

# Risk of death of individuals with different comorbidity profiles during the COVID-19 pandemic.

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## Supplementary material

<i>Disease</i>	<i>ICD-10 Codes</i>
Neoplasm	C- (all codes)
Diabetes Type I and II	E10, E11, E13
Chronic rheumatic heart diseases	I05, I06, I07, I08, I09
Angina pectoris	I20
Acute and old myocardial infraction	I21, I25.2
Stroke	I60, I61, I62, I63, I64
Parkinson	G20, G21, G22
Alzheimer's	G30
Chronic respiratory	J41, J42, J43, J44
Cirrhosis	K74.3, K74.4, K74.5, K74.6
Chronic kidney	N18

**Table A1. Selected severe chronic diseases and their respective ICD-10 codes**

<i>Pre-pandemic years (2017-2019), all deaths</i>				
	Men		Women	
Comorbidity level	Observed	Expected	Observed	Expected
0	15405	27441.79	19557	33220.23
1	10361	11643.22	10671	10431.99
2+	27846	14526.99	22460	9035.78
total	53612	53612.00	52688	52688.00
	chi2(2) = 18763.23 Pr>chi2 = 0.0000		chi2(2) = 27660.49 Pr>chi2 = 0.0000	

<i>Pandemic years (2020-2021), covid-related deaths</i>				
	Men		Women	
Comorbidity level	Observed	Expected	Observed	Expected
0	464	467.88	424	488.37
1	325	349.24	246	254.70
2+	632	603.88	384	310.93
total	1421	1421.00	1054	1054.00
	chi2(2) = 3.71		chi2(2) = 32.26	

	Pr>chi2 = 0.1568		Pr>chi2 = 0.0000	
<b>Pandemic years (2020-2021), non-covid-related deaths</b>				
	Men		Women	
Comorbidity level	Observed	Expected	Observed	Expected
0	14108	28052.11	17855	32893.11
1	10855	11502.59	11249	10440.92
2+	28748	14156.59	23266	9035.97
total	53711	53711.00	52370	52370.00
	chi2(2) = 23383.97 Pr>chi2 = 0.0000		chi2(2) = 31249.07 Pr>chi2 = 0.0000	

**Table A2. Log-rank test for equality of survivor functions.**

Covariate	Haz. Ratio	P> z	[95% Conf. Interval]
<b>Sex</b>			
Man	-	-	-
Woman	0.5388335	0.000	[0.5252521, 0.5527661]
<b>Comorbidities</b>			
0	-	-	-
1	1.443342	0.000	[1.396621, 1.491627]
2+	2.789886	0.000	[2.717445, 2.864258]
<b>Education</b>			
Low	-	-	-
Medium	0.8266617	0.000	[0.8033896, 0.850608]
High	0.575269	0.000	[0.5541492, 0.5971936]
<b>Sex#Comorbidities</b>			
Man – 0 comorbidities	-	-	-
Woman – 1 comorbidity	1.163256	0.000	[1.12236, 1.205643]
Woman – 2+ comorbidities	1.358681	0.000	[1.320305, 1.398172]
<b>Sex#Education</b>			
Men – low education	-	-	-
Woman – middle education	1.03407	0.018	[1.005816, 1.063118]
Woman – high education	1.25686	0.000	[1.212149, 1.30322]
<b>Education#Comorbidities</b>			
Low education – 0 comorbidities	-	-	-
Middle education – 1 comorbidity	1.149657	0.000	[1.105125, 1.195985]
Middle education – 2+ comorbidities	1.358861	0.000	[1.316627, 1.40245]
High education – 1 comorbidity	1.254315	0.000	[1.191065, 1.320942]
High education – 2+ comorbidities	1.597226	0.000	[1.532581, 1.664598]
LR chi2(13) = 45172.23 Prob > chi2 = 0.0000			

