

Scanning the Health and Well-Being Horizon: Trends, Opportunities, and Challenges

June 2020 (Researched in 2019)



Created in partnership with and based on the research of

VISION FORESIGHT STRATEGY



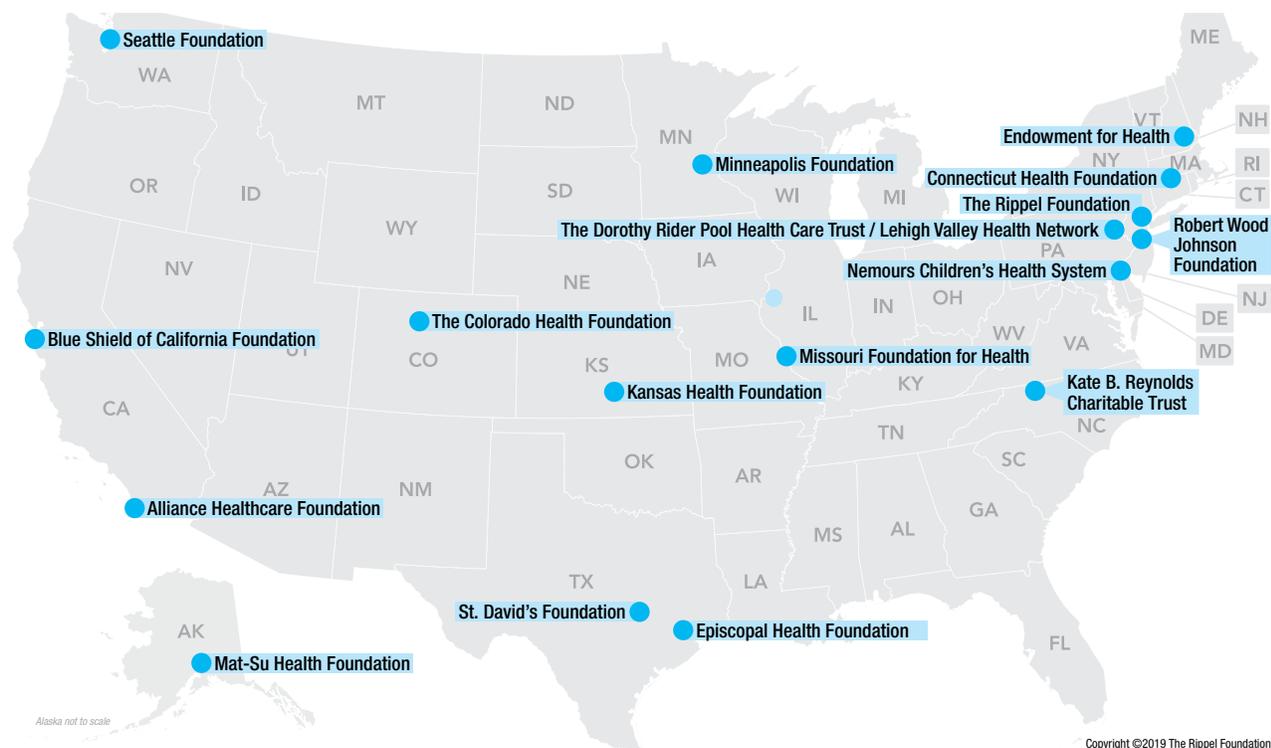


FORESIGHT is an initiative of 17 philanthropic partners led by The Rippel Foundation, created in partnership with Blue Shield of California Foundation, and closely advised by people representing a diversity of sectors who are ready to uncover and implement new ideas to address our nation's growing challenges around health and well-being. This report was created in partnership and based on the research of [Vision Foresight Strategy, LLC](#), a foresight and strategic analysis firm headquartered in Honolulu, Hawai'i.

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Discussion Questions

Below are some discussion questions that can help you begin to think about how to apply the information in this report to your community's or organization's strategies or actions. In fact, we'd love to connect with you and hear about your experience with it!

Connect with FORESIGHT in 3 ways:

1. Use the form on our [home](#) page
2. Reach out via social media
[Twitter](#) | [LinkedIn](#) | [#FutureforHealth](#)
3. Email us info@foresightforhealth.org

1. What reactions do you have to the historical trends and emerging issues—possible opportunities and challenges—presented in the report? Any you would add or modify?
2. What, if any, ideas—or seeds of ideas—formed in your mind as you read through the report?
3. Is your community or organization positioned to thrive in the future? How?
4. How could your community or organization better position itself for the future? (Think about new mindsets, strategies, partnerships or resources that might be required.) What is one step you can take to better prepare today?

Lastly, if you're reading this before August 2020, please add your voice to FORESIGHT:
<https://foresightforhealth.org/add-your-voice/>



Executive Summary

In times of dynamic, transformational change, is it necessary to pursue innovative new strategies and solutions to advance health and well-being. FORESIGHT is the first initiative of its kind to design a bold, new future for health—together. Everyone deserves to enjoy good health and well-being, and we need fresh ideas and new systems to get us there. FORESIGHT is a catalyst for equitably re-envisioning health using a futuring process that includes the voices of thousands of people across the United States. The goal is to co-design and activate the strategies and partnerships that will lead to a better future.

FORESIGHT is an initiative of 17 philanthropic partners led by The Rippel Foundation, created in partnership with Blue Shield of California Foundation, and advised by people representing a diversity of sectors who are ready to uncover and implement new ideas to address our nation's growing challenges around health and well-being.

Those involved in FORESIGHT understand that the urgency and breadth of the major issues that could impact US health and well-being could outstrip individual capacity for adaptation as well as current, collective incentives for action. Looking ahead, adjustments and solutions may be possible, but positive, systemic change is unlikely to occur without concerted and informed action. This report is the result of the first step in the FORESIGHT Phase 1 process, which focused on understanding historical trends, as well as possible opportunities and challenges on the horizon.



Our academically trained futurists conducted a scan of the health and well-being horizon to understand how the US could be impacted by various trends and emerging issues. They looked at a wide range of information sources, including academic literature, news stories, and other media. Ultimately they identified 22 trends and 52 emerging issues, which are described in brief in this report.¹ FORESIGHT grouped this material into nine themes and shared them via the [Game Changer video series](#) in late 2019.

The second step in FORESIGHT's Phase 1 process was to weave the trends and emerging issues into accessible stories of possible futures and share them with thousands of people—especially those whose voices are rarely heard—to provoke thinking not only about what sorts of futures might be possible, but what sorts of futures we, collectively, want. In the third step of Phase 1, FORESIGHT is asking a diversity of voices, particularly those of marginalized communities, to help identify a fresh vision and bold new ideas for shaping the best possible outcomes.

With a better understanding of possible futures, a clearer sense of priorities, and a set of bold ideas, FORESIGHT will launch Phase 2, working with people and organizations across the United States as they start making their vision for health and well-being a reality. This will likely require new strategies, partnerships and mindsets, a different allocation of resources, and a radical openness to experimentation. It will also require us to recognize that communities are different and therefore how they need to implement the vision will be different.

Scanning the Health and Well-Being Horizon is a living document, meaning we intend to update it as we all continuously learn and use futuring techniques in our work across sectors. Please note that the findings are from a scan conducted in 2019, prior to the Covid-19 pandemic and protests against racial injustice. We encourage readers to contact us with questions or suggestions about its content: info@foresightforhealth.org [#FutureForHealth](#) www.foresightforhealth.org

¹ A longer version of this report is available upon request: info@foresightforhealth.org.



Trends and Emerging Issues: Building Blocks of Foresight

Two of the most fundamental building blocks of foresight work are trends and emerging issues.

