The COVID-19 pandemic has changed the reality we live in. From planning scenarios and trends to preventing future pandemics, we are in a deluge of information. As organisations working towards the shared 50by40 goal, we all want to ensure that any public statements, blogs, and articles we put out are backed by strong data points that are both easily understandable and based on good science.

These factsheets are an attempt to aid partner organisations and allies in doing exactly that. We hope these act as a common resource for a diverse communication needs, from creating social media posts to backing policy briefs.

It is important to note that these factsheets are a product of research as well as facts added by partner organisations. They do not in their entirety represent the view held or endorsed by 50by40 or all of its partner organisations. Different organisations have different ideas for the solutions to the broken food system, so not all points will be relevant or appropriate for all organisations. The factsheets hope to represent the diversity of views held and endorsed by different partner organisations. To summarise, it is our effort and hope that all organisations find some facts of value, even if their organisational stance does not agree with all facts mentioned in the ‘Usage’ section.

We at 50by40 hope this document serves as a helpful tool in all of your COVID-19 communication endeavours and beyond.

Usage

Most factsheets have two parts, general facts and commentary. Facts are stated first, followed by a separate headline for commentary. There are sections that only include facts, or only include commentary, or both.

- **General facts include scientific information, building the case for the topic at hand.**

- **Commentary includes expert opinion, that is mostly backed by scientific data or refers to common knowledge.**

In terms of usage, please be sure to link any fact that is used to appropriate resources (which are listed in the footnote for each point). If possible, take the time to elaborate and back references with other compelling data points, especially when using data from commentary.
“How does COVID-19 spread?

- The virus that causes COVID-19 probably emerged from an animal source, but is now spreading from person to person. The virus is thought to spread mainly between people who are in close contact with one another (within about 6 feet) through respiratory droplets produced when an infected person coughs or sneezes. It also may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the main way the virus spreads.”¹

- Scientific analysis has determined that COVID-19 did not originate in a laboratory and research suggests bats and pangolins may have been involved in the transmission chain of the virus to people.²

Commentary

- A framework of diversity, equity, and inclusion is essential to survive this crisis and earn the trust of future constituents.³

- Investors who focus on the interplay between environmental and public health issues—ensuring access to medicines, protecting antibiotic effectiveness, fighting deforestation—say their work had only just begun to gain traction. The current pandemic, it seems, may accelerate interest. Finny Kuruvilla, chief investment officer at Eventide Asset Management, says reducing meat consumption, for example, would go a long way toward cutting the likelihood of such viruses cropping up. - Bloomberg News April 1st 2020⁴

- UN’s environment chief, Inger Andersen: “Our long-term response must tackle habitat and biodiversity loss.” “Never before have so many opportunities existed for pathogens to pass from wild and domestic animals to people.”. “Our continued erosion of wild spaces has brought us uncomfortably close to animals and plants that harbour diseases that can jump to humans.” - UNEP cited in The Guardian 2020⁵

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4 - Preventing the Next Pandemic May Start with Supply Chains. Bloomberg April 1st 2020.
It is estimated that, globally, about one billion cases of illness and millions of death [sic] occur every year from zoonoses. Some 60% of emerging infectious diseases that are reported globally are zoonoses. Over 30 new human pathogens have been detected in the last three decades, 75% of which have originated in animals...\(^1\)

Because of human and livestock population growth, changes in livestock production, the emergence of worldwide agro-food networks, and significant changes in personal mobility, human populations increasingly share a global commons of disease risk, among themselves and with domestic and wild animal species\(^2\).

Industrial systems are characterized by large numbers of animals of similar genotype being raised, predominantly in confinement, for one purpose with rapid population turnover at a single site\(^3\). [...] Without commensurate private and public investments in bioexclusion and bioccontainment measures these industrial systems can result in increased animal and public health risks\(^3\).

