

IMPACTS of COVID-19 on THE ENVIRONMENT

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ABSTRACT

The COVID-19 pandemic had scarcely made an impact on the world as of the beginning of 2020, although it has quickly spread over the universe since it was first detected in early December 2019. By mid-March 2021, the COVID-19 had practically hit every country on the earth. As a primary precaution to prevent the spread of disease and mortality, some nations have implemented quarantines and the suspension of many activities. The termination of these activities has resulted in significant economic losses. However, it has been widely reported that these steps have improved air quality, particularly in highly polluted areas with considerable populations and industrial activity. Worldwide reports and verification of lower carbon, nitrogen, sulphur, and particulate matter emissions have been made in relation with shutdown times. On the other hand, it has been revealed that ozone levels in the ambient air have increased, owing mostly to lower nitrogen emissions. Furthermore, it has been claimed that natural water resources have higher water quality. Wastewater treatment plants have reported an increase in organic load with persistent chemicals as a result of increased use of sanitizers, disinfectants, and antibiotics. In general, the qualitative and quantitative volumes of solid waste, created as a result of the COVID-19 outbreak, have both increased. This study presents and summarises the environmental impacts of COVID-19 as recorded in the literature for various countries throughout the world, which provides a comprehensive perspective of the COVID-19's environmental consequences.

Keywords: Corona virus; COVID-19, Climate change; Greenhouse gas emission; Medical solid waste.

INTRODUCTION

COVID-19, the illness produced by the novel coronavirus SARS-CoV-2, is most likely a pandemic. However, what exactly is the distinction between a pandemic, an epidemic, and an outbreak? And when does a sickness become a public health concern? These are the fundamentals of the transmission of deadly diseases, as well as what you can do to safeguard oneself, family, and local community. Let's start with the definitions of each word. Let's briefly begin with a definition for each word. An epidemic occurs when an infectious disease spreads faster than scientists would expect. It typically affects a greater geographic area than an outbreak. Meanwhile, an outbreak occurs when a disease occurs in unusually large numbers and can stay in one spot or spread out. An outbreak might span from a few days to several years. A single occurrence of a contagious disease is sometimes considered an outbreak by experts (Robinson, 2022; Mark, 2009). This may be applicable whether the disease is unknown, new to a community, or has been absent from a population for a long time. As a result, COVID-19 coronavirus disease is regarded as a global pandemic that threatens all aspects of human life, including the natural environment (Rume and Islam, 2020). The WHO's pandemic alert system is being used to prevent the spread of this disease.

Actions were made quickly and globally to slow down the large epidemic and its consequences on businesses that have a significant environmental impact, or, at the very least, to stop and prevent the virus's spread. This report manuscript will conduct a review of relevant scientific literature in order to investigate the positive and negative environmental consequences of the COVID-19 pandemic.

The consequences of the Covid-19 epidemic

The Corona virus was first found in the city of Wuhan, Hubei, China and was identified in December 2019 (Reference). The World Health Organization designated it a Public Health Emergency of International Concern on 30 January 2020, then a pandemic on 11 March 2020; although 188 countries had reported cases by July 5, 2020 (Bates et al, 2020). By November, 2021, the pandemic have claimed the lives for more than a million people. Health officials were required to recommend social isolation and quarantines in the event of a pandemic before the COVID-19 pandemic (Jamison *et al.*, 2017). Due to the severity of the virus, most nations implemented lockdowns to protect citizens, to stop its spread, and to guarantee that hospitals had enough space. The majority of these lockdowns caused widespread disruptions to daily life, which decreased the intensity and frequency of human daily activities and production.

Whatever the severity of these problems, human inactivity, commonly referred to as "anthropause", had a definite advantage for the environment. Due to travel restrictions, business closures, and other dramatic responses, COVID-19 reduced the economic activity. As global human activity decreased, there was a major reduction in the use of fossil fuels, resource consumption, and waste disposal, resulting in less air and water pollution in many parts of the world (Rume and Islam, 2020). Furthermore, greenhouse gas emissions fell significantly globally in 2020, nearly meeting the Paris Agreement's initial emissions target, as well as extraordinary drops in both GHG emissions and air pollution (Forster *et al.*, 2020).

