



COVID-19 vaccine effectiveness studies: The experience in Qatar

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Technical Consultation Meeting for the EM Regional COVID-19 Vaccine Effectiveness Studies

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An effective partnership between the government and academic sectors during the pandemic

National, federated databases for COVID-19 that include all SARS-CoV-2-related data such as PCR testing, rapid antigen testing, vaccinations, hospitalizations, and infection severity and mortality classifications per WHO guidelines

Modernization of health care

Advanced digital health platforms: The Cerner system



National COVID-19 databases

- **Completeness** of data
- Inclusion of **reason for testing**
- COVID-19 severity, criticality, and fatality strictly **per WHO definitions**

Genomic surveillance

- Viral genome **sequencing of weekly random samples**
- Real-Time PCR **genotyping** of SARS-CoV-2 infections

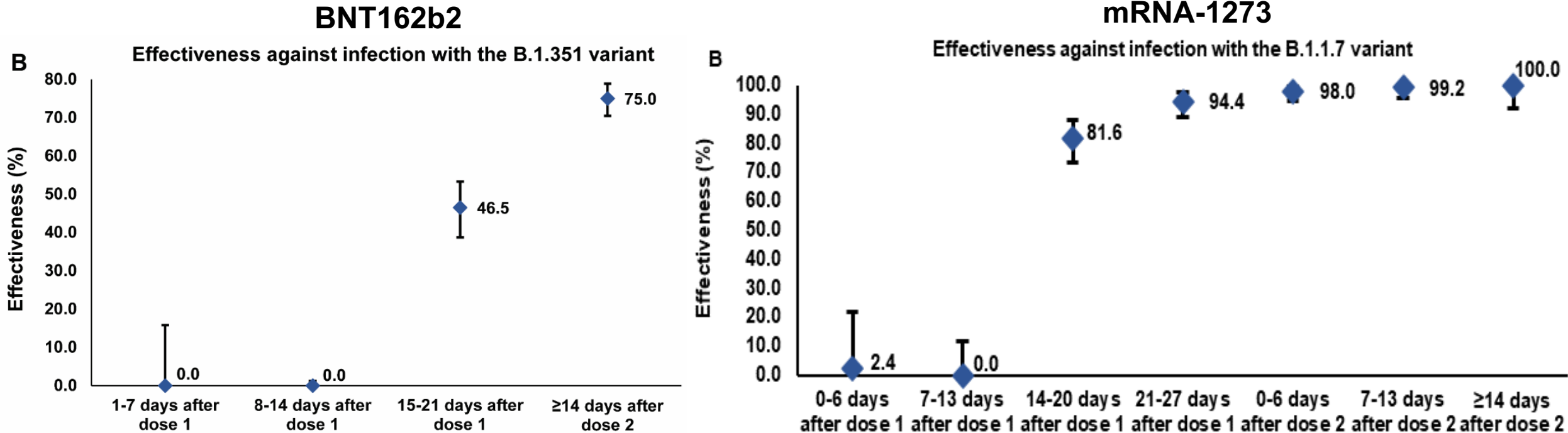
We had the different pieces together
to power epidemiologic studies of
SARS-CoV-2

Study designs

- Test-negative case-control designs
- Other case-control designs
- Cohort designs
- Target trial designs
- Cross sectional designs