The percentage of COVID-19 patients with at least one underlying health condition or risk factor was higher among those requiring intensive care unit (ICU) admission (358 of 457, 78%) and those requiring hospitalization without ICU admission (732 of 1,037, 71%) than that among those who were not hospitalized (1,388 of 5,143, 27%). The most commonly reported conditions were diabetes mellitus, chronic lung disease, and cardiovascular disease. These preliminary findings suggest that in the United States, persons with underlying health conditions or other recognized risk factors for severe outcomes from respiratory infections appear to be at a higher risk for severe disease from COVID-19 than are persons without these conditions\(^4\).

Just three victims, or 0.8% of the total, had no previous pathology. Almost half of the victims suffered from at least three prior illnesses and about a fourth had either one or two previous conditions. More than 75% had high blood pressure, about 35% had diabetes and a third suffered from heart disease\(^5\).

Transitioning toward more plant-based diets that are in line with standard dietary guidelines could reduce global mortality by 6-10% and food-related greenhouse gas emissions by 29-70% compared with a reference scenario in 2050. We find that the monetized value of the improvements in health would be comparable with, or exceed, the value of the environmental benefits although the exact valuation method used considerably affects the estimated amounts. Overall, we estimate the economic benefits of improving diets to be 1-31 trillion US dollars, which is equivalent to 0.4-13% of global gross domestic product (GDP) in 2050." - Springmann et.al. 2016 (Oxford)\(^6\)
“Other significant zoonotic diseases, the transmission of which has been associated
with wildlife, include Ebola, MERS, HIV, bovine tuberculosis, rabies, and leptospirosis.
Zoonotic diseases are responsible for over two billion cases of human illness and over
two million human deaths each year.”⁷ (Taken from a letter to WHO signed by more than
240 groups.)

‘Concentration of food animal production and the unregulated ‘evolution’ of densely
populated livestock production areas not only result in major environmental burdens,
but also generate significant animal and public health risks. Recent experience has
shown that disease containment in these areas is extremely difficult, and in the case of
outbreaks can result in the ethically rather questionable destruction of millions of
healthy birds. An unrecognized aspect of industrial food animal production concerns
worker exposures (Price et al, 2007) to zoonotic diseases.⁸

“Zoonotic viruses almost always leap to humans directly from our livestock or from
wildlife⁹ the slaughter and hunting of which bring susceptible human hosts in
particularly close contact¹⁰ with live animals and their infected tissues and fluids.” - Liz
Specht Wired article

4 - Government of US. CDC. https://www.cdc.gov/mmwr/volumes/69/wr/mm6913e2.htm
died-from-virus-had-other-illness-italy-says
6 - Springmann et.al. 2016 (Oxford). Analysis and valuation of the health and climate change cobenefits of
Report to the UK Department for International Development. 2012
10 - Bird, Brian H. and Mazet, Jonna A.K. Detection of Emerging Zoonotic Pathogens: An Integrated One Health
"Examples of livestock production, particularly cattle grazing, directly interacting with wild species are numerous and date back several decades (Taylor, 1986; Knapp & Matthews, 1996). Livestock grazing has long been known to lower population densities for a wide variety of taxa, disrupting nutrient cycling, altering freshwater systems and changing ecological community organisation (Fleischner, 1994)." -Greenpeace

Less is More Scientific Background

• ‘Expansion of agriculture promotes encroachment into wildlife habitats, leading to ecosystem changes and bringing humans and livestock into closer proximity to wildlife and vectors, and the sylvatic cycles of potential zoonotic pathogens. This greater intensity of interaction creates opportunities for spillover of previously unknown pathogens into livestock or humans and establishment of new transmission cycles. Anthropogenic environmental changes arising from settlement and agriculture include habitat fragmentation, deforestation, and replacement of natural vegetation by crops. These modify wildlife population structure and migration and reduce biodiversity by creating environments that favor particular hosts, vectors, and/or pathogens.’

