

# Mortality From COVID-19 in Iran

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With thanks from Dr Pegah Derakhshan, Arman Karimi and Dr Hamid Sharifi

# Confirmed Cases and Deaths by Country

Country	Total cases	Total death	CFR
Italy	132,547	16,523	12.46%
UK	51,608	5,373	10.41%
Spain	136,675	13,341	9.76%
France	98,010	8,911	9.09%
Netherlands	18,803	1,867	9.92%
Iran	60,500	3,739	6.18%
World	1,340,086	74,413	5.55%
China	81,708	3,331	4.07%
USA	363,105	10,736	2.95%
Germany	102,453	1,735	1.69%

CFR= death/case

CFR vary in different countries

Worldometers.info 2020, Available at: <<https://www.worldometers.info/coronavirus>> [Apr 6, 2020]

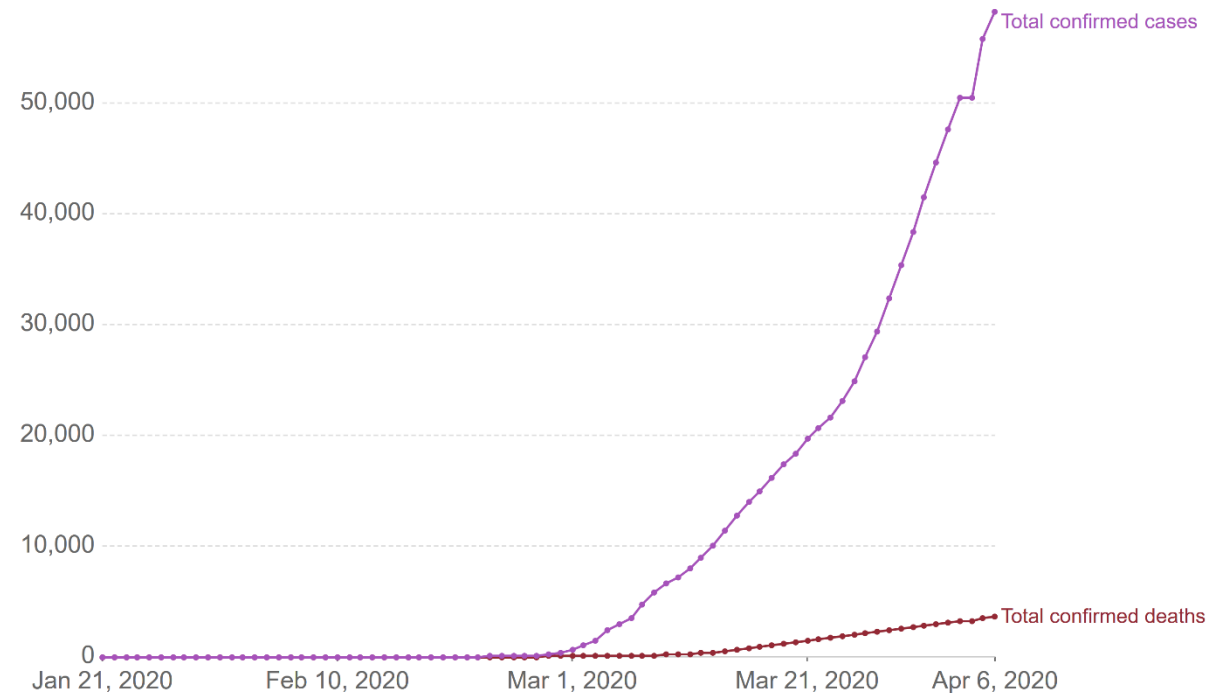
# Trend of case finding and mortality and Case Fatality Rate(CFR) in Iran

Date	Total cases	Total death	CFR
Feb 20	2	2	100%
Mar 1	43	593	7.25%
Mar 8	145	5823	2.6%
Apr 6	58226	3603	6.18%

## Total confirmed COVID-19 cases and deaths, Iran

The confirmed counts shown here are lower than the total counts. The main reason for this is limited testing and challenges in the attribution of the cause of death.

Our World  
in Data



Source: European CDC – Situation Update Worldwide – Last updated 6th April, 12:00 (London time) OurWorldInData.org/coronavirus • CC BY  
Note: The large increase in the number of cases globally and in China on Feb 13 is the result of a change in reporting methodology.

