



# Climate Change, Pandemic, and Sustainability

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# Ten threats to global health

## Infectious disease (pandemic)

**The only thing we don't know is  
when it will hit and how severe it will be**

### Ten threats to global health

Air pollution and climate change

Noncommunicable diseases

Global influenza pandemic

Fragile and vulnerable settings

Antimicrobial resistance

Ebola and other high-threat pathogens

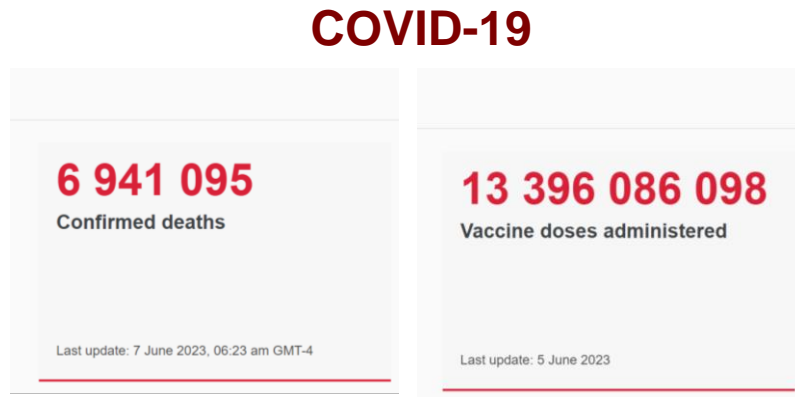
Weak primary health care

Vaccine hesitancy

Dengue

HIV/AIDS

# Climate change and pandemic



Globally, as of 12:23pm CEST, 7 June 2023, there have been 767,750,853 confirmed cases of COVID-19, including 6,941,095 deaths, reported to WHO. As of 6 June 2023, a total of 13,385,463,434 vaccine doses have been administered.

WHO 2023.

## ● Effects of temperature and humidity on the daily new cases and new deaths of COVID-19 in 166 countries

### HIGHLIGHTS

- First study to explore the effects of temperature and humidity on the daily new cases and deaths of COVID-19 world-wide.
- We used log-linear GAM to analyze the effects.
- We considered the lag effects and the cumulative effects of weather conditions.
- Temperature and relative humidity were both negatively related to the daily new cases and daily new deaths of COVID-19

### GRAPHICAL ABSTRACT

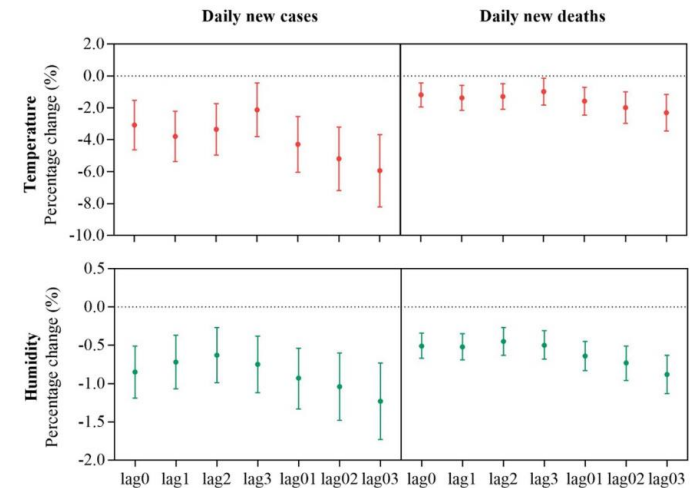
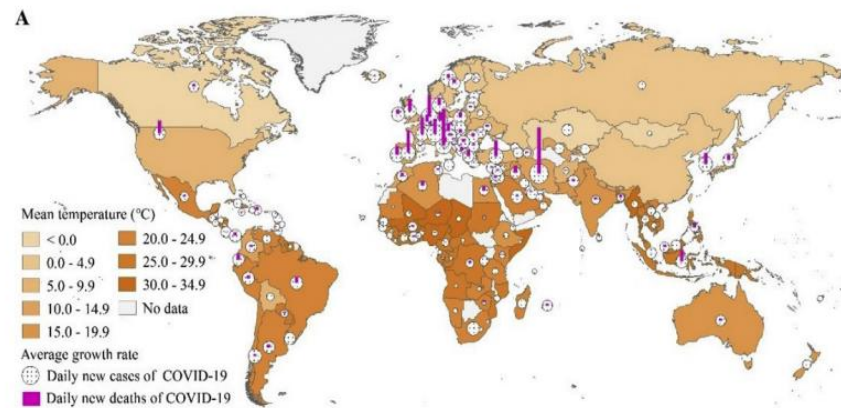


Fig. 2. Effects of temperature and relative humidity on daily new cases and daily new deaths of COVID-19 in different lag structures.

Yu Wu, et al. Science of the Total Environment 2020.