Vaccine effectiveness

BNT162b2 vaccine protection against **Beta** variant

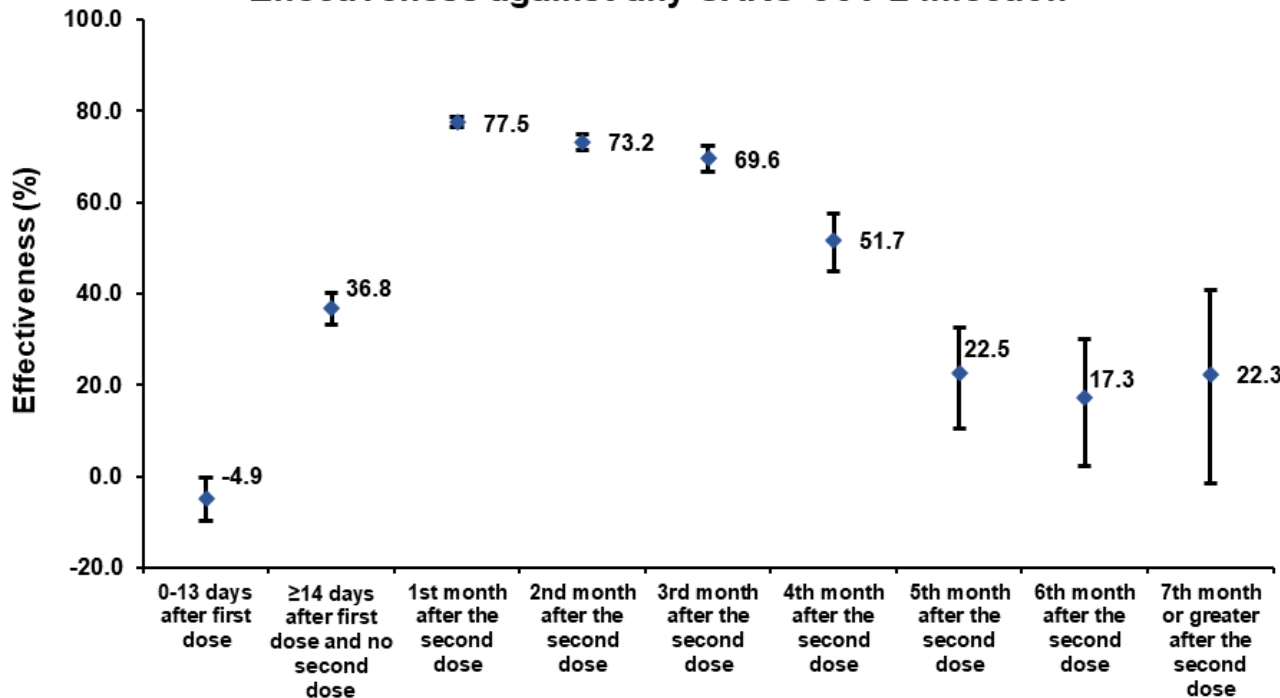


Abu-Raddad LJ, Chemaitelly H, Butt AA, National Study Group for C-V. Effectiveness of the BNT162b2 Covid-19 Vaccine against the B.1.1.7 and B.1.351 Variants. *N Engl J Med* 2021;385:187-9.
 Abu-Raddad LJ, Chemaitelly H, Yassine HM, et al. Pfizer-BioNTech mRNA BNT162b2 Covid-19 vaccine protection against variants of concern after one versus two doses. *J Travel Med.* 2021 May 28:taab083. doi: 10.1093/jtm/taab083.