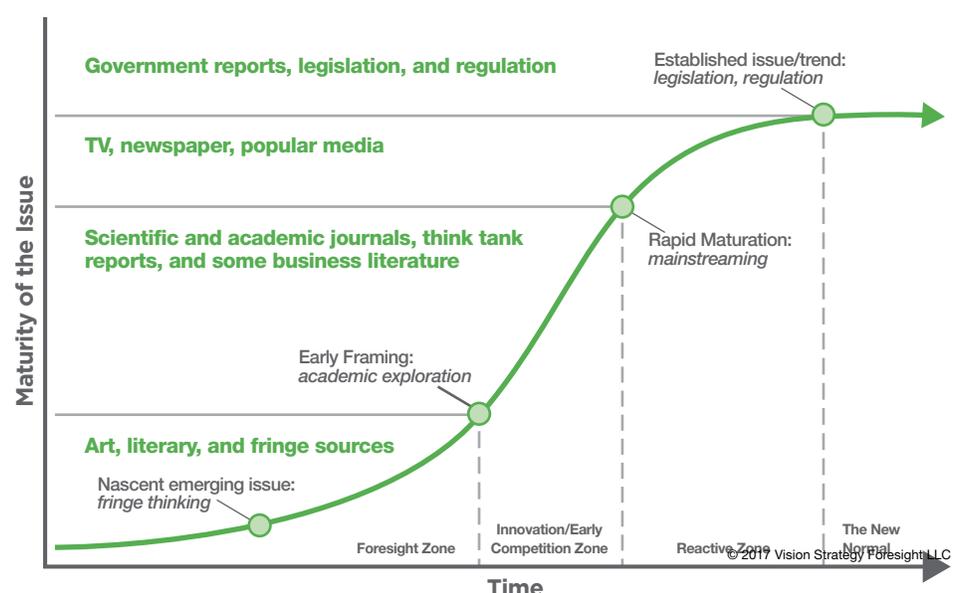
Trends are descriptions of change that has already occurred. Examples of trends include the US's shrinking middle class and the rising cost of a barrel of oil. Trends are critical building blocks of foresight (insight into how and why the future might be different from today) because they tell us about the current directions of change. While trends represent historical patterns of change over time, they can also serve as indicators for potential future developments based on what is known as the momentum of change. In general, the forces behind a measurable trend will continue over time unless significant change alters that direction. One of the first steps in assessing current signals of change, therefore, is to examine the implications of today's trends continuing along current trajectories into the future. Trend extrapolation represents a simple extension of a given trend using regression analysis to determine future "forecast" values. Such extrapolations form a "no surprise" forecast of the future where current trends continue, and no disruptive events occur.

Emerging issues represent possible opportunities or challenges on the horizon. They are valuable in foresight and strategy work because they enable organizations to identify potential opportunities and challenges before they become other people's competitive advantage, or before they arrive at the legislature for regulation. Emerging issues represent possibilities for new developments; none are guaranteed to emerge. They suggest potential risks before they become actual threats, as well as potential opportunities to nurture and shape into positive realities.

FORESIGHT's futurists, Vision Foresight Strategies (VFS), use their own version of the classic emerging issues "s-curve" (Figure 1, below) to help locate emerging issues and address their potential. As reflected in the graphic below, these shifts will range from clearly emerging reactive zone issues to the less certain, highly exploratory innovative zone issues, to the most futuristic, "fringe" foresight zone issues.

Figure 1. Vision Foresight Strategies S-Curve

Life cycle of change: model for scanning and spotting change





22 Trends Impacting Health and Well-Being

The VFS scanning produced 22 trends clustered across three categories: 1) The Broader Environment; 2) Societal Trends; 3) Health and Health Care Trends. The 22 trends are listed in Figure 2 and described in detail in this section.

Figure 2. FORESIGHT Trends

The Broader Environment	Societal Trends	Health and Health Care
<ol style="list-style-type: none"> 1. Accelerating Biodiversity Loss 2. Climate Change Increasingly Costly 3. Spreading Microbial Resistance 	<ol style="list-style-type: none"> 4. US Less Geographically Mobile 5. US's Changing Cultural Values 6. Incarcerations are on the Decline 7. Income and Wealth Gaps Continue to Widen 8. Increasingly Vulnerable but Still Growing Coastal Populations 9. Life Stages Shifting Older and Out of Order 10. Rising Costs of Living are Gentrifying the Nation's Cities 11. Deepening Battle Over Vaccines 12. US Becoming Increasingly Diverse 13. US's Shifting Faith Landscape 14. Ballooning Student Debt 15. Runaway Health Care Spending 	<ol style="list-style-type: none"> 16. Falling Life Expectancy 17. Worsening Maternal Mortality in the US 18. Unequal Burden of Disease 19. Growing Rates of Anxiety, Depression, and Suicide 20. Innovation in Medicine and Health is Accelerating 21. Health Care Becoming Increasingly Digital and Distributed 22. Expanding Health Deserts and the Divide Between Urban and Rural

Extrapolating from these trends, the US appears to be entering a period of increasing stressors and complexity, where worsening inequalities (wealth, income, health, and housing) and deteriorating health outcomes (chronic disease, maternal mortality, and mental health) combine with environmental hardships (climate crisis and biodiversity loss). The country's resilience is being challenged just as it goes through a significant generational shift (increasing diversity, liberalism, rising secularism, and changing life stages) and rapid technological change—perhaps suggesting that a new generation, with new tools, might bring new solutions to these challenges.



The Broader Environment

1. Accelerating Biodiversity Loss

DESCRIPTION

Human activity around the world is pushing an increasing number of species toward extinction with significant ramifications for human health, including undermining food security and clean water.

Humanity's negative impact on the natural world is growing as more people move into higher-consumption lifestyles, resulting in an accelerating global loss of biodiversity.

Estimates suggest most land habitats have now lost 20% of their biodiversity, with the majority of that loss occurring after 1900. Eighty-five percent of all habitats on Earth are now adversely impacted by human activity. A new United Nations report found that as many as 1 million plant and animal species are now at risk of extinction due primarily to four factors:

- Habitat loss driven by logging and farming, expanding urban infrastructure, and the draining of wetlands
- Direct over-exploitation, for example by fishing and poaching
- Pollution
- The transport of invasive species

Climate change would further amplify biodiversity loss—an estimated 5% of species worldwide would face extinction in a 2°C warmer world.

Biodiversity loss has important ramifications for human health as well as the health of the natural world. The loss of pollinators and decline of soil health has a direct impact on food security. Rainforests and coral reefs are sources of important new medicines. Wetlands and mangroves protect us from storms and help clean our water. In all, trillions of dollars of ecosystem services are increasingly at risk.

Trend Drivers

- Rising standards of living (leading to increasing per capita consumption of natural resources)
- Habitat destruction and fragmentation through the growth of urban areas and infrastructure networks
- Climate change
- Persistent demand for endangered-species-based products

Potential Impact

Biodiversity loss is forecast to accelerate between now and 2050, particularly in the tropics, pushed by additional population growth and rising standards of living.

Link to Sources



2. Climate Change Increasingly Costly

DESCRIPTION

The number and cost of climate-driven weather disasters is increasing, straining the US's ability to cope.

The number and cost of weather-related disasters is increasing rapidly in the US and around the world as the planet grows warmer, more crowded, and more developed. From 1980 to 2000, the US experienced an annual average of 3.9 weather-related disasters that cost the country more than \$1 billion dollars. From 2000 to 2010, the average jumped to 8.5 per year, and again to 11.6 per year for the 2010 to 2018 period.

The five costliest years for the US have now all occurred since 2010. The type of weather-related disasters has also shifted over time. From 1980 to 2000, winter storms and freezes accounted for 20% of all billion-dollar events. But from 2000 to 2018, these same disasters accounted for just 5%, even as the total number of billion-dollar events has grown from 82 to 162 over the respective time periods.

Trend Drivers

- Greenhouse gas emissions
- Population movements to coastal cities and into more vulnerable areas (flood plains, western forests, etc.)
- Aging infrastructure

Potential Impact

The number and cost of climate-driven weather disasters could increasingly strain the US economy, as well as the American population's ability to cope and recover.

