

## Supplementary materials,

**Table S1,** Conditions reported together with COVID-19 and influenza by presence of association and role,

Cause analyzed		Reference cause: COVID-19 (150,390 cases)				Reference cause: Influenza (2,556 cases)				p-value of $\chi^2$ test for the comparison between percentages of certificates reporting the analyzed cause with COVID-19 and influenza
ICD10 codes	Description	N, certificates mentioning both the reference cause and the analyzed cause	% of certificates mentioning the analyzed cause on certificates mentioning the reference cause	Association with the reference cause	Role of the analyzed cause	N, certificates mentioning both the reference cause and the analyzed cause	% of certificates mentioning the analyzed cause on certificates mentioning the reference cause	Association with the reference cause	Role of the analyzed cause	
A00-A09	Intestinal infectious diseases	947	0.63	Yes	Complication	33	1.29	Yes	Complication	<0.01
A40. A41. R572	Sepsis and septic shock	13,589	9.04		Complication	222	8.69		Complication	$\geq 0.05$
A49. B37. B49. B99	Infection of unspecified site	1,933	1.29	Yes	Complication	24	0.94	Yes		$\geq 0.05$
Other in A00-B99	Other infectious diseases	2,472	1.64	Yes	Complication	58	2.27	Yes		<0.05
C00-D48	Neoplasms	18,431	12.26		Comorbidity	263	10.29		Comorbidity	<0.01
D64	Other anemia	3,113	2.07		Complication	47	1.84			$\geq 0.05$
Other in D50-D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	2,078	1.38		Complication	28	1.10			$\geq 0.05$
E10-E14	Diabetes mellitus	23,936	15.92	Yes	Comorbidity	362	14.16	Yes	Comorbidity	<0.05
E66	Obesity	5,156	3.43	Yes	Comorbidity	41	1.60	Yes	Comorbidity	<0.01
E86-E87	Volume depletion and other fluid disorders	3,037	2.02		Complication	89	3.48		Complication	<0.01
Other in E00-E89	Other endocrine, nutritional and metabolic diseases	5,420	3.60		Complication	96	3.76			$\geq 0.05$
F00-F03	Dementia	11,142	7.41		Comorbidity	259	10.13	Yes	Comorbidity	<0.01
Other in F00-F99	Other mental and behavioral disorders	3,622	2.41	Yes	Comorbidity	73	2.86	Yes	Comorbidity	$\geq 0.05$
G20-G26	Extrapyramidal and movement disorders	4,252	2.83		Comorbidity	68	2.66		Comorbidity	$\geq 0.05$
G30-G31	Alzheimer disease	4,641	3.09		Comorbidity	132	5.16	Yes	Comorbidity	<0.01
Other in G00-G99	Other diseases of the nervous system	5,927	3.94		Complication	98	3.83		Comorbidity	$\geq 0.05$
I10	Hypertension	28,195	18.75	Yes	Comorbidity	354	13.85		Comorbidity	<0.01
I11-I13	Hypertensive heart disease (HHD)	7,617	5.06		Comorbidity	202	7.90		Comorbidity	<0.01
I20-I24	Acute ischemic heart diseases	3,289	2.19		Complication	95	3.72		Complication	<0.01
I25	Chronic ischemic heart disease (CHD)	19,127	12.72		Comorbidity	364	14.24		Comorbidity	<0.05
I00-I09. I30-I52	Other heart diseases	10,581	7.04		Complication	246	9.62			<0.01
I46	Cardiac arrest	34,213	22.75		Complication	730	28.56		Complication	<0.01
I48	Atrial fibrillation	18,378	12.22	Yes		255	9.98		Comorbidity	<0.01
I50-I51	Heart failure and other cardiac diseases	21,738	14.45		Complication	660	25.82	Yes	Complication	<0.01
I60-I67	Cerebrovascular diseases (CVD)	11,473	7.63		Comorbidity	156	6.10		Comorbidity	<0.01
I671. I69	Sequelae of cerebrovascular diseases	5,514	3.67		Comorbidity	134	5.24		Comorbidity	<0.01
Other in I00-I99	Other Diseases of the circulatory system	10,696	7.11		Complication	208	8.14			<0.05
J09-J11	Influenza	146	0.10	Yes						
J12-J18. J849	Pneumonia	110,161	73.25	Yes	Complication	740	28.95	Yes	Complication	<0.01
J20-J22	Other acute lower respiratory infections (ALRI)	515	0.34		Complication	107	4.19	Yes	Complication	<0.01
J40-J47 excluding J44	Chronic lower respiratory diseases (CLRD)	3,338	2.22	Yes	Comorbidity	154	6.03	Yes	Complication	<0.01
J44	Other chronic obstructive pulmonary disease (COPD)	13,414	8.92	Yes	Comorbidity	268	10.49	Yes	Comorbidity	<0.01
J80	Adult respiratory distress syndrome	7,453	4.96	Yes	Complication	77	3.01	Yes	Complication	<0.01
J81	Pulmonary oedema	1,416	0.94		Complication	110	4.30		Complication	<0.01
J960. J969	Respiratory failure	89,305	59.38	Yes	Complication	771	30.16	Yes	Complication	<0.01

Other in J00-J99	Other respiratory diseases	8,371	5.57		Complication	186	7.28	Yes	Complication	<0.01
K00-K99	Diseases of the digestive system	7,862	5.23		Complication	147	5.75		Complication	>=0.05
N17. N19	Renal failure. acute and unspecified	21,365	14.21		Complication	303	11.85		Complication	<0.01
Other in N00-N99	Other diseases of the genitourinary system	4,848	3.22			59	2.31			<0.01
R04-R09. J961	Respiratory systems symptoms and signs	12,580	8.36	Yes	Complication	288	11.27	Yes	Complication	<0.01
R50	Fever of other and unknown origin	1,962	1.30	Yes	Comorbidity	137	5.36	Yes	Complication	<0.01
R54	Senility	3,952	2.63			143	5.59			<0.01
R57. excluding R572	Shock	9,961	6.62		Complication	193	7.55		Complication	>=0.05
other R00-R99	Other signs and symptoms	49,364	32.82		Complication	716	28.01		Complication	<0.01
S00-Y98	External causes	9,298	6.18		Comorbidity	136	5.32		Comorbidity	>=0.05

**Table S2.** Deaths and standardized mortality rates for Influenza and Covid-19 by the sex and the geographical areas. Years 2020-2021.

