

# The Impact of Restricted Mobility Due to COVID-19 in Saudi Arabia

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## Instant Insight

August 19, 2020

KS--2020-II25

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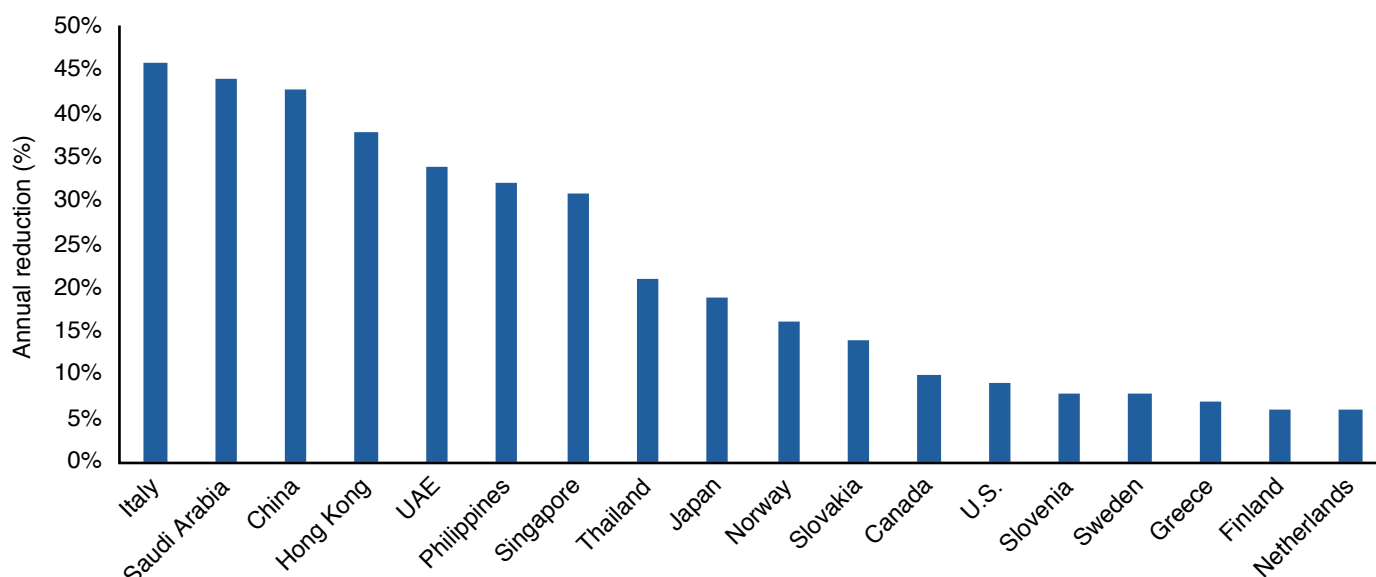
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Seven months since the first COVID-19 case was identified in Wuhan, China, the contagious and vastly transmissible virus has continued to spread and grow into a global pandemic affecting more than 20 million people. When the World Health Organization (WHO) announced a Public Health Emergency of International Concern, countries started imposing restrictions on local and international travel, as well as advocating the importance of social distancing to control the spread of the virus. An emphasis on ‘flattening the curve’ started to emerge as a way to balance the tradeoff between public health and economic activity. Countries around the world, including China, France, and the United States (U.S.), placed areas under 24-hour lockdowns and restricted movement to certain hours of the day. One of the effects of these restrictions and regulations set by governments was a dramatic decrease in traffic (Figure 1).

Figure 1 provides year-on-year traffic reduction data for 18 countries, using navigation data collected by TomTom.<sup>1</sup> Reductions in national traffic range between 6% to 46%, with a median reduction of around 20%. These values are expected to increase if restrictions on mobility continue. In Saudi Arabia, traffic congestion fell by 44%, the second-highest reduction of the 18 countries, with the highest reduction in Italy. This was a direct result of schools and airports in the Kingdom closing, as well as government curfews. This insight will analyze the effects of mobility restrictions in the Kingdom with a focus on road accidents, emissions, aviation, and e-commerce.