# Climate change and infectious diseases

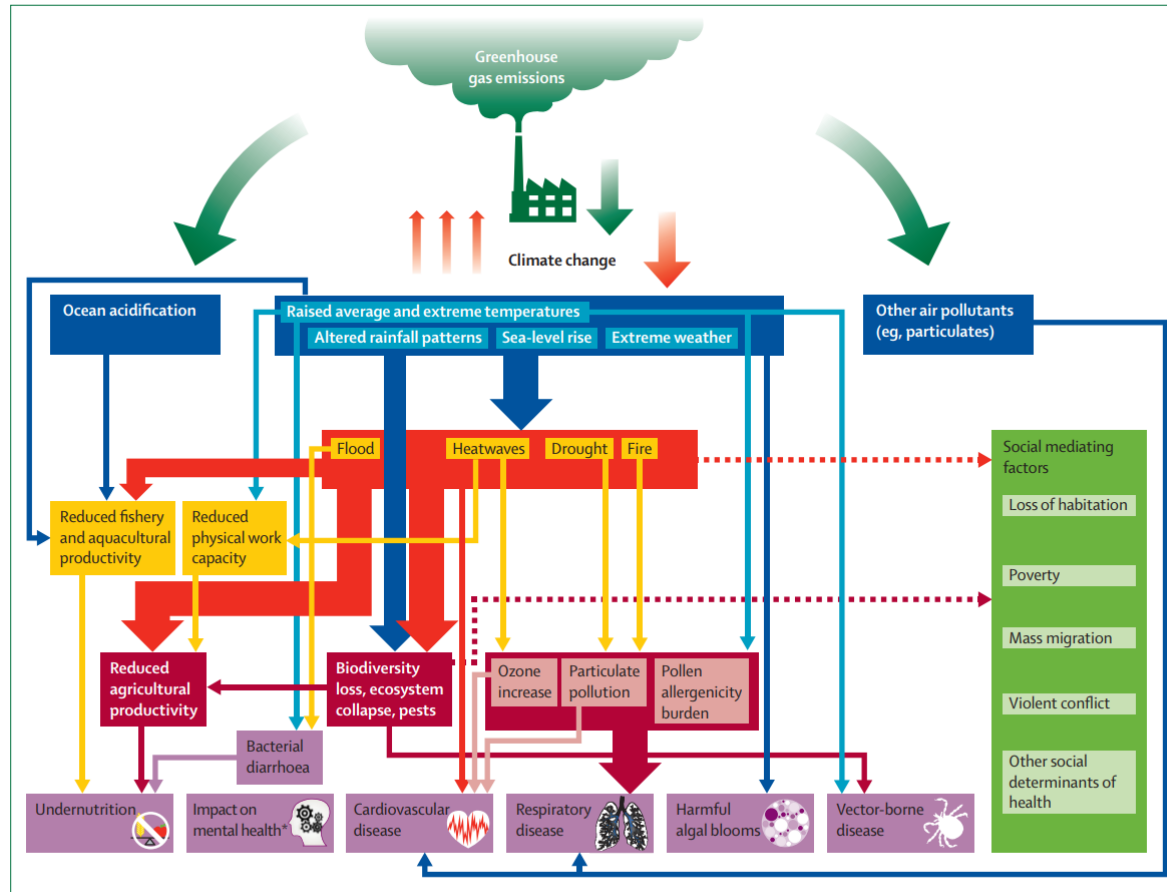


Figure 1: The health impacts of climate change

\*The mental health effects of climate change are complex and interact with many of the processes shown in the figure. Source: Lancet Commission, 2015.<sup>5</sup>