Underling cause of death							Multiple causes					
Age 0-64	Influenza			Covid			Influenza			Covid		
Areas	M	F	T	M	F	T	M	F	T	M	F	T
Deaths												
North	22	11	33	4231	1503	5734	32	13	45	4902	1853	6755
Center	10	2	12	1616	604	2220	13	2	15	1808	708	2516
South	11	11	22	3078	1292	4370	17	15	32	3400	1497	4897
Italy	43	24	67	8925	3399	12324	62	30	92	10110	4058	14168
Standardized Rates												
North	0.1	0.1	0.1	17.1	5.9	11.4	0.1	0.1	0.1	19.9	7.3	13.5
Center	0.1	0.0	0.1	15.5	5.4	10.3	0.1	0.0	0.1	17.4	6.4	11.7
South	0.1	0.1	0.1	17.7	7.0	12.2	0.1	0.1	0.1	19.5	8.1	13.7
Italy	0.1	0.0	0.1	17.0	6.2	11.5	0.1	0.1	0.1	19.2	7.4	13.2

Underling cause of death							Multiple causes					
Age 65+	Influenza			Covid			Influenza			Covid		
Areas	M	F	T	M	F	T	M	F	T	M	F	T
Deaths												
North	180	242	422	44495	37295	81790	245	344	589	50306	44633	94939
Center	20	36	56	11375	9457	20832	28	48	76	12863	11354	24217
South	41	42	83	15167	11945	27112	63	60	123	17010	13843	30853
Italy	241	320	561	71037	58697	129734	336	452	788	80179	69830	150009
Standardized Rates												
North	3.1	2.4	2.7	775.7	383.2	544.1	4.3	3.4	3.8	878.0	457.0	630.1
Center	0.9	0.8	0.8	453.7	232.5	324.6	1.2	1.1	1.1	513.4	278.2	376.1
South	1.2	0.7	0.9	398.9	212.0	292.0	1.7	1.0	1.3	448.0	244.9	331.9
Italy	2.0	1.5	1.8	590.7	301.0	421.8	2.8	2.2	2.5	667.4	356.8	486.6

Underling cause of death							Multiple causes					
All ages	Influenza			Covid			Influenza			Covid		
Areas	M	F	T	M	F	T	M	F	T	M	F	T
Deaths												
North	202	253	455	48726	38798	87524	277	357	634	55208	46486	101694
Center	30	38	68	12991	10061	23052	41	50	91	14671	12062	26733
South	52	53	105	18245	13237	31482	80	75	155	20410	15340	35750
Italy	284	344	628	79962	62096	142058	398	482	880	90289	73888	164177
Standardized Rates												
North	0.7	0.5	0.6	165.1	79.5	115.3	0.9	0.7	0.8	187.2	95.0	133.7
Center	0.2	0.2	0.2	101.0	49.7	71.6	0.3	0.2	0.3	114.1	59.4	82.8
South	0.3	0.2	0.2	92.0	47.0	66.7	0.4	0.3	0.3	103.1	54.3	75.7
Italy	0.5	0.3	0.4	128.9	63.7	91.5	0.7	0.5	0.6	145.6	75.5	105.5

**Table S3.** Annual average number of diseases reported in death certificates with mention of Covid-19, influenza or other causes of death. according the sex and geographical areas

<b>Age 0-64</b>	Influenza 2016-2019			Influenza 2020-2021			Covid-19 2020-2021			Other causes of death 2016-2019			Other causes of death 2020-2021		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Areas															
North	5.3	5.1	5.2	4.8	4.5	4.7	5.2	5.1	5.2	2.8	2.7	2.8	2.9	2.7	2.8
Center	5.0	4.4	4.7	5.5	3.0	4.2	5.2	5.3	5.3	3.0	2.9	3.0	3.1	2.9	3.0
South	4.9	5.0	4.9	5.5	5.3	5.4	5.6	5.6	5.6	3.1	3.0	3.1	3.2	3.1	3.2
Italy	5.1	4.9	5.0	5.2	4.8	5.0	5.4	5.3	5.3	3.0	2.8	2.9	3.1	2.9	3.0

<b>Age 65+</b>	Influenza 2016-2019			Influenza 2020-2021			Covid-19 2020-2021			Other causes of death 2016-2019			Other causes of death 2020-2021		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
Areas															
North	5.1	4.8	4.9	4.9	4.6	4.7	5.2	5.0	5.1	3.8	3.7	3.7	3.8	3.7	3.8
Center	5.0	4.9	4.9	5.3	5.3	5.3	5.7	5.5	5.6	3.9	3.9	3.9	4.0	3.8	3.9
South	5.1	4.9	5.0	5.4	5.1	5.2	5.8	5.6	5.7	3.9	3.8	3.8	3.9	3.9	3.9
Italy	5.0	4.8	4.9	5.0	4.7	4.9	5.4	5.2	5.3	3.8	3.8	3.8	3.9	3.8	3.8