**Table A3. Cox regression model of risk of death in the pre-pandemic period (2017-2019)**

<b>Sex#education#comorbidities</b>	<b>Margin</b>	<b>P&gt; z </b>	<b>[95% Conf. Interval]</b>
Man – Low education – 0 comorbidities	1	-	-
Man – Low education – 1 comorbidity	1.443342	0.000	[1.395848, 1.490837]
Man – Low education – 2+ comorbidities	2.789886	0.000	[2.716488, 2.863284]
Man – Middle education – 0 comorbidities	0.8266617	0.000	[0.8030557, 0.8502678]
Man – Middle education – 1 comorbidity	1.37172	0.000	[1.322524, 1.420917]
Man – Middle education – 2+ comorbidities	3.133931	0.000	[3.043401, 3.22446]
Man – High education – 0 comorbidities	0.575269	0.000	[0.5537518, 0.5967862]
Man – High education – 1 comorbidity	1.04147	0.000	[0.9932797, 1.089661]
Man – High education – 2+ comorbidities	2.563444	0.000	[2.473992, 2.652895]
Woman – Low education – 0 comorbidities	0.5388335	0.000	[0.525078, 0.552589]
Woman – Low education – 1 comorbidity	0.904689	0.000	[0.8743818, 0.9349962]
Woman – Low education – 2+ comorbidities	2.042483	0.000	[1.98238, 2.102585]
Woman – Middle education – 0 comorbidities	0.460609	0.000	[0.4438493, 0.4773686]
Woman – Middle education – 1 comorbidity	0.8890896	0.000	[0.8571325, 0.9210467]
Woman – Middle education – 2+ comorbidities	2.372528	0.000	[2.304718, 2.440337]
Woman – High education – 0 comorbidities	0.3895941	0.000	[0.3728167, 0.4063715]
Woman – High education – 1 comorbidity	0.8204719	0.000	[0.7828915, 0.8580523]
Woman – High education – 2+ comorbidities	2.358753	0.000	[2.274846, 2.442661]

**Table A3b. Predictive margins of level of comorbidities, at different combinations of sex and education level, based on cox regression model of risk of death in the pre-pandemic period (2017-2019)**

<b>Covariate</b>	<b>Haz. Ratio</b>	<b>P&gt; z </b>	<b>[95% Conf. Interval]</b>
<b>Sex</b>			
Man	-	-	-
Woman	0.5695473	0.000	[0.5548659, 0.5846172]
<b>Comorbidities</b>			
0	-	-	-
1	1.598363	0.000	[1.546658, 1.651797]
2+	3.088465	0.000	[3.006987, 3.172151]
<b>Education</b>			
Low	-	-	-
Medium	.8383584	0.000	[0.81446, 0.862958]
High	.6081677	0.000	[0.5859519, 0.6312258]
<b>Type of death</b>			
Non-Covid related	-	-	-
Covid-related	3.826356	0.000	[3.672602, 3.986547]
<b>Sex#Comorbidities</b>			
Man – 0 comorbidities	-	-	-

Woman – 1 comorbidity	1.134605	0.000	[1.095488, 1.175119]
Woman – 2+ comorbidities	1.30377	0.000	[1.266948, 1.341662]
<b>Sex#Education</b>			
Men – low education	-	-	-
Woman – middle education	1.046952	0.001	[1.018854, 1.075825]
Woman – high education	1.276615	0.000	[1.232608, 1.322193]
<b>Education#Comorbidities</b>			
Low education – 0 comorbidities	-	-	-
Middle education – 1 comorbidity	1.190595	0.000	[1.14539, 1.237584]
Middle education – 2+ comorbidities	1.358888	0.000	[1.316663, 1.402466]
High education – 1 comorbidity	1.277668	0.000	[1.215847, 1.342632]
High education – 2+ comorbidities	1.521175	0.000	[1.46058, 1.584283]
LR chi2 (14) = 52913.74 Prob >chi2 = 0.0000			
<b>Table A4. Cox regression model of risk of death in the pandemic period (2020-2021), all deaths together.</b>			

<b>Sex#education#comorbidities</b>	<b>Margin</b>	<b>P&gt; z </b>	<b>[95% Conf. Interval]</b>
Man – low education – non-covid death - 0 comorbidities	1	.	.
Man – low education – non-covid death - 1 comorbidity	1.598363	0.000	[1.545803, 1.650923]
Man – low education – non-covid death – 2+ comorbidities	3.088465	0.000	[3.005893, 3.171037]
Man – low education – covid death - 0 comorbidities	3.826356	0.000	[3669427, 3983284]
Man – low education – covid death - 1 comorbidity	6.115906	0.000	[5796257, 6435555]
Man – low education – covid death – 2+ comorbidities	11.81757	0.000	[11.24551, 12.38962]
Man – middle education – non-covid death - 0 comorbidities	0.8383584	0.000	[0.8141128, 0.862604]
Man – middle education – non-covid death - 1 comorbidity	1.595399	0.000	[1.539242, 1.651556]
Man – middle education – non-covid death – 2+ comorbidities	3.518487	0.000	[3.415994, 3.620981]
Man – middle education – covid death - 0 comorbidities	3.207858	0.000	[3.047035, 3.36868]
Man – middle education – covid death - 1 comorbidity	6.104564	0.000	[5.776307, 6.432821]
Man – middle education – covid death – 2+ comorbidities	13.46298	0.000	[12.79423, 14.13174]

