SUPPLEMENTARY MATERIAL

Extreme value theory in medical sciences: modeling total high cholesterol levels

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District	$q_{0.90}$	$q_{0.95}$	$q_{0.975}$	$q_{0.99}$	$q_{0.995}$	$q_{0.999}$	**Sample maximum**
Aveiro	242	262	281	297	328	380	392
Beja	247	259	268	275	282	316	334
Braga	241	260	272	285	295	382	590
Bragança	231	248	262	277	289	334	450
Castelo Branco	235	254	265	284	294	300	301
Coimbra	244	265	288	314	348	399	537
Évora	239	257	271	281	288	294	295
Faro	250	273	289	305	343	397	400
Guarda	237	254	264	287	295	305	309
R. A. Madeira	243	262	277	286	295	297	330
R. A. Açores	236	249	262	276	278	280	281
Leiria	243	257	274	286	290	301	316
Lisboa	245	261	276	293	302	354	400
Portalegre	238	250	261	284	291	301	302
Porto	240	257	270	283	292	315	400
Santarém	240	258	267	281	290	298	304
Setúbal	248	263	276	291	296	317	380
Viana do Castelo	237	257	272	279	283	285	286
Vila Real	240	253	270	294	321	358	400
Viseu	233	250	263	270	281	303	361

Table 1: Sample quantiles and maximum values for the total cholesterol levels, classified by district

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District	**u**	$\hat{k}$	$\hat{\sigma}$	**# Exceed.**	**Anderson Darling test**	**Cramer von Mises test**
Aveiro	250	0.01	26.3	213	0.854	0.105
Beja	250	-0.04	16.7	37	0.916	0.139
Braga	270	0.42	13.2	71	0.966	0.147
Bragança	240	0.16	18.0	57	0.450	0.049
Castelo Branco	240	-0.52	35.0	39	0.567	0.093
Coimbra	270	0.18	28.1	53	0.447	0.061
Évora	250	-0.65	30.4	44	0.470	0.063
Faro	260	0.05	27.9	51	0.643	0.123
Guarda	230	-0.25	29.1	38	0.242	0.039
Leiria	250	-0.34	24.9	101	0.709	0.071
R. A. dos Açores	230	-0.50	29.4	33	0.741	0.134
R. A. da Madeira	250	-0.28	26.2	76	1.034	0.185
Lisboa	260	0.00	22.2	385	2.688	0.377
Portalegre	240	-0.30	27.1	25	0.417	0.065
Porto	270	0.08	13.7	132	0.865	0.108
Santarém	260	-0.35	18.5	55	0.667	0.116
Setúbal	270	-0.03	16.0	94	1.511	0.250
Viana do Castelo	230	-0.38	27.0	54	2.799	0.401
Vila Real	240	0.14	20.9	74	0.540	0.063
Viseu	250	0.07	15.4	41	0.680	0.119

Table 2: Test statistics of the Anderson-Darling and the Cramer-von Mises goodness-of-fit tests for the total cholesterol levels of the 20 districts of Portugal