Waning of BNT162b2 and mRNA-1273 vaccine effectiveness against infection

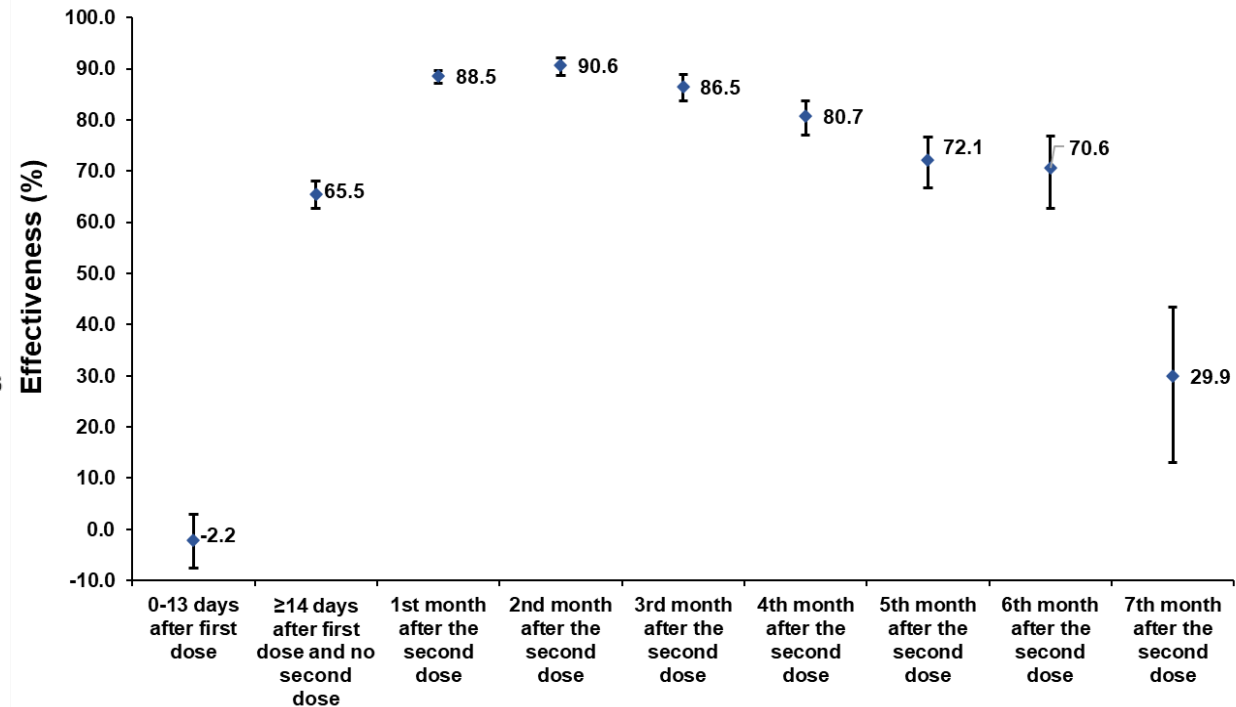
BNT162b2

Effectiveness against any SARS-CoV-2 infection



mRNA-1273

Effectiveness against any SARS-CoV-2 infection



Chemaitelly H, Tang P, Hasan MR, et al. Waning of BNT162b2 Vaccine Protection against SARS-CoV-2 Infection in Qatar. *N Engl J Med* 2021. 385:e83.

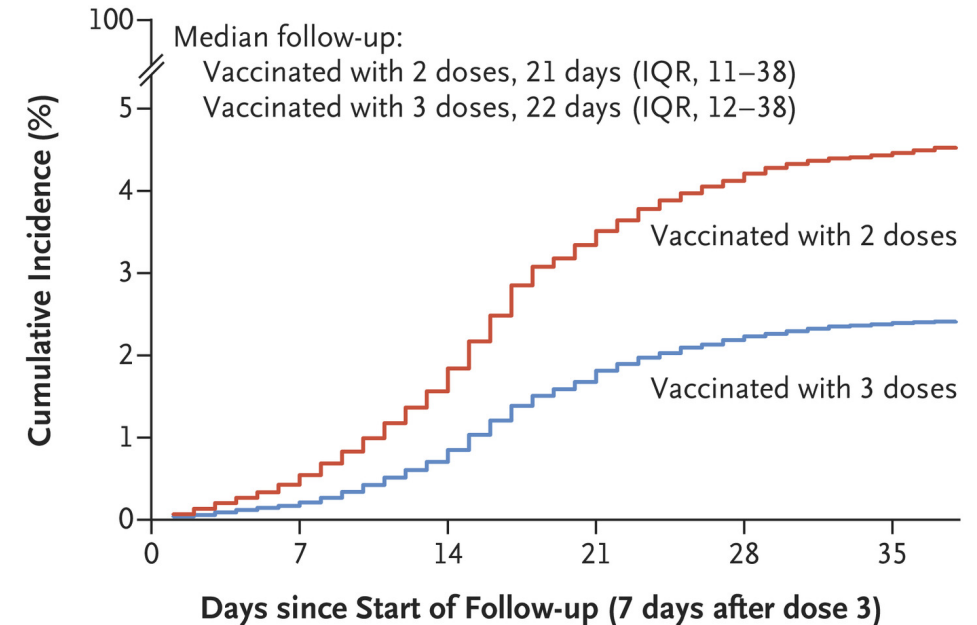
Abu-Raddad LJ, Chemaitelly H, Bertollini R, et al. Waning mRNA-1273 Vaccine Effectiveness against SARS-CoV-2 Infection in Qatar. *N Engl J Med* 2022. 386(11): 1091-1093.