Man – high education – non-covid death - 0 comorbidities	0.6081677	0.000	[0.5855359, 0.6307994]
Man – high education – non-covid death - 1 comorbidity	1.241986	0.000	[1.186845, 1.297128]
Man – high education – non-covid death – 2+ comorbidities	2.857229	0.000	[2.758204, 2.956254]
Man – high education – covid death - 0 comorbidities	2.327066	0.000	[2.197958, 2.456174]
Man – high education – covid death - 1 comorbidity	4.752281	0.000	[4.465466, 5.039096]
Man – high education – covid death – 2+ comorbidities	10.93278	0.000	[10.34831, 11.51724]
Woman – low education – non-covid death - 0 comorbidities	0.5695473	0.000	[0.5546733, 0.5844213]
Woman – low education – non-covid death - 1 comorbidity	1.03288	0.000	[0.9979516, 1.067809]
Woman – low education – non-covid death – 2+ comorbidities	2.293366	0.000	[2.224475, 2.362257]
Woman – low education – covid death - 0 comorbidities	2.179291	0.000	[2.072738, 2.285843]
Woman – low education – covid death - 1 comorbidity	3.952167	0.000	[3.742003, 4.162331]
Woman – low education – covid death – 2+ comorbidities	8.775236	0.000	[8.330351, 9.22012]
Woman – middle education – non-covid death - 0 comorbidities	0.4999037	0.000	[0.4814567, 0.5183507]
Woman – middle education – non-covid death - 1 comorbidity	1.079371	0.000	[1.041621, 1.11712]
Woman – middle education – non-covid death – 2+ comorbidities	2.735354	0.000	[2.657136, 2.813572]
Woman – middle education – covid death - 0 comorbidities	1.912809	0.000	[1.806971, 2.018648]
Woman – middle education – covid death - 1 comorbidity	4.130056	0.000	[3.907423, 4.352689]
Woman – middle education – covid death – 2+ comorbidities	10.46644	0.000	[9.946011, 10.98686]
Woman – high education – non-covid death - 0 comorbidities	0.4421942	0.000	[0.4233215, 0.461067]
Woman – high education – non-covid death - 1 comorbidity	1.024592	0.000	[0.9801514, 1.069034]
Woman – high education – non-covid death – 2+ comorbidities	2.708543	0.000	[2.613716, 2.80337]
Woman – high education – covid death - 0 comorbidities	1.691992	0.000	[1.591463, 1.792522]

Woman – high education – covid death - 1 comorbidity	3.920455	0.000	[3.686038, 4.154873]
Woman – high education – covid death – 2+ comorbidities	10.36385	0.000	[9.804709, 10.92299]

**Table A4b. Predictive margins of level of comorbidities, at different combinations of sex and education level and type of death, based on Cox regression model of risk of death in the pandemic period (2020-2021), all deaths together.**

Covariate	Haz. Ratio	P> z	[95% Conf. Interval]
<b>Sex</b>			
Man	-	-	-
Woman	0.5693748	0.000	[0.5545063, 0.584642]
<b>Comorbidities</b>			
0	-	-	-
1	1.615054	0.000	[1.562058, 1.669847]
2+	3.165599	0.000	[3.081065, 3.252452]
<b>Education</b>			
Low	-	-	-
Medium	0.833029	0.000	[0.8089474, 0.8578275]
High	0.6020769	0.000	[0.5797822, 0.625229]
<b>Sex#Comorbidities</b>			
Man – 0 comorbidities	-	-	-
Woman – 1 comorbidity	1.131343	0.000	[1.091818, 1.172298]
Woman – 2+ comorbidities	1.293577	0.000	[1.256607, 1.331635]
<b>Sex#Education</b>			
Men – low education	-	-	-
Woman – middle education	1.051244	0.000	[1.022711, 1.080574]
Woman – high education	1.287279	0.000	[1.242441, 1.333737]
<b>Education#Comorbidities</b>			
Low education – 0 comorbidities	-	-	-
Middle education – 1 comorbidity	1.193462	0.000	[1.147536, 1.241226]
Middle education – 2+ comorbidities	1.368882	0.000	[1.32583, 1.413332]
High education – 1 comorbidity	1.280207	0.000	[1.217507, 1.346136]
High education – 2+ comorbidities	1.523347	0.000	[1.461972, 1.587299]
LR chi2 (13) = 49649.14 Prob >chi2 = 0.0000			

