 997 (11.5%)
FNAC				
Total	**35 605 (100%)**	**4 885 (100%)**	**20 263 (100%)**	**10 457 (100%)**
By sex				
males	7 976 (22.4%)	1 070 (21.9%)	4 566 (22.5%)	2 340 (22.4%)
females	27 629 (77.6%)	3 815 (78.1%)	15 697 (77.5%)	8 117 (77.6%)
By age				
0-39 years	7 846 (22.0%)	1 175 (24.1%)	4 472 (22.1%)	2 199 (21.0%)
40-69 years	22 472 (63.1%)	2 863 (58.6%)	12 832 (63.3%)	6 777 (64.8%)

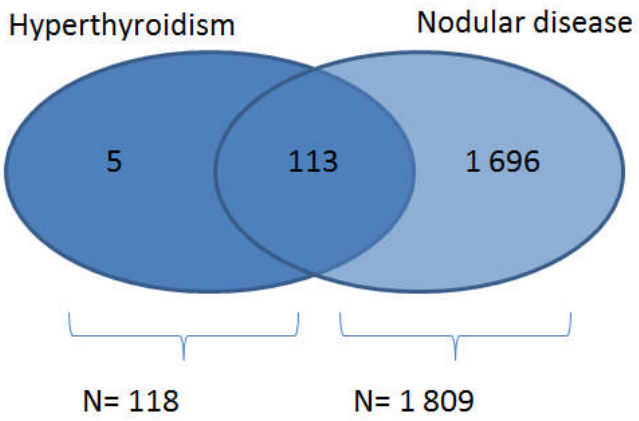
Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
70+ years	5 287 (14.8%)	847 (17.3%)	2 959 (14.6%)	1 481 (14.2%)
LYMPH NODE DISSECTION				
Total	**1 779 (100%)**	**295 (100%)**	**918 (100%)**	**566 (100%)**
By sex				
males	875 (49.2%)	145 (49.2%)	449 (48.9%)	281 (49.7%)
females	904 (50.8%)	150 (50.9%)	469 (51.1%)	285 (50.4%)
By age				
0-39 years	355 (20.0%)	73 (27.8%)	175 (19.1%)	107 (18.9%)
40-69 years	1 121 (63.0%)	171 (58.0%)	574 (62.5%)	376 (66.4%)
70+ years	303 (17.0%)	51 (17.3%)	169 (18.4%)	83 (14.7%)

11. APPENDIX 11. CHARACTERISTICS OF ALL CANCER PATIENTS

11.1. General description

Among 1 913 patients with thyroid cancer diagnosed between 2004 and 2006, 118 patients had thyrotoxicosis, 1 809 patients had nodular disease, and 113 patients could be classified in both groups (Figure 6). Ninety-nine patients could be neither classified within the thyrotoxicosis group nor in the nodular disease group.

Figure 6. Cancer patients - overview of thyrotoxic patients and patients with nodular disease



11.2. Patients and tumours characteristics

11.2.1. Patient characteristics

Table 29. Characteristics of thyroid cancer patients[a]

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**1 913 (100%)**	**233 (100%)**	**802 (100%)**	**878 (100%)**
By sex				
males	480 (25.1%)	52 (22.3%)	204 (25.4%)	224 (25.5%)
females	1 433 (74.9%)	181 (77.7%)	598 (74.6%)	654 (74.5%)
By age				
0-39 years	449 (23.5%)	58 (24.9%)	188 (23.4%)	203 (23.1%)
40-69 years	1 163 (60.8%)	142 (70.0%)	460 (57.4%)	561 (63.9%)
70+ years	301 (15.8%)	33 (14.2%)	154 (19.2%)	114 (13.0%)

[a] *These characteristics were defined at the incidence date*

The male/female ratio was 1:3. The distribution of thyroid cancers in the 3 age groups shows that the cancers were more frequent in the age group 40-69 years (60.8%).

11.2.2. Tumour characteristics

11.2.2.1. General

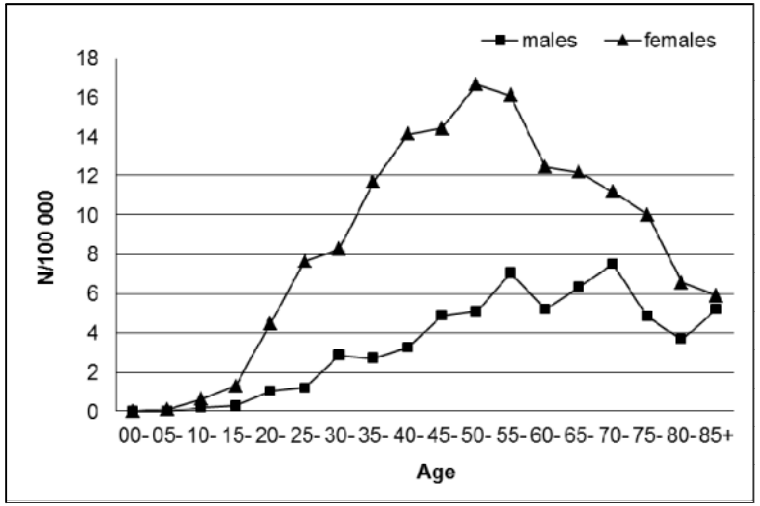
In this group of thyroid cancer patients, the European standardized incidence rate of thyroid cancer was 5.6 per 100 000 person years (Table 30). The annual average of incident cases was 638 cases. The number of cases seems to slightly increase between 2004 and 2006. However, the period of study was too short to perform a reliable time trends analysis.

Table 30. Incidence of thyroid cancer by year and sex

	2004			2005			2006			2004-2006		
	N	ESR	95 % CI	N	ESR	95 % CI	N	ESR	95 % CI	N	ESR	95 % CI
Males	149	2,62	[2,20 ; 3,05]	168	3,05	[2,58 ; 3,51]	163	2,89	[2,44 ; 3,34]	480	2,85	[2,60 ; 3,11]
Females	449	7,88	[7,14 ; 8,63]	494	8,40	[7,64 ; 9,16]	490	8,58	[7,80 ; 9,35]	1433	8,29	[7,85 ; 8,73]
Total	598	5,26	[4,83 ; 5,69]	662	5,75	[5,31 ; 6,20]	653	5,74	[5,30 ; 6,19]	1913	5,59	[5,33 ; 5,84]

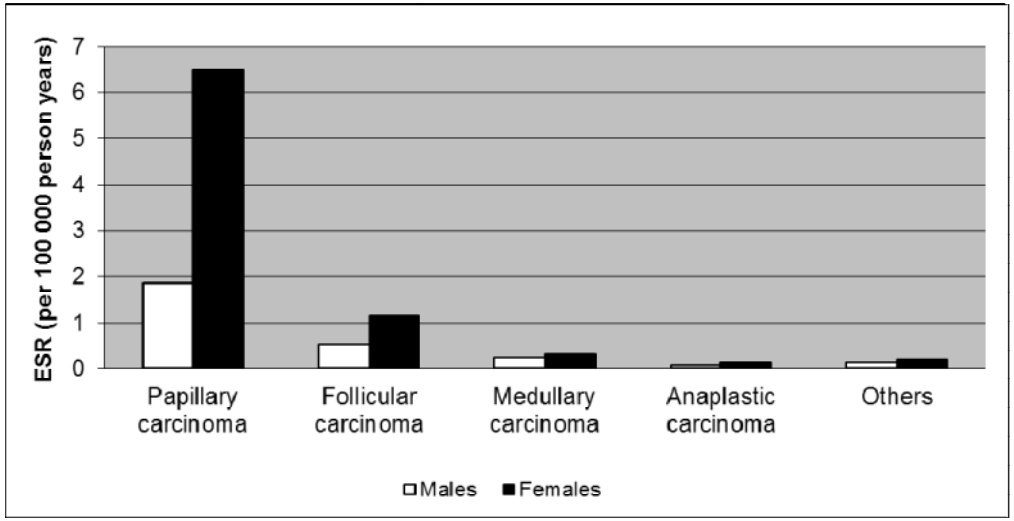
In males the incidence rate was 2.9 per 100 000 person years and in females 8.3 per 100 000 person years (Table 30). Moreover, in males age-specific incidence rates increases gradually from 15 to 70 years old whereas in females, a steep increase from 15 to 50-55 years old is observed, with a decrease afterwards (Figure 7).

Figure 7. Age-specific incidence by sex



Papillary carcinomas were the most frequent histological type (73%), followed by follicular carcinomas (16%), medullary carcinomas (5%), anaplastic carcinomas (3%) and other morphologies (3%). The male/female ratio for papillary carcinomas was 1:3 whereas the difference between males and females was smaller for the other histological types (Figure 8).

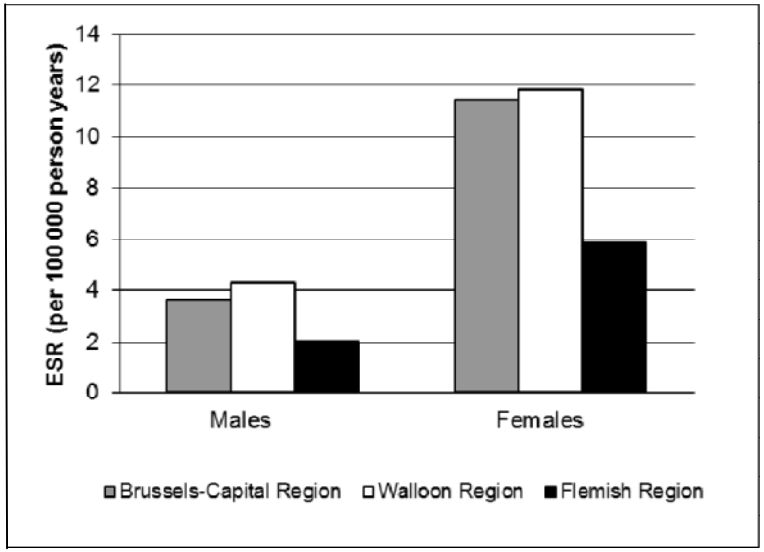
Figure 8. Incidence of thyroid cancer by histological type and sex



11.2.2.2.Incidence by region

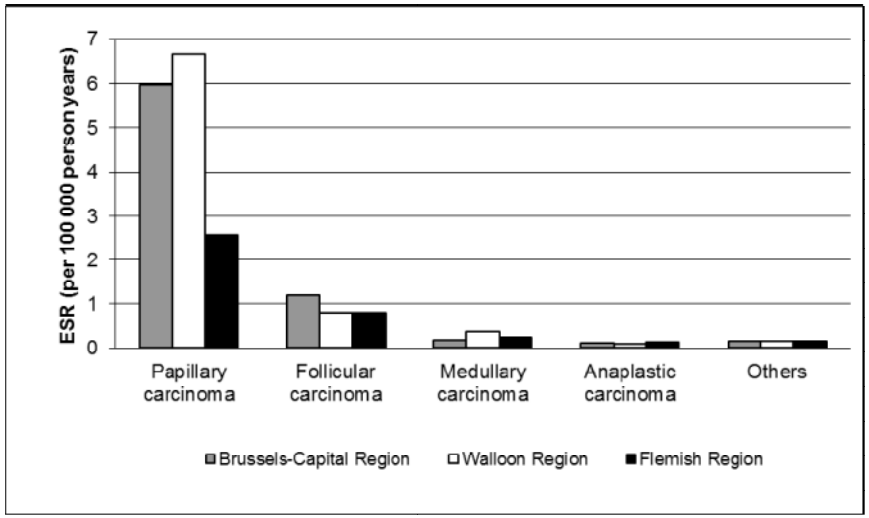
In comparison with the Flemish region, thyroid cancer incidence was twice as high in the Brussels-Capital Region and the Walloon Region (Figure 9). The incidence for 2004-2006 was respectively 3.6, 4.3 and 2.0 per 100 000 person years in the Brussels-Capital, Walloon and Flemish Region in males and 11.4, 11.8 and 5.9 per 100 000 person years in females.

Figure 9. Incidence of thyroid cancer by sex and by region



In the three regions, the most frequent histological diagnosis was papillary carcinoma (78.1%, 81.0% and 62.7% in the Brussels-Capital Region, Walloon Region and Flemish Region respectively) with an incidence significantly higher in the Brussels-Capital Region and in the Walloon Region (6.0 and 6.7 per 100 000 person years respectively) than in the Flemish Region (2.6 per 100 000 person years). The incidence of other histological types did not show a significant difference between the three regions, even if anaplastic carcinomas are more frequent in the Flemish Region (4.7% in the Flemish Region versus 1.7% and 1.4% in the Brussels-Capital Region and the Walloon Region respectively).