CFR vary in different in different period of times

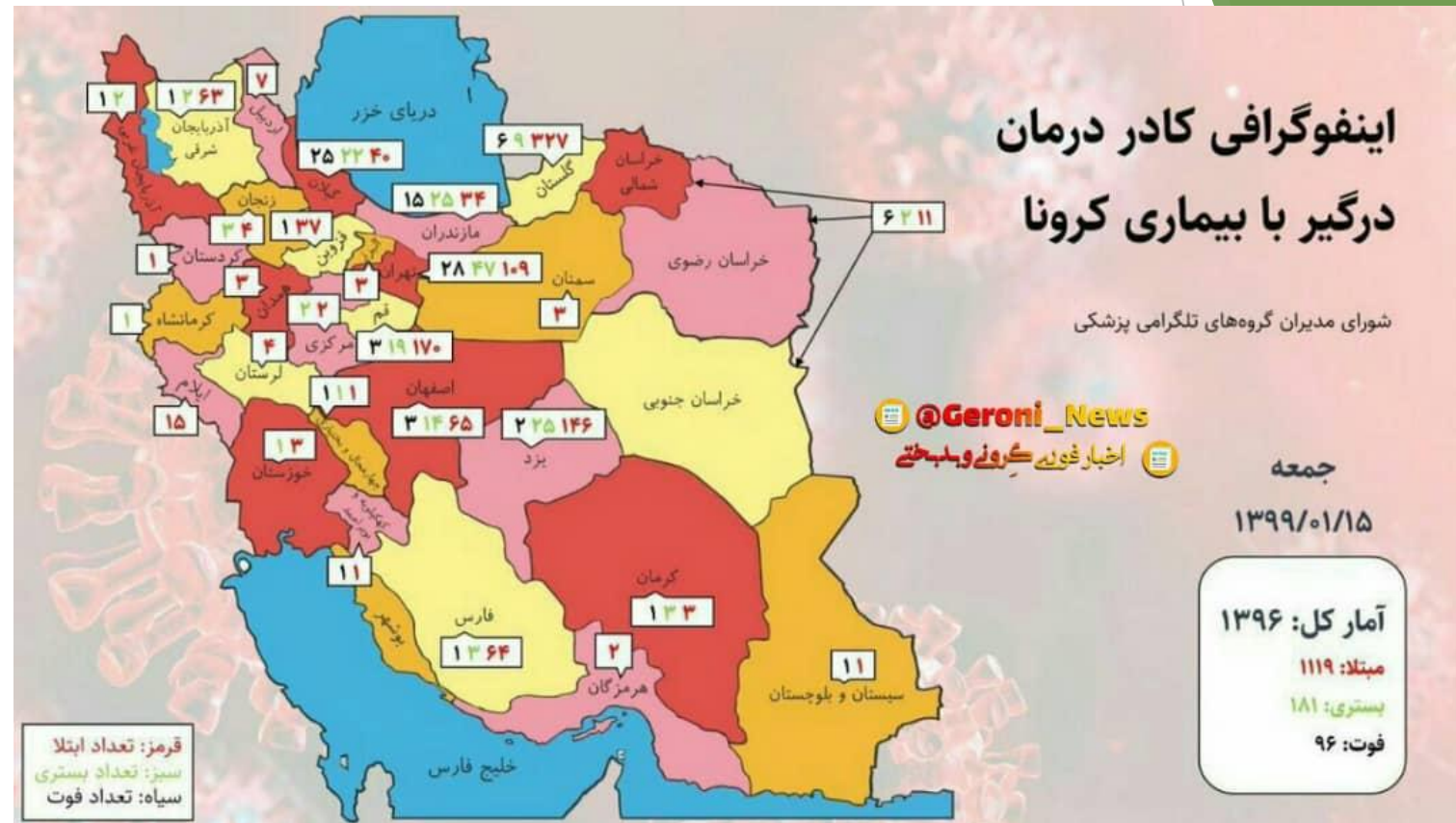
# Role of physicians and nurses during the pandemic

- ▶ Learning curve of the physicians and nurses\*
  - ▶ decreasing pattern of mortality during the course of the epidemic
- ▶ Change in therapeutic threshold of clinicians during the pandemic course
- ▶ Change in background knowledge of scientists/clinicians during the pandemic course
- ▶ exhaustion of the therapeutic personnel during the peak of the outbreak
- ▶ shortage of the devices and hospital bed specifically ICU beds

\*Salisbury, Helen. "Helen Salisbury: Fear in the time of covid." Bmj 368 (2020).