Effectiveness of BNT162b2 booster against symptomatic Omicron infection

Booster effectiveness against symptomatic Omicron infection relative to primary series was 49.4% (95% CI: 47.1-51.6%)

Booster effectiveness against COVID-19 hospitalization and death due to Omicron infection, relative to primary series, was 76.5% (95% CI: 55.9-87.5%)

A Symptomatic Omicron Infection after BNT162b2 Vaccination



No. at Risk	0	7	14	21	28	35
Vaccinated with 2 doses	189,483	162,896	131,625	97,210	74,544	59,598
Vaccinated with 3 doses	189,483	163,851	135,279	103,404	81,558	66,302

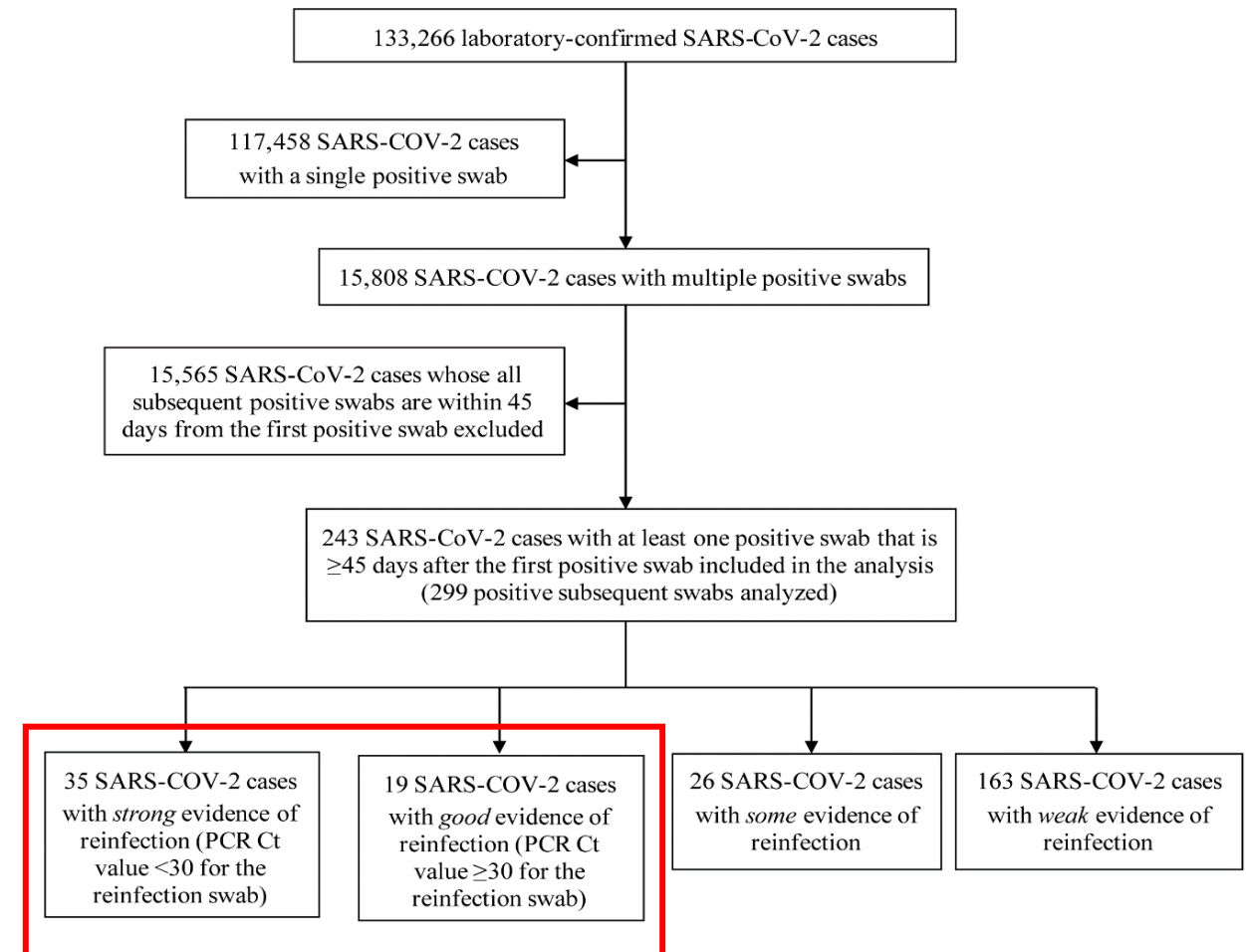
Abu-Raddad LJ, Chemaitelly H, Ayoub HH, et al. Effect of mRNA Vaccine Boosters against SARS-CoV-2 Omicron Infection in Qatar. *N Engl J Med* 2022;386:1804-16.