Environmental reports state that nitrogen emissions decreased by 30% and carbon dioxide emissions



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decreased by 931.8 million tons (Forster *et al.*, 2020). Lockdowns and other measures decreased the use of coal by 26% and nitrogen oxide emissions by 50% in China (Rume and Islam, 2020). Marshall Burke, a specialist in Earth systems, claimed that a two-month reduction in pollution prevented 77,000 Chinese citizens from dying (McMahon, 2021). The vast majority of studies, including that conducted by scientists with Conservation International, shows a direct correlation between environmental degradation and disease outbreaks, emphasizing the significance of maintaining and regenerating rehabilitative ecosystems in averting future pandemics. Health officials were required to recommend social isolation and quarantines in the event of a pandemic before the COVID-19 pandemic (Jamison *et al.*, 2017).

Direct and indirect effect Covid-19

Positive effect

COVID-19 has indirect environmental effects that can be both good and bad, especially in the most affected nations like China, the United States, Italy, and Spain (WHO, 2020). But there is a very real link between contingency planning and cleaner beaches, quieter environments, and better air quality. On the other hand, there are unfavorable secondary effects like a drop in recycling and an increase in garbage, endangering both physical places (water and land) and the environment's air quality (Scheme 1).

Air quality and climate

According to Khan *et al.* (2021), the WHO estimates that outdoor air pollution kills 7 million people annually throughout the world, with more than 80% of urban dwellers being exposed to hazardous air (WHO, 2020). People stayed at home, which significantly improved the quality of the air, especially in areas like Wuhan, northern Italy, and several American cities (Rume and Islam, 2020). Also, according to Khan *et al.* (2021) emissions of harmful gases and other pollutants decreased by 25% in 337 Chinese cities at the start of 2020, while the quality of the air improved by 11.4%. The World Health Organization estimates that air quality modification has prevented 50,000 deaths in China (CNN, 2020). It is shocking to learn that slow killers like contaminated air, smoking, and dust cause millions of deaths each year.

Particulate matter (PM) 2.5 is considered among one of the most dangerous types of pollution. It belongs to group I carcinogens. The size of the particle is measured in microns, which are equivalent to one-thirtieth of the width of a human hair (Xu and Ren, 2019). The World Health Organization (WHO) estimates that PM 2.5, which causes respiratory infections, chronic lung disease, lung cancer, and heart disease, kills about 4 million people each year (WHO, 2019). The PM 2.5 standard, which is expressed in micrograms per cubic meter, exceeds one hundred in many urban areas around the world. Due to the lockout caused by COVID-19, the level of PM 2.5 has significantly decreased, shielding thousands of people from the worst effects (Khan *et al.*, 2021).