Link to Sources



3. Spreading Microbial Resistance

DESCRIPTION

Disease-causing bacteria and fungi are growing resistant to an ever-wider array of antibiotics and antifungals, threatening to undermine many gains of modern medicine even as research into new treatments is lagging.

Antibiotics are one of the greatest life-saving inventions in human history. But their effectiveness is being increasingly undermined through overuse and misuse. Multiple-antibiotic-resistant microbes are becoming more common in hospitals, nursing homes, and other health care facilities as well as among the general population, threatening many of the public health gains made over the last century. In the US, the number of antibiotic-resistant infections more than doubled between 2002 (700,000 infections or 5.2% of all bacterial infections) and 2014 (1.6 million or 11% of all bacterial infections). They now number around 2 million per year, causing 23,000 deaths. Antibiotic-resistant infections cost the country more than \$2 billion annually in direct health costs for inpatient care alone.

Overuse of antibiotics is the primary driver of resistance. Globally, use of antibiotics has surged more than 65% since 2000. Growth prior to 2000 was driven mostly by use in high-income countries, especially the US—now beginning to see a decline in use—and also France and Italy. Most of the growth today is now coming from developing countries, particularly India, China, and Pakistan, though overall usage levels remain below those of high-income countries. Developing countries are, however, expected to close this gap.

The growth of usage in developing countries is a concern for antibiotic resistance due to a higher potential for misuse (because they are often available without prescription) and to aggregating factors like poor sanitation, which can help resistant microbes to spread.

At the same time, access to antibiotics remains a challenge in many developing countries, with many people unable to take advantage of their benefits.

Trend Drivers

- Overuse and misuse of antibiotics—particularly in the agricultural sector
- Increasing use of antibiotics in the developing world
- Market forces within the health care system don't incentivize antibiotic development
- Slow pace of research and development into new treatments

Potential Impact

Antibiotic effectiveness is being increasingly undermined through overuse and misuse at the same time that research into new treatments is lagging. Antibiotic-resistant infections have more than doubled since 2002.

Global antibiotic use is projected to increase by as much as 161% by 2030 (depending on usage rate assumptions), with even greater resistance accompanying the increase.

Link to Sources



Health and Health Care

4. US Less Geographically Mobile

DESCRIPTION

Today the US population moves less frequently and over less distance than at any time since 1948. Barriers to mobility are making it harder for lower-income households to find better employment elsewhere, potentially worsening inequality.

The share of the US population moving domestically each year reached a record low in 2016, with only around 11% of Americans relocating that year compared to an average of 18% during the 1980s, and a high of 20.2% back in 1948. The distance people move has also decreased significantly over time. The rate of moving from one state to another has fallen by 51% compared to the 1948-1971 average, and the rate of moving between counties in the same state fell 31%. Employment statistics provide another window into this decline in geographic mobility. In 1986, 41% of job seekers relocated to find employment. By 2018, only 10% of job seekers were relocating.

While the number of movers has declined, where people are moving has remained relatively consistent. People continue to move from rural areas to urban areas—though migration to suburban areas is now seeing a resurgence. People continue to leave the Northeast and Midwest for the West and South. The fastest growing states over the last decade are all in the West or South: Texas (12.1%), Utah (11.8%), Colorado (11.1%), Nevada (10.9%), Arizona (9.5%), South Carolina (+8.4%), and North Carolina (+7.3%).

There are several potential drivers behind the decrease in geographic mobility. Changes in the workplace are among the biggest. Workers today are keeping their jobs longer, reducing the job turnover that usually drives relocation. The rise of remote work and gig work is reducing the need for workers to relocate for their jobs. Lower-income households are also less likely to relocate to find better opportunities than in the past (the number of low-income movers has been declining faster than higher-income movers), perhaps due to rising costs of living around the country. Declining geographic mobility makes even more important the diffusion of health care services to more areas even as there are increasing numbers of health deserts. And even though workers may be keeping their jobs longer, they are less likely to get health care coverage from them than in the past.

Trend Drivers

- Population aging
- Rising job stability—workers today are keeping their jobs longer, reducing job turnover that usually drives relocation
- Rise of remote work and gig work reduces the need for relocation
- Increased barriers to finding work across state lines due to variability in state occupational licensing requirements
- Lower-income households less likely to relocate due to rising costs of living

Potential Impact

Declining geographic mobility makes even more important the diffusion of health care services to more areas, despite increasing health deserts.

Increasing population densities in urban centers (those unable to move to the suburbs) could lead to greater mental stress and an increased potential for the spread of infectious diseases.

Link to Sources



5. US's Changing Cultural Values

DESCRIPTION

Americans are increasingly dissatisfied with key aspects of US society, have become more liberal in their views of what is morally acceptable, and are more concerned about health and the environment.

The US's culture is constantly changing as younger generations supplant old and as new immigrants come to this country. Over the last two decades, Americans have generally grown more dissatisfied with key aspects of US society, have become more liberal in their views of what is morally acceptable, and are more concerned about health and the environment.

With regard to US society, 65% of Americans in 2019 reported being satisfied with the “opportunity for a person to get ahead by working hard”—down 10% since 2001—even as a majority of them reported being dissatisfied with the “way income and wealth are distributed in the US” (62%). Forty percent of Americans are satisfied with “our system of government and how well it works,” down 28% since 2001 (the largest percent drop of any aspect). Thirty-seven percent were satisfied with the size and influence of major corporations, down 11%. And just 26% were satisfied with the moral and ethical climate in the country, down 10%.

The public's views on gender and sexual identity, race, and other moral issues has become more liberal over time, with the percent satisfied with society's treatment of women having declined from 70% in 2001 to 53% in 2018. Public support for affirmative action programs for marginalized peoples has grown from 47% in 2001 to 61% in 2017 (among white Americans, support increased from 44% to 57% over the same time period). The percent of Americans in favor of gay marriage has grown from 27% in 1996 to 67% in 2018.

Americans' views on climate change have also shifted: more now believe that a) climate change is occurring, and that b) it is a serious threat. In 2019, for the first time, the majority of Americans (51%) described themselves as “concerned believers,” compared to 39% in 2001. Climate change skepticism has declined from a high of 28% in 2010 to 18% in 2016 (skepticism ticked up to 20% in 2019). Sixty-six percent of Americans now say that climate change is caused by human activities (up from an average of 60% between 2001-2014) and 45% think it will pose a serious threat in their lifetime (up from 35%). There remain significant belief-gaps, however, when age, sex, and partisan affiliation are considered. In 2019, 67% of 18-to-29-year-olds were concerned believers (CBs) compared to 47% of those aged 65 and older. Along gender lines, 55% of women and 46% of men were CBs. Along partisan lines, 77% of Democrats and 16% of Republicans were CBs.

Trend Drivers

- Generational change
- Rise of the millennials
- Widening inequalities

Potential Impact

Shifting cultural values are and will continue to shape policies that impact the environment, government, and societal norms in the future.

Link to Sources



6. Incarcerations are on the Decline

DESCRIPTION

The decades-long rise in incarcerations in the US is beginning to reverse due to changing sentencing laws and a long-term decrease in crime rates, but the current decline is not equally distributed.

The number of people incarcerated in the US is beginning to decline after several decades of rapid growth. This reversal began around 2008 and has so far resulted in 126,000 fewer people being incarcerated nationally between 2008 and 2017. This slow, negative trend is being driven at least in part by changes in sentencing patterns, criminal law reform, and a general decrease in the crime rate.

While national figures are improving, the picture remains mixed at the state level. Declines in California, New York, and New Jersey account for most of the national decline while, in contrast, 20 states have seen incarceration levels increase, some to record highs. Much of the recent decline has also come from federal-level prisons (due to national-level reforms) while the number of people incarcerated in jails has remained largely flat.