**Figure 1.** Annual traffic congestion reduction by country as of March 15, 2020.



Source: Reproduced graph from Exante data, TomTom.

## Road Traffic Accidents

Although road injury/death rates have improved due to stricter driving regulations and fines for infringing them, the WHO's statement following the 2019 Traffic Safety Conference in Riyadh, Saudi Arabia, still places the Kingdom among the countries with the highest road injury/death rates (Arab News 2019). This factor has long put pressure on the health care system, even more so now due to the COVID-19 pandemic. However, the restrictive mobility measures imposed in the Kingdom led to a large decrease in road congestion, thereby decreasing (directly or indirectly) road traffic accidents during that period. A report conducted by the Road Ecology Center at the University of California, Davis compared injury/fatality rates using data from the California Highway Patrol. A comparison was done between the total injury/fatality cases 10 days before and after the "shelter in place" order was imposed (March 20, 2020). From March 10-19, there was effectively no change between the 2019 and 2020 injury/fatality levels. However, from March 21-30 there was a significant decrease in traffic-related injuries/deaths compared with the same period in 2019. Furthermore, there was a 55% decrease in traffic-related injuries/deaths between March 10-19 and March 21-30, 2020. Although the Kingdom has no official data on road traffic accidents during 2020, there is a clear connection between restrictive mobility measures and fewer injuries/deaths from road traffic accidents. In addition to restricted mobility, non-essential activities and shops were closed from an early stage, which played a role in maximizing the number of hospital beds available for COVID-19 patients. This has allowed the Kingdom to maintain one of the lowest COVID-19 death rates in the world.

Saudi Arabia's Ministry of Transport took the opportunity during the curfews to perform construction work on around 2.7 million meters of roads (MoT 2020). This effort, aligned with Saudi Vision 2030, will help to maximize road safety measures and reduce road accident rates in both the short and long term.

## Emissions

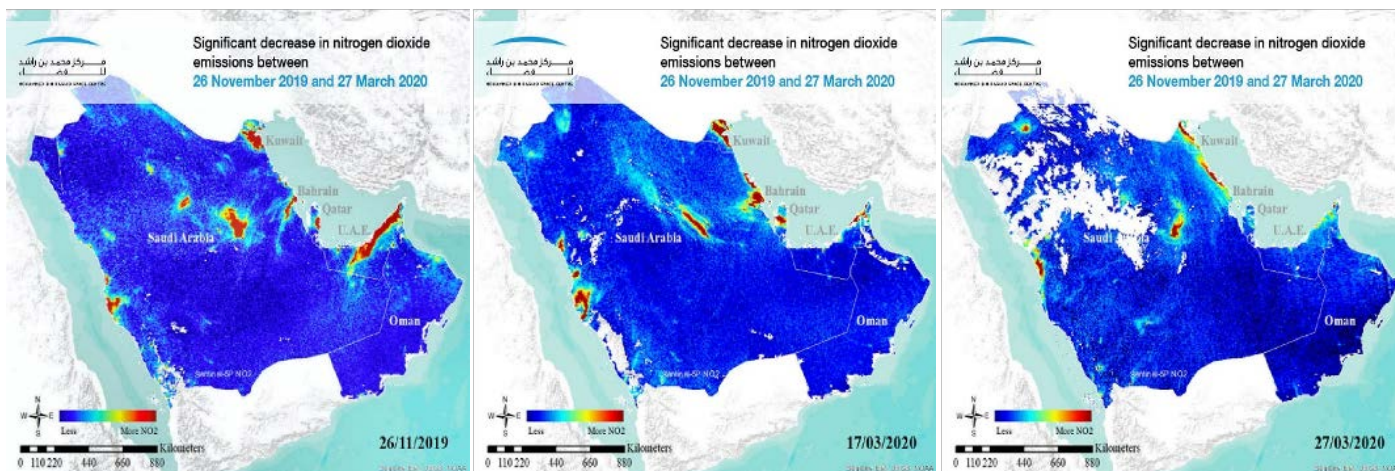
Emissions reduction was another effect of the mobility restrictions observable in satellite imagery and different air quality monitoring stations.

Nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and carbon monoxide (CO) levels were monitored during the first four months of 2020. A series of images released by the Mohammed Bin Rashid Space Centre (MBRSC) show the significant drop in NO<sub>2</sub> concentration levels between November 26, 2019 and March 27, 2020 in Saudi Arabia and other Gulf Cooperation Council countries (Figure 2). This significant decrease begins in early March, which coincides with the precautionary measures taken by the Saudi government. According to the WHO, NO<sub>2</sub> is mainly produced from burning engine fuel, power generation and other industrial processes. With fewer vehicles on the road, and, hence, lower fuel demand, the short-term reduction in NO<sub>2</sub> is significant.

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<sup>1</sup> TomTom collects traffic data from the 600 million users of its navigation devices, in-dash systems and smartphones. According to the "Location Ecosystems H1 2018 Update," HERE, Google, and TomTom led the location ecosystem effectiveness index, with Google collecting data from around 1 billion active users compared with TomTom's 600 million users.

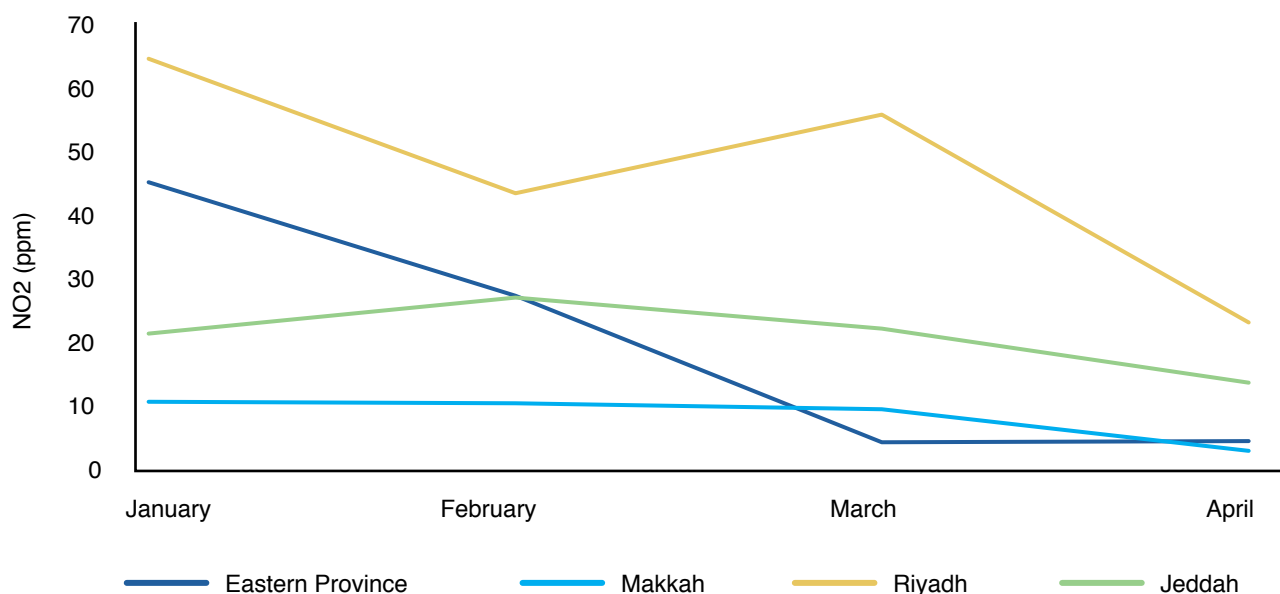
**Figure 2.** Side-by-side comparisons showing a decrease in NO2 levels in Saudi Arabia.



Source: Mohammed Bin Rashid Space Centre.

The General Authority of Meteorology and Environmental Protection (GAMEP) also provides data from air quality monitoring stations across the Kingdom on a daily, monthly, and yearly basis. Although the air quality monitoring stations are in different zoning areas of Saudi cities, the data analyzed for this insight was from the monthly reports for stations located in residential neighborhoods. Figure 3 shows the reduction in NO2 across multiple cities and provinces in the Kingdom, with Riyadh showing a 60% reduction in NO2. The variation between cities and provinces is mostly affected by their different curfew measures.

