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Knowing Well, Being Well
well-being born of understanding

The COVID Pandemic as Mosaic

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To date, the COVID19 pandemic is something of a Rorschach test. Borrowing from Billy Joel, in this mutual experience our separate conclusions are anything but the same. In response to the shared amalgam of action and reaction; data, dialogue, and diatribe-we have impressions representing diametric tensions. While some advocate for mandates, others rant against oppression and the violation of civil liberties. Some countries of the world have locked down stringently, others not at all, and increasingly now-countries have done both in a variety of sequences.

The danger in the caprices of a Rorschach test is that no consistent, cogent interpretation will be made. In the case of the pandemic, the danger is a failure to establish a shared understanding of this tumultuous history. Famously, those who fail to learn from the follies of history are destined to repeat them. This history has been fraught, and its follies-agonizingly costly. If we can agree on nothing else, we should agree that a repeat of all this is most unappetizing.

How, then, to move toward the hope of common understanding? An abrupt transition from discord to consensus seems unlikely. Between the subjectivity of a Rorschach test, and the clarity of some uniform view-what might intermediate progress resemble?

In This Issue

In this edition of *Knowing Well, Being Well* we suggest, effectively, that it might resemble a mosaic. Seen close up, a mosaic is a diversity of impressions, the many parts of a complex whole making assertions and insinuations all their own. That a diversity of perspective might result is expected. All of it might well be valid, through its particular lens.

The commentaries here, from expert and well-informed observers, illustrate that diversity of perspective, and the value in it. An understanding of the pandemic that surmounts the follies of history will be a whole greater than, but composed of, many component parts. Understanding the parts, and their situation relative to 1 another, is the promise of incremental progress as we probe the origins and toll of the COVID19 pandemic.

Looking closely at the social determinants of health, and the effects of pandemic restrictions, Holt-Lunstad and Perissinotto highlight the importance of isolation and loneliness. They help us appreciate how important and neglected these health threats were before the pandemic, and how greatly compounded by it.

Ripple and colleagues scrutinize another set of tiles in the same, great composite, and elaborate on our troubled relationship with the natural world. As with social determinants, this domain was highly problematic long before the pandemic, but has been accentuated by it. Incursions into delicate ecosystems, and disrespect for reasonable boundaries among species are among the salient contributors to emerging infectious diseases - including those with pandemic potential.

Finally, Adams offers a view in the realm of cardiometabolic liability, a matter of established importance (O'Hearn M, Liu J, Cudhea F, Micha R, Mozaffarian D. Coronavirus Disease 2019 Hospitalizations Attributable to Cardiometabolic Conditions in the United States: A Comparative Risk Assessment Analysis. J Am Heart Assoc. 2021 Feb;10(5):e019259), but also routine neglect. Obesity and related cardiometabolic liabilities were pandemic before ever SARS-CoV-2 was, and the interactions between pandemics both acute and chronic are of outsized importance. This view is highlighted here.

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Were there again as many contributors to this issue, there could well be again as many distinct impressions-all important, all separate, and ultimately, all part of a common, and complete understanding.

The ***True Health Initiative*** has commissioned an analysis of worldwide pandemic data, on-going at this time, and led by Roger Stein of NYU an expert in mathematical modeling of complex systems. Using recursive partitioning, this effort reveals the essential contributions of context to pandemic interpretation.

As an example, obesity is associated with indigence in affluent nations, and with affluence in relatively indigent nations. As a result, obesity is in turn associated with poor COVID outcomes in some countries, and favorable COVID outcomes in others. This is unlikely to be because the metabolic effects of obesity vary, but rather because the company kept by obesity does. In relatively poor nations where only the affluent are apt to "achieve" obesity, that company includes all manner of privilege, resource, and access – in turn apt to confer advantage when contending with an acute infection.

Similarly, such modeling suggests the same policy responses-the rapidity and severity of lockdowns, for instance-may translate into quite different suites of outcomes among a range of nations. Here, too, context is key. Some countries may invoke rigorous protections because it is immanent in their cultural nature to do so; others may adopt the same responses only despite reluctance, and because of extreme provocation (ie, a severe pandemic surge). The particulars of motivation belie an apparent homogeneity of action: in 1 instance, the action is anticipatory and preemptive; in another, it is reactive rather than proactive. As circumstance varies, so, too, do the apparent "effects" of the same apparent policy.