The nitrogen dioxide gas (NO₂), which is produced

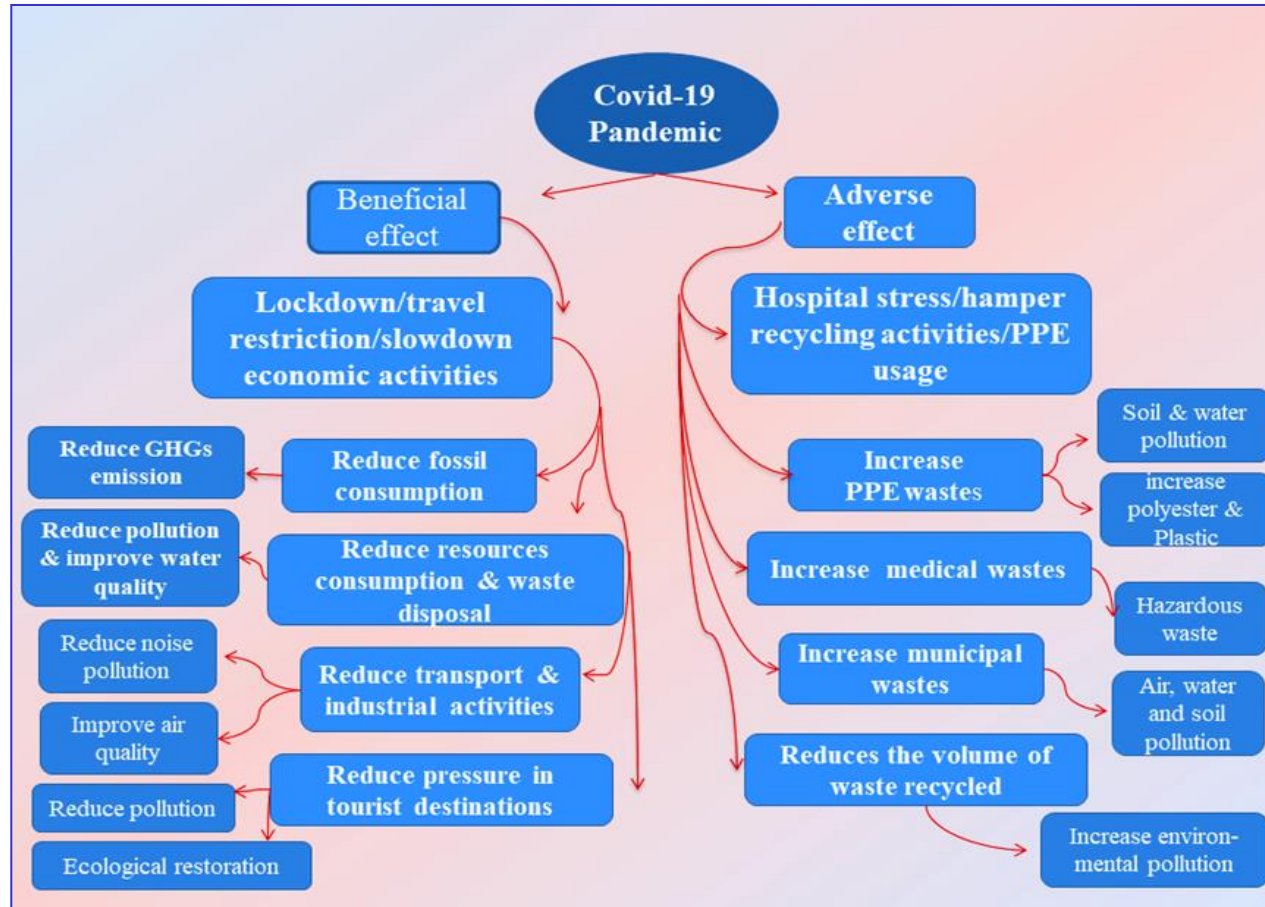
by factories, cars, and railroads, is extremely poisonous. The WHO states that if the concentration of this gas exceeds 200 g/m³, it may cause respiratory system inflammation and asthma. The Covid-19 epidemic led to traffic restrictions and factory closures, and as a result, NO₂ concentrations in the air have dramatically decreased in cities around the world (from 5.6 g/m³ to 0.2 g/m³) (Otmani *et al.*, 2020). Using the Ozone Monitoring Instrument, NASA and ESA studied the dramatic decline in NO₂ concentration during COVID-19's initial quarantine period in China (OMI). This reduction in NO₂ levels began in China and progressively spread to the rest of the world. Figure (2) (ESA, 2020) indicates a considerable decline in NO₂ levels in China's and air prior to and after the lockdown, with NO₂ emissions reducing by up to 20-30% from February 10 to February 25. However, in Europe, decline in NO₂ concentration air were observed clearly during April, 2020 compared to April, 2019 (Figure 3, Ferracci, 2020). Similar circumstances led to a significant drop in pollution levels across the board in Pakistan (Elsaid *et al.*, 2021). Using the TRO- POMIC- Sentinel-5P satellite, numerous studies have assessed the NO₂ level in many locations throughout Pakistan, including the most polluted cities, both before and during the lockdown (1st March to 15th April). According to Khan *et al.* (2020), who used the Copernicus Sentinel-5P satellite, NO₂ concentrations in several European towns had decreased by 45–50% compared to the same period last year (2021).

Emissions of carbon dioxide (CO₂) are to blame for climate change. The major sources of CO₂ emissions are energy, manufacturing, and transportation. Global CO₂ emissions have decreased as a result of the coronavirus lockdown (NASA, 2020). This resulted in the greatest decrease in anthropogenic CO₂ emissions since World War II. During the shutdown, global aviation traffic decreased by 60%, this led to a temporary decrease in CO₂ emissions compared to precrisis levels. The COVID-19 lockdown has resulted in a 200 million ton reduction in CO₂ emissions in China (Elsaid *et al.*, 2021). Experts estimate that this reduction may have prevented the loss of at least 77,000 lives (CAT, 2020). Scientists from Columbia University in New York reported a 5–10% drop in CO₂ emission within a week (March 14th – 20th, 2020), and a similar effect has been seen in northern Italy (Ferracci, 2020).