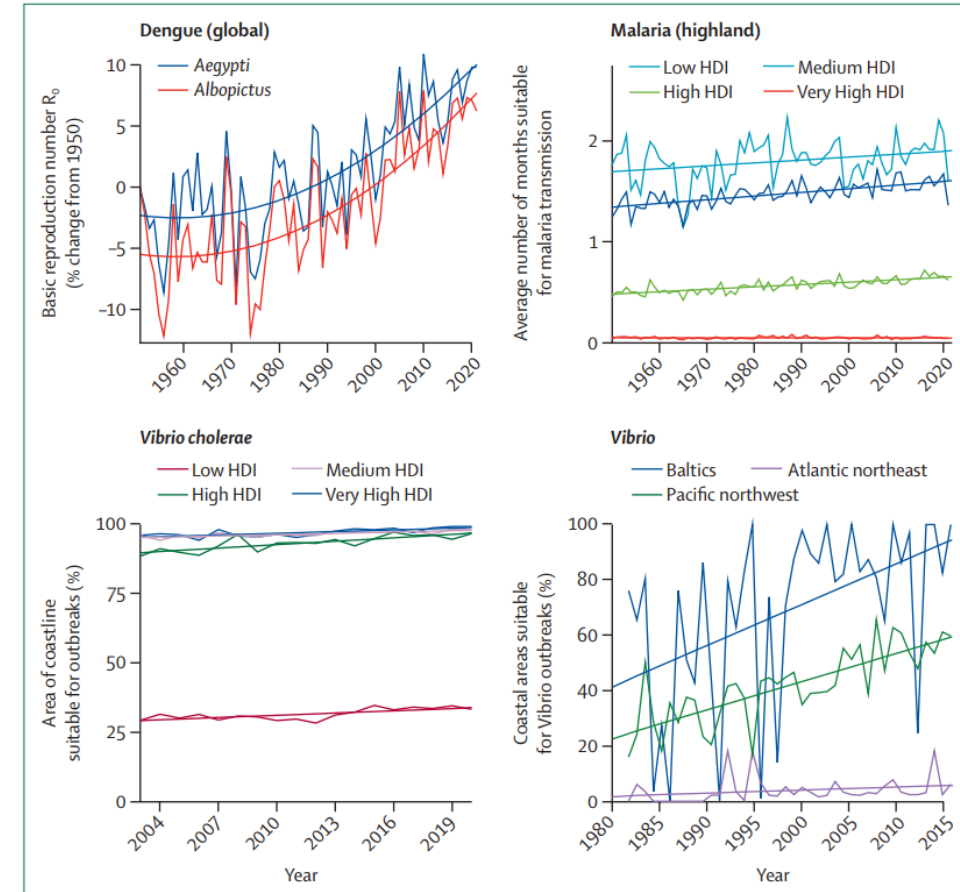
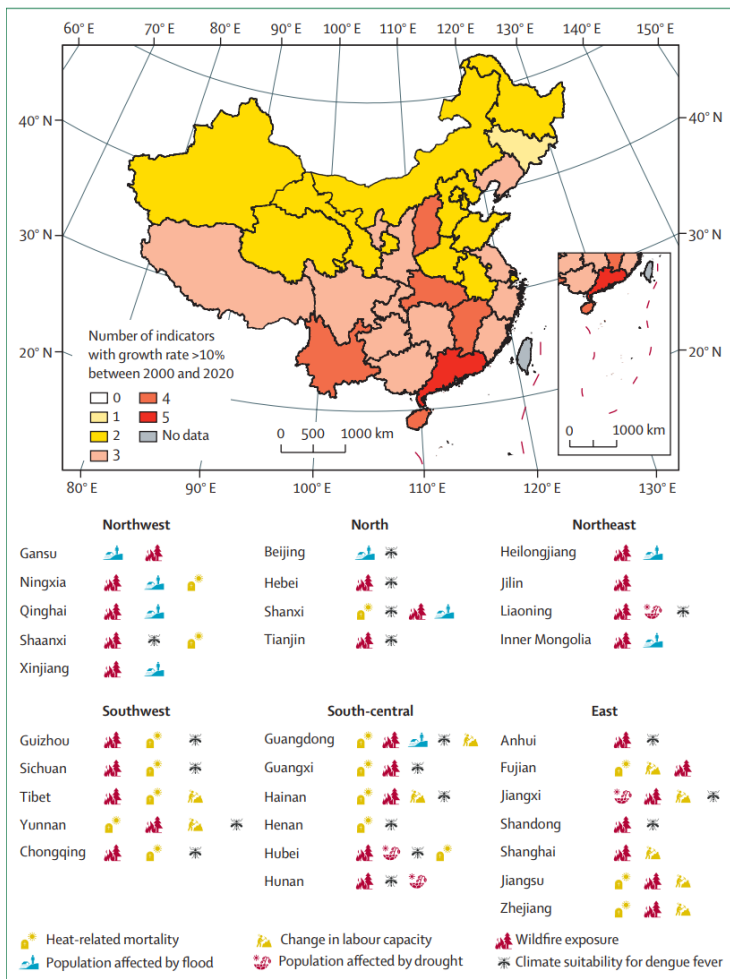


Figure 4: Change in climate suitability for infectious diseases

Thin lines show the annual change. Thick lines show the trend since 1951 (for malaria), 1951 (for dengue), 1982 (for *Vibrio* bacteria), and 2003 (for *Vibrio cholerae*). HDI=human development index.

Watts N, et al. Lancet 2017; Romanello M, et al. Lancet 2022.

# Climate change and infectious diseases



**Figure 2: The key rising health exposures from climate change in each province in China (2000–20)**  
 Each province is coloured according to the number of indicators with growth of larger than 10% between 2000 and 2020, and the icons represent indicators that have changed by more than 10% for each province. Within each province, the indicators with a growth rate higher than 10% were ranked in order with the indicator with the greatest change range being listed first.

## Panel 2: COVID-19 and the climate-health challenges in China

The outbreak of COVID-19 has been a reminder of the importance of the health and safety of the people and the country. China's economy had its first contraction in decades, contracting by 6.8% year-on-year in the first quarter of 2020. Urban unemployment also rose to an unprecedented 6.2% of the total working-age population in February, 2020, far higher than past levels of 4.8–5.3%.<sup>33</sup> Furthermore, China set up a special fund of US\$2.96 billion<sup>33,34</sup> (equivalent to 30% of the national fiscal expense in foreign affairs in 2019) to help treat COVID-19 patients in designated admission facilities.