Figure 10. Incidence of thyroid cancer by histological type and region



11.2.3. Thyrotoxicosis among thyroid cancer patients

11.2.3.1.Patient characteristics

Table 31. Characteristics of thyroid cancer patients with thyrotoxicosis[b]

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**118 (100%)**	**9 (100%)**	**63 (100%)**	**46 (100%)**
By sex				
males	20 (16.7%)	2 (22.2%)	7 (11.1%)	11 (23.9%)
females	98 (83.1%)	7 (77.8%)	56 (88.9%)	35 (76.1%)
By age				
0-39 years	22 (18.6%)	4 (44.4%)	9 (19.6%)	9 (19.6%)
40-69 years	69 (58.5%)	5 (55.6%)	37 (58.7%)	27 (58.7%)
70+ years	27 (22.9%)	0 (0.0%)	17 (27.0%)	10 (21.7%)

[b] *These characteristics were defined at the cancer incidence date.*

11.2.3.2.Diagnostic and therapeutic procedures

Table 32. Thyroid cancer patients with thyrotoxicosis: description of diagnostic and therapeutic procedures by sex and age

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
STRUMAZOL				
Total	**97 (100%)**	**8 (100%)**	**50 (100%)**	**39 (100%)**
By sex				
males	15 (15.5%)	1 (12.5%)	5 (10.0%)	9 (23.1%)
females	82 (84.5%)	7 (87.5%)	45 (90.0%)	30 (76.9%)
By age				
0-39 years	20 (20.6%)	3 (37.5%)	9 (18.0%)	8 (20.5%)
40-69 years	57 (58.8%)	5 (62.5%)	28 (56.0%)	24 (61.5%)
70+ years	20 (20.6%)	/	13 (26.0%)	7 (17.9%)
IODE ^{131}I BEFORE INCIDENCE*				
Total	**26 (100%)**	**1 (100%)**	**17 (100%)**	**8 (100%)**
By sex				
males	5 (19.2%)	1 (100.0%)	2 (11.8%)	2 (25.0%)
females	21 (80.8%)	0 (0.0%)	15 (88.2%)	6 (75.0%)
By age				
0-39 years	3 (11.5%)	1 (100.0%)	1 (5.9%)	1 (12.5%)
40-69 years	15 (57.7%)	0 (0.0%)	11 (64.7%)	4 (50.0%)
70+ years	8 (30.8%)	/	5 (29.4%)	3 (37.5%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
IODE ^{131}I AFTER INCIDENCE*				
Total	**49 (100%)**	**4 (100%)**	**28 (100%)**	**17 (100%)**
By sex				
males	11 (22.4%)	2 (50.0%)	4 (14.3%)	5 (29.4%)
females	38 (77.6%)	2 (50.0%)	24 (85.7%)	12 (70.6%)
By age				
0-39 years	12 (24.5%)	3 (75.0%)	3 (10.7%)	6 (35.3%)
40-69 years	26 (53.1%)	1 (25.0%)	16 (57.1%)	9 (52.9%)
70+ years	11 (22.4%)	/	9 (32.1%)	2 (11.8%)
SURGERY				
Total	**107 (100%)**	**9 (100%)**	**56 (100%)**	**42 (100%)**
By sex				
males	18 (16.8%)	2 (22.2%)	6 (10.7%)	10 (23.8%)
females	89 (83.2%)	7 (77.8%)	50 (89.3%)	32 (76.2%)
By age				
0-39 years	22 (20.6%)	4 (44.4%)	9 (16.1%)	9 (21.4%)
40-69 years	63 (58.9%)	5 (55.6%)	34 (60.7%)	24 (57.1%)
70+ years	22 (20.6%)	/	13 (23.2%)	9 (21.4%)
FNAC				
Total	**31 (100%)**	**2 (100%)**	**27 (100%)**	**2 (100%)**
By sex				
males	4 (12.9%)	2 (100.0%)	2 (7.4%)	0 (0.0%)
females	27 (87.1%)	0 (0.0%)	25 (92.6%)	2 (100.0%)
By age				
0-39 years	2 (6.5%)	1 (50.0%)	1 (3.7%)	0 (0.0%)
40-69 years	20 (64.5%)	1 (50.0%)	18 (66.7%)	1 (50.0%)
70+ years	9 (29.0%)	/	8 (29.6%)	1 (50.0%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
LYMPH NODE DISSECTION				
Total	**10 (100%)**	**0**	**9 (100%)**	**1 (100%)**
By sex				
males	2 (20.0%)	0	2 (22.2%)	0 (0.0%)
females	8 (80.0%)	0	7 (77.8%)	1 (100.0%)
By age				
0-39 years	1 (10.0%)	0	1 (11.1%)	0 (0.0%)
40-69 years	8 (80.0%)	0	7 (77.8%)	1 (100.0%)
70+ years	1 (10.0%)	/	1 (11.1%)	0 (0.0%)

** ^{131}I may also be administered as part of the anticancer treatment for thyroid cancer, and is then given at higher doses. Unfortunately, nomenclature codes do not distinguish the administered dose of ^{131}I. Therefore, some arbitrary decisions regarding the analyses of ^{131}I for thyrotoxicosis were made (see section methodology RQ3). For cancer cases, ^{131}I administered before or equaling the incidence date was considered as a treatment for thyrotoxicosis.*

11.2.4. Thyroid cancer patients with nodular disease

11.2.4.1.Patient characteristics

Table 33. Characteristics of thyroid cancer patients with nodular disease[c]

	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Total	**1 809 (100%)**	**220 (100%)**	**755 (100%)**	**834 (100%)**
By sex				
males	444 (24.5%)	49 (22.3%)	184 (24.4%)	211 (25.3%)
females	1 365 (75.5%)	171 (77.7%)	571 (75.6%)	623 (74.7%)
By age				
0-39 years	431 (23.8%)	56 (25.5%)	183 (24.2%)	192 (23.0%)
40-69 years	1 110 (61.4%)	134 (60.9%)	438 (58.0%)	538 (64.5%)
70+ years	268 (14.8%)	30 (13.6%)	134 (17.8%)	104 (12.5%)

[c] These characteristics were defined at the incidence cancer date

11.2.4.2.Diagnostic and therapeutic procedures

Table 34. Thyroid cancer patients with nodular disease: diagnostic and therapeutic procedures by sex and age

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
STRUMAZOL				
Total	**96 (100%)**	**8 (100%)**	**49 (100%)**	**39 (100%)**
By sex				
males	15 (15.6%)	1 (12.5%)	5 (10.2%)	9 (23.1%)
females	81 (84.4%)	7 (87.5%)	44 (89.8%)	30 (76.9%)
By age				
0-39 years	20 (20.8%)	3 (37.5%)	9 (18.4%)	8 (20.5%)
40-69 years	57 (59.4%)	5 (62.5%)	28 (57.1%)	24 (61.5%)
70+ years	19 (19.8%)	0 (0.0%)	12 (24.5%)	7 (18.0%)
IODE ^{131}I BEFORE INCIDENCE*				
Total	**22 (100%)**	**1 (100%)**	**16 (100%)**	**5 (100%)**
By sex				
males	4 (18.2%)	1 (100.0%)	2 (12.5%)	1 (20.0%)
females	18 (81.8%)	0 (0.0%)	14 (87.5%)	4 (80.0%)
By age				
0-39 years	3 (13.6%)	1 (100.0%)	1 (6.3%)	1 (20.0%)
40-69 years	12 (54.6%)	0 (0.0%)	10 (62.5%)	2 (40.0%)
70+ years	7 (31.8%)	0 (0.0%)	5 (31.3%)	2 (40.0%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
IODE ^{131}I AFTER INCIDENCE*				
Total	**1 059 (100%)**	**124 (100%)**	**451 (100%)**	**484 (100%)**
By sex				
males	282 (26.6%)	33 (26.6%)	110 (24.4%)	139 (28.7%)
females	777 (73.4%)	91 (73.4%)	341 (75.6%)	345 (71.3%)
By age				
0-39 years	301 (28.4%)	32 (25.8%)	137 (30.4%)	132 (27.3%)
40-69 years	632 (59.7%)	77 (62.1%)	254 (56.3%)	301 (62.2%)
70+ years	126 (11.9%)	15 (12.1%)	60 (13.3%)	51 (10.5%)
SURGERY				
Total	**1 750 (100%)**	**216 (100%)**	**712 (100%)**	**822 (100%)**
By sex				
males	424 (24.2%)	49 (22.7%)	168 (23.6%)	207 (25.2%)
females	1326 (75.8%)	167 (77.3%)	544 (76.4%)	615 (74.8%)
By age				
0-39 years	426 (24.3%)	54 (25.0%)	181 (25.4%)	191 (23.2%)
40-69 years	1 083 (61.9%)	133 (61.6%)	418 (58.7%)	532 (64.7%)
70+ years	241 (13.8%)	29 (13.4%)	113 (15.9%)	99 (12.0%)

Medical act	Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
FNAC				
Total	**811 (100%)**	**106 (100%)**	**477 (100%)**	**228 (100%)**
By sex				
males	192 (23.7%)	25 (23.6%)	110 (23.1%)	57 (25.0%)
females	619 (76.3%)	81 (76.4%)	367 (76.9%)	171 (75.0%)
By age				
0-39 years	193 (23.8%)	26 (24.5%)	113 (24.0%)	54 (23.7%)
40-69 years	488 (60.2%)	63 (59.4%)	276 (57.9%)	149 (65.4%)
70+ years	130 (16.0%)	17 (16.0%)	88 (18.5%)	25 (11.0%)
LYMPH NODE DISSECTION				
Total	**366 (100%)**	**43 (100%)**	**204 (100%)**	**119 (100%)**
By sex				
males	122 (33.3%)	16 (37.2%)	67 (32.8%)	39 (32.8%)
females	244 (66.7%)	27 (62.8%)	137 (67.2%)	80 (67.2%)
By age				
0-39 years	104 (28.4%)	12 (27.9%)	58 (28.4%)	34 (28.6%)
40-69 years	204 (55.7%)	24 (55.8%)	111 (54.4%)	69 (58.0%)
70+ years	58 (15.9%)	7 (16.3%)	35 (17.2%)	16 (13.5%)

** ^{131}I may also be administered as part of the anticancer treatment for thyroid cancer, and is then given at higher doses. Unfortunately, nomenclature codes do not distinguish the administered dose of ^{131}I. Therefore, some arbitrary decisions regarding the analyses of ^{131}I for thyrotoxicosis were made (see section methodology RQ3). For cancer cases, ^{131}I administered before or equaling the incidence date was considered as a treatment for thyrotoxicosis.*

12. APPENDIX 12. TREATMENT STRATEGIES FOR THYROTOXICOSIS: COMPARISON OF AGE STANDARDIZED PROPORTIONS BETWEEN REGIONS

	Brussels-Capital Region versus Flemish Region		Brussels-Capital Region versus Walloon Region		Flemish Region versus Walloon Region	
	CIF	*95%CI*	CIF	*95%CI*	CIF	*95%CI*
Main outcome measure A	1.24	[1.07;1.44]	0.82	[0.70;0.96]	0.66	[0.59;0.74]
Main outcome measure B	0.72	[0.63;0.83]	1.55	[1.32;1.82]	2.15	[1.93;2.39]
Main outcome measure C	0.77	[0.29;2.10]	1.60	[0.58;4.43]	2.07	[1.13;3.78]
Secondary outcome measure A1	1.03	[1.00;1.05]	1.19	[1.15;1.22]	1.15	[1.13;1.18]
Secondary outcome measure A2	0.79	[0.74;0.85]	0.64	[0.60;0.69]	0.81	[0.78;0.85]

13. APPENDIX 13. TREATMENT STRATEGIES FOR NODULAR DISEASE: COMPARISON OF AGE STANDARDIZED PROPORTIONS BETWEEN REGIONS

	Brussels-Capital Region versus Flemish Region		Brussels-Capital Region versus Walloon Region		Flemish Region versus Walloon Region	
	CIF	*95%CI*	CIF	*95%CI*	CIF	*95%CI*
Outcome measure A	1.02	[0.98;1.06]	0.69	[0.67;0.72]	0.68	[0.67;0.70]
Outcome measure B	0.98	[0.95;1.02]	1.68	[1.61;1.75]	1.70	[1.65;1.76]
Outcome measure C	0.74	[0.68;0.80]	1.24	[1.13;1.35]	1.68	[1.58;1.79]
Outcome measure D	0.75	[0.70;0.80]	1.72	[1.59;1.87]	2.29	[2.17;2.43]
Outcome measure E	1.06	[0.88;1.29]	1.12	[0.92;1.36]	1.05	[0.91;1.21]
Outcome measure F	1.48	[1.11;1.96]	0.88	[0.68;1.14]	0.59	[0.49;0.73]
Outcome measure G	0.62	[0.46;0.83]	1.45	[1.03;2.03]	2.33	[1.88;2.88]
Outcome measure H	0.91	[0.57;1.43]	1.68	[1.03;2.76]	1.86	[1.32;2.61]

14. APPENDIX 14. RESULTS FOR OUTCOME MEASURES A, B AND C WITHOUT EXCLUSION OF PATIENTS WHO UNDERWENT THYROID SURGERY WITH PRIOR THYROTOXICOSIS AND WITHOUT PRIOR FNAC

14.1. Results

The age-standardized rates for nodular disease were calculated, using the European Standard Population as a reference (ESR).