This, then, is an initial attempt to demonstrate the range of views that will be required to make of this pandemic a common understanding. We might start by conceding that competing perspectives often derive from looking at distinct parts of a complex whole.

In that regard, the mosaic metaphor is both instructive, and hopeful. Viewed from proximity, only parts of a mosaic can be clearly seen. The assembly of those parts into a cogent whole requires…a bit of distance.

Isolation in the Time of Covid: What is the True Cost, and How Will we Know?

Julianne Holt-Lunstad, PhD[1] and Carla M. Perissinotto, MD[2]

Keywords
social connection, loneliness, social isolation, assessment, Covid-19

Introduction

Rising concerns about social isolation and loneliness (SIL) began well before the pandemic, with many suggesting that we were facing a loneliness epidemic. While these concerns were shared among researchers and those who serve older adults and other vulnerable populations, these issues were largely underappreciated by the broader public,[1] and even less so by the health care community. Fast forward to the emergence of the Covid-19 pandemic, and suddenly "those at risk" for SIL presumably included everyone. Immediate and widespread "social distancing" policies and practices were implemented nearly globally to reduce social contact to hasten the spread of the virus, but without a critical look at whether these policies aimed to save lives may also increase the risk of earlier death. Concerns about SIL grew exponentially across the globe, with crucial questions raised about whether the pandemic-related restrictions, including forced isolation, would increase loneliness across the population; if so, whether some groups were at greater risk, and what kinds of secondary health effects might occur as a result.

The Costs of Isolation: Lives Influenced

While there continue to be many unanswered questions about the long-term effects of the pandemic, we do have some evidence pointing to the impact on loneliness and who may be at the greatest risk. For example, a meta-analysis of 32 longitudinal studies that collected data at some point before and during the pandemic demonstrates that there were increases in loneliness severity within individuals as well as increases in global prevalence rates of loneliness.[2] This experience of SIL is location agnostic and not unique to the United States. A multi-national study, including over 20 000 participants from 101 countries, further examined who might be most impacted. This data demonstrates that those with significant financial needs, mental health concerns, and those living alone (particularly those not by choice) were more likely to report severe loneliness both before and during the pandemic relative to those without those characteristics.[3] This evidence suggests that loneliness has increased both in prevalence and severity and helps us understand who may be at greatest risk for loneliness and consequently worse health outcomes. Yet, sadly, we cannot adequately answer how this relates to secondary health effects without nationally standardized sources or mechanisms of data collection. Furthermore, in the United States, we still do not have consensus on collecting standardized assessments of SIL in

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health encounters (despite recommendations to do so[4,5]), and without this, we will not know the full magnitude of risk and health consequences.

The Costs of Isolation: Health Consequences

Both authors served as committee members on a National Academy of Science Engineering and Medicine expert consensus report focused on the medical and health care relevance of SIL among older adults.[5] Ironically, and perhaps thankfully, this report was published just 2 weeks prior to the World Health Organization declaring a pandemic and immediately prior to shelter in place orders. This report summarizes decades of evidence on the health effects of SIL by researchers spanning continents and fields of study. These data, including systematic reviews and meta-analyses, find substantial evidence that SIL increases the risk for depression,[6] dementia,[7] cardiovascular disease and stroke,[8] and risk for premature all-cause mortality.[9] This report concludes that the evidence points to significant mental, cognitive and physical health morbidities with the strongest evidence associated with risk for premature mortality.[5] Furthermore, a growing body of evidence has documented the influence of SIL on various biomarkers, such as markers of chronic inflammation,[10] that may serve as the underlying mechanisms to explain the associations with poorer outcomes. Thus, prior to the Covid-19 pandemic, we had evidence of the health risks associated with SIL, and yet we were not prepared to appropriately respond to the potential harm that was unfolding before our eyes by enforcing mass isolation. We already knew SIL was a problem, but now we are faced with determining the full scope and ramifications of this problem.