# Health Worker's Mortality

Country	Number of deceased
Iran	96
Italy	66
UK	5
France	5
Spain	5
USA	1



- ۱- نسبت به آمار کلی به واقعیت نزدیکتر است (شناسایی و گزارش آنها آسانتر است)
- ۲- نشان از حجم درگیری نظام سلامت با بیماری
- ۳- نشان از تجهیزات (تحریم) و مدیریت نظام سلامت

# PCR test vs. clinical presentation

	with PCR test				with clinical presentation			
	Date	Confirmed cases	Confirmed death	CFR(%)	Date	Confirmed cases	Confirmed death	CFR(%)
China	Feb12	44724	1114	2.49	Feb14	64021	1381	2.15
Hospitalized cases at IUMS	Mar19	۶۳۱	۱۱۰	17.4*0.2= 3.39	Mar19	877	149	16.9*0.2=3.38

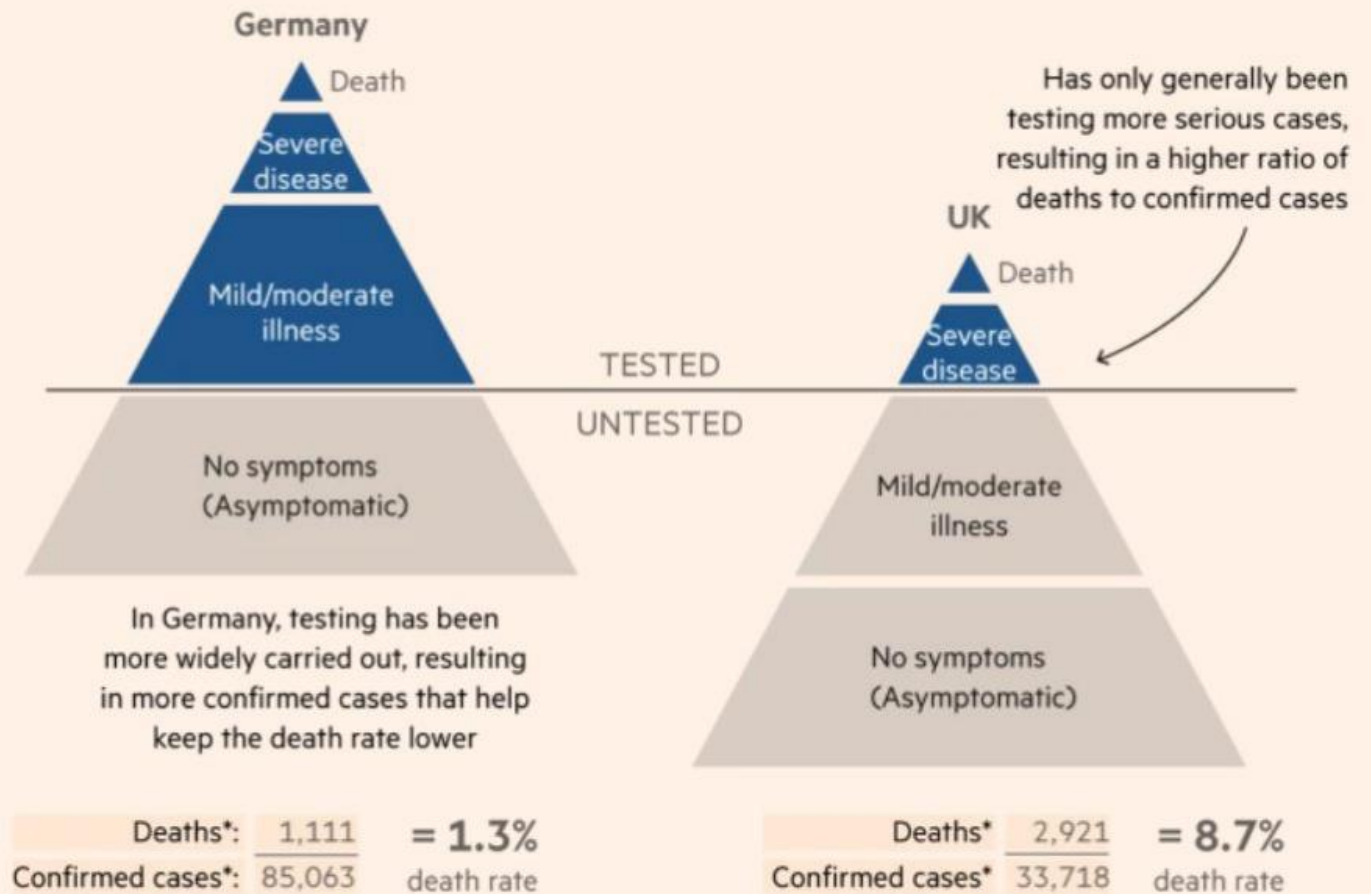
Max Roser, Hannah Ritchie and Esteban Ortiz-Ospina (2020) - "Coronavirus Disease (COVID-19) - Statistics and Research". Published online at OurWorldInData.org.  
Retrieved from: '<https://ourworldindata.org/coronavirus>' [Online Resource]