• ‘Intensification of livestock production, especially pigs and poultry, facilitates disease transmission by increasing population size and density, although effective management and biosecurity measures will mitigate the between-herd spread of zoonotic diseases, such as brucellosis and tuberculosis. As an alternative to investing in improved husbandry or in situations of poor animal health service provision, antimicrobials are often used for growth promotion, disease prevention, or therapeutically, which in turn promotes the evolution of antimicrobial resistance in zoonotic pathogens. Intensification also requires greater frequency of movement of people and vehicles on and off farms, which further increases the risk of pathogen transmission.’

• ‘The first known outbreak of Nipah virus occurred in Malaysia during 1998–1999, causing respiratory disease in pigs and high case fatality in humans. Epidemiological outbreak investigation showed that pig and human cases had occurred in 1997 on a large intensive pig farm in northern Malaysia, where Nipah virus–infected fruit bats were attracted to fruit trees planted around the farm. This provided the opportunity for virus spillover to susceptible pigs via consumption of fruit contaminated with bat saliva or urine. Respiratory spread of infection between pigs was facilitated by high pig and farm density and transport of pigs between farms to the main outbreak area in south Malaysia. Pigs then acted as amplifier hosts for human infection. Almost all human cases had contact with pigs; there was no evidence of direct spillover from bats to humans or of human-to-human transmission.’
Pathogens tend to be amplified in animals raised in CAFOs and, thus, are more difficult to eliminate in meat packing processes. Recent outbreaks in Asia have shown that transmission of infectious agents can arise from small farms raising poultry in proximity to domiciles and to other animals. However, because CAFOs tend to concentrate large numbers of animals close together, they facilitate rapid transmission and mixing of viruses. There is a concern that increasing the numbers of swine facilities adjacent to avian facilities could further promote the evolution of the next pandemic. ‘Animals held in confinement produce large amounts of waste, which need to be disposed of. Much of this waste, which may contain large quantities of pathogens, is disposed of on land, posing an infection risk for wild mammals or avians. Poultry house waste is also utilized in aquaculture, a form of food animal production, which results in the creation of artificial wetlands and thereby increases direct opportunities for contact with wild avians.’

Commentary

“What was extremely interesting from the start, but isn’t discussed so much now, is why we humans can get this virus at all. It’s a matter of human expansion. We’ve become too numerous, and take up too much space. We humans exploit animals and nature. So we get not only meat and milk, but also strange viruses. This ought to be given more attention”. - Björn Olsen, Professor of Infectious Diseases, Department of Medical Sciences, Uppsala University

We are witnessing increasing globalization, with persons, animals, and their products, moving around the world. This movement enables unprecedented spread of infections at speeds that challenge the most stringent control mechanisms.

Andrew Cunningham, Professor of Wildlife Epidemiology at the Zoological Society of London: “The underlying causes of zoonotic spillover from bats or from other wild species have almost always -- always -- been shown to be human behavior,” said Cunningham. "Human activities are causing this." When a bat is stressed -- by being hunted, or having its habitat damaged by deforestation -- its immune system is challenged and finds it harder to cope with pathogens it otherwise took in its stride. "We believe that the impact of stress on bats would be very much as it would be on people," said Cunningham. "It would allow infections to increase and to be excreted -- to be shed. You can think of it like if people are stressed and have the cold sore virus, they will get a cold sore. That is the virus being ‘expressed.’ This can happen in bats too.” - CNN 2020
Kate Jones, Chair of Ecology and Biodiversity at University College London: "It's not OK to transform a forest into agriculture without understanding the impact that has on climate, carbon storage, disease emergence and flood risk," said Jones. "You can't do those things in isolation without thinking about what that does to humans." - CNN 2020

Diseases like coronavirus could be here to stay, as humanity grows and spreads into places where it's previously had no business. Changing human behavior is an easier fix than developing a vastly expensive vaccine for each new virus. "There are tens of thousands [of viruses] waiting to be discovered," Cunningham said. "What we really need to do is understand where the critical control points are for zoonotic spillover from wildlife are, and to stop it happening at those places. That will be the most cost-effective way to protect humans." - CNN 2020

"A high density of livestock is a challenge, because if a pathogen does jump from the forest into those livestock, it can spread very readily," "Pathogens spread much better when their hosts are at high density. That's what COVID is doing right now." Felicia Keesing, ecologist and educator, Bard College, New York. 