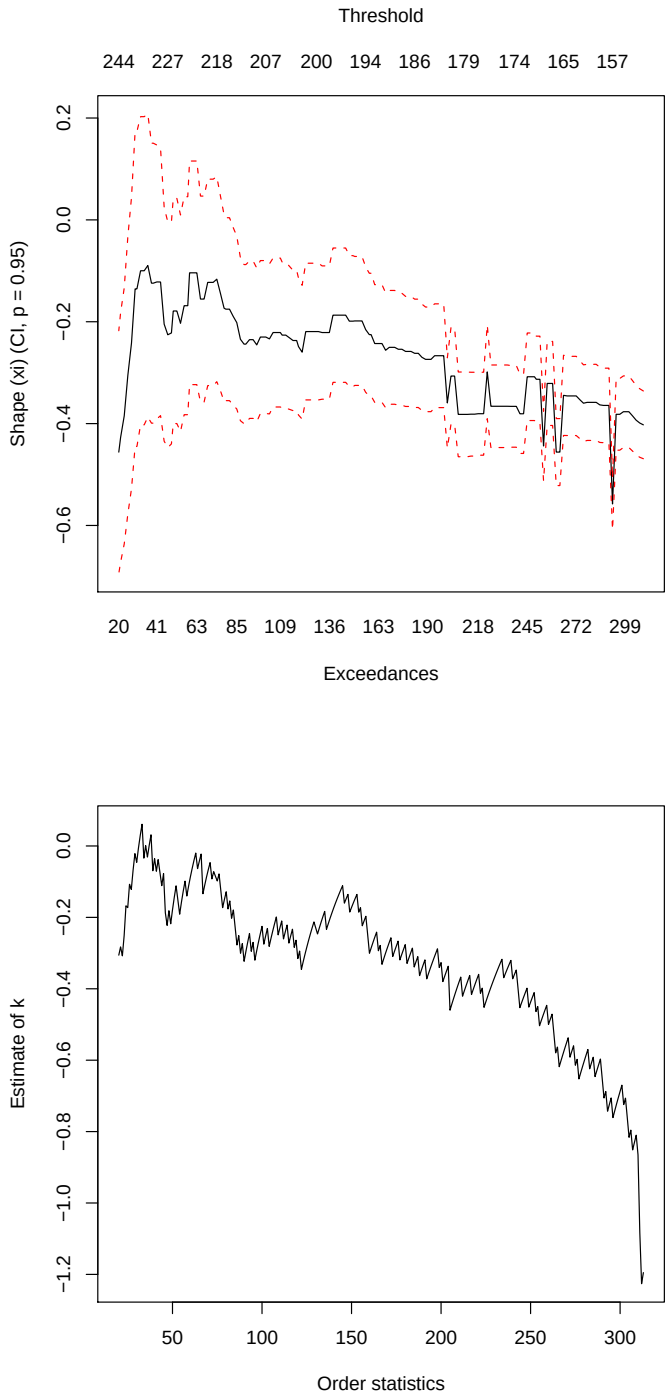

Figure 1: Plots of the estimates of the shape parameter of the GPD for Portalegre - ML estimates (tpo) and Moments estimates (bottom)