# Testing Strategies

Severe cases are preferentially tested more than those with mild to moderate symptoms (Selection bias)

Confirmation of diagnosis in deceased cases happened sooner than clinically suspicious patients in Iran

The 'iceberg' problem: how testing policy affects Covid-19 death rates



# COVID-19 is over-reported by physicians

- ▶ In case fatality statistics reported by Italian authorities a COVID-19 related death is defined as a deceased patient who tested positive for SARS-CoV2 by RT-PCR, independent from preexisting diseases that may have caused his/her death.\*
- ▶ Electing to define death from COVID-19 in this way may have resulted in an overestimation of the case-fatality rate.
- ▶ For instance, patient who perishes due to myocardial infarction with co-existing COVID-19 infection will be reported as a fatal COVID-19 case in their death certificate.

\*Onder, Graziano, Giovanni Rezza, and Silvio Brusaferro. "Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy." *JAMA* (2020).



# Age and Underlined disease

- patients with history of non-communicable disease are at higher risk of mortality

Country	Prevalence of non-communicable disease	Median Age
Iran	93444.87 per 100,000	32
China	91760 per 100,000	38.4
USA	92182 per 100,000	38.3

Institute for Health Metrics and Evaluation (IHME). GBD Compare. Seattle, WA: IHME, University of Washington, 2015. Available from <http://vizhub.healthdata.org/gbd-compare>. Accessed [Apr 7,2020]



Daily situation Report on Corona virus disease in Iran, National Committee on COVID-19 Epidemiology and Iranian CDC- Ministry of Health Medical Education, IR Iran; [March13, 2020]

# Indicators of infected and death cases in Iran (April 4)

Indicators	New lab-confirmed cases (in last 72 h)	COVID-19 deaths (in last week)
Age Mean (SD)	52.7(18.2)	67.4 (17.4)
Age Median (IQR)	53(38-66)	71(51-81)
Cases Over 60 years (%)	-	71.3
Cases with at least one co-morbidity (%)	27	81.8
Cases over 60 years/with at least one co-morbidity (%)	-	87.9

# International Sanctions implemented on Iran

- ▶ decreased quality of care provided to patients due to shortage of resources (lower test per million population in most 13 prevalent countries for COVID-19: 2,214 tests per 1 milion, Switzerland: 18,776).
- ▶ Total tests in Iran: 189790
- ▶ ICU care: 12% in Iran vs. 20% in world