Reduction of water pollution

Concerning the positive effects, Covid-19 monitoring in sewage waters is a useful tool in the timely exposure of community infections, and many water bodies throughout the world had lower pollution levels during the pandemic. Water pollution is prevalent in developing countries such as Egypt, Sudan, India, and the bulk of Africa, where residential and industrial pollutants are dumped into rivers with only partial treatment (Islam and Azam, 2015; and 2015; and Islam and Huda, 2016).

Impacts of Covid-19 on the environment



Scheme (1): Beneficial and adverse effects of Covid-19 pandemic on environmental elements..

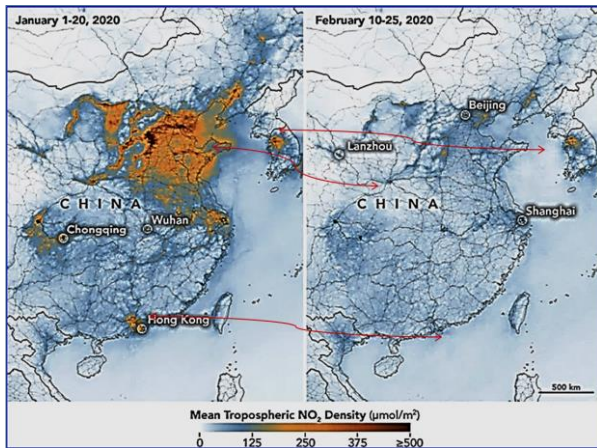


Figure (2): Map of East Asia , China in particular, showing the tropospheric average column density of NO₂ during January 2020 and February 2020. Map ported by satellite measurements during Covid-19 lockdown. Red arrows are represented the differences during the recorded period (ESA 2020).

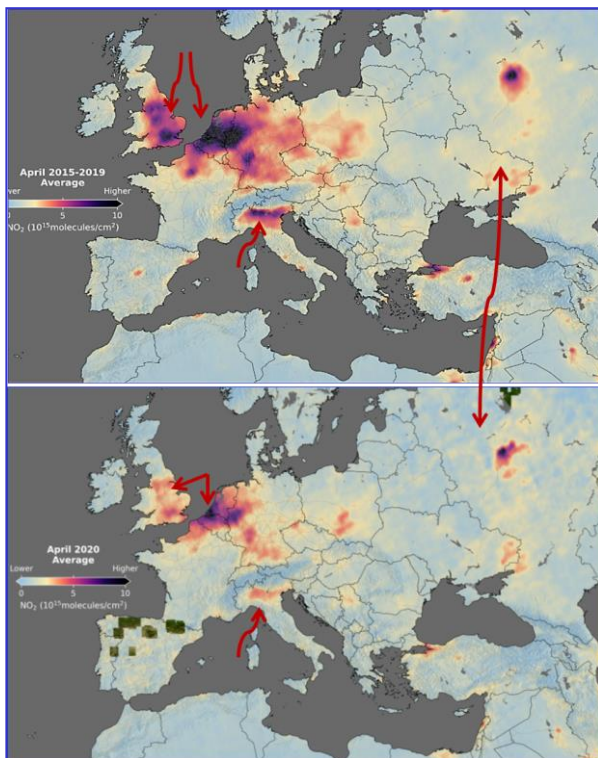


Figure (3): Map of Europe, reported by satellite measurements, showing large decreases in gases emission which were observed during April 2020 (bottom) relative to the April 2015-19 average (top). Red arrows represented the difference before and after Covid-19 lockdown. Credit: NASA, https://SO2.gsfc.nasa.gov/NO2/NO2_index.html

Many investigations have found that during the COVID-19-induced lockdown, the water quality in rivers and other bodies of water improved (Valentina-Mariana *et al.*, 2022; Chakraborty *et al.*, 2021). Water quality appears to have improved as a consequence of the delayed disposal of industrial waste and other trash. During the lockdown, the major industrial sources of pollution reduced or stopped production entirely, reducing pollution to a very low level (Yunus *et al.*, 2020). According to Rume and Islam (2020) and Singhal and Matto (2020), as a case study, the Ganga

and Yamuna rivers in India have gained a substantial level of cleanliness due to a lack of industrial pollution during India's shutdown days. Similar behaviour, as well as immaculate water quality, was observed in Haridwar and Rishikesh, India, as a result of a rapid drop in tourism and a 500 percentage reduction in sewage and industrial waste (Somani *et al.*, 2020).