5. https://www.pnas.org/content/pnas/110/21/8399.full.pdf
8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817683/
9. Ibid.
“Healthy diets have an appropriate caloric intake and consist of a diversity of plant-based foods, low amounts of animal source foods, unsaturated rather than saturated fats, and small amounts of refined grains, highly processed foods, and added sugars.”

- “Overall, studies concur that plant-based foods cause fewer adverse environmental effects per unit weight, per serving, per unit of energy, or per protein weight than does animal source foods across various environmental indicators...”

- “The consumption of animal-sourced food products by humans is one of the most powerful negative forces affecting the conservation of terrestrial ecosystems and biological diversity...impacts can be remediated through...reducing demand for animal-based food products and increasing proportions of plant-based foods in diets...”

- 'Most studies conclude that a diet rich in plant-based foods and with fewer animal source foods confers both improved health and environmental benefits. Overall, the literature indicates that such diets are “win-win” in that they are good for both people and planet.'

- 'Transformation to healthy diets by 2050 will require substantial dietary shifts. Global consumption of fruits, vegetables, nuts and legumes will have to double, and consumption of foods such as red meat and sugar will have to be reduced by more than 50%. A diet rich in plant-based foods and with fewer animal source foods confers both improved health and environmental benefits.'

**Commentary**

- The economic recovery plans that are being put in place are important to cushion the biggest shocks brought about by COVID-19, but they should also be used to make smart choices geared towards the right direction of a transition to a cleaner and more resilient food system.'

- 'We need to fundamentally rethink the way we have organized our food system. This means using a systems approach and planetary health perspective to effectively address the parallel crises we are facing.'

- 'The current COVID-19 pandemic is affecting the political, economic, social, environmental and food sectors. This multidimensional threat requires an adequate response to protect the most vulnerable and marginalized groups not only in cities but also in rural areas. In line with the 2030 Agenda, this situation pushes for urgent transition towards sustainable food systems.'
"We also need to seriously question and change our production and consumption patterns since these have immense environmental consequences. Our appetite for meat has to change, but we also need to change other activities that demand more and more forest land, and which are a threat to our survival. Otherwise, our food production system will kill us, sooner or later."

"Meat is increasingly recognized as a sensory experience, characterized by a specific combination of amino acids, fats, and minerals rather than by its means of production. No animal has to be farmed or hunted and no disease has to be risked to enjoy a juicy burger or a crispy nugget."

"Both plant-based and cultivated meat products remove the food insecurity and zoonotic disease concerns inherent in animal-based food."

2 - Ibid.
5 - Ibid.
11 - Ibid.
Commentary

(While some points do mention facts, they mostly guide the commentary in the point)

- “Reducing land used for livestock feed and meat production, can also free up land for agroecological crop production for human consumption, reduce deforestation pressure, and possibly free up land for restoration of biodiverse ecosystems…”¹ This is taken from an Action Aid paper titled ‘Principles for a Just Transition in Agriculture.’

- 'After the COVID-19 crisis we should adopt a planetary health approach to prevent other potential risks that can arise from it. The concept of planetary health is based on the understanding that human health – and civilisation – depend on flourishing natural systems. The socio-economic progress of the last century has been based on an unsustainable exploitation of natural systems which jeopardizes the continuity of such gains. And this exploitation has taken a heavy toll on our ecosystems, with far-reaching health implications.’²

- 'Large swaths of agricultural farmland used for the monoculture of staple, commodity and feed crops, as well as livestock production, have led to widespread soil erosion and the decline of (agro) biodiversity. This has also reduced the agricultural system's resilience to external shocks. Furthermore, long global supply chains and limited food sovereignty for most countries have made the entire food system vulnerable to disruptions like the current COVID-19 lockdowns, leading to food insecurity and rising food prices.’³