The incarceration rate is also declining and is now at its lowest level since 1996. The gap between White and Black prison populations has also shrunk since 2008, though Black and Hispanic people are still disproportionately represented in the prison system due to many reasons, with racist policies and enforcement systems (e.g., “the school-to-prison pipeline” and inequitable rates of arrest by race) that regularly disadvantage some while advantaging others being a strong driver. The US continues to have the highest incarceration rate of any country in the world at 860 inmates for every 100,000 adults aged 18 and up.

Trend Drivers

- Changes in sentencing patterns
- Changes in criminal laws for drug-related crimes
- Changes and transparency in unequal law enforcement practices
- A long-term decrease in the crime rate
- Population aging
- Potential economic growth after the Great Recession

Potential Impact

Should the current trends hold, the decline in incarceration rates among people of color could help close the income and wealth gaps as more people of color (particularly Black and Hispanic males) are able to enter the workforce.

Significant inequities in enforcement of laws, incarceration rates, and treatment of people of color will persist if not addressed.

Link to Sources



7. Income and Wealth Gaps Continue to Widen

DESCRIPTION

Income inequality and wealth inequality continue to worsen, particularly along race and ethnicity lines.

Income inequality has worsened significantly in the US, as measured in terms of the share of all income earned by the top 1% of the population versus the share earned by the bottom 50%. Since 1980, the top 1% of income earners have seen their share double from 10% to 20-22% of all income earned, while the bottom 50% have seen their share decline from 20% to 13%. The last time income inequality was this great was just before the Great Depression, when the share of the top 1% was 24%. Gender-based income inequality has generally improved over time although it has widened at the highest earning levels.

Over the same period, wealth inequality, as measured in terms of the value of a family's property and financial assets minus the value of their debts, has increased even faster than income inequality. Race and ethnicity are significant factors in wealth inequality, and this has worsened over time as institutional bias and racist policies (e.g., redlining that leads to fewer Black people being homeowners and prevents wealth from being passed from one generation to the next) continue to advantage Whites over People of Color and this disadvantage carries on to new generations. In 1983, the median wealth of White families was eight times greater than the median wealth of Black families (\$105,000 versus \$13,000, respectively—in 2016 dollars). By 2016, the gap between White and Black family wealth had grown to 10 times (\$171,000 versus \$17,000, respectively). While the median wealth of White families grew by \$66,000 between 1983 and 2016, median Black family wealth only grew by \$4,000. Median Hispanic family wealth has increased slightly faster than Black family wealth, but still remains eight times less than White families.

Trend Drivers

- Income inequality
- Educational inequalities
- Tax reforms that decreased progressiveness
- Decline of unions
- Wealth inequality: lack of homeownership by people of color, fewer retirement savings and more student loan debt held by people of color

Potential Impact

The wealth gap, more than income inequality, poses a generational barrier to achieving greater equity, as the amount of wealth a person can hand down to their children is greatly influenced by racial and ethnic inequities.

Link to Sources



8. Increasingly Vulnerable but Still Growing Coastal Populations

DESCRIPTION

Americans are continuing to move to coastline counties even as the threat from storms and sea-level rise worsens.

The US's coastline counties continue to see rapid population growth in the face of rising sea levels and more frequent storms. The country's coastal counties added some 34.8 million people between 1970 and 2010, reaching a high of 123 million people in 2010 (about 39% of the US total population). An additional 10 million people are projected to move to the coasts between 2010 and 2020 (about 5.3 million to the vulnerable Atlantic and Gulf of Mexico coasts). Many of the states currently experiencing the fastest growth are also some of the most vulnerable to coastal flooding and storms: South Carolina (+13.3%); Texas (+10.1%); Florida (+9.7%); Georgia (+7%); Delaware (+5.8%); and North Carolina (+5.7%).

Sea-level rise varies by geography. The US Gulf and Atlantic coasts are seeing seas rise faster than average, at about one inch per every three years, with the additional rise due to a combination of land subsidence and a slowing gulf stream. Forecasts for future sea level rise vary: by 2050, the US coasts could see a sea level rise of 10 to 22 inches, and by 2100, of two to six feet. Recent projections suggest that 4.9 million Americans could be at risk of displacement under a three-foot sea level rise by 2100, while a six-foot rise could displace as many as 13.1 million.

Trend Drivers

- Population movements
- Distribution of economic opportunities
- Urbanization
- Climate change

Potential Impact

The threat from storms and sea-level rise is likely to result in significant population displacement in the future as the impacts from climate change intensify. Along with the considerable direct socioeconomic ramifications, the displacement of large numbers of people would have major long-term repercussions, especially for health (spread of disease, trauma) and well-being (housing, employment, loss of community, etc.).

Link to Sources



9. Life Stages Shifting Older and Out of Order

DESCRIPTION

Americans are entering major life stages later in life, from getting married and starting a family, to entering and exiting the labor force. They are also increasingly less likely to follow a traditional path of timing and sequencing.

Cultural and socioeconomic forces are leading more people to change the timing and sequence of major life events. Americans are now getting married later—the average age of first marriage has increased from 21 in 1960 to 29 in 2018. They are having children later—the average age for a woman having her first child has increased from 21 in 1970 to 27 in 2018. They are buying homes later—from 30 in 1970 to 32 in 2018. They are even retiring later—from 57 in 1990 to 62 in 2018—reversing an earlier trend of decreasing age of retirement.

Americans are also more likely to enter major life stages out of the traditional linear sequence—the percent of children born outside of marriage, for example, has increased from less than 10% in 1960 to 45% in 2017. Similarly, more people are now interrupting careers to return to school before starting a second or third career. Others are retiring only to reenter the workforce again.

Trend Drivers

- Cost of living
- Low incomes and slow wage growth
- Advances in education and equality for women
- Changing values
- Ballooning student loan debt

Potential Impact

The long-term cultural shifts are having a number of impacts, including increasing demand for specialized health services for older mothers, health and social services for older workers, and education services for lifetime learning.

Link to Sources



10. Rising Costs of Living are Gentrifying the Nation's Cities

DESCRIPTION

The costs of essential services are rising rapidly in many high-population urban centers, widening the affordability gaps between cities and surrounding areas.

The cost of living is rising rapidly in major US cities, creating a widening affordability gap between high-population urban centers and other communities. This gap is now growing faster than at any time in the last 20 years. In 2007, the country's 20 most expensive urban centers had an average cost of living (composite index measure) 50% greater than the average for the rest of the country. By 2018, the cost of living in these cities was 62% higher on average than surrounding areas. The income level required to live comfortably in these 20 cities increased by an average of \$13,000 between 2017 and 2018 alone. Housing remains a primary driver of this increase, but the rising cost of essential services like childcare, medical care, and education are also pushing the cost of living up. The current economic expansion is helping wages hold pace with inflation, but cost increases in essential services continue to exceed inflation.

The increasing cost of services like childcare (+110% since 1997), medical care (+99% since 1997), and education (+151% since 1997) can have a significant, detrimental impact on low- and middle-income households in urban areas. Services may be cheaper in rural areas but tend to be less available—particularly medical care—and they tend to be of lower quality. Even when such households are not priced out of the services, they will have less money to devote to building the human capital and physical assets needed to move up the income ladder. Access to education and childcare are especially important to such households.

Trend Drivers

- Overly concentrated economic growth
- Shortage of housing in key areas
- Little productivity growth in service sectors leading to increasing wages and higher prices
- Feedback loop of gentrification

Potential Impact

As the cost of living increases in many high-population urban centers, households already relatively well-off will be the ones most able to move further up the ladder, resulting in increased inequality and gentrification as current low- and middle-income residents are priced out of housing and opportunities.

Link to Sources



11. Deepening Battle Over Vaccines

DESCRIPTION

The number of unvaccinated children is increasing, weakening herd immunity in the US. This increase is due both to a movement against vaccines and the growing cost in time and money of keeping children vaccinated.