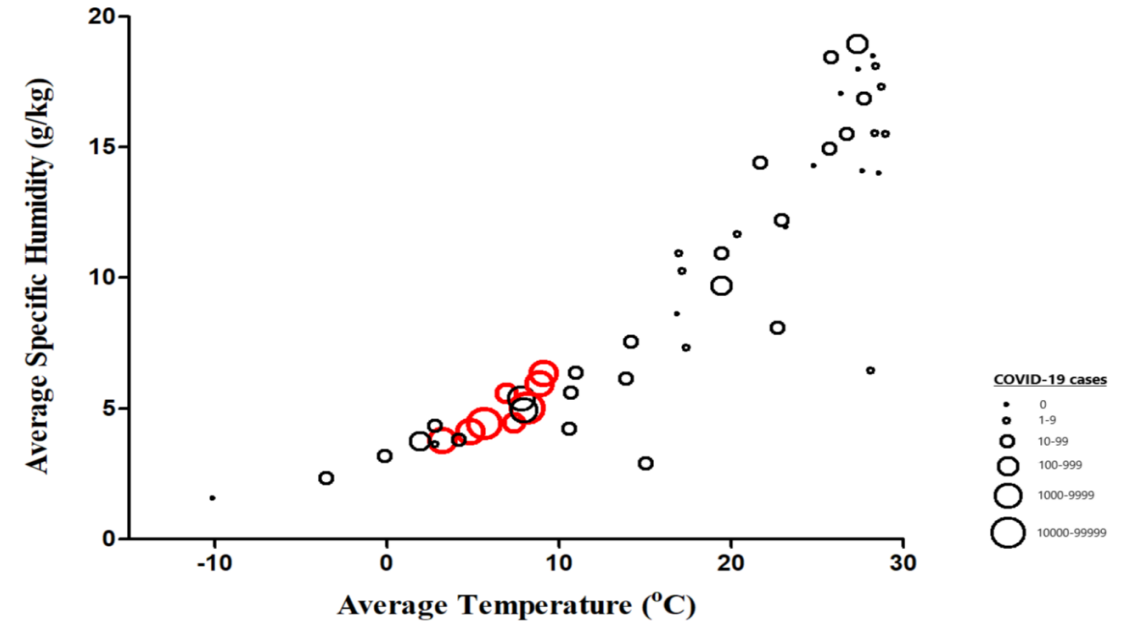
Indicators of screened, infected and death cases

Screening (since March 4 till April 4, 2020; 15:00 GMT)	Value
Number of services delivered for COVID-19	69.485.840
Target population with symptoms (%)	1.45
Screened symptomatic cases referred to clinic (%)	0.2
Visited cases that required homecare (%)	24.5
Visited cases that received dual-medication (%)	0.6
Visited cases that referred to the hospital (%)	4.6
People visiting hospital and are admitted in the hospital (%)	30.5
Clients' satisfaction of the received services (%)	97.3
<b>New lab-confirmed cases (in last 72 h)</b>	
Age mean (standard deviation)	54.2 (19.2)
Age median (inter-quartile range)	53 (39-70)
Sex distribution (%)	
Male	52.7
Female	47.3
Cases with at least one co-morbidity (%)	53.0
Cases admitted in ICU* (%)	12.3
Cases with more severe forms of the disease **	15.5
<b>COVID-19 deaths (in last week)<sup>§</sup></b>	
Age mean (standard deviation)	67.0 (16)
Age median (inter-quartile range)	72 (61-82)
Cases over 60 years (%)	77.2
Sex distribution (%)	
Male	57.7
Female	42.3
Cases with at least one co-morbidity (%)	60.4
Cases over 60 years/ with at least one co-morbidity (%)	87.9

\* To the total number of hospitalized COVID-19 patients. \*\* Based on available data, we considered patients with death outcome, as well as those admitted to ICU or under mechanical ventilation as more severe cases. The information in this chart is based on hospitalized cases, and outpatients are not included in this calculation. Inclusion of outpatients and asymptomatic cases would decrease the proportion of severe cases. <sup>§</sup> To increase the sample size, analysis of death cases is done on the data in the last week.