We Cannot Adequately Solve a Problem Without Adequately Measuring the Problem

Measurement in Clinical Settings

What kinds of effects of SIL may be occurring at a population level that we are unaware of because we are not adequately measuring it? Evidence of the secondary mental health effects during the pandemic has become apparent because these have been measured and included in the EHR. For example, early in the pandemic, a study using the data from 61 million adults, obtained from data from the electronic health record, demonstrated that patients with a recent mental health disorder were significantly at greater risk for infection, hospitalization, and death from Covid-19 relative to those with no mental health disorder.[11] Another study examining the electronic health record found that 33% of Covid-19 patients developed a new neurological and psychiatric diagnosis within 6 months.[12] Importantly SIL are different from mental health (eg, depression or anxiety); however, this data has important implications for understanding the potential consequences of SIL and points to missed opportunities. First, well-established bi-directional associations between SIL and mental health outcomes suggest similar associations with the Covid-19 infections may exist with SIL. Second, the scope of secondary health effects due to mass isolation practices and policies are unknown because loneliness or other social indicators are not routinely collected in health assessments. If SIL were in the EHR, direct and indirect associations with COVID-19 infections and other health outcomes could be known.

Measurement of SIL within health care settings are also needed to identify those at risk and those already experiencing SIL, to understand associated health risks and track changes over time. While there is robust evidence of associations between SIL and short and long-term health outcomes, it is not clear the exactly how long 1 can remain isolated or lonely before such health effects emerge. Indeed, based on an evaluation of the evidence an IOM Report concluded that it is critical to include measurement of social connection and isolation in the electronic health records.[4] Alongside this report is ongoing work by the Gravity Project, which provides further guidance on implementing this task. Without a baseline understanding, it is nearly impossible to begin to understand how to intervene and how to prevent morbidity and mortality. Without systematically identifying these social risks, we are not only missing opportunities for affecting people's lives, but importantly impacting the costs of health care.[13]

Population Health Measurement

To better gauge impact more broadly and guide public health efforts, we also need systematic measurement of SIL nationally. For example, the UK National Office of Statistics established a standardized measure of loneliness in 2017, and subsequently were able to map loneliness during the Covid-19 pandemic and where it tended to be worse. These maps can then be used to inform solutions, guide where resources and are best prioritized, and subsequently remeasured to evaluate effectiveness. We need something similar in the US and other nations. For example, national measurement of SIL would facilitate the inclusion of these factors in the Health People 2030 objectives to establish national goals and track progress over time. Standardized and routinely collected national assessments will help us accurately estimate the prevalence rates of isolation and loneliness within the population and whether national and local efforts, societal trends, and policies change these prevalence rates over time.

National assessments of SIL in the US and globally would have been incredibly helpful to have before the Covid-19 pandemic to capture the consequences of reduced social contact, but it is not too late. The world has experienced disruptions across various sectors of society, but perhaps none felt more than education, workplace, and health. Shifts to online education, remote working, and telemedicine are likely to continue in some form and unlikely to return to pre-pandemic levels. To fully understand the effects of these shifts in societal trends, we need to look beyond the evidence of convenience, access, and productivity levels and include adequate measurement of SIL. Measurement allows us to identify features of practices and policies that may be more detrimental to SIL than others.

Conclusion

The full scope and ramifications of the broader effects on population health associated with the pandemic are likely to extend far beyond the official death toll from Covid-19. There are likely deaths that ensued from SIL, yet these were never adequately assessed, nor is it possible to indicate isolation or loneliness as an official cause of death. Many clinicians and non-clinicians saw patients, family members, and friends suffer and die and recognized that it was due to isolation—but cannot directly say so. We need to measure SIL both within health care settings and in population health to establish direct and indirect influences on health, and guide and evaluate efforts to reduce risk.

Because restrictions in social contact have been experienced globally to some extent, we must take this opportunity to collect reliable data to understand the reaching long-term effects of isolation and loneliness.

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Zoonotic Diseases and Our Troubled Relationship With Nature

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The coronavirus pandemic provides us with an opportunity to reassess and reboot our relationship with nature. Reducing the pressures on our planet's life-giving ecosystems will help solve converging environmental crises as well as benefit public health and well-being. Rather than piecemeal solutions to the rising probability and magnitude of zoonotic disease outbreaks, runaway climate disruption, and mass biodiversity loss, we suggest systemic change in the way humanity functions and interacts with nature.