**Figure 3. Nitrogen dioxide levels across Saudi Arabia during COVID-19 (2020).**



Source: The General Authority of Meteorology and Environmental Protection, Saudi Arabia.

GAMEP’s monthly air quality reports also show a decrease in other emissions. The Aziziya area, located in a residential area in Makkah, saw a 19% reduction of SO2 between January and April 2020. Nazareth Park station was one of the earliest stations to record a decrease in CO levels, from 2.9 parts per million (ppm) in February to 0.3 ppm in April. The significant drop recorded by this station shows the direct impact of traffic reduction on air quality. This station is located in Qatif, which was the first city to implement a curfew. The Riyadh Environment group, part of the Royal Commission for Riyadh City, announced that Riyadh had seen a reduction in CO of 56% between January and April 2020.

## Aviation

COVID-19 has also massively reduced air traffic, both locally and internationally. With most international and domestic flights suspended around the world the International Air Transport Association (IATA) estimates that air traffic in the Middle East and North Africa region (MENA) could fall by 51% compared with 2019, reducing the revenue of the MENA aviation industry by around \$24 billion. In a report published on April 23, the IATA estimated that the Saudi aviation industry would suffer a revenue loss of \$7.2 billion, with revenue falling 35% compared with 2019. This would risk some 287,500 jobs, with around 35 million fewer passengers expected. Furthermore, the Saudi aviation industry directly, and through related revenue from tourism, accounts for around \$17.9 billion of the country’s gross domestic product (GDP) (IATA 2020). These estimates were based on a scenario of severe travel restrictions lasting for three months. Moreover, the Official Aviation Guide (OAG) has been monitoring weekly airline passenger capacity cuts in response to the imposed measures since the beginning of the outbreak. Their April report shows that Saudi Arabian airline passenger capacities declined by more than 100,000 seats from 14.3% from April 13 to April 20 (Table 1).

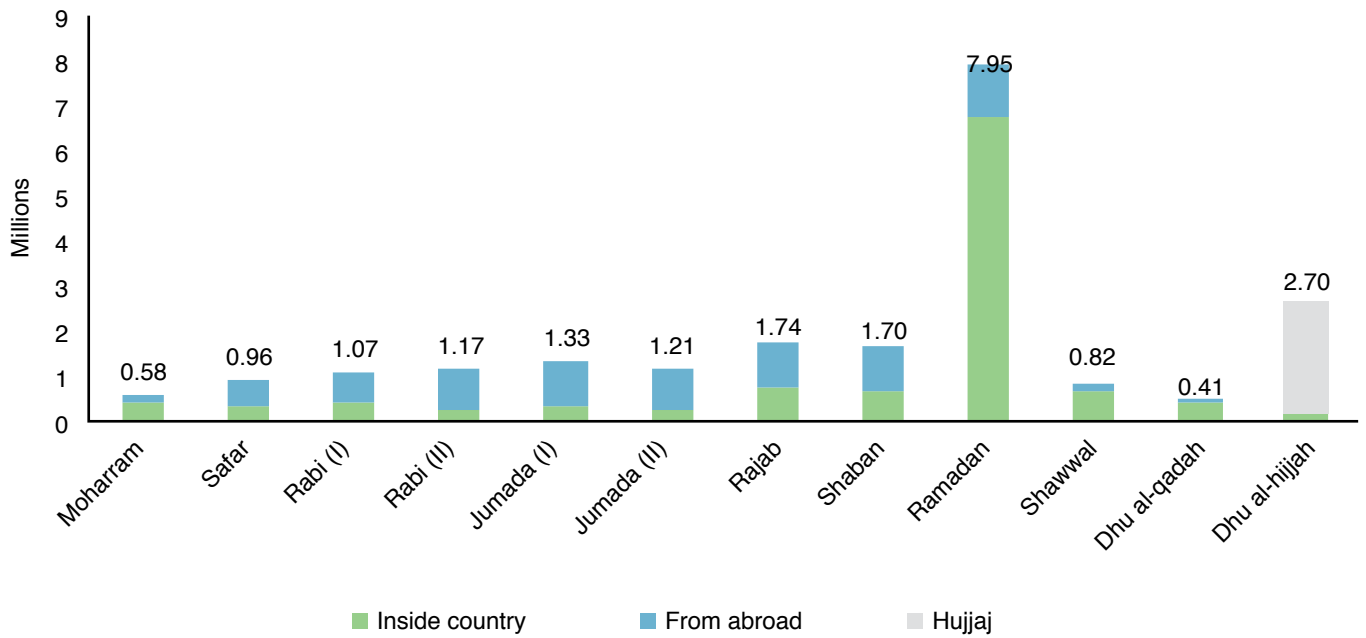
**Table 1.** Week-on-week capacity changes.