- 'Governments provide an astonishing £560bn a year in farm subsidies, and almost all of them are perverse and destructive, driving deforestation, pollution and the killing of wildlife. Research by the Food and Land Use Coalition found that only 1% of the money is used to protect the living world. It failed to find “any examples of governments using their fiscal instruments to directly support the expansion of supply of healthier and more nutritious food.”⁴

- "Misuse and overuse of existing antimicrobials in humans, animals and plants are accelerating the development and spread of antimicrobial resistance. Antimicrobial resistance poses a formidable challenge to achieving Universal Health Coverage and threatens progress against many of the Sustainable Development Goals, including in health, food security, clean water and sanitation, responsible consumption and production, and poverty and inequality."⁵
Even when these viruses circulate only within their animal hosts, the threats to human prosperity and food security are too high to bear. The current African Swine Fever Virus outbreak has been responsible for an estimated 50 percent drop in pork production in the world’s largest pork-producing country and led to a dramatic rise in overall food prices. 

4 - https://www.theguardian.com/commentisfree/2020/jan/08/lab-grown-food-destroy-farming-save-planet?fbclid=IwAR1brFO4sA5NjbEFuXFbLJi5qYNSpfY8r-epcctiOr2mvlagQsdj5KaJpMXU
5 - https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf?ua=1
6 - https://www.wired.com/story/opinion-modernizing-meat-production-will-help-us-avoid-pandemics/
“Total net GHG emissions from Agriculture, Forestry, and Other Land Use (AFOLU) emissions represent 12.0 +/- 3.0 GtCO₂eq yr during 2007-2016. This represents 23% of total net anthropogenic emissions.”

- Diversification in the food system (e.g., implementation of integrated production systems, broad-based genetic resources, and diets) can reduce risks from climate change. Balanced diets, featuring plant-based foods, such as those based on coarse grains, legumes, fruits and vegetables, nuts and seeds, and animal-sourced food produced in resilient, sustainable and low-GHG emission systems, present major opportunities for adaptation and mitigation while generating significant co-benefits in terms of human health.

- “Studies have found that long-term climate warming tends to favor the geographic expansion of several infectious diseases, and that extreme weather events may help create the opportunities for more clustered disease outbreaks or outbreaks at non-traditional places and time.”

- “Mounting evidence indicates that biodiversity loss frequently increases disease transmission. Current evidence indicates that preserving intact ecosystems and their endemic biodiversity should generally reduce the prevalence of infectious diseases.”

- The drivers of disease emergence are human activities that are expanding on a global scale, including deforestation, agricultural intensification and the wildlife trade. This has led to an exponential increase in the frequency of animal-human contact and likelihood of novel disease emergence and spread, suggesting that pandemics will become more frequent and more devastating in the future. These threats face all countries because once diseases emerge, they travel rapidly and freely through our global networks of travel and trade.

- “Ecosystems in nature function similarly to the human body: When they are robust and healthy — which means they have diverse species and space for healthy animal populations — they are more resistant to disease. Thriving ecosystems also provide a variety of benefits to surrounding humanity, from fresh water to food to fertile soil. However, when human activities such as logging and mining disrupt and degrade these ecosystems, animals are forced closer together and are more likely to be stressed or sick, as well as more likely to come into contact with people. In these conditions, diseases bounce back and forth between wildlife populations and humans.”
Climate change is accelerating the loss of animal habitats and the ways humans change the land. Cutting down old-growth and rain forests, which harbour a rich biodiversity of life, to create agricultural or pastoral land potentially brings people and livestock in closer contact with previously isolated populations of bats, and other animals harbouring previously unencountered disease. In turn, biodiversity loss threatens natural food sources which means animals seek other sources of food found where people live. As climate change causes large disasters like floods and drought, human food sources are also lost, and growing food insecurity pushes people to further encroach on animal habitats, increasing animal contact and contributing to the trade in wildlife."