The percentage of unvaccinated children in the US has increased over time, from 0.3% in 2001 to 1.3% in 2015, while the percentage of parents refusing at least some vaccines for their children increased from 2.5% in 2010 to 4.2% in 2016. A movement against vaccines, along with increasing distrust of institutions more generally, is at least partly responsible. A 2018 poll showed that support for vaccines (those who believe “vaccines are crucial to public health”) declined by 10% between 2008 and 2018. Other drivers include increasing costs and increasing time required to ensure a child is properly vaccinated. In 2017, 17.2% of unvaccinated children were also uninsured, compared to just 2% of all children. In 2016, only 60% of children living below the poverty line received the rotavirus vaccine compared to 73% of the general population. Vaccination rates also vary significantly by state, with Arkansas, Colorado, Idaho, Kansas, and Pennsylvania having rates below 88% for kindergarteners in comparison to 16 states with vaccination rates above 96% for kindergarteners.

At the same time, there has been real progress. The percentage of children receiving the full seven-vaccine series recommended by the Centers for Disease Control and Prevention (CDC) has increased from 69% of children born in 2010 to 77% of children born in 2013, and the individual rates for the seven vaccines passed 80% in 2016 (though additional improvement is needed to achieve herd immunity for some diseases—diphtheria, pertussis, and measles). A significant majority of Americans remain confident in vaccine safety (32% “very confident,” and 53% “somewhat confident”) compared to those who questioned it (12% were “not too confident” and 6% were “not at all confident”).

Views regarding the safety of vaccines vary by country. The US has a relatively low level of mistrust (13.5% of respondents questioned vaccine safety)—on par with Canada and Mexico. In comparison, Japan, Russia, France, and Greece all had response rates of 25% to 30% questioning vaccine safety. And some countries, like Pakistan and the Democratic Republic of the Congo, have seen violence break out over vaccine drives.

Trend Drivers

- Increasing distrust of health system, government, and vaccines
- Increasing cost and time required to ensure children are vaccinated
- Lack of financial incentives for combination vaccines or other means of making vaccines easier for all to access

Potential Impact

If increases in unvaccinated children continue, it could weaken the US herd immunity protection from disease and disease outbreak.

Herd immunity is the resistance to the spread of a contagious disease within a population that results if a sufficiently high proportion of individuals are immune to the disease, especially through vaccination.

Link to Sources



12. US Becoming Increasingly Diverse

DESCRIPTION

The US is undergoing a demographic transition from a majority White population to a population without a single majority group—a transition that could either herald a more liberal and inclusive society or an even more polarized society with growing divides along ethnic, racial, and generational lines.

The US population has been majority White since the country’s founding, but this is changing. Over the last half century, the US population has shifted from 84% White and 16% people of color (11% Black, 4% Latino, and 1% Asian) in 1965, to 62% White and 38% people of color (12% Black, 18% Latino, and 6% Asian) today. Should current demographic trends continue, by 2044 the US population will likely diversify to the extent that Whites are forecast to make up 49.7% of the population and people of color 50.3% (13.1% Black, 24.6% Latino, 7.9% Asian, and 3.8% multiracial).

This shift toward greater diversity is most clearly visible when considered on generational lines. Today’s young generations are the most diverse in the country’s history. Those under the age of 15 are already primarily people of color, comprising 50.1% of the population, with Whites comprising 49.9%. Generation Z (those born between 1995 and 2015) are 50.9% White, 25% Latino, 13.8% Black, 5.3% Asian or Pacific Islander, 0.8% American Indian or Native Alaskan, and 4.1% multiracial. Contrast that with the baby boomer generation: 71% White, 11% Black, 10% Latino, 5% Asian or Pacific Islander, 0.7% American Indian or Native Alaskan, and 1% multiracial.

At the state level, 14 states plus the District of Columbia now have minority White populations for the under-15 age group, including California Texas, Florida, and New York.

Four main drivers are responsible for this trend toward increasing diversity among the younger generations: 1) increasing immigration levels from outside Europe; 2) declining fertility rates; 3) population aging; and 4) changing social mores regarding interracial marriage and gender equity. While the number of all immigrants entering the US has grown over time, fewer immigrants now are coming from European countries than in the past, while more are coming from the rest of the world. Fertility rates are now declining for all ethnic and racial groups, but White women are seeing a much more rapid decline than other groups due generally to their having both greater household wealth and better access to education and health services. Declining fertility rates also drive up the median age of the population. The median age of the White population in the US is rising faster than other groups—the White median age in 2018 was 43.6 compared to 29.5 for Latinos and 20 for multiracial populations.

Between 2000 and 2018, 92% of the country’s population growth came from people of color, half from Latinos. Changing social mores regarding interracial marriage are also driving an increase in multiracial children, who are now the fastest growing population subgroup, followed by Asians or Pacific Islanders and Latinos. That group is projected to more than double by 2060 to around 12% of the population.

The country’s changing demographics often provide a narrative for the far right in the US’s increasingly partisan civic and political landscape, with 46% of Americans and 59% of Republicans reporting having fears that a “majority minority” population might weaken “American culture” and prompt more ethnic and racial conflict, while 30% of Americans and 42% of Democrats report feeling that this would actually help strengthen US customs and values.

Trend Drivers

- Immigration
- Falling fertility rates
- Population aging
- Changing social norms

Potential Impact

Increasing diversity of people in the US could either herald a more liberal and inclusive or a more isolated society divided across ethnic, racial, and generational lines.

Link to Sources



13. US's Shifting Faith Landscape

DESCRIPTION

The US's faith landscape is undergoing a significant generational shift from historically dominant traditional Christian denominations toward greater secularism and religious diversity.

The US's faith landscape is undergoing three simultaneous seismic shifts toward: 1) greater religious diversity; 2) greater ethnic and racial diversity within Christianity; and 3) greater secularism. Christianity, particularly Protestantism, remains the dominant religion in the US, but the share of Americans identifying as Christian has declined over time. In 1948, 70% of Americans identified as Protestant. Today, that percentage stands at 35%. Catholicism's share is also on the decline. After experiencing a period of growth from 1948 to the 1980s (reaching a high of 29% in 1982), the share of Catholics in the US population has declined to 22% today. Other religions—Islam, Buddhism, Hinduism, Judaism—continue to grow, rising from 1-2% of the population in 1948 to 7.5% today, but their rates of growth are now slowing. The fastest growing sector today is comprised of those identifying as unaffiliated, no religion, or secular. In 1948, 1% of the US population identified as having no religion. In 2018, that percentage had reached 23%, with much of that growth coming after 2000.

The demographics of religion are also changing. Christians in the US are increasingly People of Color. In 1976, 81% of Americans identified as White and Christian; today, they only represent 43%. The White population has also become significantly more likely to be unaffiliated or to affirm no religion compared to other populations, though the unaffiliated share among People of Color is also rising.

There appears to be a confluence of demographic and socioeconomic drivers behind these trends. Immigration patterns are shifting from European immigration to immigration from Asia, Africa, and Latin America. In the US, younger generations are more diverse, better educated, and more tolerant of religious diversity and secularism.

The increase in religious diversity and the growth of unaffiliated or no religion group also have a geographic component. In general, states in the West, Great Lakes, and New England regions tend to be the most religiously diverse while those in the Midwest and South tend to be significantly less diverse. In 20 states, mostly in the West, the unaffiliated or no religion group now make up a larger part of the population than does any religious group.

Trend Drivers

- Population aging; younger generations are more diverse and tolerant of religious diversity and secularism
- Immigration patterns are shifting from European immigration to immigration from Asia, Africa, and Latin America
- Increasing levels of education
- Church scandals
- The internet as a means for secularists to connect and organize

Potential Impact

Changing faith patterns will likely continue to shift centers of influence and connection in the US and may foster religious backlash or divisions between faith traditions and the unaffiliated.