	9-Mar	16-Mar	23-Mar	30-Mar	6-Apr	13-Apr	20-Apr
<b>Saudi Arabia</b>	1,301,605	1,102,472	861,953	798,780	753,546	695,040	594,701

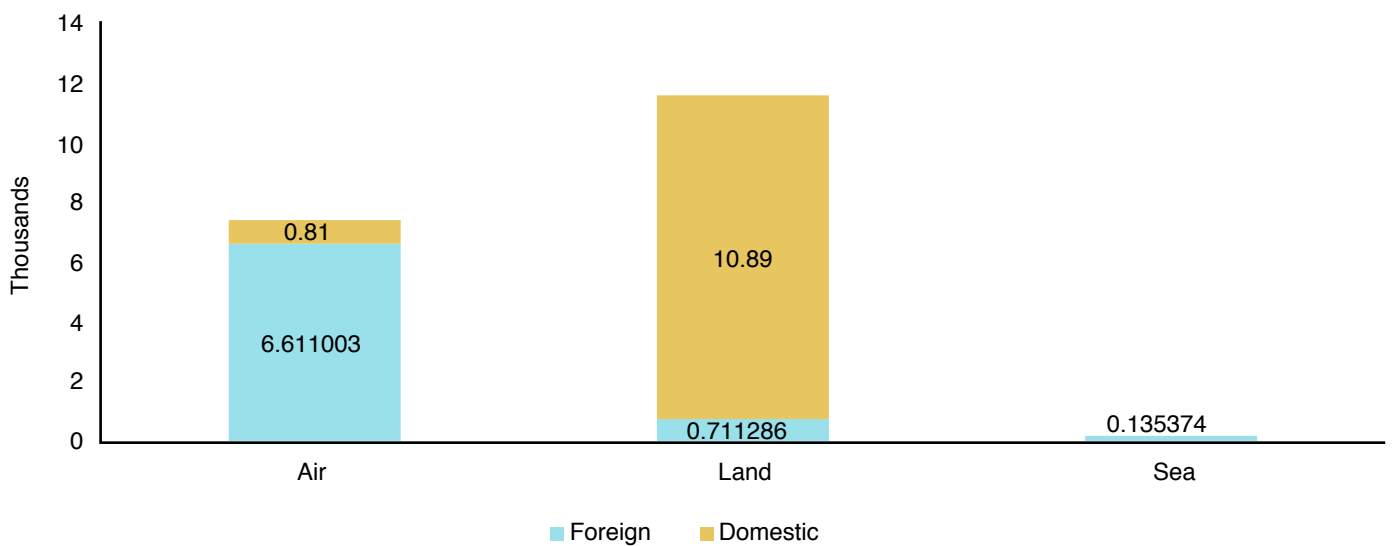
Source: OAG Schedules Analyser, 2020.

Another form of traffic reduction expected this year in the Kingdom is pilgrimage travel, which contributed 6.1% of total Saudi GDP in 2019 (GaStat 2020b). A major decrease in Hajj and Umrah pilgrims was expected due to the restrictions set by the government on local and international travel. During 2019, around 19 million pilgrims visited Makkah to perform Umrah, an increase of 4.63% compared with 2018. Of the total, 38.93% were international Umrah pilgrims and 61.07% came from the Kingdom. Land travel (private cars, trains, and buses) is the most common means of transportation (93%) for domestic pilgrims when traveling to Makkah, while 88.65% of foreign pilgrims travel by plane (GaStat 2020b). Umrah pilgrims’ numbers have been growing year-on-year, and higher growth was expected in 2020 due to the new Saudi tourist visa launched in September 2019. However, on March 4 (Rajab 9), the Saudi government suspended Umrah for all domestic and foreign pilgrims.