The staggering loss of human life and disruptions to everyday life from the coronavirus (COVID-19) pandemic have caused immeasurable pain across the world as well as enormous financial losses. If and when the time comes that it is deemed safe to resume all our typical activities, the world will still be a markedly different place. To reduce the likelihood and impact of the next pandemic and other natural disasters, we need to address human, animal, and planetary health together. Immediate action is critical to solving these co-linked crises.

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One hypothesis on how COVID-19 originally infected people in China is that the virus spilled over from infected bats and possibly other wild animals that were forced into close proximity with humans, making it a zoonotic disease. Humans – their increasing numbers, soaring extraction of natural resources and escalating consumption – are changing the planet in fundamental ways that threaten our overall health and well-being, especially that of future generations.[1] The ever-increasing pressure we exert on nature endangers not only the biosphere, but human civilization itself.[2]

Phenomenal economic growth, particularly in wealthy nations, has consumed massive amounts of natural resources, only to deposit much in landfills, with unprecedented global warming emissions as a byproduct. Explosive world population growth (3 billion people in 1960, nearing 8 billion now) has spread human populations to remote areas, thereby destroying wildlife habitats, and forcing wild animals to adapt or perish (Figure 1A). Some 1 million species of plants and animals are now facing extinction worldwide.[3] In North America alone, 3 billion birds have vanished in recent decades.[4] The world has likely now entered the sixth mass extinction.

Our global environmental footprint — a measure of our use of natural resources and the consequent impacts on ecosystems — has depleted 60% of the ecosystem benefits provided to us free of charge by nature.[5] These benefits are best maintained by natural features that purify drinking water, cleanse the air, pollinate crops, regulate the climate, provide new medicines, inoculate our microbiomes, and enrich our lives. Unfortunately, at the rate we are going, these losses will only accumulate as we force more wild animals out of natural habitats (Figure 1B and 1C), alter wildlife migrations, and melt the permafrost that could be harboring novel pathogens.

Our insatiable meat consumption is upping the ante on pathogen spillover (Figure 1D and 1E). Large and dense populations of poultry and livestock can facilitate the rapid spread of pathogenic agents to humans, and crowded farm animal-feeding operations can increase the probability of emerging infectious diseases (Figures 1F-1I). The H5N1 bird flu, which spilled from chickens to people in 1997,