Table 35. Age-standardized rates (n/100 000 person-years) for surgery and FNAC over the period 2003-2008, per region

2003-2008	Belgium		Brussels-Capital Region		Flemish Region		Walloon Region	
	ESR	*95%CI*	ESR	*95%CI*	ESR	*95%CI*	ESR	*95%CI*
Nodular disease	88.5	[87.8 ; 89.2]	117.3	[114.6 ; 120.1]	70.1	[69.2 ; 70.9]	114.6	[113.2 ; 116.1]

Age-standardized rates by region showed most nodular disease in the Brussels-Capital Region followed by the Walloon Region and the Flemish Region.

14.1.1. A: Proportion of patients with nodular disease treated with surgery, regardless of FNAC

Denominator: All patients with nodular disease

Numerator: All patients with nodular disease undergoing surgery, with or without FNAC (proportion of surgical approach)

Figure 11. Flowchart outcome measure A

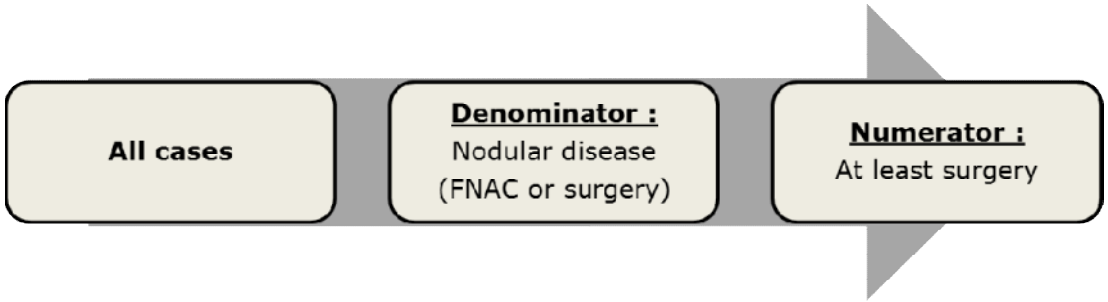


Table 36. Crude and age-standardized proportions of patients with nodular disease treated with surgery by region and age group

		Belgium	ɪsels-Capital Region	Flemish Region	Walloon Region
Nodular disease	**(n)**	60 684	7 265	28 388	25 031
Surgery	**(n)**	34 435	3 474	13 553	17 408
% patients with nodular disease treated with surgery	**(%)**	56.7	47.8	47.7	69.5
	[95%CI]	[56.4 ; 57.1]	[46.7 ; 49.0]	[47.2 ; 48.3]	[69.0 ; 70.1]
% by age group					
0-39 years	**(%)**	61.0	54.8	53.9	72.0
	[95%CI]	[60.1 ; 61.8]	[52.6 ; 57.1]	[52.6 ; 55.1]	[70.8 ; 73.2]
40-69 years	**(%)**	57.4	48.4	47.6	70.3
	[95%CI]	[56.9 ; 57.9]	[46.9 ; 49.9]	[46.9 ; 48.3]	[69.6 ; 71.0]
70+ years	**(%)**	46.8	33.4	38.7	61.5
	[95%CI]	[45.7 ; 47.9]	[30.7 ; 36.3]	[37.2 ; 40.2]	[59.8 ; 63.2]
Age-Standardized Proportion	**(%)**	58.4	50.5	50.4	69.5
	[95%CI]	[57.9 ; 59.0]	[49.0 ; 52.0]	[49.5 ; 51.2]	[69.7 ; 71.3]

In Belgium for the period 2003-2008, more than half of patients with nodular disease were treated with surgery (56.7% [95%CI: 56.4; 57.1]). In the Walloon Region, surgical intervention was performed more frequently than in other regions. This observation was confirmed after age-standardization. Analyses by age group showed a gradient with more surgery in younger patients (0-39 years :61.0% for Belgium [95%CI: 60.1; 61.8]) than in patients of 70 years and older (46.8 for Belgium [95%CI: 45.7; 47.9]). The same gradient was observed within the regions, with the highest proportions for each age group in the Walloon Region.

14.1.2. B: Proportion of patients with nodular disease treated with conservative approach

Denominator: All patients with nodular disease

Numerator: All patients with nodular disease undergoing FNAC not followed by surgery

Considerations: First FNAC and first surgery were considered

Figure 12. Flowchart outcome measure B

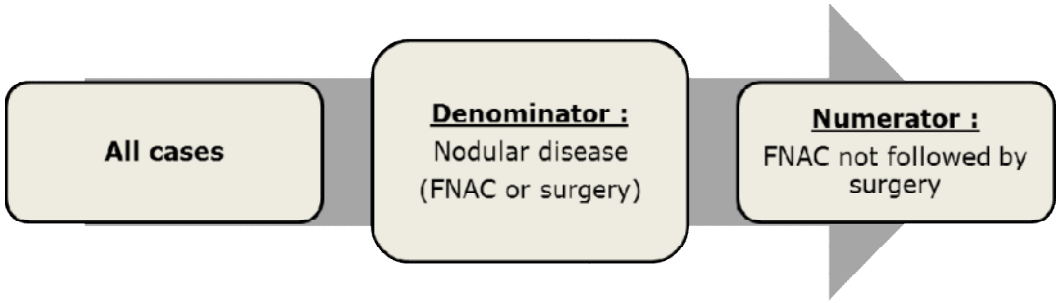
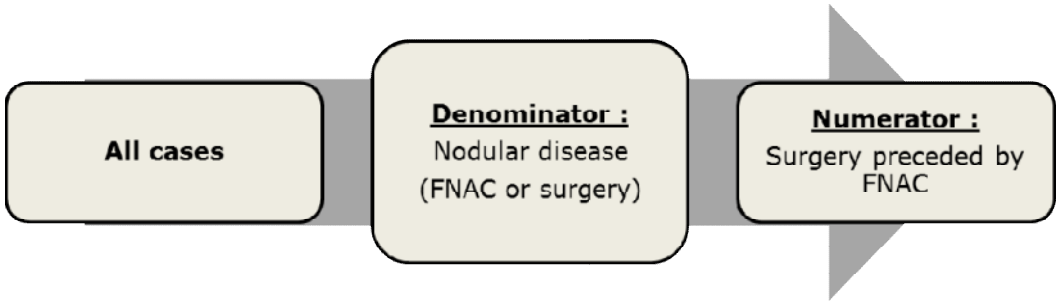


Table 37. Crude and age-standardized proportions of patients with nodular disease treated with conservative approach by region and age group

		Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Nodular disease	**(n)**	60 684	7 265	28 388	25 031
Conservative approach	**(n)**	26 387	3 813	14 895	7 679
% patients with nodular disease with conservative approach	**(%)**	43.5	52.5	52.5	30.7
	[95%CI]	[43.1 ; 43.9]	[51.3 ; 53.6]	[51.9 ; 53.0]	[30.1 ; 31.3]
% by age group					
0-39 years	**(%)**	39.2	45.4	46.3	28.2
	[95%CI]	[38.4 ; 40.1]	[43.1 ; 47.6]	[45.1 ; 47.5]	[27.0 ; 29.5]
40-69 years	**(%)**	42.8	52.0	52.6	29.9
	[95%CI]	[42.3 ; 43.3]	[50.5 ; 53.5]	[51.9 ; 53.4]	[29.2 ; 30.6]
70+ years	**(%)**	53.4	66.8	61.5	38.7
	[95%CI]	[52.3 ; 54.4]	[63.9 ; 69.5]	[60.0 ; 63]	[37.0 ; 40.4]
Age-Standardized Proportion	**(%)**	41.8	49.7	49.8	29.7
	[95%CI]	[41.2 ; 42.3]	[48.2 ; 51.2]	[49.0 ; 50.6]	[28.9 ; 30.6]

Of all Belgian patients with evidence of nodular disease during the period 2003-2008, a conservative approach was preferred in 43.5% of patients (95%CI: [43.1; 43.9]). Both crude and age-standardized proportions showed that this approach was more frequent in the Flemish Region or in the Brussels-Capital Region than in the Walloon Region, where the proportions of FNAC was the lowest. Moreover, analyses by age group suggested that a conservative approach was more common in patients of 70 years and older (53.4% for Belgium [95%CI: 52.3; 54.4]), while it was less frequently the case for patients up to 39 years (39.2% [95%CI: 38.4; 40.1]). This age-related trend was observed in all regions.

Figure 13. Flowchart outcome measure C



14.1.3. C: Proportion of patients with nodular disease treated with surgery preceded by FNAC

Denominator: All patients with nodular disease

Numerator: All patients with nodular disease undergoing surgery preceded by FNAC

Considerations: First FNAC and first surgery were considered

Table 38. Crude and age-standardized proportions of patients with nodular disease treated with surgery preceded by FNAC by region and age group

		Belgium	Brussels-Capital Region	Flemish Region	Walloon Region
Nodular disease	**(n)**	60 684	7 265	28 388	25 031
Surgery preceded by FNAC	**(n)**	9 218	1 072	5 368	2 778
% patients with nodular disease undergoing FNAC before surgery	**(%)**	15.2	14.8	18.9	11.1
	[95%CI]	[14.9 ; 15.5]	[14.0 ; 15.6]	[18.5 ; 19.4]	[10.7 ; 11.5]
% by age group					
0-39 years	**(%)**	19.1	16.4	23.8	14.4
	[95%CI]	[18.5 ; 19.8]	[14.8 ; 18.1]	[22.7 ; 24.8]	[13.5 ; 15.4]
40-69 years	**(%)**	15.1	15.1	18.9	10.9
	[95%CI]	[14.7 ; 15.4]	[14.1 ; 16.3]	[18.3 ; 19.5]	[10.4 ; 11.4]
70+ years	**(%)**	9.5	10.4	11.3	6.9
	[95%CI]	[8.9 ; 10.1]	[8.7 ; 12.3]	[10.4 ; 12.3]	[6.1 ; 7.9]
Age-Standardized Proportion	**(%)**	17.0	15.7	21.0	12.8
	[95%CI]	[[16.6 ; 17.5]	[14.6 ; 16.8]	[20.3 ; 21.8]	[12.1 ; 13.5]

Of all Belgian patients with evidence of nodular disease during the period 2003-2008, only 15.2% (95%CI: [14.9; 15.5]) underwent thyroid surgery preceded by FNAC. This proportion was highest in the Flemish Region (18.9 [95%CI: 18.5; 19.4]), followed by the Brussels-Capital Region (14.8% [95%CI: 14.0; 15.6]) and the Walloon Region (11.1% [95%CI: 10.7; 11.5]). After age-standardization, this observation was confirmed. Analyses by age group showed that younger patients (0-39 years) with nodular disease underwent surgical treatment preceded by FNAC about two times more often (19.1% for Belgium [95%CI: 18.5;19.8]), than patients of 70 years and older (9.5% [95%CI: 8.9; 10.1]). This age-related trend was also observed within each region.

14.2. Comparison of age standardized proportions between regions

All interregional comparisons of age standardized proportions showed significant differences.

Table 39. Comparison of age-standardized proportions between regions

	Brussels-Capital Region versus Flemish Region		Brussels-Capital Region versus Walloon Region		Flemish Region versus Walloon Region	
	CIF	*95%CI*	CIF	*95%CI*	CIF	*95%CI*
Outcome measure A	0.90	[0.81;0.99]	0.67	[0.61;0.73]	0.74	[0.69;0.80]
Outcome measure B	1.09	[1.01;1.18]	1.59	[1.43;1.76]	1.45	[1.32;1.60]
Outcome measure C	0.70	[0.61;0.80]	1.22	[1.07;1.39]	1.74	[1.56;1.95]

15. APPENDIX 15. INTERNATIONAL COMPARISON OF THYROID CANCER INCIDENCE TRENDS

15.1. France

15.1.1. Epidemiology of thyroid cancer : evolution

1. Incidence : 6 672 new cases in 2005 ; world standardized incidence: 4.2 for 100 000 men and 12.7 for 100 000 women[1]. These incidence rates range among mean incidence rates reported in Western Europe, between Iceland (high incidence) and England, Scotland, and the Netherlands (low incidence). The French rates are similar to those reported in USA by SEER registries.
2. Time trend analyses :

- ~ 10-fold increase in the rate of thyroid cancer for the cohort born in 1978 compared to those born in 1928[2, 3]. The risk acceleration was stronger for cohorts born between 1920 and 1960, followed by a stabilization[4].
- Between 1980 and 2005, there was a five-fold increase in the annual number of cases diagnosed in men (from 325 to 1599) and in women (from 1 027 to 5 073). More than 80% of that rise corresponded to an increased risk while less than 20% corresponded to demographic changes (population increase and ageing in both sexes)[5]
- The annual rates of increase of thyroid cancer between 1980 and 2005 were 5.8 % in men and 6.0 % in women[5] while the annual rates of increase for papillary cancer incidence were 6.2 and 8.1% in men and women, respectively[2].