**Table A5. Cox regression model of risk of death in the pandemic period (2020-2021), non covid-deaths.**

Sex#education#comorbidities	Margin	P> z	[95% Conf. Interval]
Man – Low education – 0 comorbidities	1	0.000	-

Man – Low education – 1 comorbidity	1.615054	0.000	[1.561169, 1.668938]
Man – Low education – 2+ comorbidities	3.165599	0.000	[3.079916, 3.251282]
Man – Middle education – 0 comorbidities	0.833029	0.000	[0.8085924, 0.8574656]
Man – Middle education – 1 comorbidity	1.605668	0.000	[1.548372, 1.662963]
Man – Middle education – 2+ comorbidities	3.60979	0.000	[3.503208, 3.716371]
Man – High education – 0 comorbidities	0.6020769	0.000	[0.579359, 0.6247949]
Man – High education – 1 comorbidity	1.244856	0.000	[1.188805, 1.300907]
Man – High education – 2+ comorbidities	2.903399	0.000	[2.801556, 3.005243]
Woman – Low education – 0 comorbidities	0.5693748	0.000	[0.5543087, 0.5844409]
Woman – Low education – 1 comorbidity	1.04035	0.000	[1.004736, 1.075964]
Woman – Low education – 2+ comorbidities	2.331559	0.000	[2.260608, 2.402511]
Woman – Middle education – 0 comorbidities	0.4986112	0.000	[0.47995, 0.5172725]
Woman – Middle education – 1 comorbidity	1.087306	0.000	[1.048753, 1.12586]
Woman – Middle education – 2+ comorbidities	2.794964	0.000	[2.714119, 2.875809]
Woman – High education – 0 comorbidities	0.441289	0.000	[0.422219, 0.460359]
Woman – High education – 1 comorbidity	1.032249	0.000	[0.986983, 1.077515]
Woman – High education – 2+ comorbidities	2.752772	0.000	[2.655398, 2.850146]

**Table A5b. Predictive margins of level of comorbidities, at different combinations of sex and education level and type of death, based on Cox regression model of risk of death in the pandemic period (2020-2021), non covid-deaths.**