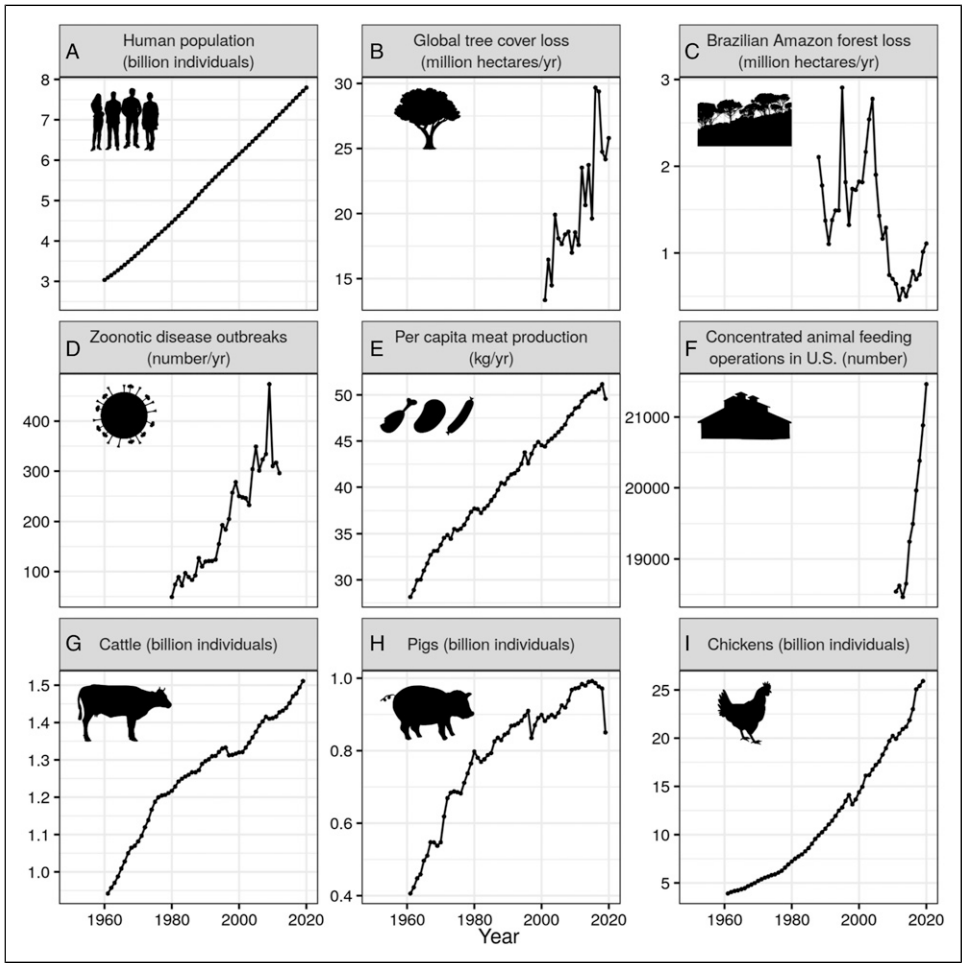

Figure 1. Trends in variables related to zoonotic disease risk. Increasing human population size and expansion (A) has been a major driver of deforestation (B, C), contributing to an overall rise in the incidence of zoonotic disease outbreaks (D). This rise might be exacerbated by increasing concentrated animal feeding operations (F), meat consumption (E), especially of cattle (G), pigs (H), and chickens (I). Note that we omitted the final estimate of zoonotic disease outbreak (A) because it could be based on incomplete data. The recent major decrease in pig numbers (H) is likely due to African swine fever in Asia.[12] Global tree cover loss (B) does not account for forest gain. Data sources: A, E, G, H, I - FAOSTAT[13]; B - Hansen et al[14]; C - Butler et al[15]; D - Smith et al[16]; F - EPA[17].

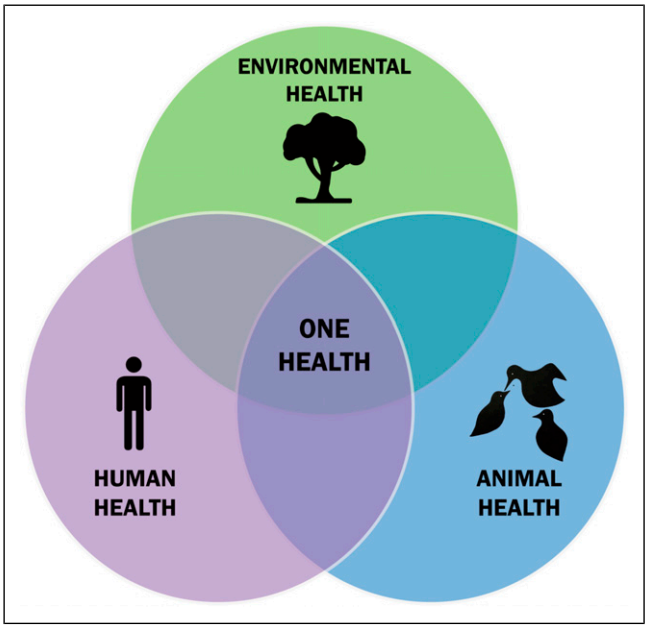

Figure 2. Illustration of the One Health concept. One Health lies at the intersection of human, animal, and environmental health, and reflects the important connections among these components. For example, reducing zoonotic disease risk requires careful consideration of all 3 types of health and how they can be optimized together. This image is a derivative of https://commons.wikimedia.org/wiki/File:One-Health-Triad-en.png (Thddbfk; CC BY-SA 4.0).

ravaged chicken stocks and killed approximately 60% of the humans known to have contracted the virus. Fortunately, this outbreak subsided before many more people died. The H1N1 swine flu was a massive pandemic, jumping from pigs to people in 2009. The Centers for Disease Control and Prevention estimated that from 2009 to 2018, the H1N1 swine flu caused at least 100.5 million illnesses, 936 000 hospitalizations, and 75 000 deaths in the United States alone.[6] Globally, an estimated 151 700 to 575 400 people died from H1N1 swine flu in just the first year of that pandemic.[7]

The loss of predators that keep host animals, like mice and deer, in check is connected to the spread of Lyme disease in North America.[1,8] Poaching, overhunting, and the global trade in wild animals contribute to disease spread (Figure 1D). Zoonotic diseases that were likely caused by wild meat hunting and butchering include Ebola, HIV-1 and HIV-2, among others.[9] The source of the deadly Ebola outbreak has been linked to both deforestation and to virus spillover from the hunting and consumption of primates or bats in Africa. The HIV epidemic was likely the result of African primates being killed, processed, and eaten by hunters. More than 30 million humans have died from HIV since the beginning of this epidemic.