**Figure 4.** Total number of pilgrims in 2019 by month.



**Figure 5.** Mode of travel for pilgrims.



Source: GaStat (2020a).

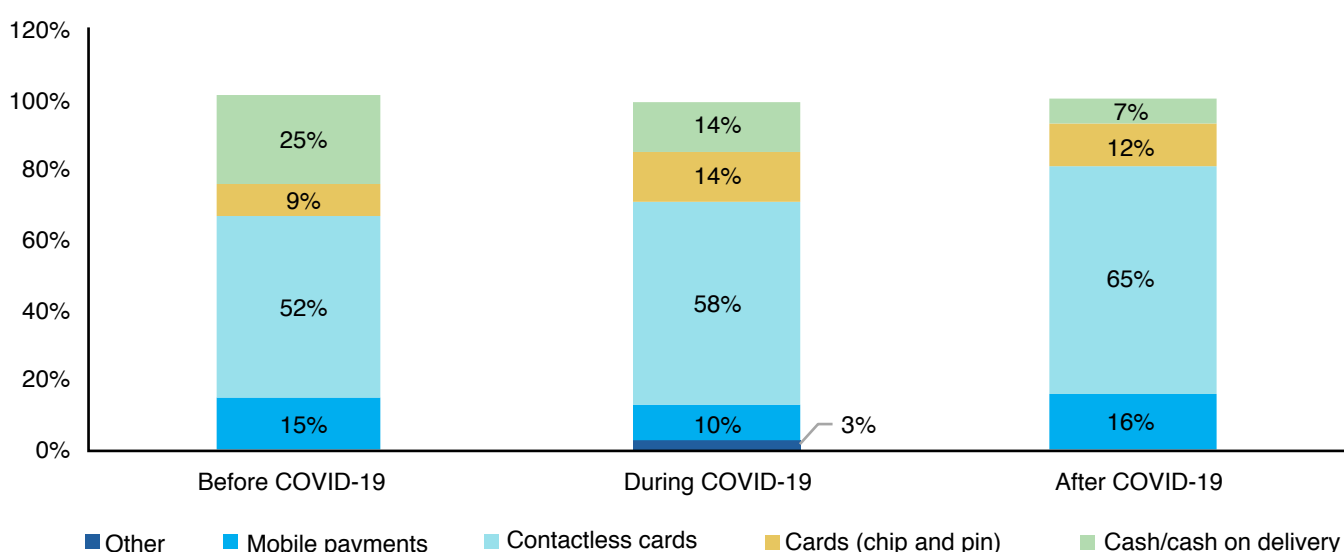
As Figure 4 shows, in 2019, 59% of all pilgrims to Makkah came between Rajab and Ramadan (Hijri Islamic months which translate to March and April in the Gregorian calendar). These two months account for over 50% of the annual pilgrims to Makkah, and, with the suspension of Umrah in Makkah still in place, this year's numbers might be reduced by more than 60% year-on-year. The Saudi authorities advised pilgrims to delay their plans for this year's Hajj, but they did not make any official statements about cancellations. Aside from performing religious acts in the Kingdom, pilgrims also contribute to tourism and business in the Makkah and Madinah regions, as well as the Kingdom's economy more broadly. However, with this dramatic reduction in pilgrims, the contributions of Hajj and Umrah to the Saudi economy this year will have been sizably reduced.

## E-Commerce

The Saudi e-commerce sector has seen a rapid spike in growth amid the restrictive measures taken to curb the spread of COVID-19, with online payments reaching \$450 million in March, according to the Saudi Payments Company. Also, the number of orders made through delivery apps increased by 54% from March to April and 240% from March to May. The number of delivery drivers registered on delivery apps has increased by 500% since the beginning of the outbreak (CITC 2020).