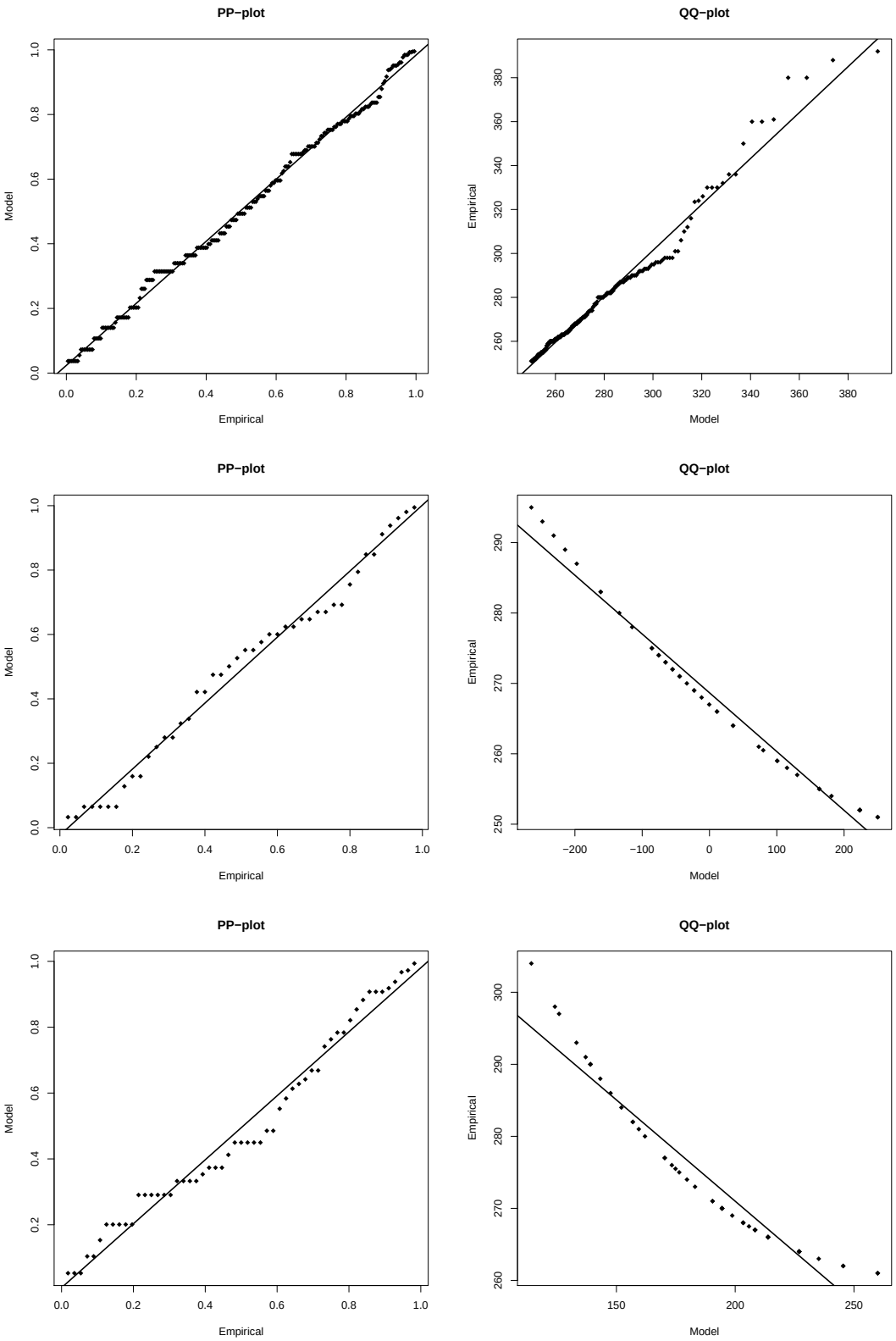

Figure 2: GPD model fit for Aveiro $u = 250$ (top row), for Évora $u = 250$ (central row) and for Santarém $u = 260$ (bottom row)