Link to Sources



14. Ballooning Student Debt

DESCRIPTION

The increasing burden of student loans is worsening overall inequality and means many borrowers must delay important life decisions.

Student loans are now the fastest growing form of household debt and the second largest source of debt outside of mortgages. The total amount of student debt reached a record \$1.56 trillion in 2019 (roughly \$4,920 for every person in the US). Some 44.7 million Americans, or one in five adults, currently hold student debt, with the average amount owed at a record high of \$32,000 (when combining student and parent borrowers). This rising debt burden is having a significant socioeconomic impact on society, with borrowers having to wait longer to start a family, buy a house, and even become an entrepreneur. It is also affecting choices significantly later in life as the fastest growing age group of student loan borrowers are now adults aged 60 and older—the numbers of whom have more than doubled over the last 10 years (the majority of borrowers are still under the age of 30, but the average age is shifting older).

The ballooning of student loan debt also worsens inequality in the country, as those who leave school with debt but no degree find it difficult to pay back loans. Even students who complete their degrees often face monthly payments of \$200 to \$300 per month, which can be a significant burden. Student debt also represents a stream of dollars not added to local economies. Approximately 11 percent of student loan holders (5.1 million people) are currently in default, unable to keep up their payments. The increasing cost of education is certainly a primary driver, but there are other causes, including the fact that many borrowers never get into the right repayment plan and are advised by predatory lenders who encourage them to accept lower payments with unusually high or unfixed interest rates (and other unethical practices) rather than using income-based payment plans.

Trend Drivers

- Increasing cost of education
- Wages not keeping up with cost of living
- High-paying jobs requiring more advanced/multiple degrees
- Debt management pressures largely due to repayment plans with unreasonable payment rates

Potential Impact

The rising debt burden will continue to have a significant socioeconomic impact on society as borrowers wait longer to start a family, buy a house, and start a business.

Borrowers who cannot repay their debts will likely experience reduced standards of living, delayed retirement, and potentially increased reliance on public safety nets later in life.

Link to Sources



15. Runaway Health Care Spending

DESCRIPTION

Health care spending is rising worldwide, but the US has poorer health outcomes than other high-income countries despite spending almost double per capita what those countries spend.

The US currently spends around \$10,300 dollars per person on health care each year (total public and private spending), an increase of 226% since 2000. The US spends 28% more than the next highest per capita spending country in the world, Switzerland, which spent \$8,009 in 2017. The US spends roughly twice what the European Union (EU) does as a whole, per capita. US health care spending has also grown at a faster rate than in other countries, outpacing the average rate of growth for high-income countries since 1980. That rate of increase has, however, slowed in recent years and, since 2010, is in line with the average of 3.7% growth per year.

The US has seen improvement in many health and wellness indicators since 1990, including reduced overall mortality, reduced preventable hospitalizations, and improved health care coverage. Nonetheless, it continues to lag behind many high-income countries despite higher US spending. In 1990, the US scored 80.7 out of 100 on the Healthcare Access and Quality Index (HAQ) produced by the Global Burden of Disease Study. By 2016, the US score had risen to 88.7, an eight-point improvement, but still ranking only 28th on the Index. Australia, by comparison, saw an improvement of 12 points over the same period, from 83.9 to 95.9. The infant mortality rate in the US fell from 9.4 deaths per 100,000 live births in 1990 to an all-time low of 5.7. In comparison, over the same period the EU saw infant mortality decline from 9.8 to 3.4. The US has also seen some health indicators worsen in recent years in contrast to other high-income countries, including maternal mortality and lifespan (due in significant part to the opioid epidemic).

Trend Drivers

- Population aging
- Inefficiencies in the health care system
- The opioid epidemic

Potential Impact

US health care spending continues to outpace other countries without an associated return on investment in terms of outcomes; increased health care spending will have implications for other societal investments, especially in areas that could positively impact health and well-being.

Link to Sources



Health and Health Care

16. Falling Life Expectancy

DESCRIPTION	Rising rates of drug overdoses and suicides are causing US life expectancy to fall for the first time since World War I.
	Trend Drivers
	Potential Impact
	Link to Sources

Life expectancy in the US has declined for three straight years after decades of nearly continuous increase—the last sustained decrease was due to the 1918 Spanish Flu pandemic. In 2014, US life expectancy stood at 78.8 years, but by 2017, it had fallen to 78.6 years. The recent downturn in life expectancy is largely due to the increasing rate of drug overdoses (up 350% since 1999, with 70,000 deaths in 2017), suicides (up 33% since 1999, with 47,000 deaths in 2017), and chronic liver disease (up 31% since 2000, with 40,000 deaths in 2017). These three sources of mortality are not distributed equally. All three tend to disproportionately impact men (especially middle-aged, White men; and Native American men for liver disease); all three tend to be clustered geographically, with some states seeing significantly higher rates than others (West Virginia, New Mexico, and Montana especially); and all three tend to be higher in rural areas than in urban areas—all of which underlines the strong socioeconomic factors influencing these increases.

- Opioid crisis
- Mental health crisis
- Lack of access to health services and resources
- Lack of access to economic and social opportunities

Drug overdoses and suicides, causing US life expectancy to fall for the first time since World War I, may reflect a growing reaction to socio-economic stressors, especially experienced in more rural areas and by men.



17. Worsening Maternal Mortality in the US

DESCRIPTION

The increasing prevalence of chronic disease and unequal access to health services are combining to increase US maternal mortality rates—some states have rates equivalent to those of developing countries.

The US has the highest rate of maternal mortality of any developed country, at 26 deaths per 100,000 live births. This is on a par with China and Russia. It is the only developed country where the rate is increasing over time. American women are now 50% more likely to die of pregnancy-related complications than mothers a generation ago, with Black women three to four times more likely to die from pregnancy-related complications than White women.

Maternal mortality rates also differ significantly by state. Louisiana and Georgia have the highest rates in the country at 58 and 48 deaths per 100,000 births respectively, rates which are on par with Iraq. In contrast, California and Massachusetts have the lowest, at four and eight respectively, which are rates on par with the top-ranked countries in the world, like Sweden. It is estimated that roughly 60% of maternal deaths are preventable with today's medical technologies and practices. Health professionals are now working to enhance data collection and data-driven decision making, and to establish a set of standard protocols for dealing with pregnancy emergencies. But the drivers of this trend, particularly the incidence of chronic disease and lack of access to health services, suggest maternal mortality is likely to get worse before it gets better.

Trend Drivers

- Increasing prevalence of chronic diseases
- Racial and ethnic inequalities in treatment and access to health resources
- Lack of social support and culturally competent, responsive care
- Lack of standardized protocols in health care
- Increasing maternal age

Potential Impact

Although largely preventable, US maternal mortality rates will continue to grow if access to health services and chronic disease management does not improve, thereby endangering all women, but especially Black women.

Link to Sources



18. Unequal Burden of Disease

DESCRIPTION

Certain socioeconomic and racial and ethnic groups are disproportionately impacted by the increasing burden of disease.

The US is in the late stages of a long-term transition from the leading cause of death and morbidity being communicable diseases—caused by circumstances and factors over which people have little control—to noncommunicable diseases, (which can be mitigated and altered through personal practices, such as diet, substance use, and exercise). This shift has been part of an overall reduction in mortality rates among the nation’s general population (from 744 deaths per 100,000 persons in 1990 to 578 per 100,000 in 2016) as health care has improved. But this progress is not occurring for all racial, ethnic, and socioeconomic groups because they lack access to conditions that can mitigate disease. Diabetes is one example reflecting both an increasing and an unequal impact.