What can be Done to change Direction and Reduce Human Suffering and Death From Zoonoses?

Immediate changes include accelerating the development of new medicines and vaccines while caring for the most vulnerable. One-quarter of all medicines come from the tropics. Of special importance are the phyto-chemical properties of rainforest plants, particularly those derived with the cooperation and respect of Indigenous Knowledge. Veterinarians working with ecologists and medical doctors need rapid response capabilities to locate and contain emerging infectious-disease hotspots quickly. An encouraging program is 'One Health' at the Centers for Disease Control and Prevention.[10] This multidisciplinary approach to zoonotic disease prevention explicitly links human and ecosystem health (Figure 2).

'Wet markets', where wild animals are housed in high densities in typically unhygienic conditions, must be closed, and the trade of wild species that have elevated risks of zoonotic disease transmission strictly curbed. Much of the demand is fueled by the U.S., which consumes some 20% of the global wild-species trade.[11]

As consumers, we have choices; eating lower on the food chain is one of them that will have sweeping benefits in many sectors of sustainability. In addition to being a healthier choice for many, major reductions in meat consumption would help slow the rate of deforestation, biodiversity loss, and climate change, while simultaneously improving human health and potentially reducing risks of diseases being transferred from animals to humans. No longer are plant-based protein products just for vegetarians, as now some of the biggest meat producers in the world have launched plant-based meat analogs (substitutes) for the mass market. Plant-based dairy and egg analogs are also becoming widely available. Research on laboratory or cultured meat (growing meat from muscle cells in the lab) also shows promise as being environmentally friendly.

We urgently need international sustainability efforts to reduce the pressures on the planet's life-giving ecosystems by at least bending the human population growth curve downward. There are policies that can lower fertility rates ethically and equitably while strengthening human rights: achieving full gender equity and making secondary education and job opportunities a global norm for girls and young women.

Greater collaboration among governments and local communities is needed to protect at least 30% of Earth's terrestrial and marine habitats by 2030, particularly in regions that still have vast areas of intact ecosystems, large carbon stores, and vulnerable species. The timing is critical to stem accelerating biodiversity losses. Along with other climate-conscious efforts such as weaning ourselves from our fossil-fuel addiction, this protection would help keep carbon safely stored in ecosystems like forests instead of emitting most of it to the atmosphere when forests are cleared.

As we recover from this pandemic, it would be foolish to go back to business as usual and lose sight of the climate and biodiversity crises about which the world's scientific community and religious leaders like Pope Francis and the Dalai Lama are warning us. If we ignore their calls, we will pave the way for new pandemics and other threats, such as the potential catastrophic effects of global heating. The COVID-19 pandemic has shown us that, if absolutely needed, we can make life-saving behavioral changes. It has taught us how to lower our consumption habits and our carbon footprint.

An integrated nature-based agenda is gaining momentum. Rather than piecemeal solutions to the climate crisis, biodiversity loss, and pandemics, we need transformative change in the way society fundamentally interacts with the natural world.[12] We must create a new carbon-free economy operating within the limits of the biosphere and atmosphere. We must restore and preserve ecosystems, and change the way we interact with animals. We can reduce fertility rates through voluntary family planning, while eating mostly plant-based

foods. We can remodel our economy to account for the actual impacts of development and resource extraction on the wellbeing of humans and the preservation of the environment. We can do all of this while addressing social justice issues and honoring the diversity of people, especially Indigenous populations, around the world. Making good on these essential goals is necessary to ensure climate stability and provide life support for future generations on Earth.

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Accounting for the Origins and Toll of COVID 19 The key role of Overweight in COVID-19

Mary L. Adams, MS, MPH[1]

Abstract

Both global and US data show associations between COVID-19 death rates and overweight or obesity, which are also risk factors for several other outcomes. Evidence suggests that among the strategies to reduce overweight and obesity are the simple actions of increasing fruit and vegetable consumption and physical activity. Potential benefits include saving thousands of lives and billions of dollars in a future pandemic and reduced risk of other chronic conditions.