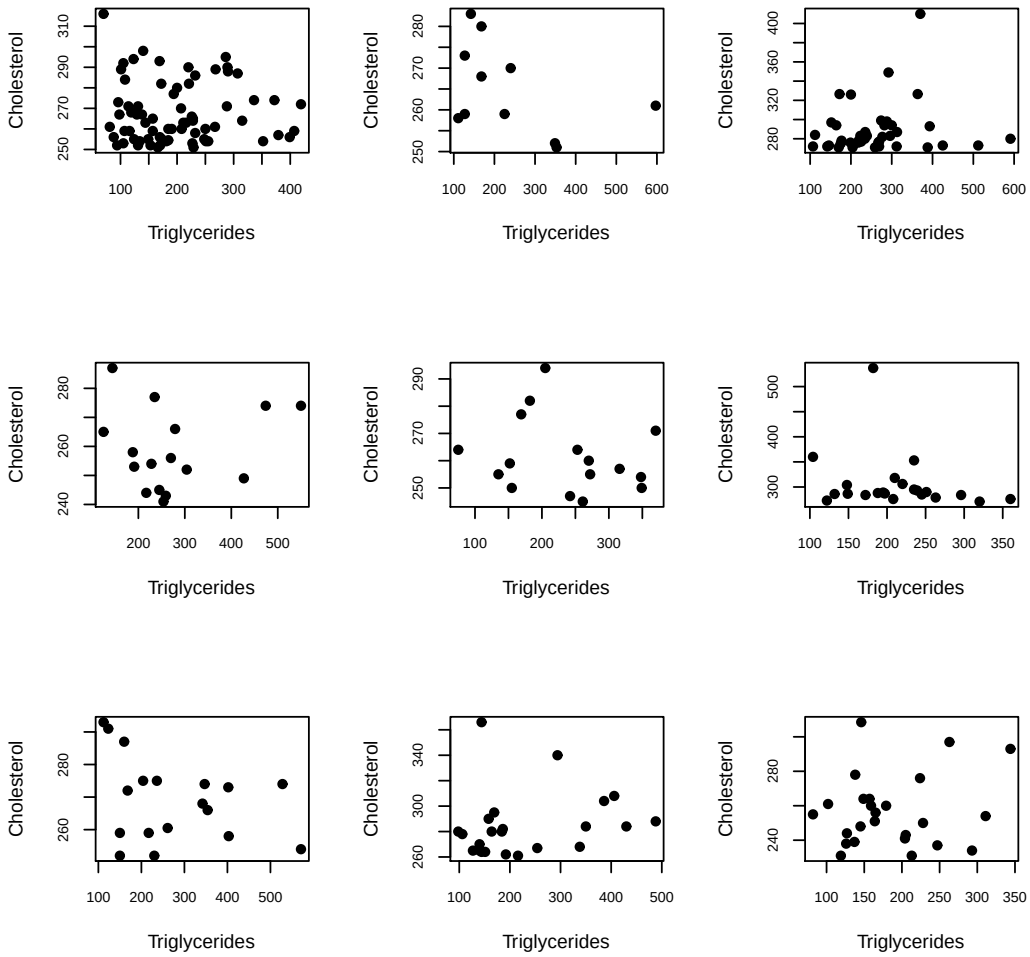

Figure 3: High total cholesterol levels distributed by triglyceride/district - Aveiro, Beja, Braga (top row, left to right), Bragança, Castelo Branco, Coimbra (central row, left to right) and Évora, Faro, Guarda (bottom row, left to right)