In Europe, particularly in Italy, it was reported that the COVID-19 lockdown caused the Grand Canal in Italy to become clear, and many aquatic species started to reappear. However, water pollution was minimal in Malaysia, Thailand, the Maldives, and Indonesia (Kundu, 2020). According to Jribi *et al.* (2020), the lockout in North Africa, Tunisia, has resulted in less food waste, which has reduced soil and water pollution. However, there has been a drop in the usage of industrial water, particularly in the local textile sector. Furthermore, as export-import traffic declines, fewer commercial ships and other vessels cruise the world, lowering emissions and decreasing coastal pollution. Similar lockdown behaviour was recorded in Egypt, although no reports documented anything other than disease fluctuation (Moustafa and Mansour, 2020).

Reduction of noise pollution

Noise pollution is the term used to describe the harmful effects that excessive sound produced by various human activities, such as operating machines, driving vehicles, and building (Zambrano-Monserrate *et al.*, 2020). Noise pollution is the third most dangerous type of pollution, behind air and water pollution, according to the World Health Organization (WHO, 2020). Noise has been linked to a variety of negative consequences on human health, including cardiovascular disease, hypertension, and sleep loss. According to surveys, over 360 million individuals globally are at danger of hearing damage as a result of noise pollution (Sims, 2020). In the meantime, the latest European Environment Agency's (EEA) research "Noise in Europe - 2020," road traffic is the leading source of noise pollution in Europe, with noise levels expected to rise in both urban and rural regions over the next decade due to urban growth and rising demand for mobility.

The other major causes of environmental noise pollution include rail, aeroplane, and industry. Animals are also negatively impacted by anthropogenic noise pollution because it upsets the balance between predator-prey detection and avoidance. Contrarily, separation and lockdown measures forced people to remain inside, which reduced noise levels in most cities (Zambrano-Monserrate *et al.*, 2020). For instance, Delhi, experienced a 40–50% reduction in noise during the most recent lockdown (Somani and others, 2020). The Central Pollution Control Board of India reports that the noise level in Delhi's populated areas has dropped from 55 decibels during the day and 45 decibels at night to 40 decibels during the day and 30 decibels at night (Sims, 2020). Furthermore, fewer flights and car movements around the world as a result of travel limitations have resulted in less noise pollution. In Germany, for example, passenger air

travel has plummeted by more than 90%, car traffic has decreased by more than 50%, and railroads are working at a 25% slower rate than usual (Sims, 2020).

Negative environmental impact

Increasing of biomedical wastes

Negative impacts of the COVID-19 outbreak caused a dramatic increase in medical wastes worldwide, endangering both human health and the environment if not adequately managed. Due to the requirement to manage patient decontamination, treat a high number of patients, and gather samples from potential patients, hospitals produced a lot of infectious and biological waste which considered huge wastes (Zambrano-Monserrate *et al.*, 2020).

Worldwide, the output of medical waste increased, and each nation's facilities determined how to dispose it in effective way. For instance, the generation of medical waste, in India, increased from 550 to 600 kg/day to over 1000 kg/day during the country's initial shutdown in Ahmedabad (Somani *et al.* 2020). In Bangladesh's capital city of Dhaka has been producing more than 206 million tonnes of medical waste every day since COVID-19 (Rahman *et al.*, 2020). Another scenario in medical solid wastes, China produces around 190 million tonnes of medical waste per day (Saadat *et al.*, 2020; and Zambrano-Monserrate *et al.*, 2020).

