

Comorbidity Factors Influence COVID-19 Mortality; Age Barely Does

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Key Points

Comorbidity factors (such as heart disease, hypertension, and diabetes) influence mortality from COVID-19 about 15 times as much as age does.

Elderly populations have a dramatic increase in comorbidity factors, but we estimate that a healthy 80 year-old has a probability of death from COVID-19 that is about $\frac{1}{4}$ of the reported mortality rate in Italy ***for all patients***.

Key Assumption of Many:

People with and without comorbidity factors have the same chance of death from COVID-19, or at least, age and pre-existing conditions both add substantially to mortality.

Our evidence indicates that age is a minor risk compared to pre-existing conditions.

| | A | B | C | D | E |
|-----------|-----------|----------------------|--|--|--|
| Age group | % healthy | Age group % of cases | Healthy in age group as % of all cases ($C = A \times B$) | Death rate from COVID-19 for age group | Contribution of healthy to death total ($E = C \times D$) |
| 80+ | | | | | |
| 70 – 79 | | | | | |
| 60 – 69 | | | | | |
| 50 – 59 | 50% | 19% | 9.5% | | |
| 40 – 49 | | | | | |
| 30 – 39 | | | | | |
| TOTAL | | | | | |

We have data on the percentage of Italians who are healthy (no comorbidity factor) and the fraction of COVID-9 cases in each age group. Since 19% of the cases are among people between 50 and 59 and half of that group is healthy, healthy people between 50 and 59 comprised 9.5% of all cases.

| | A | B | C | D | E |
|-----------|-----------|----------------------|--|--|--|
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| 80+ | | | | | |
| 70 – 79 | | | | | |
| 60 – 69 | | | | | |
| 50 – 59 | 50% | 19% | 9.5% | 1.2% | 0.11% |
| 40 – 49 | | | | | |
| 30 – 39 | | | | | |
| TOTAL | | | | | |

We also know, from Italian Ministry of Health data, that 1.2% of people between 50 and 59 have died from COVID-19 in Italy. If we assume that the healthy are as likely as those with a morbidity factor to die, then 1.2% of the 9.5% of the population that is healthy and between 50 and 59 died. That is $0.012 \times 0.095 = 0.00114$ or approximately 0.11% of all cases.

| | A | B | C | D | E |
|--------------|-----------|----------------------|--|--|--|
| Age group | % healthy | Age group % of cases | Healthy in age group as % of all cases (C = A x B) | Death rate from COVID-19 for age group | Contribution of healthy to death total (E = C x D) |
| 80+ | 15% | 18% | 2.7% | 23.6% | 0.64% |
| 70 – 79 | 25% | 20% | 5.0% | 15.3% | 0.77% |
| 60 – 69 | 36% | 18% | 6.5% | 4.9% | 0.32% |
| 50 – 59 | 50% | 19% | 9.5% | 1.2% | 0.11% |
| 40 – 49 | 70% | 12% | 8.4% | 0.6% | 0.05% |
| 30 – 39 | 79% | 7% | 5.5% | 0.4% | 0.02% |
| TOTAL | | | | | 1.91% |

We now fill out our full table in the same way and find that, if healthy and unhealthy people are equally likely to die, approximately 1.91% of all the people who were diagnosed with COVID-19 would be healthy people who died. There were 35,731 COVID-19 cases in our data set, so the number of healthy people who died would have been 682.

| | A | B | C | D | E |
|--------------|------------------------------------|----------------------|--|--|--|
| Age group | % w/one or more comorbidity factor | Age group % of cases | Unhealthy in age group as % of all cases (C = A x B) | Death rate from COVID-19 for age group | Contribution of healthy to death total (E = C x D) |
| 80+ | 85% | 18% | 15.3% | 23.6% | 3.61% |
| 70 – 79 | 75% | 20% | 15.0% | 15.3% | 2.30% |
| 60 – 69 | 64% | 18% | 11.5% | 4.9% | 0.56% |
| 50 – 59 | 50% | 19% | 9.5% | 1.2% | 0.11% |
| 40 – 49 | 30% | 12% | 3.6% | 0.6% | 0.02% |
| 30 – 39 | 21% | 7% | 1.5% | 0.4% | 0.01% |
| TOTAL | | | | | 6.61% |

We do the same thing for those people who had at least 1 comorbidity factor and find that of the 35,731 COVID-19 cases in our data set, the number of unhealthy people who died would have been 2,362 under our hypothesis that healthy and unhealthy people are equally likely to die.

Key Takeaways

- Under our maintained hypothesis: We expect that 1.9% of the 35,731 cases in Italy as of March 20 are healthy people over 30 years old who died. That is 681 people.
- Under our maintained hypothesis: We expect that 6.6% of the 35,731 cases in Italy as of March 20 are people with one or more comorbidity factor over 30 years old who died. That is 2,362 people.
- Under our maintained hypothesis : We expect that $681/(681 + 2,362) = 22.4\%$ of the deceased had no comorbidity factor ***if*** the healthy and unhealthy have an equal chance of dying.
- But the Italian data show: 2.1% of the deceased had no comorbidity factor.
- ***The assumption that the healthy and the unhealthy have an equal chance of dying is clearly wrong. Those with comorbidity conditions are actually about 10.5 times as likely to die as those who are healthy.***