Over 30 million Americans (9.4% of the total population) now have diabetes (23.8% of whom are undiagnosed), up from 2.5% in 1990. An estimated 1.5 million people are diagnosed with diabetes each year and diabetes is now the seventh leading cause of death in the US. While diabetes prevalence is increasing across the country, rates are significantly higher in Southern and Appalachian states (West Virginia [15.2%], Mississippi [14.2%], Alabama [14.1%], Louisiana [13.6], South Carolina [13.4%]) and are significantly lower in the West and Northwest (Utah [7.1%, Colorado [7.4%], Alaska [7.4%], Minnesota [7.8%]). The widest gap is between West Virginia, which has a diabetes prevalence comparable to Fiji and Tonga (18%), and Utah, which is at about the same level as Thailand (less than 10%). The UK, by comparison, has a national rate of only 4.3%.

Diabetes prevalence is also highly skewed when it comes to race, ethnicity, and age. In 2015, 7.4% of Whites had diabetes compared to 15.1% of American Indians and Alaska Natives, 12.7% of Blacks, and 12.1% of Latinos. Diabetes is also increasing faster among populations other than the non-Hispanic White population. In terms of age, diabetes is most highly prevalent in adults aged 65+, but 10-to-19-year-olds (particularly among People of Color) are now the fastest growing age group for type-2 diabetes—increasing at 5.2% per year.

Trend Drivers

- Socioeconomic and racial policies and practices resulting in inequalities and conditions that foster susceptibility to disease (e.g., food deserts, substandard housing)
- Geographic disparities, as well as opioid access and use, are factors that contribute to an unequal burden of disease

Potential Impact

In the absence of improving inequitable life conditions (e.g., economic, health, education, housing, food) and addressing underlying racial policies that hold such conditions in place, the US will continue to face increasing and unequal disease burden.

Link to Sources



19. Growing Rates of Anxiety, Depression, and Suicide

DESCRIPTION

Anxiety, depression, and suicide rates are increasing across the US and could create new demands and responses from health care and other systems.

The US has seen a marked increase in anxiety, depression, and suicide rates over the past two decades. The US is the third most anxious and depressed country in the world (after China and India) and is 27th with regard to suicide (at a rate of 15.9 per 100,000 people in 2019). In contrast, Canada is 44th.

Anxiety disorders affect roughly 18% of the US population each year, with about 3% suffering from generalized anxiety disorder. A 2018 poll regarding the general sense of anxiety found that 39% of Americans feel more anxious now than they did a year ago; in 2017, only 19% reported feeling more anxious. Millennials appear to be the most anxious generation overall, but anxiety levels are increasing faster for baby boomers.

Depression in the US has increased 33% since 2013, with rates increasing across all age groups and for both men and women, but particularly among young adults (young girls especially) where diagnosis rates are up 63%. Depression tends to be more common among women, with 10% of women aged 20+ identifying as depressed compared to 6% of men.

Suicide is the tenth leading cause of death in the US at 15 suicide deaths per 100,000 in 2018 (up from 11.6 in 2008). The overall suicide rate is now at a 50-year high—up 25% since 1999—but the rate increase is not even across the board. Over the last 20 years, much of the increase in the suicide rate has been driven by an increase in suicides among middle-aged White men—particularly in rural areas—and among young adults, especially teenage girls. Suicide is now the second leading cause of death for ages 10 to 35 and the fourth leading cause of death for ages 35 to 54. Suicide in the US is still a heavily male phenomenon, with 3.5 times as many men dying by suicide than women; the male suicide rate has been increasing faster than the female rate.

Suicide rates vary significantly by ethnicity. Rates are highest for Whites (at 15.85 deaths per 100,000) and much lower for Blacks and Asian Americans (6.61 per 100,000). The gap in suicide rates between urban and rural areas is also significant and widening. Between 1999 and 2017, suicide rates in rural areas grew from 13.1 people per 100,000 individuals to 20 per 100,000, while rates in urban areas increased from 9.6 to 11.1. Suicide rates increased in all states except Nevada between 1999 and 2016. Idaho, Utah, North Dakota, South Dakota, Kansas, Minnesota, New Hampshire and Delaware all saw increases of more than 40% over the same time period.

Trend Drivers

- Lack of access to mental health care
- Affordability of mental health care
- Disparities between urban and rural residents
- Economic insecurity
- Opioid epidemic
- Social media

Potential Impact

Marked increases in anxiety, depression, and suicide rates will create new demands on and responses from health care and other systems.

Link to Sources



20. Innovation in Medicine and Health is Accelerating

DESCRIPTION

The pace of innovation in medicine and health continues to accelerate, raising issues of equal access, ethics, and risk assessment.

The pace of innovation in medicine and human health has been accelerating over time, driven partly by advances in supporting digital technologies. Over the last decade, digital advances have been matched in their effects on medicine and health by a rapidly expanding confluence of innovations including artificial intelligence (AI), three-dimensional (3D) printing, nanotechnology, and biotechnology. The number of medical-related patents has grown by 730% since 1980, with almost one-quarter of that increase occurring between 2010 and 2016. These have included patents from categories such as analysis of biological materials, biotechnology, pharmaceuticals, and medical technologies.

Multiple medical technologies, including DNA sequencing and medical imaging systems, have been closely following Moore's Law (increasing in speed at a doubling every two years), or surpassing it, suggesting even more rapid gains in the future. The rapid pace of technological advancement is not always reflected in the wider medical field, however, as practices and systems take time to adjust to the new technologies. And the improvements in a technology's cost and performance aren't always reflected in cost reductions and greater efficiencies for the end user.

Trend Drivers

- Snowballing of human knowledge
- Development of supporting technologies
- Convergence of additional technologies
- Increasing private resource and development funding
- Rise of new technology drivers, like China and the developing world

Potential Impact

The pace of innovation in medicine and health continues to accelerate, raising opportunities for new interventions, but also issues of equal access, ethics, and risk assessment.

Link to Sources



21. Health Care Becoming Increasingly Digital and Distributed

DESCRIPTION

From telemedicine to one-stop-shopping for health, the spread of smart, digital technologies into every aspect of life is also transforming the delivery of health care services.

Advancing technology, combined with accelerating institutional investment in health (private equity, venture capital, and hedge funds) and the entry of technology companies (Apple, Google, Amazon) into the ecosystem are driving the evolution of new business models and health care products. The results (so far) have been a push to provide more distributed health services by shifting care from traditional settings like inpatient, hospital-based care and outpatient medical clinics to retail clinics, home-based care, and telemedicine applications. Online and mobile apps have driven the rise of one-stop-shopping companies offering a full range of health care services from patient services to pharmacy to health insurance.

Trend Drivers

- Entry of technology firms into the health care ecosystem
- Accelerating institutional investment into health care services
- Growth of digital technologies and social platforms
- Growth of e-commerce

Potential Impact

The spread of smart, digital technologies into every aspect of life is transforming the delivery of health care services, changing the way we think about, access, and even define health care. Uncertainty around how much technology people will accept (e.g., patients wanting in-person, human contact).