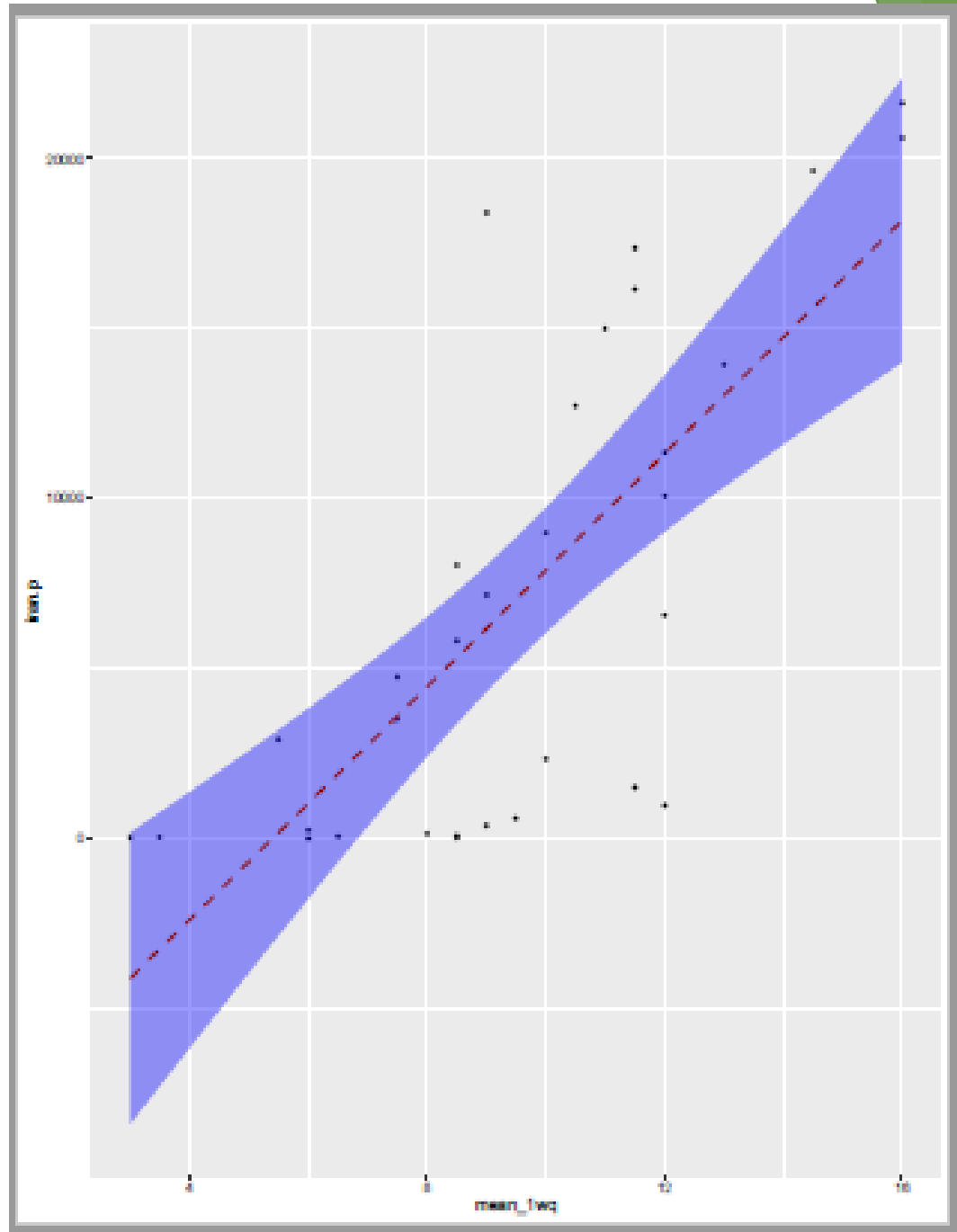
# COVID-19 and meteorological Parameters

- ▶ Many respiratory viruses have been shown to be affected by weather
- ▶ COVID-19 showed similar behavior
- ▶ COVID-19 Transmission is **REDUCED** by:
  - a. High Temperature
  - b. High Humidity
- ▶ Temperature and Humidity can affect the mortality of COVID-19
- ▶ In the figure the red circles belong to countries with higher mortality and incidence rates
- ▶ **Higher** mortality rate can be associated with particular range of temperature humidity (as represented in the figure)



1. Wang J, Tang K, Feng K, Lv W. High Temperature and High Humidity Reduce the Transmission of COVID-19. Available at SSRN 3551767. 2020.
2. Sajadi MM, Habibzadeh P, Vintzileos A, Shokouhi S, Miralles-Wilhelm F, Amoroso A. Temperature and latitude analysis to predict potential spread and seasonality for covid-19. Available at SSRN 3550308. 2020.
3. Bukhari Q, Jameel Y. Will coronavirus pandemic diminish by summer? Available at SSRN 3556998. 2020.