From the pandemic, China has learned to attach more importance to the early prevention of diseases. This lesson has been reflected in the establishment of the National Bureau of Disease Control and Prevention (NBDCP) in April, 2021,<sup>8</sup> which is a vice ministerial-level bureau directly administered by the National Health Commission.

The five major responsibilities of the NBDCP are: to formulate policies on prevention and control of infectious diseases and on public health supervision; to guide the construction of a disease prevention and control system; to plan and guide the construction of an epidemic monitoring and early warning system; to guide the construction of a scientific research system on disease control; and to supervise public health and infectious disease control. However, within the NBDCP mandate, there is no direct reference to the health impacts of climate change, signifying a worrying absence of attention to



the top global risk identified.<sup>35,36</sup> In April, 2021, President Xi Jinping clearly named climate change and the COVID-19 pandemic as two major challenges faced by the world and advocated that countries should work together to formulate a collective response.<sup>30</sup>

The impacts of COVID-19 have been devastating and, as of Oct 4, 2021, COVID-19 has killed about 4.8 million people worldwide.<sup>37</sup> Although the COVID-19 pandemic represents an acute health crisis, the health impacts of climate change will continue to worsen in the coming years and decades without additional action. Taking a very conservative estimate, climate change has been already linked to an additional 150 000 deaths since 2000, a number that will rise to 250 000 in 2030.<sup>38</sup> The health burden from climate change would increase rapidly if climate change is not addressed in a timely and adequate manner.<sup>4,5,24</sup> The COVID-19 pandemic and climate change have a lot in common, with interlinkages in the root causes and the response measures.<sup>1,39-41</sup> The health impacts from the pandemic are immediate and radical, and they require a rapid and integrated response; however, it is also important to jointly fight climate change, which is a broader, longer-term, and more complex challenge that society faces. Preventing the health risks of climate change should become a key responsibility of the new NBDCP. Underestimating the health risks from climate change will be something that our health and economy cannot afford to do.



## Panel 3: Estimated economic losses of extreme rainfall and the COVID-19 epidemic in Zhengzhou in 2021

From July 17 to July 23, 2021, Henan province (central China) was hit by unprecedented levels of heavy rainfalls and floods, and its capital city Zhengzhou had extensive casualties and property damage.<sup>71</sup> The event was listed as the deadliest natural disaster in 2021 in China.<sup>72</sup> The situation was further worsened in Zhengzhou by a local coronavirus epidemic a week later,<sup>73</sup> which affected the progress of the post-flood recovery and compounded climate risks.

- Extreme rainstorm (July 20, 2021)
- The first case of COVID-19 reported (July 30, 2021)
- Recovery of subways hit by floods suspended (Aug 5, 2021)
- COVID-19 control measures lifted (Aug 28, 2021)

Using similar methods as indicator 4.1.4, the total economic losses of these events were estimated to be US\$19.6 billion, equivalent to 0.12% of China's gross domestic product in 2021,<sup>74</sup> excluding health costs. Although the flood-induced direct damage only occurred in Zhengzhou, the indirect losses occurred across other regions due to supply chain disruptions (appendix p 107). Although almost a third (29%) of direct losses happened in Zhengzhou's real estate industry, the indirect losses were bigger in Zhengzhou's non-metallic mineral product (13%), food and tobacco (10%), and transportation services (10%). In regions outside Zhengzhou, the agriculture, mining, petroleum and coking, chemical products, accommodation and restaurants, and financial services were the most heavily affected sectors by these events. Among them, the agriculture in Henan (except Zhengzhou) had the greatest indirect loss, at \$0.4 billion. This case study shows how devastating an extreme climate event can be, both to lives and economies, and how the confluence of different risks, such as the collision between an epidemic and extreme weather, can further aggravate socioeconomic consequences. The huge economic costs of these events show the value of risk assessment, planning, and the implementation of early and adequate adaptation and mitigation actions towards climate change.