Protection of natural immunity

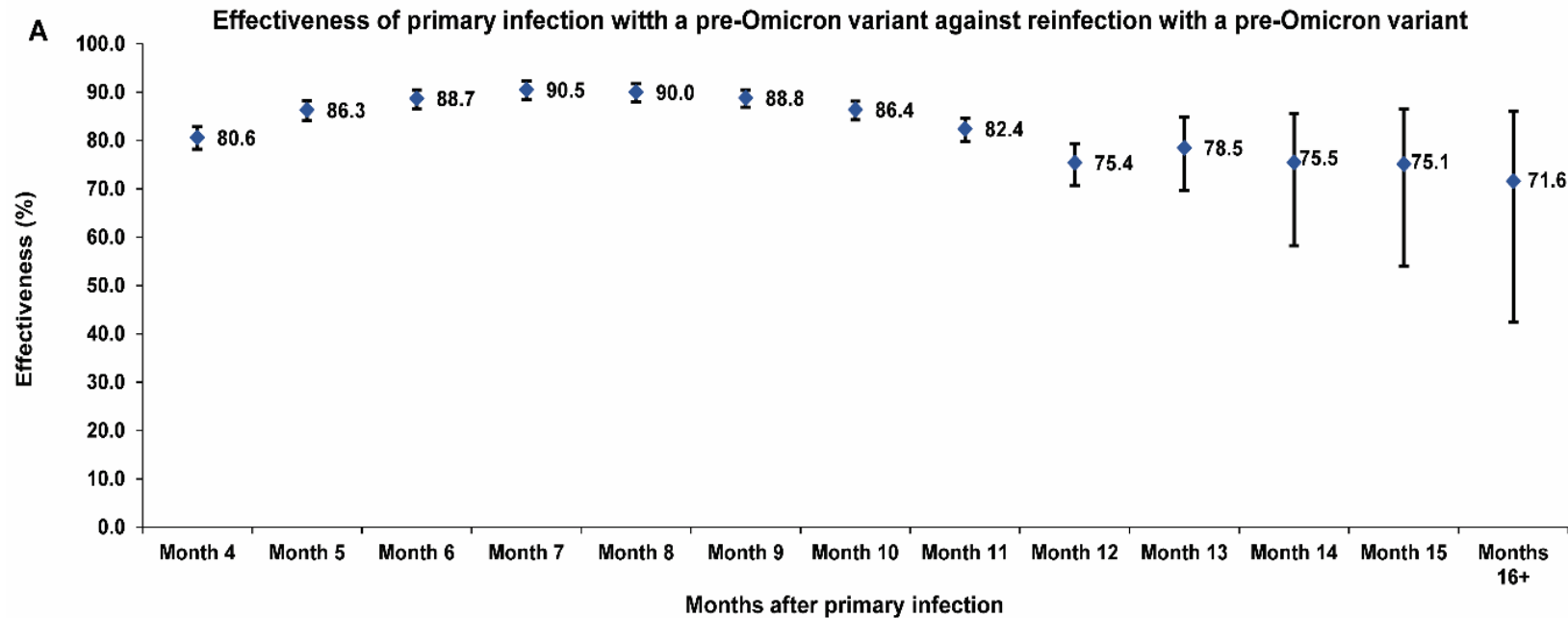
Protection of natural infection

Effectiveness of natural infection against reinfection was estimated at 95%.

Abu-Raddad LJ et al. Assessment of the risk of SARS-CoV-2 reinfection in an intense re-exposure setting. *Clinical Infectious Diseases* 2020. [ciaa1846](https://doi.org/10.1093/cid/ciaa1846). doi: 10.1093/cid/ciaa1846



Waning of natural immunity before Omicron



Evidence for waning of natural infection protection over time

Chemaitelly H, Nagelkerke N, Ayoub HH, et al. Duration of immune protection of SARS-CoV-2 natural infection against reinfection. *J Travel Med* 2022;29:taac109. doi: 10.1093/jtm/taac109.

Protection against symptomatic Omicron reinfection

SARS-CoV-2 Variant	PE_s against symptomatic reinfection
Alpha	90.2% (95% CI: 60.2-97.6)
Beta	84.8% (95% CI: 74.5-91.0)
Delta	92.0% (95% CI: 87.9-94.7)
Omicron	56.0% (95% CI: 50.6-60.9)

Altarawneh HN, Chemaitelly H, Hasan MR, et al. Protection against the Omicron Variant from Previous SARS-CoV-2 Infection. *N Engl J Med* 2022; 386(13): 1288-90.

**>20 major frontline COVID-19
discoveries**

COVID-19 national response accomplishments

- 97 COVID-19 papers published since pandemic onset
 - 13 papers published in the *New England Journal of Medicine* ranked at the 99th percentile and were the most viewed at NEJM website
 - 10 papers published in *Lancet journals*
 - 3 papers published in *Nature Medicine*
 - 2 papers published in *the Journal of American Medical Association (JAMA)*
- These accomplishments are exceptionally unique within the context of the modern history of medical scholarship in our region.

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ORIGINAL ARTICLE

Waning of BNT162b2 Vaccine Protection against SARS-CoV-2 Infection in Qatar

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COVID-19 national response accomplishments

- Informed guidelines at WHO and different country guidelines
- Presented numerous times at high level meetings such as by Dr. Anthony Fauci in his White House press briefing and in US Senate testimony.
- Covered widely in international press and media such as at New York Times, Washington Post, CNN among others.
- This all shows the **potential we have to excel in the Middle East and North Africa with the right investment on science.**

Key ingredients

- Structure, completeness, and quality of the databases.
- Academic technical epidemiology capacity
- Academic genomic surveillance capacity
- Strong and effective partnership between the academic and governmental sectors.

THANK YOU

- *Ministry of Public Health*
- *Hamad Medical Corporation*
- *Sidra Medicine*
- *Qatar University*
- *Primary Health Care Corporation*
- *Infectious Disease Epidemiology Group & WHO Collaborating Centre for Disease Epidemiology Analytics on HIV/AIDS, Sexually Transmitted Infections, and Viral Hepatitis*
- *Biomedical Research Program at Weill Cornell Medicine-Qatar*



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