

Supplementary document 1. Imputation of the expected date of death for unvaccinated individuals who did not experience the events under study.

We used the life tables by region, age, and sex for the year 2020, published by the Italian Institute of Statistics (http://dati.istat.it/Index.aspx?DataSetCode=DCIS_MORTALITA1), reporting the probability of death $q_{x,y,z}$ (per 1000), where $x, y,$ and z indicate the region, age and sex, respectively.

Based on a uniform distribution, we randomly extracted and assigned a number in the interval 0-1 to every individual who did not experience the event under study, assuming it as the cumulative probability of death $S(t)$.

Based on the survival exponential function $S(t) = \exp\{-q_{x,y,z} \cdot t\}$, we then calculated the expected days of survival for each individual after the last vaccine dose administration as $t = -\log(S(t)) / (q_{x,y,z} / 365 \cdot 1000)$.

Among the 18,524,568 vaccinated individuals who did not experience the events under study up to 12 January 2022, we imputed a total of 74,954 (0.405%) deaths estimated to be occurred before the censoring date (12 December 2021).

Supplementary document 2. Conditions defining comorbidities and immunocompromise giving priority access to vaccination

Conditions defining comorbidities giving priority access to vaccination

Description
Respiratory diseases requiring oxygen therapy, idiopathic pulmonary fibrosis
Advanced heart failure (Classes III-IV NYHA) and post cardiogenic shock patients
Amyotrophic lateral sclerosis and other motor neuron disorders, multiple sclerosis, muscular dystrophy, infantile cerebral palsy, myasthenia gravis, dysimmune neuropathies
Type 1 diabetes, Type 2 diabetes with complications or requiring combination therapy (with at least two antidiabetes drugs)
Addison's disease
Panhypopituitarism
Cystic fibrosis
Cirrhosis of the liver
Intracerebral ischemic or hemorrhagic event that has led to impaired neurological and cognitive
Individuals who have suffered a stroke in 2020 - 2021, or who have had a stroke prior to 2020 ranked as level 3 or higher
Thalassemia major
Sickle cell anemia
Other severe anemias
Down syndrome
Body Mass Index >35
Severely disabled persons pursuant to law 104/1992 art. 3 paragraph 3

Conditions defining immunocompromise

ICD9-CM	Description
279.8	Defects of the complement system. Other specified disorders involving the immune mechanism; Deficiency or dysfunction of a single component (C1-C9)
279.1	Deficiency of cell-mediated immunity
279.0	Deficiency of humoral immunity
042, 079.53, V08	Human immunodeficiency virus [HIV] disease, Human immunodeficiency virus, type 2 [HIV-2], Asymptomatic human immunodeficiency virus [HIV] infection status
279	Disorders involving the immune mechanism
	Congenital and acquired disorders with poor antibody production, drug-induced immunosuppression