# Impact of COVID-19 pandemic on SDGs

1 NO POVERTY

## END POVERTY IN ALL ITS FORMS EVERYWHERE

**MORE THAN 4 YEARS OF PROGRESS AGAINST POVERTY HAS BEEN ERASED BY COVID-19**

**WORKING POVERTY RATE ROSE FOR THE FIRST TIME IN TWO DECADES**

**PUSHING AN ADDITIONAL 8 MILLION WORKERS INTO POVERTY**

**UNEMPLOYMENT CASH BENEFITS DURING THE PANDEMIC (2020)**

**RISING INFLATION AND IMPACTS OF WAR IN UKRAINE FURTHER DERAIL PROGRESS**

NUMBER OF PEOPLE LIVING IN EXTREME POVERTY IN 2022

581 MILLION

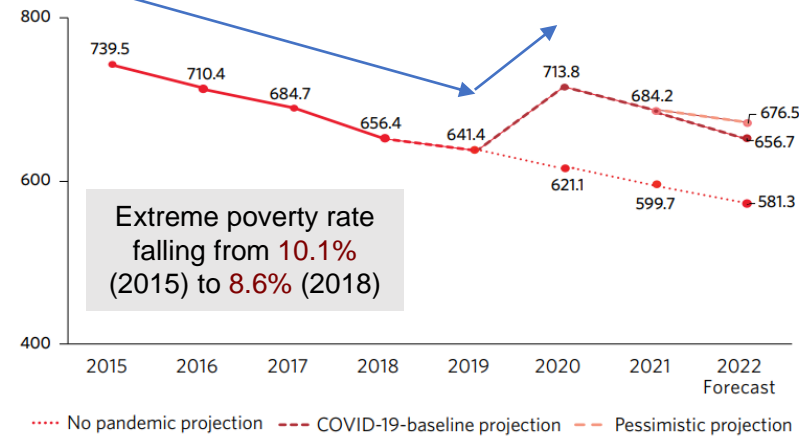
PRE-PANDEMIC PROJECTION

657-676 MILLION

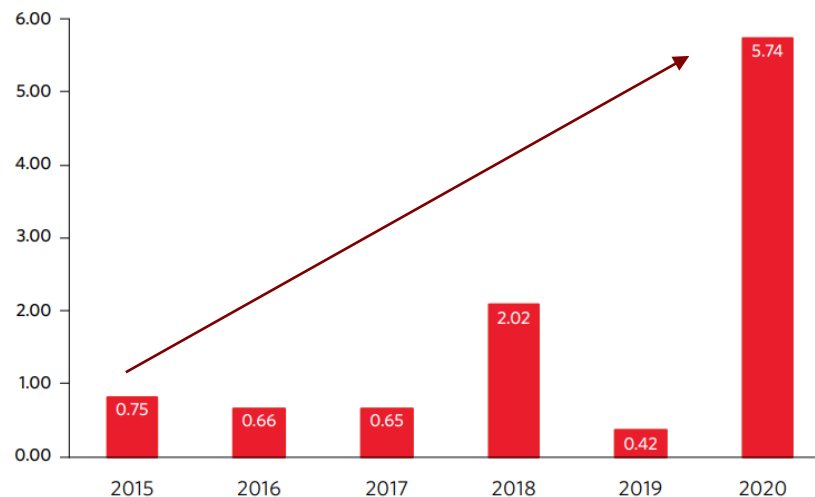
CURRENT PROJECTION

**DISASTER-RELATED DEATHS ROSE SIXFOLD IN 2020 LARGELY AS A RESULT OF THE PANDEMIC**

Number of people living on less than \$1.90 a day, 2015-2018, 2019-2022 projection before and after COVID-19 (millions)



Disaster-related mortality (rate per 100,000 population), 2015-2020



- Nowcasts suggest that the global poverty rate **increased sharply** from 2019 to 2020, from 8.3 per cent to 9.2 per cent, the first rise in extreme poverty since 1998 and the largest since 1990.
- Disaster-related deaths **rose sixfold** in 2020, **largely as a result of the pandemic**.
- As countries were **coping with the economic fallout of the pandemic**, 33 countries reported **\$16.5 billion** in direct economic losses in 2020, **due to other disasters**.
- Of this amount, **41%** (\$6.8 billion) was in the agriculture sector and **38%** (\$6.2 billion) related to losses resulting from damaged or destroyed critical infrastructure.

UN. The Sustainable Development Goals Report 2022.



# Impact of COVID-19 pandemic on SDGs

## 2 ZERO HUNGER END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

## 3 GOOD HEALTH AND WELL-BEING ENSURE HEALTHY LIVES AND PROMOTE WELL-BEING FOR ALL AT ALL AGES

**CONFLICT, COVID-19, CLIMATE CHANGE AND GROWING INEQUALITIES ARE CONVERGING TO UNDERMINE FOOD SECURITY WORLDWIDE**

**SOARING FOOD PRICES AFFECTED 47% OF COUNTRIES IN 2020 (UP FROM 16% IN 2019)**

**ABOUT 1 IN 10 PEOPLE WORLDWIDE ARE SUFFERING FROM HUNGER**

**NEARLY 1 IN 3 PEOPLE LACK REGULAR ACCESS TO ADEQUATE FOOD (2020)**

**149.2 MILLION CHILDREN UNDER AGE 5 SUFFER FROM STUNTING (2020)**

**TO REDUCE STUNTING IN CHILDREN BY 50% BY 2030, ANNUAL RATE OF DECLINE MUST DOUBLE (FROM 2.1 TO 3.9% PER YEAR)**

**COVID-19 IS THREATENING DECADES OF PROGRESS IN GLOBAL HEALTH**

- INFECTED MORE THAN **500 MILLION PEOPLE** WORLDWIDE (MID-2022)
- LED TO **15 MILLION DEATHS** (2020-2021)
- DISRUPTED ESSENTIAL HEALTH SERVICES: **92% OF COUNTRIES** (END 2021)
- HALTED PROGRESS ON **UNIVERSAL HEALTH COVERAGE**