Table 40. Thyroid cancer incidence rates in France (1980-2008; WSR)

	Years							Mean yearly trend (%)	
	1980	1985	1990	1995	2000	2005	2008[a]	1980-2005	2000-2005
Men	1.0	1.3	1.7	2.3	3.1	4.2	5.0	5.8	6.4
Women	2.0	3.9	5.2	7.0	9.5	12.7	15.2	6.0	6.1

Source. Colonna 2010
Note. Data for 2008 are projections based on the assumptions that the trend observed in the period 1980-2004 will continue until 2008

3. Geographical variations:

- There are high spatial disparities in incidence rates (multiplying factor varied between 1 and 3 for women, between 1 and 2 for men). The highest incidence rate was observed in Tarn (15.9/100 000 persons-years) whereas the lowest incidence rate was observed in Bas-Rhin (5.7/100 000 person-years)[4]. The lowest rates were reported in areas in Alsace, more exposed to Chernobyl Fallout whereas the less exposed areas reported the highest rates for thyroid cancer.
- In the recent period (2000-2004), the incidence of papillary carcinomas varied widely between administrative departments whereas the distribution of other subtypes is more homogeneous. The incidence differences between departments can be attributed to differences in observed papillary carcinomas[5].
- In young people (0-19 years), geographical disparities were reported between the Western (4.7/10^6 persons-years; 95%CI 3.9-5.3) and the Eastern (6.3/10^6 persons-years; 95%CI 5-7.6) parts of the country during the period 1999-2001. Since 20% of all cases were reported in young people born after 1986, the hypothesis of a radioactive contamination can be excluded[4].

- The rural/urban environment was found statistically significant: the ratio was estimated at 0.72 (95% CI: 0.62–0.84) in men and 0.82 (95% CI:0.73–0.93) in women. General practitioner density did not appear to have a significant effect on incidence. Other hypothesis: differences in care offered and accessibility to specialists involved in thyroid cancer, namely endocrinologists and surgeons who are more likely to have their practice in urban zones[6]

4. Gender:

- Sex ratio 1:3 (male:female)[1]
- Higher increase in women (+8.1% per year) than in men (+6.2% per year)

5. Age groups: no overt increase in the incidence of thyroid cancers in children younger than 15 years old; the mean rate in this age group was 0.5-2/ 10^6 persons-years (1978-2001) and are similar to rates reported by SEER program in USA (1.8/10^6 persons-years between 1975-2002) and Circ for Europe (1.8/10^6 persons-years between 1990-1999)[4].

6. Histologic types: The increase concerned mainly papillary cancer whose WSR incidence increased from 0.53 to 2.77 in men (multiplied by 5.2) and from 1.76 to 10.0 (multiplied by 5.7) in women. Between 1985-1989 and 2000-2004, the percentages of papillary subtype relative to all thyroid cancer types evolved from 55% to 73% in men and from 62% to 84% in women[5]. In the meanwhile, the incidence of other subtypes such as follicular (from 0.28 to 0.50 in men; from 1.02 to 1.18 in women) and medullary (from 0.15 to 0.33 in men; from 0.19 to 0.33 in women) only slightly increased and that of the anaplastic subtype even decreased (from 0.12 to 0.08 in men; from 0.16 to 0.10 in women)[5]. Papillary carcinoma was the most frequent in all age groups, its proportion sharply decreased in people over 75 years old (at this age, a quarter of patients had anaplastic carcinomas).

7. Cancer stages:

- Increase in the proportion of microcarcinomas (≤ 1 cm) from 18.4% (1983 to 1987) to 43.1% (1998 to 2001)[3].
- Between 1983 and 2000, the sharpest increase was observed for cancers < 10 mm, with a yearly progression of over 12% in men and women, which corresponds to a 4-fold increase in the incidence rate. In this group, tumours measuring 5 mm or less increased annually by 13% in men and 14% in women[1]; such very little tumours represented 27% of all cases on the period 2000-2004[4]. These results are robust since they concern 3 000 cases diagnosed in a population of over 4.6 million inhabitants

8. Mortality:

- Five-year overall and relative survival rates: 95% and 99% for papillary carcinomas ; 85% and 95% for follicular subtypes; 82% and 88% for medullary subtypes and, 10% and 15% for anaplastic carcinomas[5];
- Survival also differed between sexes. For papillary subtypes, 5-year overall and relative survival rates were 88% and 95% in men and 96% and 99% in women respectively
- Survival is improving over time: considering all subtypes, the 5-year overall survival increased from 81% between 1989-1991 and 91% between 1995-1997[5].
- 403 deaths in 2005 (0.3% of all cancer-related deaths); world standardized mortality rates: 0.3 (for men and women)[1]
- Between 1980 and 2005, the mean annual rate of mortality is -1.8% in men and -3.1% in women(Colonna 2010). This decrease can be explained by the decrease in incidence of anaplastic cancers with a worse prognosis[2].

Table 41. Thyroid cancer mortality rates in France (1980-2008; WSR)

	Years							Mean yearly trend (%)	
	1980	1985	1990	1995	2000	2005	2008[a]	1980-2005	2000-2005
Men	0.4	0.4	0.4	0.3	0.3	0.3	0.2	-1.8	-2.7
Women	0.6	0.6	0.5	0.4	0.4	0.3	0.3	-3.1	-3.1

Source. Colonna 2010
Note. Data for 2008 are projections based on the assumptions that the trend observed in the period 1980-2004 will continue until 2008

9. More recent diagnoses: small size, papillary types, diagnosed fortuitously after surgery for benign thyroid diseases

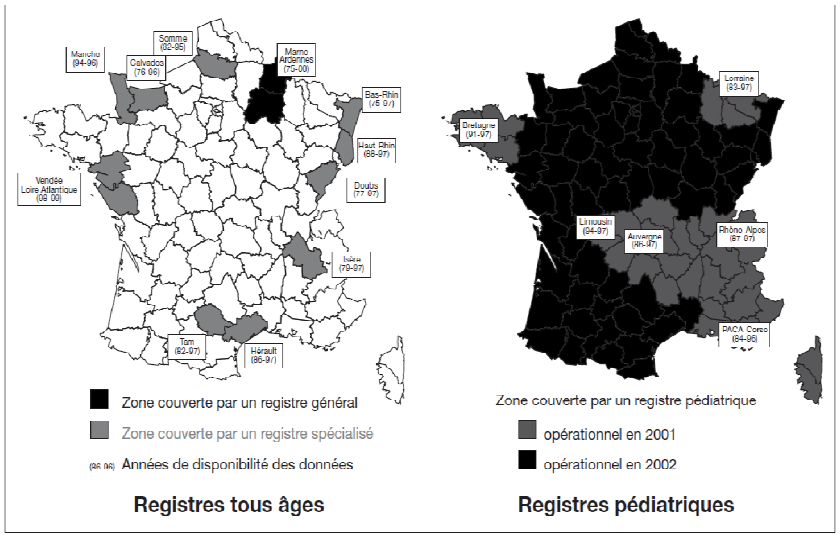
15.1.2. Potential causes of evolution

- Exposure to external radiation or to fallout from nuclear weapon testing:
  - 19 nuclear power plants located throughout France
  - Chernobyl disaster
- Genetic predisposition
- Residence in an endemic goiter area
- History of thyroid disease and parity
- Changes in practices for the management of thyroid diseases
- Changes in diagnostic practices, such as use of X-Rays for dental examinations in children[2])
- Changes in histological classification of thyroid tumours

15.1.3. Cancer registry - available data

- Three types of cancer registries co-exist in France[7]:
  - Thirteen general French population-based cancer registries covering 13% of the adult population in 11 metropolitan departments (Bas-Rhin, Calvados, Doubs, Haut-Rhin, Hérault, Isère, Loire Atlantique, Manche, Somme, Tarn and Vendée) and 3 Oversea departments (Martinique, Nouvelle Calédonie, Polynésie)
  - One specialized thyroid cancer registry in Champagne-Ardennes that exhaustively collected the information in these two departments
  - The children registries (0-14 years) with regional registries that exist since many years and a national registry for solid tumours that was set up in 2000[4]

Figure 14. French departments covered by cancer registries and periods with available data



Source. Institut de Veille Sanitaire (2001)

- Hospital claims databases from care units (PMSI) including DRG codes of thyroidectomy and on diagnosis codes of thyroid cancer in a principal or secondary position[8].

15.1.4. Surveillance structures

The French Department of Health requested the Institut de Veille sanitaire (Public Health Agency) to coordinate a multidisciplinary Thyroid Cancer Committee composed of epidemiologists, endocrinologists, pathologists, endocrine, head and neck surgeons, nuclear physicians, and researchers, to pursue 3 goals:

1. To analyze the temporal and geographical incidence trends of thyroid cancer.
2. To understand if the increased incidence is real or artificially derived from an earlier diagnosis caused by increased diagnostic activity.
3. To set up guidelines to improve the national surveillance system of thyroid cancer

15.1.5. Types of epidemiological studies

Two retrospective multicenter studies were conducted to analyze trends in diagnostic and surgical practices of thyroid diseases between 1980 and 2000 and to relate them to the increase in thyroid cancer incidence. Characteristics of the population and diagnosis procedures (especially thyroid ultrasonography [US], and cytology) changing trends in indications, extent of thyroid surgery, proportion of cancers and of microcancers were described over time and their impact on cancer incidence analyzed.

15.1.6. Evidence for causes

1. Diagnostic practices (evolution from 1980 to 2000): screening effect

- Increase use of US procedures from 3% to 84.8% in patients with thyroid diseases (from 1980 to 2000)[9].
- Increase use of fine-needle aspiration biopsy (FNAB) from 8% to 36% in patients with thyroid nodules[9].
- Thyroid cancer is a detectable cancer at a preclinical stage with a high proportion of silent cancers – the sensitivity of the screening tool is high[9].
- The observation of a linear cohort effect is compatible with the hypothesis regarding the progression in referral to health-care in younger generations. This also applies to the greater increase in women, who are the major consumers of health-care and also because the prevalence of benign thyroid conditions is greater in women[2]
- However, evolution of diagnostic practices should lead to an increasing detection of vesicular forms, which remain stable or even are decreasing; this decrease could be explained by changes in the histopathological classification of tumours

2. Therapeutic strategies (evolution from 1980 to 2000)

- Surgery in patients with goiter: from 24% to 46%[3].
- Surgery for clinically isolated nodule: from 58% to 31%[3].
- Thyroidectomies for benign diseases: from 30% to 80%[3]. Total thyroidectomies evolved from 9% to 29% of all surgical interventions between 1980 and 2000[4].
- Almost 50% of papillary carcinomas are detected preoperatively by cytology[3].
- The proportion of cancer among patients who were operated on increased from 9% in 1980 to 29% in 2000. Among these cancers, 39% were not suspected before surgery and 69% of them were 1 cm or less in diameter[3].
- High geographical disparities were reported in surgical rates: higher rates of surgical interventions were reported in the South and the South-Eastern part of the country whereas lower rates were reported in the North-Eastern part[4].
- Incidental cancers detected in surgical specimens were reported to represent a third of all cancers: 30% of the cancers were discovered within goiter and 15% of all the cases of ‘clinical goiter’ were found to coexist with a cancer[10]

3. Thyroid pathology practices

- In 1975, the WHO guidelines recommended to classify any follicular carcinoma with a papillary component as papillary. The application of the 1988 WHO classification of differentiated thyroid carcinomas led to transfer some diagnoses of follicular carcinomas or atypical adenomas into the category of follicular variants of papillary carcinomas[1]. The gradual adoption of these guidelines by all anatomopathologists led to reclassify follicular or mixed carcinomas into papillary subtype[5].
- The number of pathological slides derived from each surgical specimen has probably increased over time (not recorded)