Once transmission of COVID-19 expanded beyond Asia, the role of cardiometabolic risk factors and especially overweight and obesity, became clear.[1] With early data coming from China where

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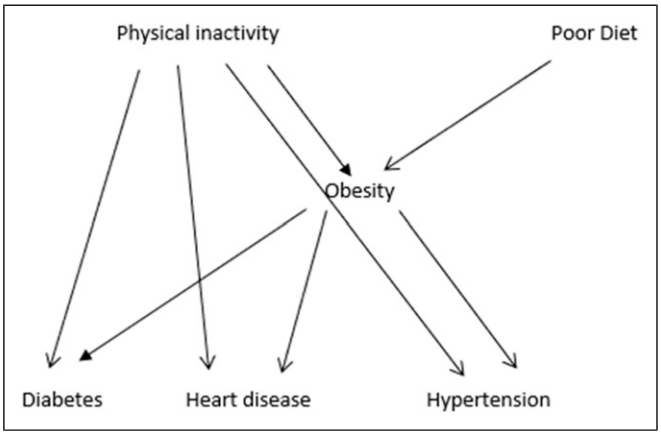

Figure 1. Diagram of relationships between obesity, its risk factors, and potential consequences. Derived from Adams et al.[10]

obesity rates are low, obese adults were not a group with reported high COVID-19 hospitalization or death rates. Early hospitalization data from the US found that adults with hypertension (49.7%), obesity (48.3%) chronic lung disease (34.6%), diabetes (28%), and cardiovascular disease (27.8%) were disproportionately represented among those hospitalized with COVID-19.[2] Another US study limited to cardiometabolic conditions found similar but somewhat lower rates of hospitalizations among those with obesity (30.2%) hypertension (26.2%), diabetes (20.5%) and heart failure (11.7%). Estimates of the percentage of adults with increased risk of hospitalization and death from COVID-19 found that the 5 conditions[2] included 56.0% of all US adults.[1]

Further evidence of the significance of obesity in the risk of complications from COVID-19 comes from the World Obesity[4] Federation (WOF), which showed that in countries where the prevalence of overweight is >50%, the death rate from COVID was about 10 times that in countries where overweight was less prevalent. Results showed a nearly flat line for deaths vs overweight for countries with overweight <50%, with the slope rising dramatically above 50%. The US, with an overweight prevalence of 67.9%, had a death rate 23.5 times that in countries with overweight <50%. Using more recent data[5,6] and obesity instead of overweight, results are similar with the rise in deaths occurring at about 15%, again with a nearly flat line below 15%. A study of 30 industrialized countries[7] found that along with obesity, other factors including population density, the age structure of the population, population health, GDP, ethnic diversity, and how the pandemic was handled were also associated with COVID death rates. That model explained 63% of the intercountry variation in COVID death rates. The findings by the WOF[4] suggest that 90% or more of the COVID-19 deaths in the US might have been prevented if our overweight prevalence was below the 50% threshold. They also note that COVID-19 is not a special case and that we should expect the next pandemic to have similar associations between overweight/obesity and deaths.

Obesity and overweight were also associated with COVID deaths within the US, with the associations less striking than global differences, but still statistically significant.[8] Data on obesity and overweight are from the 2019 Behavioral Risk Factor Surveillance System (BRFSS) and the number of deaths/million were assigned to the state in which the survey respondent resided.[9] Mean number of state COVID deaths through July 29, 2021[8] for obese respondents was 1804 (95% CI 1800-1807) vs 1795 (1793-1797) for respondents who were not obese and for overweight and non-overweight respondents the corresponding figures were 1800 (1798-1802) and 1793 (1790-1797).