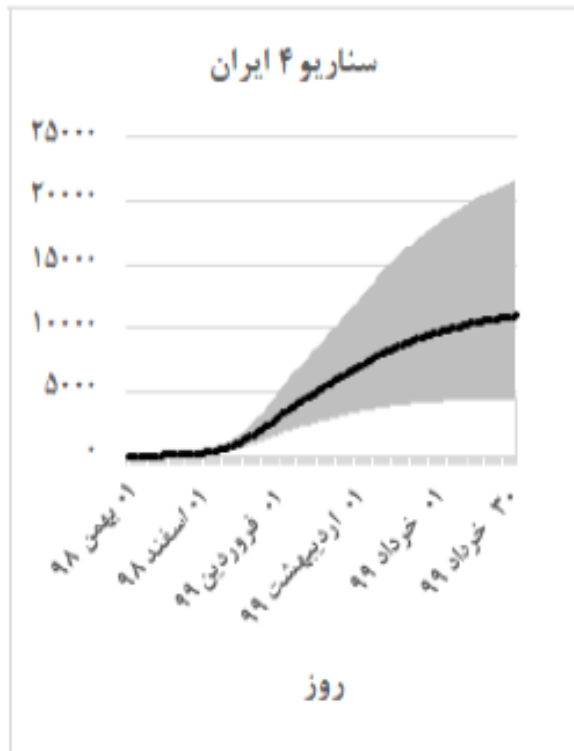
ارتباط دمای هفته قبل (محور  
افقی) با بروز بیماری (محور  
عمودی) در استانهای مختلف  
ایران



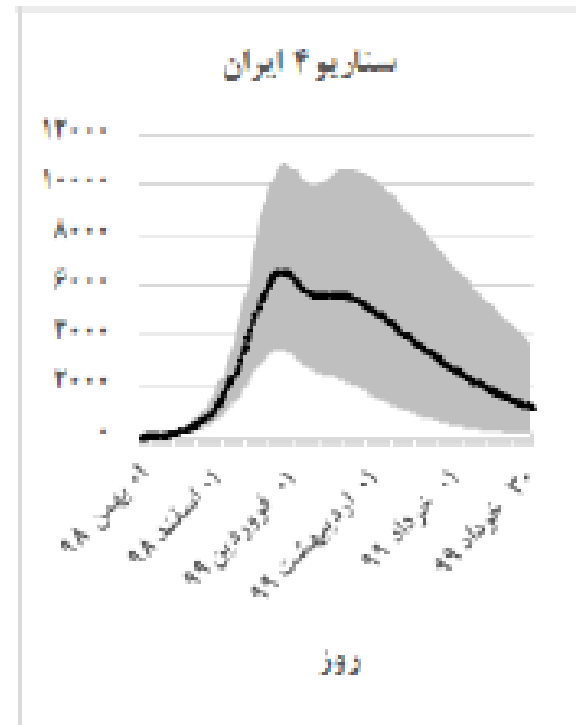
Pooled mean number of days from the onset of COVID-19 symptoms until death was 15.93 (95% CI: 13.07, 18.79)

Epidemiological Characteristics of COVID-19; a Systemic Review and Meta-Analysis

Malahat Khalili, Mohammad Karamouzian, Naser Nasiri, Sara Javadi, Ali Mirzazadeh, Hamid Sharifi



روند مرگ تجمعی در کشور از ابتدای اپیدمی  
یعنی اول بهمن ماه تا انتهای خرداد ماه



روند بستری تجمعی در کشور از ابتدای اپیدمی  
یعنی اول بهمن ماه تا انتهای خرداد ماه

بررسی نتایج مدلسازی اپیدمی کووید-۱۹ در ایران و تهران در سناریوهای مختلف تا پایان خردادماه ۱۳۹۹، مرکز تحقیقات مدلسازی در سلامت، دانشگاه علوم پزشکی کرمان، ۱۳ فروردین ماه ۱۳۹۸

مرگ	بیماران مبتلا				
تعداد کلی تا ۳۰ خرداد	تعداد کلی تا ۳۰ خرداد	تعداد موارد جدید در روز طی پیک بیماری	تاریخ پیک قابل انتظار	فاصله گذاری اجتماعی	جمعیت کلی
۹۳۲ (۳۷۳ - ۱۸۳۶)	۴۹۸۰۴ (۱۸۸۵۵ - ۱۰۴۱۱۳)	۵۷۹ (۲۴۷ - ۱۰۸۲)	۱۲ فروردین ۹۹	٪۲۰	۵ میلیون نفر
۵۷۱ (۲۲۲ - ۱۱۵۷)	۳۵۸۷۰ (۱۴۳۳۷ - ۷۳۱۶۷)	۴۷۳ (۱۹۱ - ۹۱۲)	۱۲ فروردین ۹۹	٪۳۰	



درصد مرگ بر اساس تشخیص بالینی در منطقه تحت پوشش دانشگاه  
علوم پزشکی ایران: ۱۸۵۴ / ۴۱۵ معادل ۱۸/۳ درصد

According to AR for death: Malignancy, CVD, Pulmonary, Renal and DM