4. Chernobyl accident

- Epidemiological evidence does not favour any link with the Chernobyl accident[2, 9]:
  - The increase has begun before 1986 and the progression is continuing since 1978; the same observation is made in other countries where Chernobyl fallout cannot be considered as causal factors (e.g. USA).
  - The lowest rates were reported in areas in Alsace (East), more exposed to Chernobyl fallout whereas the less exposed areas reported the highest rates for thyroid cancer. In the Eastern part of the country, the expected mean number of cases during the 25 years-period 1991-2015 without exposition to radioactivity was 899 (+/-60 due to uncertainties in estimations, 839-959. An estimated excess of 7-55 cancers was reported (no more than those expected without contamination)[4].
  - The risk of thyroid cancer potentially associated with the Chernobyl fallout in France was estimated for those who were younger than 15 y in 1986, i.e. the population group at highest risk of thyroid effects from ionizing radiation. A study was conducted in more than 2 500 000 children younger than 15 years old in the Eastern part of the country[11]. Most of the thyroid doses received in France from the Chernobyl fallout came from the ingestion of food contaminated by ^{131}I. However, regardless of the risk model and the period of calculation, when a linear non-threshold dose-effect relationship between radioactive iodine exposure and thyroid cancer is assumed, the predicted number of excess cases attributable to the Chernobyl fallout in France (between 11.2 and 55.2 excess cases for the period 1991-2015) is less than the statistical uncertainty in the number of spontaneous cases predicted (1 342 expected spontaneous cases [0.8-4.1%])[11]. However, this study suffered from two limitations: the first involved the lack of knowledge of spontaneous thyroid cancer incidence rates (in the absence of exposure); the second was the failure to consider the uncertainties[12]. Further, Catelinois et al.[12] conducted both uncertainty and sensitivity analyses to mitigate these limitations. The number of spontaneous thyroid cancers was estimated from French cancer registries on the basis of two scenarios: one with a constant incidence, the other using the trend observed. Thyroid doses were estimated from all available data about contamination in France from Chernobyl fallout. Depending on the scenario, the number of spontaneous thyroid cancer cases ranges from 894 (90%CI: 869-920) to 1,716 (90%CI: 1,691-1,741). The number of excess thyroid cancer cases predicted ranges from 5 (90% Uncertainty Intervals: 1-15) to 63 (90% UI: 12-180).
  - Cardis et al.[13] have calculated the predicted number of cases of thyroid cancer in Europe up to 2065 possibly due to radiation from the Chernobyl accident and from other causes. All European countries were grouped into 5 categories according to the level of contamination by ^{131}I received in 1986 by children younger than 5 years of age. Group 1 (<5mSv) included Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Latvia, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. For thyroid cancer, the estimated fraction of all cancer cases attributable to radiation was 0.03% for exposure at all ages and 0.20% for exposure before age 15 up to 2005. These AF were respectively 0.08% and 0.16% up to 2065. The uncertainties intervals were quite large.

Table 42. Predicted number of cases of thyroid cancer in the less contaminated European countries (average thyroid dose 1mSv) possibly due to radiation from the Chernobyl accident and from other causes, 95% uncertainty intervals and estimated fraction of all thyroid cancer cases attributable to radiation (AF)

	Population in 1986	From radiation	95% UI	From other causes	AF to 2005
Exposure at all ages	311.6 10^6	60	10-270	224 000	0.03%
Exposure before age 15	60 500 000	30	5-170	15 000	0.20%
	Population in 1986	**From radiation**	**95% UI**	**From other causes**	**AF to 2065**
Exposure at all ages	311.6 106	800	150-4 100	950 000	0.08%
Exposure before age 15	60 500 000	700	150-3 600	440 000	0.16%

Source. Cardis et al.[13]
Note. Pays included in group 1 were Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Latvia, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom

5. Environmental risk factors

- Iodine deficiency in the mountain areas far from the sea until 1950's : can explain the high incidence observed in Tarn but cannot explain low incidence in other regions in the Eastern part of France[2]. There is a progressive disappearance of iodine deficiencies[5].
- Environmental contamination linked to atmospheric atomic weapon tests at the end of the 1950s: the ionising radiation effect should have been maximal on cohorts born during the period 1945–1965 and exposed during childhood, given that it is mainly exposure during childhood that is known to increase the risk. However, for papillary cancers, we observed an increase in risk for all cohorts, even if an acceleration was noted starting with the cohort born at the end of the 1930s[2]
- Environmental contamination in chemical and industrial areas. In Rhône Valley, several nuclear sites are concentrated in the Tricastin area, enclosed in the border departments of Ardèche, Drôme, Gard and Vaucluse. First nuclear plans were created in '60 whereas the last EDF site was created in 1974. A descriptive epidemiological study was conducted in order to evaluate the health status of the population 10 km around this area[14]. The aims were to compare incidence rates and mortality rates from cancers across this area, the 4 bordering departments and the whole country. Twenty-four cancerous localizations, including thyroid cancers were investigated. The incidence rates of cancers in Tricastin area were 1) not statistically different from those reported in the 4 bordering departments nor in the whole country for solid tumours in children and for malignant hemopathy (leukemia) during the period 2000-2006; 2) not statistically different from those reported in the 4 bordering departments nor in the whole country for all cancerous localizations in adults for the period 2004-2007, except for pancreatic cancer in women (not already explained). Mortality rates from cancer in the Tricastin area were higher for prostate cancer in men, Hodgkin lymphoma and pancreatic cancer in women but were lower for oesophageal and liver cancer than in referent areas. They were not statistically significant for all other cancers[14].

- A large number of chemical pollutants were incriminated in thyroid tumorigenesis (e.g. dioxins, PCBs, organochlorine pesticides, phthalates, nitrates, aluminum cadmium, solvents,…)[15]. Very few epidemiological studies have investigated the role of environmental exposure in thyroid diseases, because it is difficult to assess low- or very low- dose exposure to chemical substances. Most studies conducted so far, were occupational studies in specific environments (e.g. wood or papermaking industries, textile industry, manufactures of computers or shoes)[15].
- Increase in diagnostic use of X-Rays for dental examinations in children: In the absence of reliable data for France, it cannot be ruled out that it had some small effect on the risk of thyroid cancer[1, 2].

15.1.7. Recommendations

- Dedicate a national registry to thyroid cancer in youths (< than 18 years old)
- For adults, strengthen the French regional registries (that cover 13% of the population)
- Continuous and exhaustive registration of incident cases through the National Hospital Discharge Survey that covers the entire territory
- Focused analysis of clinical and pathologic data in case of a cluster alert in any given area
- Standardize reporting of surgical specimens (including stage and size)
- Assign a unique health registration number per patient
- Follow-up of practice indicators such as thyroidectomy rates

15.1.8. Conclusion

In France, the most plausible explanation for the observed evolution is related to the evolution of medical attitudes regarding screening of thyroid problems, as well as monitoring and cure of benign thyroid conditions, which have led to a strong increase in incidental diagnosis and the discovery of less aggressive tumours. The fact that the observed increase is only related to differentiated cancers, essentially papillary cancers, supports this theory[2]. Within a defined geographical area, the incidence of cancer would relate to surgical activity in particular that concerning benign goiter, mostly multinodular.

However, the impact of changes in diagnostic and therapeutic practice on incidence rates was not clearly documented so far. To test the hypothesis that the increase of thyroid cancer depends on microcarcinomas and that such an epidemic reflects an intensive diagnostic activity, one would need to analyse time trends of incidence controlling for tumor size and for evolution of practices. Such exercises may be hampered by several factors such as availability of population based data on tumor size (a parameter not routinely recorded in France until recently) and identification of reliable practice indicators, such as US and FNAB rates as screening procedures and thyroidectomy rates[9].

Similar observations are made for other cancers, such as breast cancer and prostate cancers: increasing incidence with age and accessibility to diagnostic at a subclinical stage owing screening tests. Moreover, the evolution of these cancers is slow and in some cases, regression is also observed[16]. Screening practices induce an overdiagnosis of cancers that would remain silent without such screening[16].

15.2. Switzerland

15.2.1. Epidemiology of thyroid cancer: evolution

1. Incidence :

- During the period 1980-1999, the ESR incidence rates were 5.60/100 000 in women and 2.52/100 000 in men[17]
- During the period 2003-2006, the ESR incidence rates were estimated to be 8.2/100 000 women and 3.3/100 000 men[18].
- Time trend analyses :
  - From 1998 to 2007, ESR shifted from 2.6 to 3.3 (+30%) for males and from 6.9 to 8.1 (+60%) among females[18]
  - The number of new yearly cases increased from 88 (1983-1987) to 135 (2003-2007) in men (+53%) and from 195 (1983-1987) to 290 (2003-2007) in women (+49%)[18]

2. Geographical variations:

- During the most recent period 1996–1998, incidence rates for all morphologies combined ranges from 1.62 (Graubünden–Glarus) to 2.99 (Valais) among males and from 2.13 (Graubünden–Glarus) to 8.09 (Basel) among females[17]
- The papillary subtype varies from 33.3% (Valais) to 87.5% (Geneva) among males and from 50% (Graubünden–Glarus) to 84.2% (Ticino) among females[17].

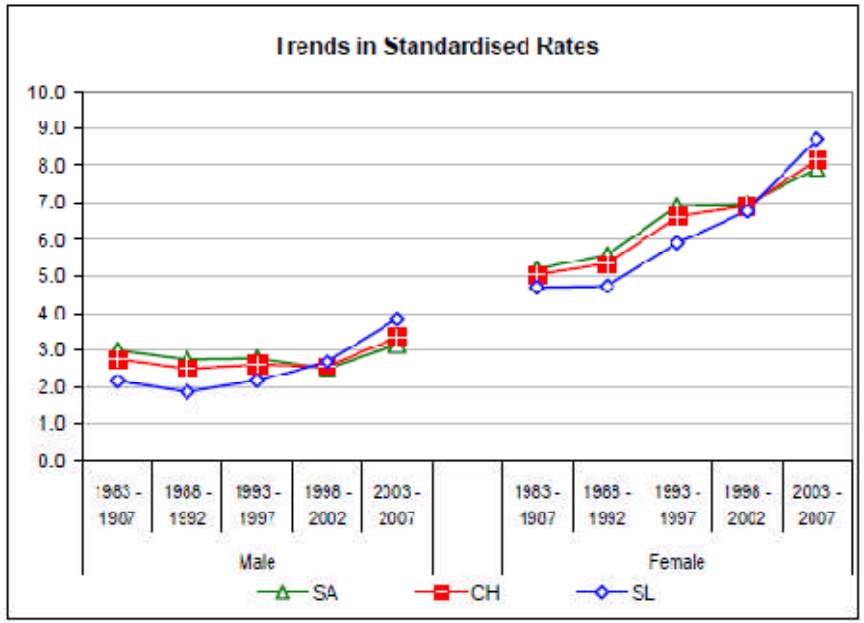
3. Gender: incidence rates are much higher among women than among men (5.60 vs. 2.52 in all Swiss registries combined)[17].

Table 43. European standard rates of thyroid cancer incidence by period

Gender	Period	SA	CH	SL	C.I. 95% of CH	
Male	1983 - 1987	2.99	2.76	2.15	0.44	5.69
	1988 - 1992	2.75	2.50	1.86	0.60	4.91
	1993 - 1997	2.78	2.61	2.17	0.75	4.86
	1998 - 2002	2.50	2.56	2.69	0.81	4.69
	2003 - 2007	3.15	3.35	3.84	1.51	5.79
Female	1983 - 1987	5.19	5.05	4.70	1.97	8.63
	1988 - 1992	5.58	5.34	4.73	2.58	8.54
	1993 - 1997	6.92	6.63	5.92	3.71	9.89
	1998 - 2002	6.96	6.91	6.77	4.07	10.11
	2003 - 2007	7.92	8.15	8.70	5.02	11.35
Male	Annual trend	1.013	1.025	1.059		
Female	Annual trend (3 last periods)	1.014	1.021	1.039		

Source NICER 2010[18]
Note. SA: Alemannic Switzerland; CH: Switzerland; SL: Latin Switzerland

Figure 15. Trends in European standardized rates of thyroid cancer incidence by period



Source: NICER 2010[18]
Note. SA: Alemannic Switzerland; CH: Switzerland; SL: Latin Switzerland

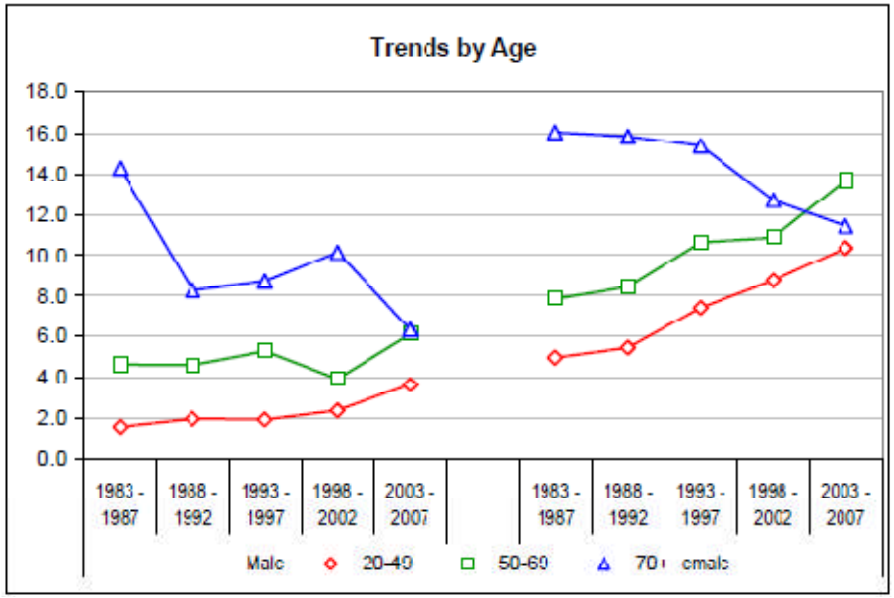
4. Age groups: Age-period-cohort analyses revealed that the youngest cohorts of men and women born after 1940 had an increased risk of all types of thyroid cancer while the cohort of people born between 1920 and 1939 were at increased risk of the papillary subtype[17]