Obesity and overweight are among several potentially modifiable risk factors associated with a wide variety of outcomes, especially cardiometabolic ones.[10] Figure 1 above illustrates the critical role of diet and exercise in the development of overweight and obesity and the pathways to other conditions identified as increasing the risk of COVID hospitalizations.[2,3] Many of these conditions are also leading causes of death unrelated to COVID-19. Not only do a majority of US adults have ≥ 1 of these conditions,[1] the figure shows that the cardiometabolic conditions are related and obesity is a key risk factor for all. Biologic plausibility for these relationships includes diminished immune response[3] along with chronic systemic inflammation[3,11] associated with obesity and potentially leading to metabolic dysfuntion.[11] Reduced physical activity alone tends to reduce immunity[11] although we present no evidence of immunity being a factor in COVID-19 deaths. Consistent with results above for obesity,[8,9] other US groups with higher COVID death rates/million than comparison groups include adults with diabetes (1820 deaths/million), hypertension (1811), heart disease (1825), blacks (1900), and residents of red states (1830); Significantly lower death rates were found for Asians (1731). In each case the higher (or lower) death rates were associated with higher (or lower) obesity rates, with obesity rates ranging from 12.6% for Asians to 53.4% for adults with diabetes. Thus, it is possible that the higher COVID hospitalization and death rates often seen for these groups may be related to their higher obesity rates.

These findings suggest that successful strategies to lower weight have the potential to reduce deaths and hospitalizations for several outcomes including those from another pandemic.[4] Reducing overweight and obesity will not be easy especially with obesity rates in the US continuing to increase.[12] But as recently as 1990, the US prevalence rate for overweight was 44.5% and obesity was 11.5%.[13] While the risk factors of diet and exercise are inherently broad and ill-defined, the BRFSS surveys include measures which should be easy to define and monitor. That diet measure is eating fruits and vegetables a combined < 5 or ≥ 5 times a day, and the exercise measures are living a sedentary lifestyle (no/yes for engaging in leisure time physical activity) and meeting (or not) the recommendations for participating in moderate physical activity ≥150 minutes a week or vigorous activity ≥75 minutes a week. Walking is a common example of moderate exercise. Results from the 2019 BRFSS[9] indicate that among the only 8.2% of adults eating fruits and vegetables ≥ 5X/day and meeting the exercise recommendation, 24.7% were obese compared with 36.8% of adults doing neither. While this rate does not achieve the threshold value of 15%, it represents a 33% reduction in obesity rates from the 47% of all adults doing neither. The states in which these adults resided had significantly lower deaths/million compared with states containing adults who reported both risk factors (1776 (1766-1785) vs 1804 (1801-1808) respectively). Corresponding reductions in rates of hypertension, heart disease, and diabetes for those reporting eating fruits and vegetables ≥5X/day and meeting physical activity recommendations were 24%, 35%, and 45%, respectively.

Consistent with the above findings, the WOF found that countries where populations were less physically active and consumed higher levels of animal fats, vegetable oils, and sugars were also more likely to have higher death rates from COVID-19.[4] The strongest association with increased death rates was shown for consumption of sugar-sweetened beverages. These results suggest additional changes that

may be needed to further lower overweight and obesity rates beyond any reduction achieved with the 2 simple changes above.

In late 2020, Harvard scientists estimated the cost of COVID-19, assuming it would be substantially contained by the fall of 2021 with total deaths at 625 000.[14] Their total estimated cost was $16 trillion,[14] about half which was estimated due to premature deaths and long term physical and mental health effects and half to lost income from the economic shutdowns. These total costs amount to 90% of annual GDP and nearly $200,000 for a family of 4. With 2 very simple behavior changes - eating fruits and vegetables ≥5 times a day and walking (or the equivalent) 22 minutes each day - having the potential to reduce overweight and obesity and thus save lives, this seems like a strategy worth encouraging. Even if overweight is not lowered below the 50% threshold,[4] US data noted above[8,9] indicate significant number of deaths could be prevented and it would be a start. Other factors that have been found to be associated with COVID death rates such as population density, the age of the population, GDP, ethnic makeup, and how the pandemic was handled[7] would likely be no easier to change than obesity and overweight. Although COVID-19 deaths continue at the present time, it is more realistic to consider any improvements from behavior change in the longer term, such as the next pandemic or deaths prevented due to diabetes, heart disease or hypertension. As difficult as it might be to change behaviors to significantly lower obesity and overweight rates, based on COVID impacts on health care, the economy, and life in general in the past 18 months and the estimated $16 trillion cost[14] the alternative is frightening to contemplate. Experience with COVID-19 shows that even with safe and effective vaccines, deaths continue.

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