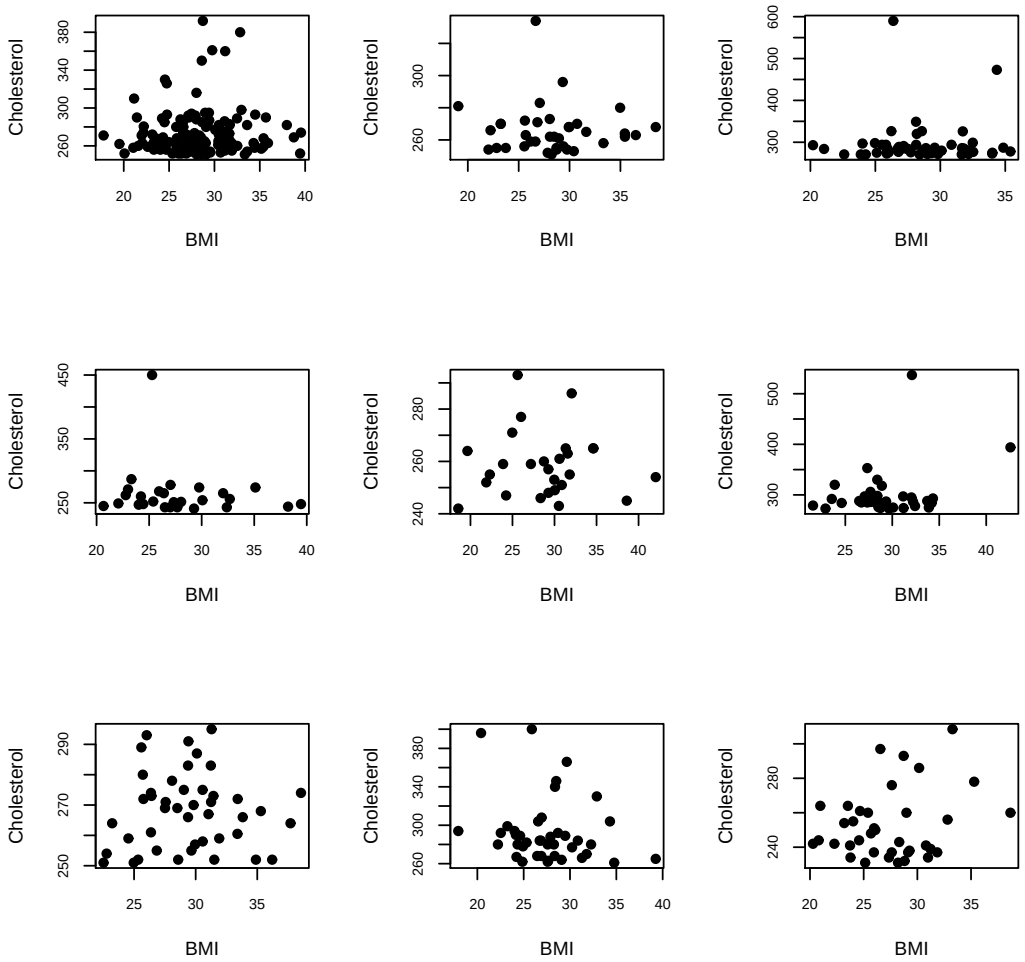

Figure 4: High total cholesterol levels distributed by BMI/district (bottom) - Aveiro, Beja, Braga (top row, left to right), Bragança, Castelo Branco, Coimbra (central row, left to right) and Évora, Faro, Guarda (bottom row, left to right)