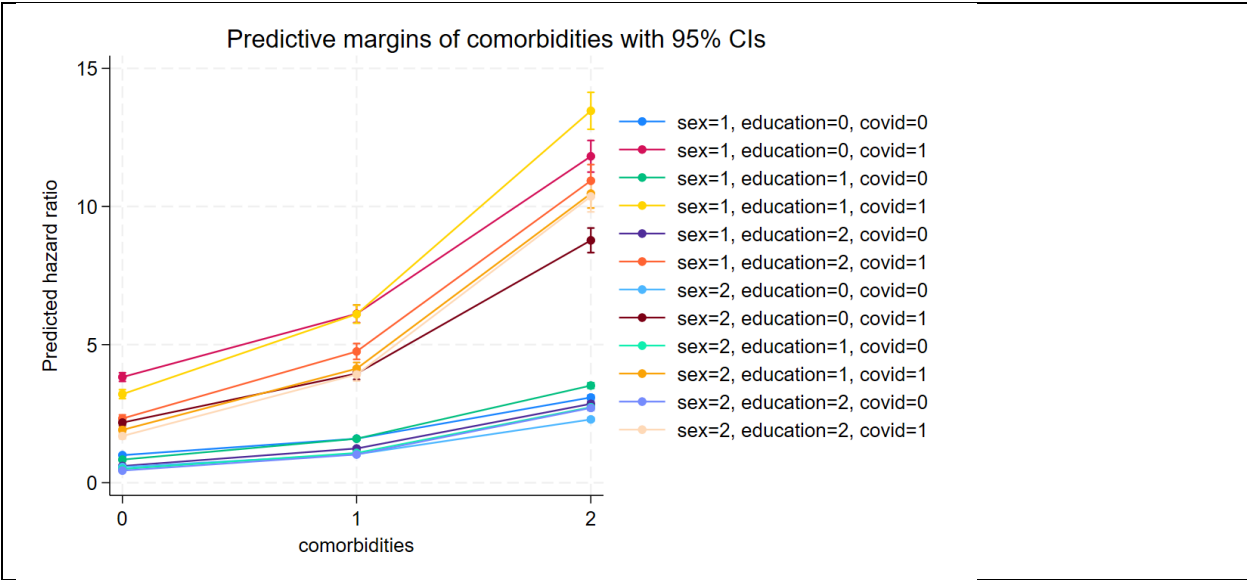
Covariate	Haz. Ratio	P> z	[95% Conf. Interval]
<b>Sex</b>			
Man	-	-	-
Woman	0.6167813	0.000	[0.5376016, 0.7076228]
<b>Comorbidities</b>			
0	-	-	-
1	0.9444076	0.437	[0.8175838, 1.090904]
2+	1.068673	0.290	[0.9450696, 1.208443]
<b>Education</b>			
Low	-	-	-
Medium	1.13485	0.006	[1.037653, 1.241152]
High	1.192981	0.004	[1.057761, 1.345487]
<b>Sex#Comorbidities</b>			
Man – 0 comorbidities	-	-	-
Woman – 1 comorbidity	1.192005	0.113	[0.9590318, 1.481573]
Woman – 2+ comorbidities	1.379866	0.001	[1.142803, 1.666104]

LR chi2 (7) = 116.82  
 Prob >chi2 = 0.0000

**Table A6. Cox regression model of risk of death in the pandemic period (2020-2021), covid-deaths**

Sex#education#comorbidities	Margin	P> z	[95% Conf. Interval]
Man – Low education – 0 comorbidities	1	0.000	-
Man – Low education – 1 comorbidity	0.9444076	0.000	[0.8082198, 1.080595]
Man – Low education – 2+ comorbidities	1.068673	0.000	[0.9373177, 1.200029]
Man – Middle education – 0 comorbidities	1.13485	0.000	[1.033236, 1.236464]
Man – Middle education – 1 comorbidity	1.071761	0.000	[0.8889538, 1.254568]
Man – Middle education – 2+ comorbidities	1.212784	0.000	[1.031901, 1.393667]
Man – High education – 0 comorbidities	1.192981	0.000	[1.049465, 1.336498]
Man – High education – 1 comorbidity	1.12666	0.000	[0.9165793, 1.336742]
Man – High education – 2+ comorbidities	1.274907	0.000	[1.056313, 1.493501]
Woman – Low education – 0 comorbidities	0.6167813	0.000	[0.5320375, 0.701525]
Woman – Low education – 1 comorbidity	0.6943344	0.000	[0.5835591, 0.8051098]
Woman – Low education – 2+ comorbidities	0.9095216	0.000	[0.7829024, 1.036141]
Woman – Middle education – 0 comorbidities	0.6999542	0.000	[0.581829, 0.8180795]
Woman – Middle education – 1 comorbidity	0.7879654	0.000	[0.6407372, 0.9351936]
Woman – Middle education – 2+ comorbidities	1.032171	0.000	[0.8536281, 1.210713]
Woman – High education – 0 comorbidities	0.7358084	0.000	[0.5971022, 0.8745146]
Woman – High education – 1 comorbidity	0.8283279	0.000	[0.6581242, 0.9985315]
Woman – High education – 2+ comorbidities	1.085042	0.000	[0.8776979, 1.292386]

**Table A6b. Predictive margins of level of comorbidities, at different combinations of sex and education level and type of death, based on Cox regression model of risk of death in the pandemic period (2020-2021), covid-deaths.**



**Fig. A1. Predictive margins of level of comorbidities, at different combinations of sex and education level and type of death, based Cox regression model of risk of death in the pandemic period (2020-2021), all deaths together.**

Legend: sex: 1= man, 2=woman; education: 0=low, 1=middle, 2=high.