Table 44. Crude rates of thyroid cancer incidence by age group and mean annual trends

Gender	*Period*	*0-19*	*20-49*	*50-69*	*70+*
Male	1983 - 1987	0.12	1.59	4.64	14.27
	1988 - 1992	0.23	1.99	4.63	8.27 **
	1993 - 1997	0.11	1.95	5.29	8.70
	1998 - 2002	0.06	2.38	3.96 **	10.15
	2003 - 2007	0.30	3.66 **	6.12 **	6.34 **
Female	1983 - 1987	0.57	4.98	7.86	16.06
	1988 - 1992	0.60	5.46	8.43	15.84
	1993 - 1997	0.65	7.40 **	10.63 **	15.37
	1998 - 2002	0.27	8.75 **	10.87	12.71 *
	2003 - 2007	0.54	10.37 **	13.70 **	11.43
Male	Annual trend		1.065	1.015	0.969
Female	Annual trend		1.034	1.026	0.971
	(3 last periods)				

Source: NICER 2010[18]
*Note. *,**: significant variations at 95% and 99% (Mantel-Haenszel test) – statistical significance of mean annual trends was not computed*

Figure 16. Trends in European standardized rates of thyroid cancer incidence by age and by period



Source: NICER 2010[18]

5. Histologic types:

- Over the period 1980–1999, the papillary group represented 58% of all thyroid cancers[17]
- Over the period 1980–1999, there was an increase for papillary cases and a decrease for non-papillary cases, with stable trends when all morphologies are combined[17].

6. Mortality (WSR): 1.4/100 000 for men and 1.6/100 000 for women between 1955–64; 0.7 and 1.0 respectively between 1985–89[19].

15.2.2. Potential causes of evolution

- Differences in iodine intake may be one factor explaining the geographic variation, high intake being associated with a slightly increased risk of developing papillary thyroid cancer although low intake leads to increased risk of follicular carcinoma[18] - Switzerland is an iodine-deficient country → introduction of iodine-enriched salt since 1922[19]
- Increased diagnostic activity: cytology, ultrasound, and scintigraphy[19]
- Changes in histological classification of thyroid tumours: the diagnostic criteria for the histological classification of thyroid tumours have been subject to changes over the past decades (WHO guidelines 1974, 1988), favouring the diagnosis of the papillary subtype at the expense of the follicular one[19].

15.2.3. Cancer registry - available data

- Swiss Cancer Registries Network (ASRT/VSKR) grouping 9 cancer registries, covering 62% of the Swiss population (14 cantons on 26) and recording new cases of cancer since 1980[18]

15.2.4. Types of epidemiological studies

- Retrospective observation of incidence rates for all types of thyroid cancer in Switzerland (9 cancer registries) during 20 years[17]
- Retrospective exam of data from the Geneva Cancer Registry; all incident cases diagnosed between 1970 and 1998 (n=436)[19]

15.2.5. Evidence for causes

1. Diagnostic practices

- The slight increase in papillary thyroid cancer that was observed before 1985 may be explained by an increased use of minimally invasive techniques, in particular fine-needle cytology but this did not significantly increase the proportion of silent papillary cancers or microcarcinomas[19]
- Between 1970 and 1974 none of the papillary thyroid cancers was diagnosed by means of cytology, whereas between 1995 and 1998 almost 50% of the papillary cancers were diagnosed cytologically[19]

2. Thyroid pathology practices

- the sharp increase in papillary thyroid cancer incidence between 1970 and 1998 in Geneva can be partly explained by changes in histological WHO criteria in 1988: 45% of the lesions diagnosed as follicular cancer between 1970 and 1980 were reclassified as papillary cancer (compared to 25% between 1990 and 1998)[19].

15.3. Grand-Duchy of Luxembourg

15.3.1. Epidemiology of thyroid cancer: evolution

1. Incidence: The average, annual, age-standardized incidence rate (WSR) of thyroid carcinomas during the study period 1990–1999 was 5.9 per 100 000 for both genders[20]
2. Time trend analyses :

- The comparison of the crude incidence rates of the patients with TC diagnosed in the two 5-year periods 1990–1994 and 1995–1999 revealed an increase of 36.5% for both genders combined from 6.3 to 8.6 per 100 000, for females by 32.0% from 9.7 to 12.8 per 100 000 and for males by 51.7% from 2.9 to 4.4 per 100 000[20].
- Comparing the two 5-year periods 1990–1994 to 1995–1999, there was a significant increase in the absolute number of all TCs from 126 to 184 cases ($p<0.001$). The absolute number of TCs increased significantly in females over the two periods from 98 to 138 cases ($p<0.01$), in males from 28 to 46 cases ($p<0.001$)[20]

3. Geographical variations: no information reported
4. Gender: The average, annual, age-standardized incidence rate (WSR) of thyroid carcinomas in Luxembourg over the period 1990–1999 for all ages was 3.0 per 100 000 for males and 8.8 per 100,000 for females[20], i.e. a sex ratio of 1:3[20]
5. Age groups[20]:

- Children and adolescents: 1%
- 20-44 years: 40.6%
- 45-69 years: 50.0%
- ≥ 70 years: 8.4%

6. Histologic types: 310 thyroid carcinomas during the period 1990-1999: 80.0% papillary, 14.5% follicular, 3.5% medullary and 2.0% anaplastic/undifferentiated carcinomas[20]
7. Cancer stages: The increasing thyroid cancer incidence rates is mainly due to the increase in the diagnosed microcarcinomas over the last 5 years[20].
8. Mortality: The overall observed 3-year survival rate of the 310 patients with TC was 93.9 +/- 3% (291/310) and the 5-year observed survival rate 92.9 +/- 3% (288/310)[20].

15.3.2. Potential causes of evolution

- sex hormones may play a role in the etiology of these thyroid cancer (at the same time 7.1% of female patients with TC developed a second primary breast cancer tumours)[20]
- radiation-induced oncogenesis (i.e. atmospheric nuclear weapon programmes in the US and former Soviet Union, atomic bombing in Japan in 1945)
- environmental reasons (e.g. radon exposure)

15.3.3. Cancer registry - available data

The national Morphologic Tumour Registry (MTR), a population-based cancer registry at national level which collects data on about 95% of the precancerous and cancerous lesions verified by microscopic examinations[20]

15.3.4. Surveillance structures

No specific surveillance structure for thyroid cancer.

15.3.5. Types of epidemiological studies

A retrospective chart review from 1 January 1983 to 31 December 1999[20]

15.3.6. Evidence for causes

1. Diagnostic practices: in 1997, there was a two-fold increase of the incidental microcarcinomas of the papillary type, which may be the major cause of the peak in 1997. Improved image giving procedures (i.e. ultrasound, computer scanner) play a certain role in the detection of more suspicious nodular lesions of less than 1 centimetre)[20]
2. Therapeutic strategies: During the whole period (1990–1999) the number of surgical specimens examined (n=5 611 cases) remained stable, 532 specimens in 1990 and 531 in 1999[20]
3. Thyroid pathology practices: more strict application of the histopathologic WHO-classification in the department under study.
4. Chernobyl accident: No significant increase in childhood thyroid cancers was reported (only 3 cases in children and adolescents ≤ 20 years) in the series of 1990s). This does not support the hypothesis of increased radiation-associated TC in Luxembourg following the exposure to nuclear fallout after the Chernobyl accident as a causative effect and is consistent with the low individual (mean) dose of radiation following the accident (12.2 millirem)[20]

15.3.7. Recommendations

Long-term follow-up beyond 10 or 20 years is needed to clearly demonstrate an excess in mortality as a consequence of the increasing number of diagnosed TCs)[20].

15.3.8. Conclusion

The increasing thyroid cancer incidence rates especially of the papillary subtype seem mainly due to the increase in the diagnosed microcarcinomas over the last 5 years. To some extent, this reported increase is caused by changes in histological diagnostic criteria (i.e. atypical follicular adenoma with so-called groundglass nuclei being classified now as papillary TC follicular variant) and may also be linked to the use of more efficient diagnostic tools. The number of thyroid surgery over the study period remaining stable[20].

Changes in immigration rates had no impact on the number of diagnosed TCs and the Chernobyl fallout had no influence since no rise in the number of childhood cancers was reported[20].

15.4. The Netherlands

15.4.1. Epidemiology of Thyroid cancer : evolution

1. Incidence : 505 new cases in 2008 (http://www.cijfersoverkanker.nl/ ; accessed on March 15th 2011); ESR: 2.7 per 100 000 persons, 1.7 per 100 000 men and 3.8 per 100 000 women.
2. Time trend analyses :

- Fairly stable ESR between 1.9 and 2.1 per 100 000 persons in the period 1989-2001. Afterwards clear increase to 2.7 per 100 000 persons in 2008 (http://www.cijfersoverkanker.nl/ ; accessed on March 15th 2011).
- Estimated annual percentage change (EAPC) between 1989 and 2003: 0.4%[21].

3. Geographical variations:

- Regions: In 2008, the ESR ranged between 2.5 (Amsterdam region) and 3.1 per 100 000 persons (Leiden region) across the eight Comprehensive Cancer Centres (http://www.cijfersoverkanker.nl/ ; accessed on March 15th 2011).
- The rural/urban environment: no information

4. Gender:

- Sex ratio: 0.45 in 2008
- Similar estimated annual percentage change between 1989 and 2003 for men (0.3%) and women (0.5%)[21].

5. Age groups: no information
6. Histologic types: The increase only concerned papillary cancer, with an ESR of 1 per 100 000 persons in 1989 and an ESR of 1.8 per 100 000 persons in 2008 (http://www.cijfersoverkanker.nl/ ; accessed on March 15th 2011). Between 1989 and 2003, the overall incidence of papillary cancer increased with 2.1% per year (p<0.001)[21].
7. Cancer stages: Increasing incidence between 1989 and 2003 of stage I tumours (2.3% per year, p=0.001)[21].

Table 45. Distribution of stages between 2003 and 2009

Combined stage (%)	2003	2004	2005	2006	2007	2008	2009
I	49.1	48	46.9	46.6	51	49.2	48.4
II	9.4	12.5	9.8	12.6	11.7	11.2	10.7
III	12.3	12.3	14.7	14.4	11.5	14.5	16.7
IV	24.1	23.9	24.9	22.8	22.7	23.1	21
Unknown	5	3.4	3.6	3.5	3.2	2	3.2

(http://www.cijfersoverkanker.nl/ ; accessed on March 15th 2011)

8. Mortality: Decrease in mortality of 2.3% per year (p=0.01) between 1989 and 2003. This was due to a decrease in mortality rate in women of 2.9% per year (p=0.004), whereas the mortality rate in males did not change significantly during the same period (EAPC = -1.5%, p=0.27).

15.4.2. Potential causes of evolution

No information retrieved

15.4.3. Cancer registry - available data

Eight population-based cancer registries (Comprehensive Cancer Centres) covering >95% of all cancer cases.

15.4.4. Surveillance structures

No information retrieved

15.4.5. Types of epidemiological studies

No information retrieved

15.4.6. Evidence for causes

1. Diagnostic practices:

- FNAC: Between 1989 and 2003, the number of FNACs each year progressively increased from 1 093 in 1989 to 4 123 in 2003, with 10.7% or 185 FNACs per year (p<0.0001)[21]. A diagnosis of thyroid cancer was made in 2 493 cases based on cytopathological examination. The number of thyroid cancers at cytopathological examination also increased yearly with 9.5% (p<0.0001). Therefore, the proportion of thyroid cancers diagnosed or suspected at cytological examination among all of the performed FNAC did not change during the study period (p=0.07).

2. Therapeutic strategies:

- Between 1989 and 2003, the number of thyroid surgeries decreased on average with 73 surgeries per year (p<0.0001). The proportion of thyroid cancers among the patients who had surgery increased from 9.4% in 1989 to 13.5% in 2003 (p<0.0001)[21].