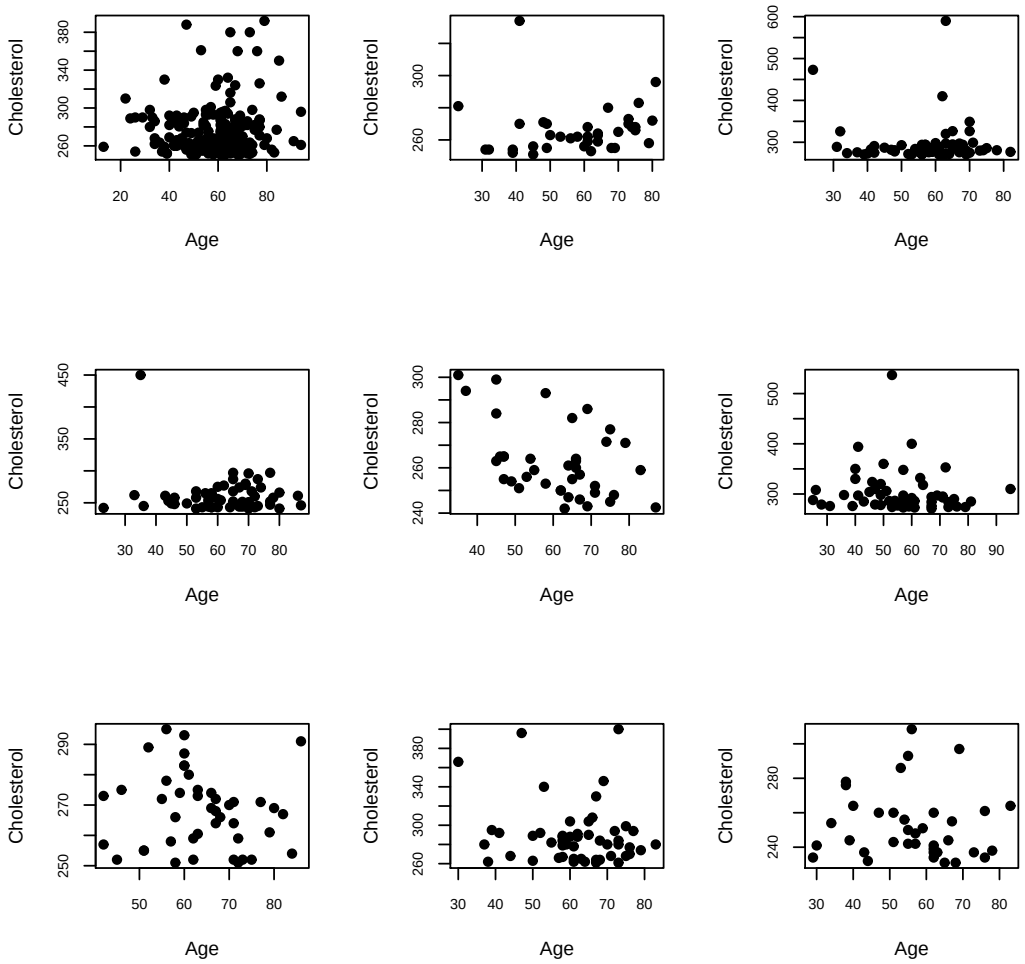

Figure 5: High total cholesterol levels distributed by age/district - Aveiro, Beja, Braga (top row, left to right), Bragança, Castelo Branco, Coimbra (central row, left to right) and Évora, Faro, Guarda (bottom row, left to right)