↓ GLOBAL LIFE EXPECTANCY   ↓ IMMUNIZATION COVERAGE   ↑ PREVALENCE OF ANXIETY / DEPRESSION   ↑ DEATHS FROM TUBERCULOSIS & MALARIA

**UKRAINE CRISIS TRIGGERED FOOD SHORTAGES FOR THE WORLD'S POOREST PEOPLE**

**UKRAINE AND THE RUSSIAN FEDERATION SUPPLY GLOBAL EXPORTS:**

- 30% OF WHEAT**
- 20% OF MAIZE**
- 80% OF SUNFLOWER SEED PRODUCTS**

**22.7 MILLION CHILDREN MISSED BASIC VACCINES IN 2020**

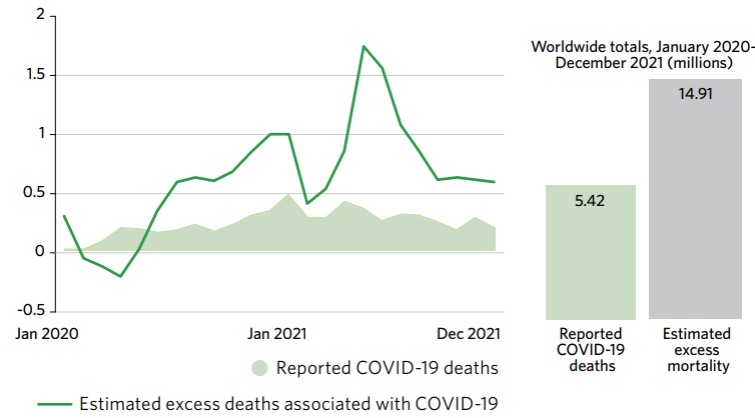
**3.7 MILLION MORE THAN IN 2019**

**PANDEMIC CLAIMED THE LIVES OF 115,500 FRONT-LINE HEALTH-CARE WORKERS**

**TUBERCULOSIS DEATHS RISE FOR THE FIRST TIME SINCE 2005**

2019: 1.2 MILLION   2020: 1.3 MILLION

Reported COVID-19 deaths and estimated excess deaths globally, 2020-2021 (millions)



- About **two thirds** of the additional deaths were linked to **disruptions** in the provision of malaria services **during the pandemic**.
- Disruptions associated with the pandemic globally caused **a noticeable rise** in the number of TB deaths, from 1.2 million in 2019 to 1.3 million in 2020 (excluding TB deaths in people with HIV). This is the first year-on-year increase in TB deaths since 2005, and **it took the world back to the 2017 level**.

# Impact of COVID-19 pandemic on SDGs



**ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL**

## COVID-19 PANDEMIC

HAS DEEPENED A GLOBAL LEARNING CRISIS

147 MILLION CHILDREN MISSED OVER HALF OF IN-PERSON INSTRUCTION IN 2020-2021



ENTRENCHED INEQUITIES IN EDUCATION HAVE ONLY WORSENED DURING THE PANDEMIC



MANY COUNTRIES ARE IMPROVING SCHOOL INFRASTRUCTURE AS CLASSROOMS REOPEN



24 MILLION LEARNERS

(PRE-PRIMARY TO UNIVERSITY LEVEL)

MAY NEVER RETURN TO SCHOOL



EDUCATION IS A LIFELINE FOR CHILDREN IN CRISES



REMOTE LEARNING

IS OFFERED TO 3 MILLION UKRAINIAN CHILDREN IN THE CHAOS OF WAR (APRIL 2022)

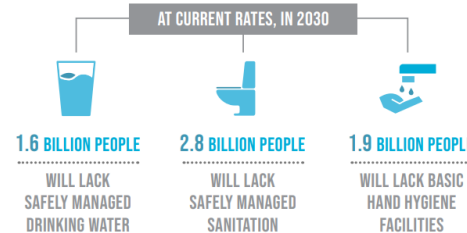


**ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL**

THE WORLD'S WATER-RELATED ECOSYSTEMS ARE BEING DEGRADED AT AN ALARMING RATE

OVER THE PAST 300 YEARS, OVER 85% OF THE PLANET'S WETLANDS HAVE BEEN LOST

MEETING DRINKING WATER, SANITATION AND HYGIENE TARGETS BY 2030 REQUIRES A 4X INCREASE IN THE PACE OF PROGRESS



FOR AT LEAST 3 BILLION PEOPLE,

THE QUALITY OF THE WATER THEY DEPEND ON IS UNKNOWN DUE TO A LACK OF MONITORING

733+ MILLION PEOPLE

LIVE IN COUNTRIES WITH HIGH AND CRITICAL LEVELS OF WATER STRESS (2019)

ONLY ONE QUARTER

OF REPORTING COUNTRIES HAVE >90% OF THEIR TRANSBOUNDARY WATERS COVERED BY OPERATIONAL ARRANGEMENTS (2020)



**PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL**

GLOBAL ECONOMIC RECOVERY IS HAMPERED BY:

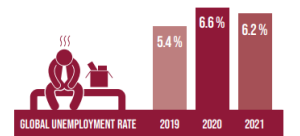


GLOBAL ECONOMIC RECOVERY IS FURTHER SET BACK BY THE UKRAINE CRISIS



GLOBAL UNEMPLOYMENT

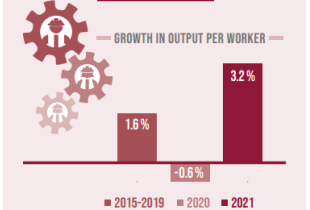
TO REMAIN ABOVE PRE-PANDEMIC LEVEL UNTIL AT LEAST 2023



1 IN 10 CHILDREN ARE ENGAGED IN CHILD LABOUR WORLDWIDE

160 MILLION TOTAL CHILDREN (2020)

WORKER PRODUCTIVITY HAS REBOUNDED, BUT NOT IN LDCs



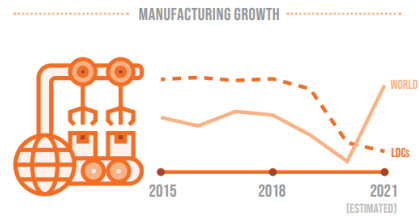


# Impact of COVID-19 pandemic on SDGs

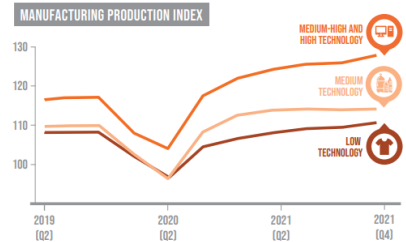


**BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION**

## GLOBAL MANUFACTURING HAS REBOUNDED FROM THE PANDEMIC BUT LDCs ARE LEFT BEHIND



## HIGHER-TECHNOLOGY INDUSTRIES ARE FAR MORE RESILIENT IN CRISES THAN THEIR LOWER-TECH COUNTERPARTS

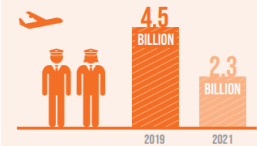


## SMALL-SCALE INDUSTRIES

LACK ACCESS TO FINANCIAL SUPPORT FOR RECOVERY

ONLY 1 IN 3 SMALL MANUFACTURERS ARE BENEFITING FROM A LOAN OR LINE OF CREDIT (2020-2021)

## PASSENGER AIRLINE INDUSTRY IS STILL STRUGGLING TO RECOUP CATASTROPHIC LOSSES



2.3 BILLION PASSENGERS IN 2021, COMPARED WITH 4.5 BILLION IN 2019

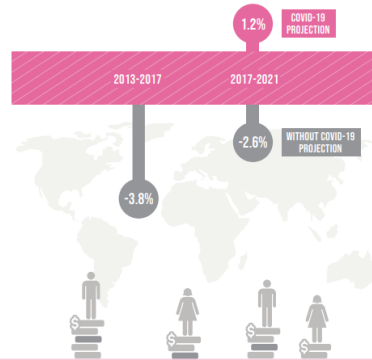
1 IN 3 MANUFACTURING JOBS ARE NEGATIVELY IMPACTED BY THE CRISIS



**REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES**

PANDEMIC HAS CAUSED THE FIRST RISE IN BETWEEN-COUNTRY INCOME INEQUALITY IN A GENERATION

CHANGE IN BETWEEN-COUNTRY INCOME INEQUALITY (2013-2021)



GLOBAL REFUGEE FIGURE HITS RECORD HIGH

WAR IN UKRAINE PUSHES THE WORLD TOTAL EVEN HIGHER

NUMBER OF REFUGEES OUTSIDE THEIR COUNTRY OF ORIGIN INCREASED BY 44% BETWEEN 2015 AND 2021



5,895 MIGRANTS

LOST THEIR LIVES IN 2021

THE DEADLIEST YEAR SINCE 2017 FOR MIGRANTS

1 IN 5 PEOPLE

HAVE EXPERIENCED DISCRIMINATION ON AT LEAST ONE OF THE GROUNDS PROHIBITED UNDER INTERNATIONAL HUMAN RIGHTS LAW



**MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE**

NUMBER OF COUNTRIES WITH LOCAL DISASTER RISK REDUCTION STRATEGIES NEARLY DOUBLED BETWEEN 2015 AND 2021 (51 TO 98 COUNTRIES)