'It is widely accepted that SARS-CoV-2 originated from wild pangolins sold for human consumption in a wet marked in Wuhan. As previously occurred with SARS (2003), the swine flu (2009) and MERS (2012), close contact between wild species and humans allowed the virus to cross between species resulting in the appearance of a new human disease that rapidly spread in the globalized world. These interactions are increasingly frequent given the exploitation of natural resources to respond to the growing human population’s increasing demands for energy and animal-based foods. In the last century, about half of the emerging infectious diseases of zoonotic origin resulted from changes in land use, agricultural practices and food production to respond to such demands.

'Origins of new pathogens like SARS-CoV-2 stem from environmental degradation.'

'There is increasing evidence pointing to the links between this spread of zoonotic diseases and deforestation. For example, the outbreak of a type of malaria common in macaque monkeys that spread to humans in Malaysia in 2002, is linked by scientists to deforestation caused by the expansion of oil palm plantations.'

'Approximately 31% of the infectious diseases that have originated in wildlife since 1940 have been related to some form of land use change. This includes deadly diseases such as HIV/AIDS, Ebola, and Zika Virus; all of which originated in altered forest landscapes.'

'The risk for emergence of new zoonotic agents from wildlife depends largely on 3 factors: 1) the diversity of wildlife microbes in a region (the "zoonotic pool"); 2) the effects of environmental change on the prevalence of pathogens in wild populations; and 3) the frequency of human and domestic animal contact with wildlife reservoirs of potential zoonoses.'
‘The ecologic diversity in Cameroon and the range of new and changing land-use patterns make it an ideal setting to examine the impact of environmental changes on novel disease transmission. Deforestation rates in Cameroon are high, with a loss of 800–1,000 km² forest cover per year and corresponding increase in road-building and expansion of settlements. Finally, Cameroon is representative of the region from which a range of notable emerging infectious diseases, including HIV/AIDS, Ebola and Marburg viruses, and monkeypox, have emerged.¢13

‘Where native vertebrate diversity is high, mosquito and tick vectors evidently feed from a wider variety of hosts, most of which are poor reservoirs for the pathogens, resulting in lower infection prevalence. Protection of humans against exposure to zoonotic pathogens should be added to the list of utilitarian functions provided by high biodiversity."14

Commentary

“Climate change will affect the environment, animals, insects, and human populations through various channels, increasing exposure and sensitivity to infectious diseases before and during a pandemic outbreak. In short, climate change can act as a threat multiplier."n15

“For infectious diseases, climate change is a threat multiplier. It takes existing threats – whether from a cholera outbreak, the spread of Zika to new geographical areas, or the severe malnutrition that accompanies drought – and enhances them. The risks are familiar but their impact is amplified in frequency and severity. A changing climate can expand the distribution of infectious diseases, especially those transmitted by mosquitoes and other vectors, and invite the emergence of others. The emergence of Nipah virus and Hanta virus as human pathogens has been traced to extreme weather events that forced animal hosts to leave their ecological niches and invade human settlements.”n16

‘When you lose biodiversity, we’re left with the creatures that are shedding bacteria, viruses, and parasites more heavily than their counterparts. We’re losing the species that serve a protective role by either absorbing and killing off these pathogens, or actually killing the mice and rats."17

‘We are only just now starting to get a sense of the collateral damage, including the emergence of secondary effects such as zoonotic infections that threaten human health. While we race to contain the spread of COVID–19 and its toll on human health, we will also need to take stock of how we can contain future pandemics, providing an increasingly compelling case for protecting animal habitats.”18
“Human actions that impact animals, such as changes in land use and climate change, have a profound effect on how these diseases spread.”

'Deforestation rates have soared across the globe, driven largely by agriculture and logging. Not only does this put stress on wildlife habitats, it could accelerate climate change — which could also impact the spread of disease.'

2. IPCC land use report 2019
10. https://adsabs.harvard.edu/abs/YgQfJApqIClCRAB&url=https%3A%2F%2Fwww.swissre.com%2Fdam%2Ficr%3A1552d59b2-76c6-4626-a91a-75b0ed5897e%2FPandemics_in_a_changing_climate_Final_report_FINAL.pdf&usg=AOvVawOZaXBCZ_s6XF6sUkJ2TNdK
13. Ibid.