According to Visa's COVID-19 CEMEA Impact Tracker report, a survey of around 500 Saudi consumers and merchants indicated that around 38% of merchants established an e-commerce platform during the lockdown to accommodate demand. Eighty percent of merchants predicted an increase in the use of such platforms even after the COVID-19 crisis. The same report estimates that contactless payments will increase to 65% of all consumer transactions after the pandemic, rising 52% from pre-COVID-19 levels (Figure 6). This trend is in line with the Vision 2030 target of reaching a 70% share of contactless payments in consumer transactions by 2030, up from the 2020 target of 28%.

**Figure 6.** Frequent payments method used by customers.



Source: VISA (2020).

Note: Totals might not add up due to rounding from the source.



## Looking Ahead

As the impact of restricted mobility from this pandemic unfolds, longer-term changes in consumer behavior and impacts on different sectors are attracting experts' attention. One of their major concerns is how people will react when countries ease their lockdown restrictions and what transportation will look like after the pandemic. Many experts predict that people will become more reluctant to use public transportation and ridesharing services and keep following social distancing measures for a while, which would result in greater use of private vehicles. Moreover, China's experience post-lockdown supports this prediction: it experienced a surge in vehicle traffic, with almost all its major cities reaching their pre-pandemic averages (Johnson 2020).

Emissions and air quality are also coming into focus, with one of the short-term positive impacts of the global lockdown measures being improvements in air quality. Emissions are expected to go back to their long-term averages when countries restart their economies. Many experts are concerned that the rebound in emissions might be larger than the decline under the lockdown measures if countries depend heavily on carbon-intensive energy sources and historically low oil prices to rebuild their economies. This happened after the 2008-2009 global financial crisis, following which global carbon dioxide emissions from fossil fuel combustion and cement production decreased by 1.4% in 2009, before growing by 5.9% in 2010 (Glen et al. 2011). However, this sharp rebound could be a learning opportunity for countries, as highlighted by Dr. Fatih Birol, Executive Director of the International Energy Agency:

*“If the aftermath of the 2008 financial crisis is anything to go by, we are likely to see a sharp rebound in emissions as soon as economic conditions improve. But governments can learn from that experience by putting clean energy technologies – renewables, efficiency, batteries, hydrogen and carbon capture – at the heart of their plans for economic recovery.”*

However, there is expected to be a decrease in demand for air travel even after the pandemic. A survey by IATA shows that 40% of recent travelers indicate that they will wait at least six months after the virus is contained before flying internationally again (IATA 2020). Moreover, business travel in particular is expected to be reduced in the long term, as the perception of its necessity for most people has changed after online meetings and video conferencing have been shown to work successfully.

This pandemic has highlighted the essential role of e-commerce and has encouraged more businesses to invest in online platforms to mitigate the economic impact of the various restrictions. E-commerce is estimated to be growing in Saudi Arabia, supported by the digital transformation plans of Vision 2030, the Saudi government's blueprint for economic diversification.

The reduction in the Kingdom's road traffic is expected only to be short term. However, when the world emerges from this pandemic and travel bans are lifted, any profound long-term effects on global communities and whether any of the newly adapted habits will persist will become clearer.