15.4.7. Recommendations

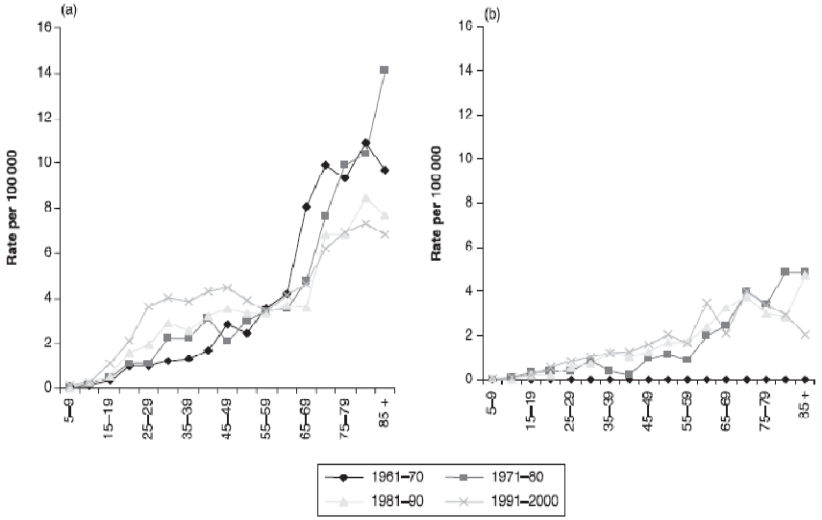
No information retrieved

15.5. Scotland

15.5.1. Epidemiology of thyroid cancer: evolution

1. Incidence : approximately 100 new cases diagnosed each year[22]
2. Time trend analyses : Between 1960 and 2000 the annual EASR of thyroid cancer increased from 1.76 to 3.54 per 100 000 in females (33.9%, P< 0.001), and from 0.83 to 1.25 per 100 000 in males (59.3%, P < 0.001)[22].
3. Geographical variations: not reported
4. Gender: three times more common in females than in males[22].
5. Age groups: In both sexes, thyroid cancer is more common in older age groups. However, in the last decade (1991-2000), there appears to be a shift in incidence cancer rate to younger age groups[22]

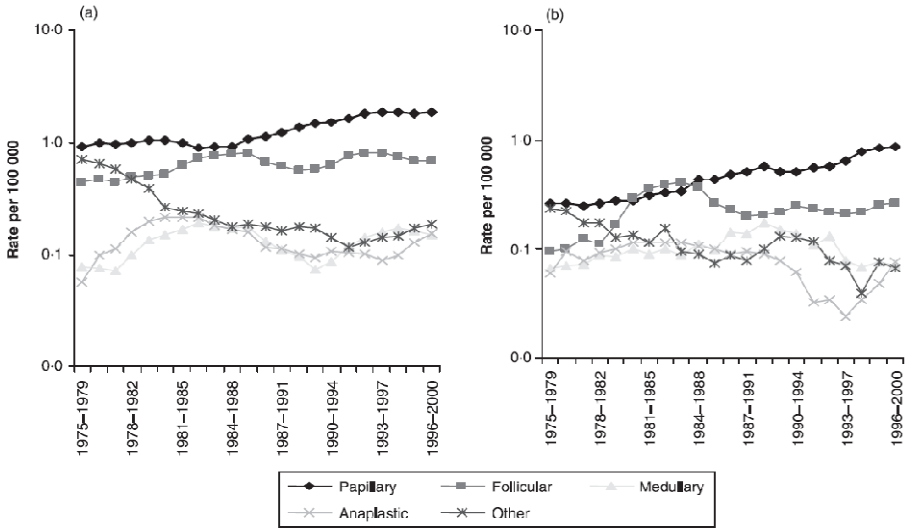
Figure 17. Thyroid cancer in females (a) and males (b) in Scotland: age-specific incidence rate by period of diagnosis



Source. Reynolds (2005)[22]

6. Histologic types: the estimated change in incidence of papillary thyroid cancer between 1975 and 2000 was 165.9% (P <0.001) in females and 331.3% (P <0.001) in males. The incidence of follicular thyroid cancer also increased between 1975 and 2000 in both females and males (females 67.6%, P= 0.001 and males 72.0%, P=0.051). The incidence of anaplastic and medullary thyroid cancer did not change significantly[22].

Figure 18. Incidence of histologically verified thyroid cancer by cell type in females (a) and males (b), 1975-2000, Scotland



Source: Reynolds (2005)[22]

7. Cancer stages: not reported
8. Mortality: mortality from thyroid cancer progressively decreased over the study period.

- Thus EASR for females fell from 1.05 to 0.28 (decrease of 75.3%, P< 0.001) and for males from 0.73 to 0.34 (decrease of 57.1%, P< 0.001). Globally, 1-, 5-, and 10 year relative survival are higher for men and women diagnosed in the last available periods than the corresponding survival for earlier diagnosis periods. The relative 1-year survival was 84.8% (95%CI 81.3%-87.8%) in 1996-2006 compared to 68.6% (95%CI 63.7%-73.0%) in 1976-80. The relative 5-year survival was 82.7% (95%CI 78.3%-86.2%) in 1991-1995 compared to 63.8% (95%CI 58.3%-68.7%) in 1976-80. The relative 10-year survival was 75.5% (95%CI 69.9%-80.2%) in 1986-1990 compared to 60.0% (95%CI 54.3%-65.1%) in 1976-80 [22].
- The papillary and follicular types have a better prognosis than the anaplastic carcinoma for both sexes. For all types, the better prognosis is reported for females. In men, the relative 10-year survival was 88.9% (95%CI 80.4-93.8%) for papillary type, 80.9% (95%CI 66.8%-89.4%) for follicular type, 47.2% (95%CI 31.2%-61.6%) for medullary type and 4.2% (95%CI 0.6%-13.9%) for anaplastic type. In women, the relative 10-year survival was 96.6% (95%CI 94.0-98.1%) for papillary type, 88.6% (95%CI 83.6%-92.2%) for follicular type, 67.0% (95%CI 51.4%-78.6%) for medullary type and 10.4% (95%CI 5.3%-17.6%) for anaplastic type[22].
- In both sexes, survival from thyroid cancer was better is the diagnosis was made under the age of 50 years[22]

15.5.2. Potential causes of evolution

1. Changes in registration data quality
2. The introduction of new World Health Organization (WHO) histological criteria for definition of thyroid cancer[22].

15.5.3. Cancer registry - available data

Thyroid cancer registrations (1960–2000) were obtained from the Scottish Cancer Registry with a national coverage since 1958[22].

Mortality data (1960–2002), based on date of registration of death where the primary cause of death was thyroid cancer, were obtained from the General Register Office, Scotland[22].

15.5.4. Surveillance structures

There is no specific surveillance structure for thyroid cancer.

15.5.5. Types of epidemiological studies

Reynolds et al. conducted a descriptive epidemiological study to investigate trends in the incidence and mortality of thyroid cancer in Scotland, between 1960 and 2002[22].

15.5.6. Evidence for causes

1. Diagnostic practices : not under study
2. Therapeutic strategies : not under study
3. Thyroid pathology practices: the change in histological criteria seems unlikely to explain the overall increase in thyroid cancer incidence, since the incidence of follicular carcinoma also increased[22]
4. Chernobyl accident : Although areas of Scotland were exposed to radioactive fallout, this was much less than in other European countries. The numbers of cases of thyroid cancer in Scottish children aged 0–14 years are too small to produce meaningful trends[22].
5. Environmental risks factors: not under study
6. Iodine supplementation: there has been no change in iodine supplementation[22]
7. Ionising radiation: not under study

15.5.7. Recommendations

Introduction and implementation of standardized treatment protocols should further improve survival.

15.5.8. Conclusion

Despite an increase in thyroid cancer over the past 40 years, there has been a decrease in overall mortality from this malignancy with improved survival estimates at 1, 5 and 10 years. It seems unlikely that a recognized environmental risk factor in Scotland, such as radiation exposure or iodine supplementation, can explain the increase in thyroid cancer incidence. Falling mortality in the face of increasing incidence reflects improvements in survival, partly due to the diagnosis of less aggressive tumours. The introduction and implementation of evidence-based guidelines for the management of thyroid cancer should increase improvement in survival[22].

15.6. Canada

15.6.1. Epidemiology of thyroid cancer: evolution

1. Incidence : Liu et al.[23] studied the incidence of thyroid cancer in Canada (excluding Quebec) from 1970 to 1996 using the Canadian Cancer Registry. A total of 18 804 incident cases of thyroid cancer were registered during this period[23].
2. Time trend analyses : the overall age-adjusted incidence rates of thyroid cancer doubled from 3.3 per 100 000 in 1970–1972 to 6.6 per 100 000 in 1994–1996 among female patients, and from 1.1 per 100 000 to 2.2 per 100 000 among male patients in the same time frame (AAPC: 3.5% vs 3.2%)[23].
3. Geographical variations: not reported
4. Gender and age groups: the age-specific patterns of change were different across genders. For example, reproductive age-group women (age 25–44) experienced the most rapid increase (AAPC = 3.7%), while elderly women (age 65–84) had only a slight increase (AAPC = 0.7%) over the study period (1970-1996)[23].

Table 1 Age-specific incidence rate of thyroid cancer (per 100 000 population) and average annual percent change (AAPC) in Canada excluding Quebec, 1970–72 to 1994–96[a]

Age (year)	Female			Male		
	1970–72	1994–96	AAPC[b]	1970–72	1994–96	AAPC[b]
10–24	1.55	2.92	2.54**	0.37	0.74	1.67*
25–44	4.43	11.04	3.65**	1.27	2.84	2.74**
45–64	5.84	12.78	3.36**	1.97	4.56	2.93**
65–84	8.16	10.69	0.66*	4.08	5.88	1.68**
All ages[a]	3.26	6.82	3.50**	1.12	2.23	3.15**

*$P < 0.05$; **$P < 0.01$ [a]Rates were adjusted to the World Standard Population. [b]Trends were estimated by Poisson regression. See the Methods.

Source : Liu et al.[23]

5. Histologic types: According to data for provinces of Ontario, Saskatchewan and British Columbia, 60% of 13 712 incident cases of thyroid cancer were classified as papillary carcinomas, 15% as follicular carcinoma and 25% as NOS. Papillary carcinoma more than tripled between 1970–72 and 1994–96, from 1.4 to 5.4 per 100 000 among females and from 0.4 to 1.4 per 100 000 among males. Other types remained more or less stable[23].
6. Cancer stages: A study conducted on the incidence of thyroid cancer over a 12-year period in Ontario reported that the incidence of medium-sized tumours (2–4 cm) remained stable over time, but a slight increase in large tumours (> 4 cm) among patients 45 years and younger was reported in the same time frame[24].
7. Mortality: not reported

15.6.2. Potential causes of evolution

- Prior radiotherapy in childhood (benign conditions of the head and neck) [23].
- Diagnostic radiology and increase in number of imaging tests (CT, MRI, US) per capita[25]
- Possible associations between hormones and reproductive factors
- More intensive diagnostic activity (FNAB, radio-isotope scanning)
- Broader indications for surgical removal of solitary nodules
- Introduction of new histological criteria

15.6.3. Cancer registry - available data

Thyroid cancer incidence data for 1992-1995 were obtained from the Canadian cancer Registry (data for Québec were excluded)[23].

15.6.4. Evidence for causes

1. Diagnostic practices

A study conducted on the incidence of thyroid cancer over a 12-year period in Ontario reported that the rising rate of differentiated thyroid cancer in Ontario is due mostly to increasing detection of small tumours from greater use of medical imaging[24]. Between 1993 and 2006, the numbers of CT, US, and MRI tests have been increasing at 18% per year[25]. A study evaluating the increase use of imaging tests reported that the incidence in females is rising at a similar rate to the numbers of neck imaging tests[25]. Consequently, authors hypothesized that males may be underdiagnosed with thyroid cancer in Ontario because they have fewer screening tests[25].

15.7. Germany

15.7.1. Epidemiology of thyroid cancer: evolution

1. Incidence: 5 300 new cases in 2006[26]; ESR: 3.4 per 100 000 men, 7.5 per 100 000 women.
2. Time trend analyses: Increasing incidence and mortality rates between 1980 and 2006 (Figure 19 and Figure 20; no exact data provided).