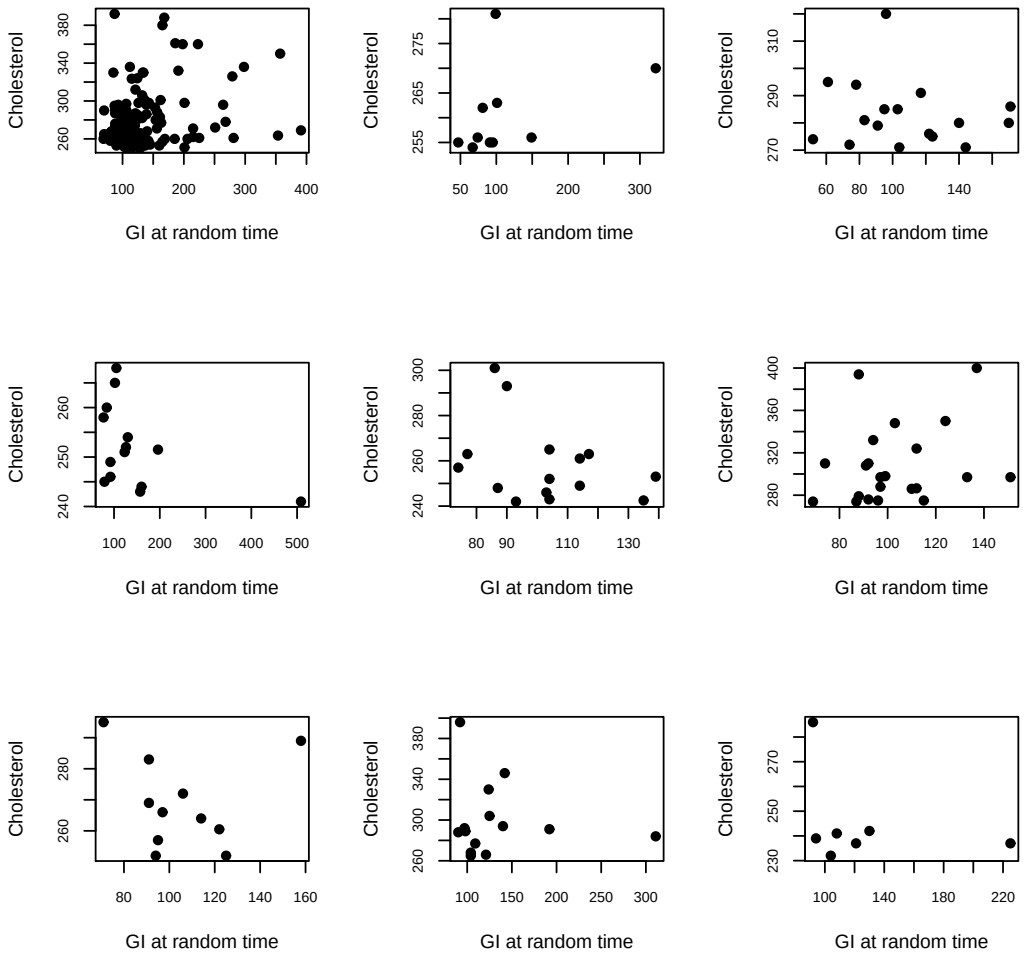

Figure 6: High total cholesterol levels distributed by glucose level at random time/district - Aveiro, Beja, Braga (top row, left to right), Bragança, Castelo Branco, Coimbra (central row, left to right) and Évora, Faro, Guarda (bottom row, left to right)

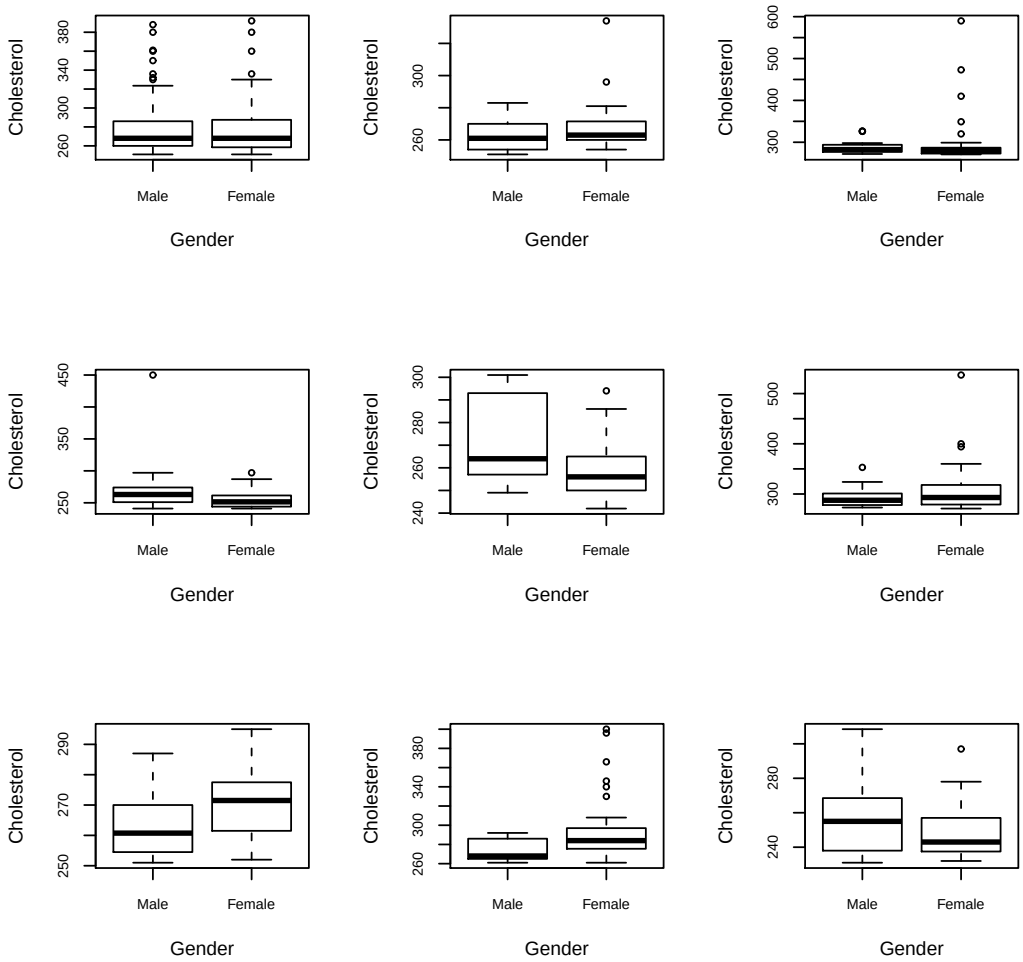

Figure 7: High total cholesterol levels distributed by gender/district - Aveiro, Beja, Braga, (top row, left to right) Bragana, Castelo Branco, Coimbra (central row, left to right) vora, Faro e Guarda (bottom row, left to right)