## References

- TomTom. 2020. "Traffic Index: About." Accessed May 2020. [https://www.tomtom.com/en\\_gb/traffic-index/about/](https://www.tomtom.com/en_gb/traffic-index/about/).
- The Saudi Civil Aviation Holding Company (SAVC). n.d. "Aviation Industry." [https://www.savc.com.sa/en-us/P/corporatization/Aviation\\_Industry](https://www.savc.com.sa/en-us/P/corporatization/Aviation_Industry).
- Saudi Open Data Portal. 2019. "Ministry of Interior - General Directorate of Traffic." July 16.
- Institute for Health Metrics and Evaluation. 2017. "What Causes the Most Deaths?" September 15. <http://www.healthdata.org/saudi-arabia>.
- Casey, David. 2020. "COVID-19: Middle East and Africa Market Update (w/e April 26)." Routes Online, April 28. <https://www.routesonline.com/news/29/breaking-news/291003/covid-19-middle-east-and-africa-market-update-we-april-26/>.
- Communications and Information Technology Commission (CITC). 2020. Press release. <https://www.citc.gov.sa/ar/mediacenter/pressreleases/Pages/20200601.aspx>
- VISA. 2020. "COVID-19 CEMEA Impact Tracker." June.
- DeNicola, Erica, Omar S. Aburizaize, Azhar Siddique, Haider Khwaja, and David O. Carpenter. 2016. "Road Traffic Injury as a Major Public Health Issue in the Kingdom of Saudi Arabia: A Review." *Frontiers in Public Health*, September 30. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5044776/>.
- General Authority for Statistics (GaStat). 2020a. "Umrah Statistics Bulletin, 2019." Accessed April 30, 2020. [https://www.stats.gov.sa/sites/default/files/umrah\\_2019\\_e-15-3\\_kp.pdf](https://www.stats.gov.sa/sites/default/files/umrah_2019_e-15-3_kp.pdf)
- . 2020b. "Gross Domestic Product 2019." Accessed August 10, 2020. [https://www.stats.gov.sa/sites/default/files/gdp\\_report2019\\_en\\_1.pdf](https://www.stats.gov.sa/sites/default/files/gdp_report2019_en_1.pdf)
- General Authority of Meteorology and Environmental Protection (GAMEP). 2020. "Air Quality Monthly Report." Accessed April 29, 2020, <https://www.pme.gov.sa/Ar/Environment/AirQuality/Pages/AQ-Reports.aspx?folderID=fb4fb307-f7a8-4c2c-9a0c-d0ebeed5b088>
- Grant, John. 2020. "Coronavirus Update Week Twelve - Below Forty Million and Counting." *Official Aviation Guide*, April 6. <https://www.oag.com/blog/below-forty-million-and-counting>.
- Invest Saudi. 2020. "Investment Highlights - Spring 2020." April.

Johnson, Keith. 2020. "Can Europe and the U.S. Follow China's Lead on Economic Recovery?" *Foreign Policy*, March 25.

Peters, Glen, Gregg Marland, Corrine Le Quéré, Thomas Boden, Josep Canadell, and Michael Raupach. 2011. "Rapid Growth in CO<sub>2</sub> Emissions after the 2008–2009 Global Financial Crisis." *Nature Climate Change* 2:2-4.

Retallack, Angus Eugene, and Bertram Ostendorf. 2020 "Relationship Between Traffic Volume and Accident Frequency at Intersections." *International Journal of Environmental Research and Public Health*, February 21. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7068508/>.

Riyadh Environment. 2020. Twitter (@arriyadhenv), April 15, 11:37 p.m. <https://twitter.com/arriyadhenv/status/1250523713776254982?s=20>

The International Air Transport Association (IATA). 2020. "Slow Recovery Needs Confidence Boosting Measures." April 21. <https://www.iata.org/en/pressroom/pr/2020-04-21-01/>.

———. 2020. "Relief is Critical for Middle East Airlines as COVID-19 Impact Deepens." April 23. <https://www.iata.org/en/pressroom/pr/2020-04-23-01/>.

———. 2020. "IATA Calls on the Government of the Kingdom of Saudi Arabia to Support Aviation in the Face of COVID-19 Crisis." May 13. <https://www.iata.org/en/pressroom/pr/2020-05-13-01/>.

The International Energy Agency (IEA). 2020. "Global energy demand to plunge this year as a result of the biggest shock since the Second World War." April 30. <https://www.iea.org/news/global-energy-demand-to-plunge-this-year-as-a-result-of-the-biggest-shock-since-the-second-world-war>.

World Health Organization (WHO). 2020. "WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020." March 11. <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.

Rashid Hassan. 2019. "KSA's traffic accident deaths, injuries decrease in 2018." *Arab News*, March 12. <https://www.arabnews.com/node/1465286/saudi-arabia>

Shilling, Fraser. Special Report: Impact of COVID19 on California Traffic Accidents. Road Ecology Center UC DAVIS, 2020.

"Total of More than 2,770,000 Meters. Ministry of Transport Intensifies Work on The Kingdom's Roads during Curfew Period." Ministry of Transport, May 10, 2020. <https://www.mot.gov.sa/ar/MediaCenter/News/Pages/NEWS1133.aspx>.



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