In Egypt, there had been a rise in medical wastes according to solid waste statistics. Early in June, a few days after Egypt reported 30,000 cases of COVID-19, a green activist collected more than 100 kg of plastic from a 60-meter-long beach. A little over 5% of the trash was made up of surgical masks. A prompt action was taken and the ministry had intensified works to control trash lots in Cairo and Giza, and removed a total of 224,881 tons of solid waste and safely disposed it. However, continuous coordination with the ministers of health, population, and higher education and scientific research to implement the policy of correct sorting of waste inside hospitals to reduce the amount of waste produced and safely manage it. Additionally, 68 staff from the Health Ministry received training on the appropriate safe disposal method for each government.

Safety equipment use and random disposal

The Covid-19 outbreak caused a surge in the use of plastic protective equipment (PPE), which negatively impacted human home safety and raised waste production globally (Calma, 2020). PPE made of plastic were typically dumped in public spaces and occasionally with domestic rubbish due to a lack of knowledge about infectious waste management (Rahman *et al.*, 2020). When these materials are disposed of irresponsibly, it poses a serious risk to human health, clogs waterways, and increases pollution (Singh *et al.*, 2020).

Although experts and accountable authorities advise that domestic organic waste and plastic-based protective equipment be appropriately disposed of and segregated, mixing these wastes increases the risk of

disease transmission and virus exposure to garbage employees (Somani *et al.*, 2020). Therefore, ignorance of infectious waste management also posed a serious threat to human health.

CONCLUSION

Since the start of COVID-19 in mid-December 2019 and the number of confirmed cases and deaths, several countries have taken measures to restrict the spread of disease infection, including the quarantine and lockdown of social, commercial, and industrial operations. Numerous environmental consequences have been caused by these actions. Taking into account all the severely impacted environmental components, such as air, water resources, wastewater, and solid waste, a detailed analysis of the COVID-19's many effects had been compiled. Thus, one could draw the conclusion that the pandemic scenario lowers GHG emissions, noise levels, and water pollution, and reduces pressure on tourist locations. All of which might support natural system restoration. On the other hand, lockdown during Covid-19 pandemic had caused the quality of wastewater and medical solid wastes to degrade and demanding effective wastewater treatment to stop the spread of disease infection. These wastes were considered among the negative impact of the disease.

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تأثير كوفيد-19 على البيئة

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الملخص العربي

لم يكن لجائحة كوفيد-19 تأثير يذكر على العالم حتى بداية عام 2020، على الرغم من انتشارها بسرعة في جميع أنحاء العالم منذ اكتشافها لأول مرة في أوائل ديسمبر 2019. بحلول منتصف مارس/آذار 2021، كان فيروس كورونا قد ضرب عمليا كل بلد على وجه الأرض. وكإجراء وقائي رئيسي لمنع انتشار الأمراض والوفيات، طبقت بعض الدول الحجر الصحي وتعليق نشاطات كثيرة. وأدى إنهاء هذه الأنشطة إلى خسائر اقتصادية كبيرة. بيد أنه أفيد على نطاق واسع أن هذه الخطوات أدت إلى تحسين نوعية الهواء، لا سيما في المناطق الشديدة التلوث التي تضم أعدادا كبيرة من السكان والنشاط الصناعي. وقد تم الإبلاغ والتحقق على نطاق العالم من انبعاثات أقل كربون ونيتروجين وكبريت وجسيمات تتعلق بوقت التوقف عن العمل. ومن ناحية أخرى، كشف النقاب عن أن مستويات الأوزون في الهواء المحيط قد ازدادت، ويعزى ذلك في معظمه إلى انخفاض انبعاثات النيتروجين. وعلاوة على ذلك، زعم أن الموارد المائية الطبيعية تتسم بنوعية مياه أعلى. وقد أبلغت محطات معالجة مياه الصرف عن زيادة في الأحمال العضوية مع المواد الكيميائية الثابتة نتيجة لزيادة استخدام المطهرات والمضادات الحيوية. وعموما، فإن الحجم النوعي والكمي للنفايات الصلبة، الذي أنشئ نتيجة لتقشي فيروس كورونا، قد زاد. تعرض هذه الدراسة وتلخص الآثار البيئية لكوفيد-19 كما سجلت في المؤلفات لمختلف البلدان في جميع أنحاء العالم، والتي توفر منظورا شاملا للعواقب البيئية لكوفيد-19.