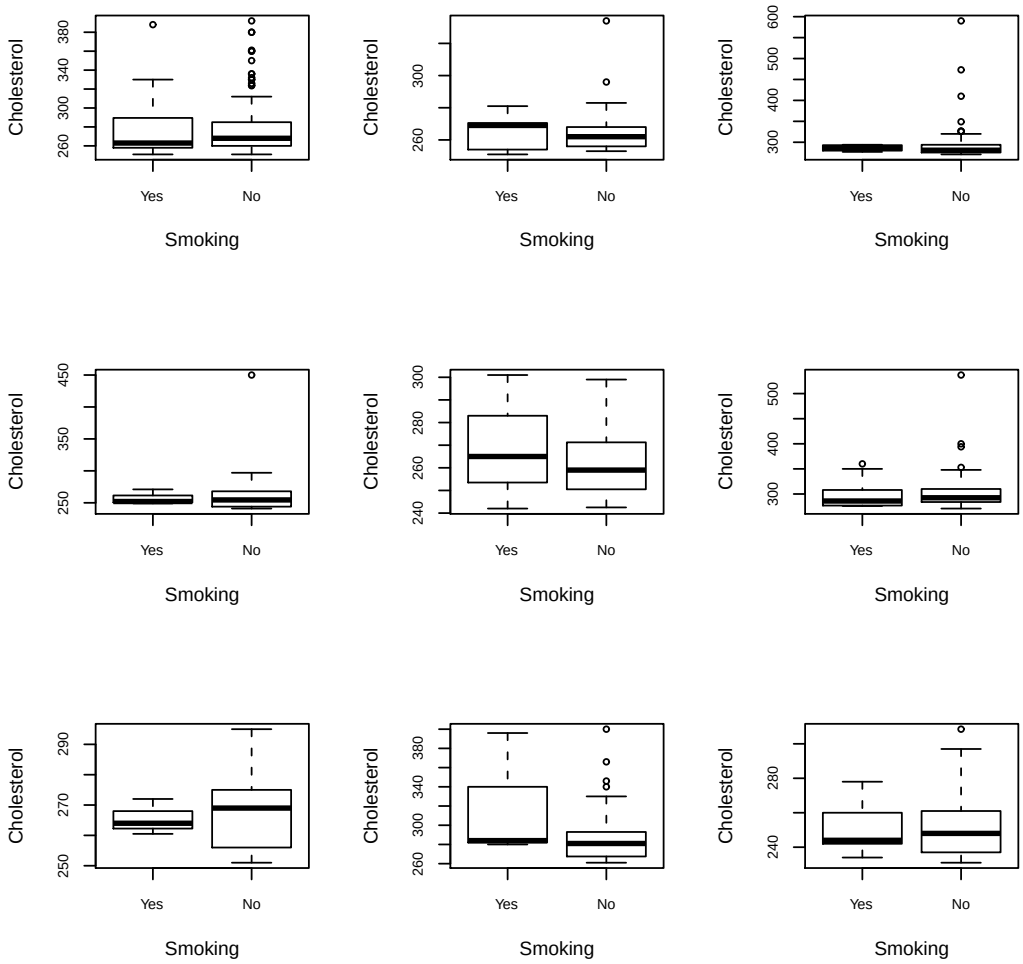

Figure 8: High total cholesterol levels distributed by smoking habits/district (bottom) - Aveiro, Beja, Braga, (top row, left to right) Bragana, Castelo Branco, Coimbra (central row, left to right) vora, Faro e Guarda (bottom row, left to right)