Figure 19. Age-standardized incidence and mortality rates in Germany, 1980 – 2006[26]

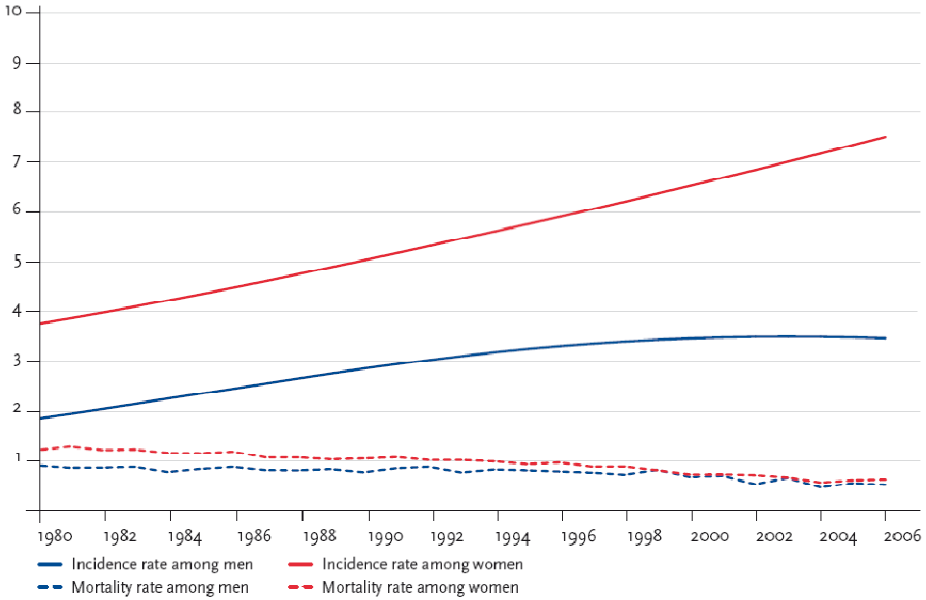
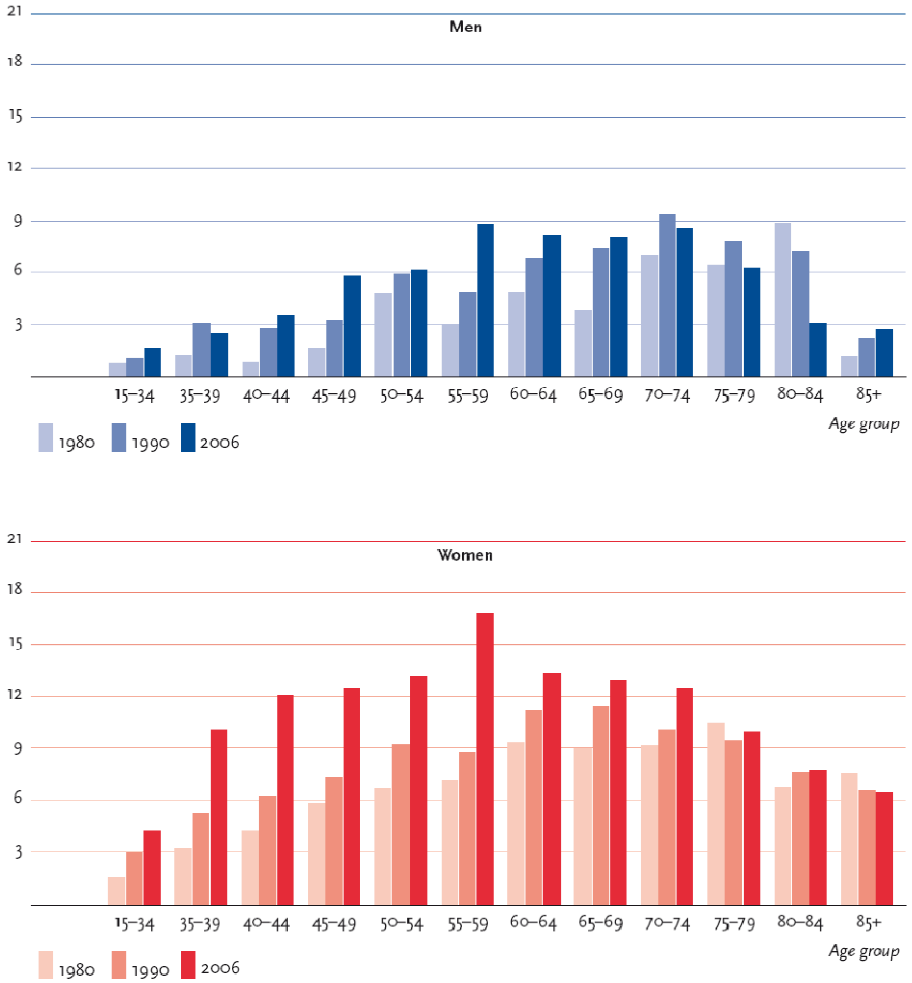


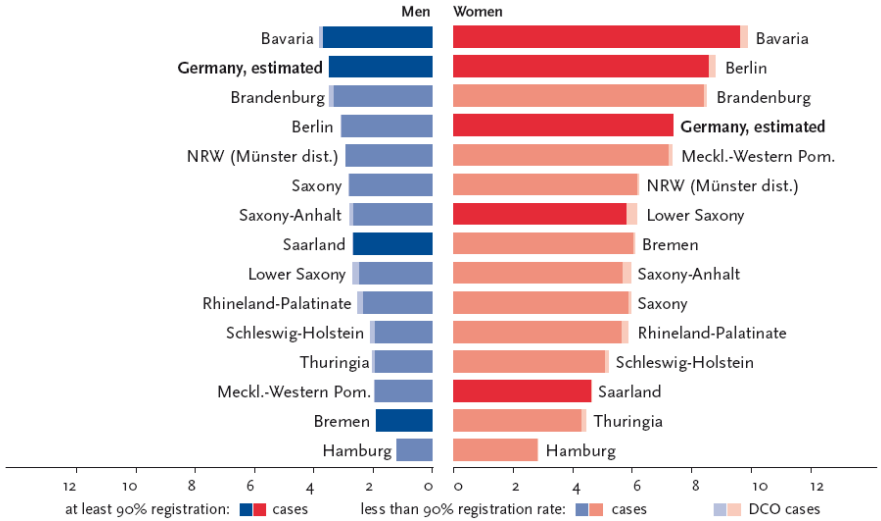
Figure 20. Age-standardized incidence rates in Germany by gender for 1980, 1990 and 2006[26]



3. Geographical variations:

- Regions: Highest incidence rates in Bavaria, lowest rates in Hamburg (Figure 21).

Figure 21. Registered age-standardized incidence rates in the regions of Germany, 2005 – 2006[26]



- The rural/urban environment

4. Gender: No information retrieved
5. Age groups: Highest incidence rates in age category 55-59 years (Figure 20).
6. Histologic types: No information retrieved
7. Cancer stages: No information retrieved
8. Mortality: 760 deaths in 2006[26]; European Standardized mortality rate: 0.5 per 100 000 men, 0.6 per 100 000 women.
9. More recent diagnoses: No information retrieved

15.8. Sweden

15.8.1. Epidemiology of thyroid cancer: evolution

1. Incidence: Between 2004 and 2008, 333 new cases of thyroid cancer were registered annually[27]; WSR: 1.5 per 100 000 males, 3.8 per 100 000 females.
2. Time trend analyses:

- Incidence: estimated annual change in WSR between 1999 and 2008: +2.8% in males, +2.5% in females (Figure 22).
- Mortality: estimated annual change in WSR between 1999 and 2008: +1.6% in males, -1.0% in females (Figure 23).

Figure 22. Age-standardized incidence rates (world) in Sweden, 1960 – 2008[27]

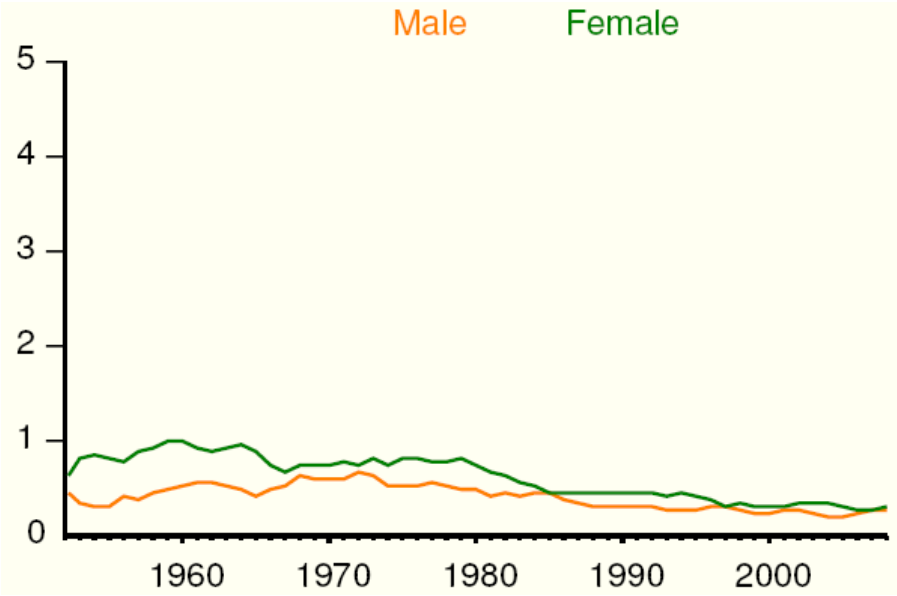
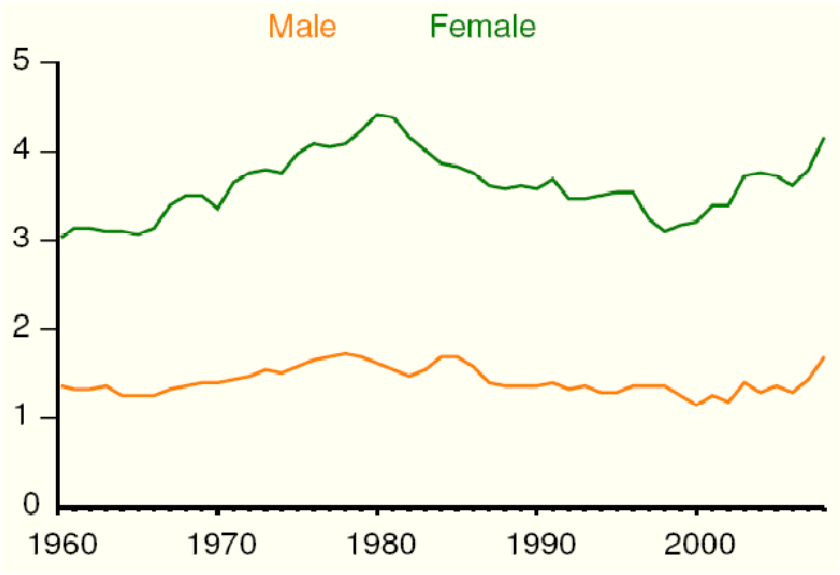


Figure 23. Age-standardized mortality rates (world) in Sweden, 1960 – 2008[27]



3. Geographical variations:
- Regions
- The rural/urban environment: no significant differences[28]

4. Gender:
- Sex ratio: 1:2.53 (period 2004-2008)

5. Age groups: No information retrieved
6. Histologic types: No information retrieved
7. Cancer stages: No information retrieved
8. Mortality: Between 2004 and 2008, 70 deaths per year were registered (males: N=25; females: N=45)[27]. WSR: 0.3 per 100 000 persons. Relative 5-year survival: 79% (95%CI 75-84%) in males, 85% (83-87%) in females.
9. More recent diagnoses: No information retrieved

15.8.2. Evidence for causes

1. Chernobyl accident: A slight exposure-related increase in total cancer incidence has occurred in Northern Sweden after the Chernobyl accident[29]. Controlling for age and various other factors, the adjusted relative risks for the exposure categories were 1.00 (reference <3 kBq/m2), 1.05, 1.03, 1.08, 1.10 and 1.21. The excess relative risk was 0.11 per 100 kBq/m2 (95% CI 0.03-0.20). The cancer incidence rate differences between 1988-1996 and the reference period 1986-1987 in each category were 30.3, 36.8, 42.0, 45.8, 50.1 and 56.4 per 100 000 persons. No clear excess occurred for thyroid cancer.
2. Iodine: In iodine-deficient areas, the relative risk (RR) of developing thyroid cancer was 0.92 for all histologic types combined, 0.80 for papillary cancer and 0.87 for anaplastic carcinoma[28]. Residence in iodine-deficient regions was associated with a 2-fold increased risk of follicular cancer in men (RR 1.98) and a 17% increase in risk in women (RR 1.17).
3. Ionising radiation: Among 36 792 individuals who received ^{131}I for diagnostic purposes during 1952–1969 and were alive and free of thyroid cancer 2 years after exposure, excess thyroid cancers were observed only among the 1 767 patients who reported previous external radiation therapy to the neck (standardized incidence ratio [SIR] 9.8, 95%CI 6.3-14.6) and among those originally referred due to suspicion of a thyroid tumor (SIR 3.5, 95%CI 2.7- 4.4 for 11 015 patients without previous external radiation therapy)[30]. Patients without previous exposure to external radiation therapy to the neck who were referred for a reason other than suspicion of a thyroid tumor had a SIR of 0.91 (95%CI 0.64-1.26).

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