LEAVING NO ONE BEHIND WILL REQUIRE AN INTENSIFIED FOCUS ON 1 BILLION SLUM DWELLERS

AS CITIES GROW, MUNICIPAL SOLID WASTE PROBLEMS MOUNT



IN SUB-SAHARAN AFRICA, LESS THAN 1/3 OF CITY DWELLERS HAVE CONVENIENT ACCESS TO PUBLIC TRANSPORTATION



99% OF THE WORLD'S URBAN POPULATION BREATHE POLLUTED AIR

ACCORDING TO NEW WORLD HEALTH ORGANIZATION AIR QUALITY GUIDELINES OF PM<sub>2.5</sub> < 5 UG/M<sup>3</sup>



# Climate Change and Sustainability

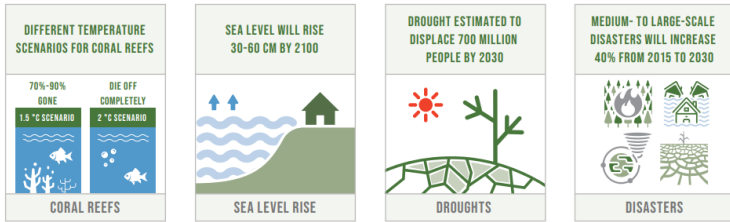
13 CLIMATE ACTION

TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS



**CLIMATE CHANGE** IS HUMANITY'S "CODE RED" WARNING

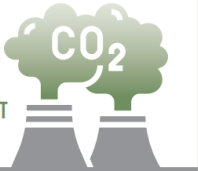
OUR WINDOW TO AVOID CLIMATE CATASTROPHE IS CLOSING RAPIDLY



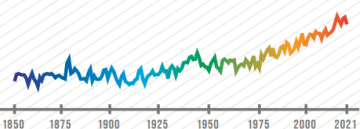
ENERGY-RELATED CO<sub>2</sub> EMISSIONS INCREASED

6% IN 2021

REACHING HIGHEST LEVEL EVER



RISING GLOBAL TEMPERATURES CONTINUE UNABATED, LEADING TO MORE EXTREME WEATHER



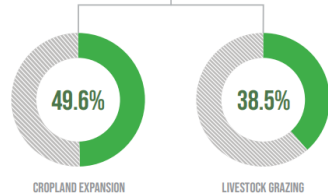
15 LIFE ON LAND

PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

10 MILLION

HECTARES OF FOREST ARE DESTROYED EVERY YEAR

ALMOST 90% OF GLOBAL DEFORESTATION IS DUE TO AGRICULTURAL EXPANSION



133 PARTIES HAVE RATIFIED THE NAGOYA PROTOCOL, WHICH ADDRESSES ACCESS TO GENETIC RESOURCES AND THEIR FAIR AND EQUITABLE USE



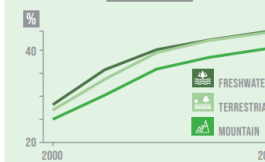
BIODIVERSITY IS LARGELY NEGLECTED IN COVID-19 RECOVERY SPENDING



AROUND 40,000 SPECIES ARE DOCUMENTED TO BE AT RISK OF EXTINCTION OVER THE COMING DECADES



NEARLY HALF OF FRESHWATER, TERRESTRIAL AND MOUNTAIN KEY BIODIVERSITY AREAS ARE PROTECTED



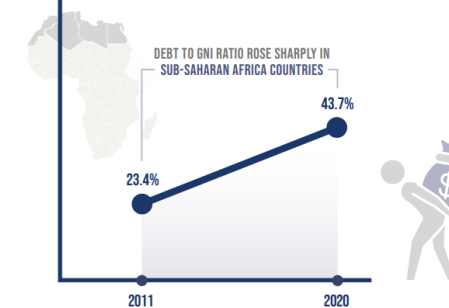
17 PARTNERSHIPS FOR THE GOALS



STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT



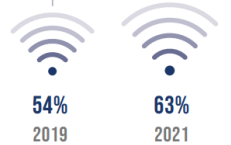
RISING DEBT BURDENS THREATEN DEVELOPING COUNTRIES' PANDEMIC RECOVERY



INTERNET

UPTAKE ACCELERATED DURING THE PANDEMIC

% OF INDIVIDUALS USING THE INTERNET



IN 2021

NET ODA REACHED A NEW HIGH OF \$177.6 BILLION, LARGELY DUE TO COVID-RELATED AID

FOREIGN DIRECT INVESTMENT REBOUNDED TO \$1.58 TRILLION, UP 64% FROM 2020

REMITTANCES REACHED \$605 BILLION, UP 8.6% FROM 2020



ODA FOR SDG DATA DECLINED BY MORE THAN 18% IN 2020



# Climate Change, Pandemic, and Sustainability



- Transition to clean and renewable energy
- Reducing carbon emissions
- Enhancing biodiversity conservation and ecosystem protection



- Establishing a resilient health system
- Strengthening disease surveillance, preparedness, and response
- Raising public awareness and promoting behavioral changes

## Enhancing global cooperation



# Thanks!



**“We must rise higher to rescue the Sustainable Development Goals – and stay true to our promise of a world of peace, dignity and prosperity on a healthy planet.”**

*— ANTONIO GUTERRES  
SECRETARY-GENERAL OF THE UNITED NATIONS*