Link to Sources



22. Expanding Health Deserts and the Divide Between Urban and Rural

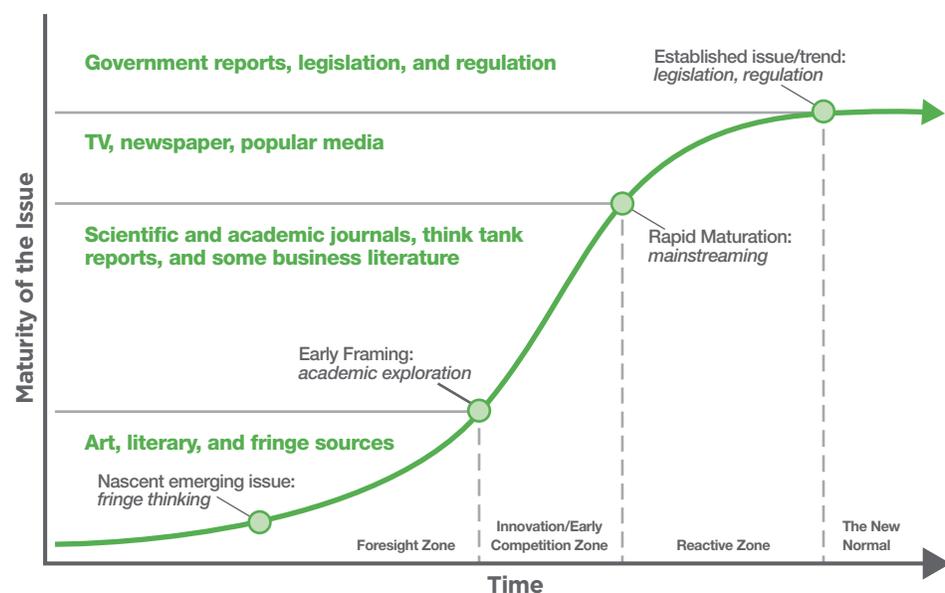
DESCRIPTION	The loss of rural health care providers is worsening existing disparities in health outcomes between rural and urban populations.	
	<p>Rural areas in the US are increasingly becoming health deserts: areas where access to health services is more difficult and health outcomes are worse than in urban areas. People living in rural areas today face higher rates of mortality from heart disease, cancer, injuries (including overdoses), chronic lower respiratory disease, and stroke. They also experience higher infant and maternal mortality, and greater rates of suicides and mental health issues than those living in urban areas.</p> <p>This divide may be due in part to people living in rural areas being older and having lower income and formal education levels than people in urban areas—all of which are correlated with worsening health outcomes. But reduced access to health care services is another major factor. Ninety-five rural hospitals across the US have closed since 2008—64 in just the past five years. The closure of such hospitals disproportionately affects low-income and elderly rural residents. The hospital closures are due in part to a reduction in Medicare payments and are concentrated in states that have not expanded Medicaid.</p> <p>Along with hospital closures, it is becoming increasingly difficult to find doctors and other health specialists willing to work in rural areas. In 2017, there were only 30 medical specialists per 100,000 people in rural areas compared to 263 specialists per 100,000 people in urban areas. The difficulty in accessing health care services and reduced economic opportunities in rural areas is also exacerbating the opioid crisis. Overdose death rates in rural areas are 45% higher than in urban.</p>	<p>Trend Drivers</p> <ul style="list-style-type: none">• Urbanization• Consolidation of hospitals• Medicare cuts• Difficulty recruiting medical specialists for rural areas• Income inequality• Educational inequality
		<p>Potential Impact</p> <p>The loss of health care providers in rural areas will further increase existing disparities in health outcomes between rural and urban populations, and impact the role that telehealth technology will need to play.</p>
		<p>Link to Sources</p>



52 Emerging Issues Presenting Potential Challenges and Opportunities for Shaping Health and Well-Being

In addition to the trends research, VFS conducted an environmental scan and emerging issues analysis and identified 52 potentially important emerging issues. Clustered into three zones, the issues are depicted in VFS's own version of the classic emerging issues s-curve: 1) Reactive Zone; 2) Innovation Zone; 3) Foresight Zone (see Figure 1, shared again here for reference). It can be helpful to organize emerging issues into zones to better understand and address their potential. Reactive zone issues are clearly emerging, innovation zone issues are highly exploratory, and foresight zone issues are futuristic, or fringe.

Figure 1. Vision Foresight Strategies S-Curve
Life cycle of change: model for scanning and spotting change



The 52 emerging issues are listed in Figure 3 (below) and described in detail in this section. Driven by the pace of change and innovation, the next three decades will include significant shifts with wide-ranging implications for health and well-being. Emerging issues are valuable in foresight and strategy work because they enable organizations to identify opportunities and challenges before they become other people's competitive advantage, or before they arrive at the legislature for regulation. Emerging issues represent possibilities for new developments; none are guaranteed to emerge. They suggest potential risks before they become actual threats, as well as potential opportunities to nurture and shape into positive realities.

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Figure 3. FORESIGHT Emerging Issues

Reactive Zone	Innovation Zone	Foresight Zone
<ol style="list-style-type: none"> 1. The New Job Market 2. It Takes a Village 3. Consequences of Health Foods 4. Marijuana Freedom 5. Menstrual Equity 6. Automated Transport Networks 7. Climate Crisis Impacts Health 8. US Economic Recession 9. Sugar is the New Tobacco 10. Digital Alienation 11. Male Birth Control Pill 12. Increasingly Extreme US Political Swings 13. Collapse of a Generation 14. Birthstrike 15. A New End of Life 16. Techno-Holistic Health Care 	<ol style="list-style-type: none"> 17. Automation Driving Macroeconomic Reform 18. Food as Medicine and Social and Ecological Justice 19. Elder Exploitation 20. Waste Inequity 21. Personalized Medicine 22. End of Personal Privacy 23. Value of Caregiving 24. Climate Migrants and Adaptation 25. A US Authoritarian State 26. Digital Countries 27. Death of Pricing 28. End of Abortion Rights 29. End of Meat in Global Food Supply 30. Climate Crisis Impacts Food Supply 31. Data Sovereignty 32. Radical Transparency 33. Ending Pain and Anxiety Through DNA 34. Zombie Viruses and Toxic Threats from Melting Permafrost 35. Ready Player Escape 36. Techno-Hubris in Health 37. Humans Training Machines to Train Humans 38. Biased Algorithms 39. Changing Understanding of and Response to Racism 40. Civil Rights-Based Disability Equity Framework 	<ol style="list-style-type: none"> 41. Extreme Longevity for a Few 42. “Everywhere” Living Online 43. Machine Charities 44. World Without Money 45. Living Medicine 46. Demographic Assumptions Overturned 47. Co-ops at the End of Capitalism 48. Redefining Childbearing 49. Zoonotic Outbreaks Become the New Normal 50. Runaway Microbial Tribbles 51. Kids Curing Kids 52. Editing Out Addiction



Reactive Zone

1. The New Job Market

QUICK DESCRIPTION	More flexible work arrangements “gig-ifying” the job market could have significant implications for the future of work.	
 Context	 Upstream Trends and Issues	
<p>An increasing number of Americans are transferring out of secure, permanent, salaried, or hourly-wage jobs into less secure “gig” arrangements. The gig economy encompasses everything from driving passengers to the airport, coding new virtual reality games, or filing paperwork for a mega-conglomerate. These jobs are usually temporary contracts that give employees flexibility to work their own hours, but the pay is often low, the benefits non-existent, and employment security totally lacking. Gig employees are less expensive than regular employees as they are not subject to employment laws and protections. These lowered costs can help small businesses stay afloat through economic downturns, and help large multinational corporations maximize profits by cutting benefit costs. Even professional occupations, such as teachers, doctors, and lawyers, may increasingly be “gig-ified,” as evidenced by universities’ increased use of adjunct faculty.</p> <p>Many people like the flexibility of working and defining their own hours. However, low wages, low job security, and the lack of health care or unemployment insurance add stress to daily life. Policy makers in Europe and the US are working to establish systems to secure workers’ benefits within the gig economy. Gig workers faced with poor pay are unionizing in novel ways in attempts to improve their situation. In a related trend, progressive companies are learning from the popularity of gig arrangements and adapting their employee arrangements to maintain a productive, motivated work force. As a result they are supporting better work-life balance, remote working, and flexibility.</p>	<ul style="list-style-type: none"> • Economic inequality • US economic recession • Sharing economy • Increased automation 	
		 Link to Sources



2. It Takes a Village

QUICK DESCRIPTION	New options for communal living are emerging, offering shared living and working options that offer alternatives to nuclear family structures.	
 Context	 Upstream Trends and Issues	
<p>Divorce rates in the US have been high for decades. Partly in reaction to this, people are opting to avoid marriage. Others are opting to avoid relationships completely and live single lives. Some adopt less traditional forms of relationships, such as open or polyamorous relationships, or are choosing to raise children without a partner. This shifting relationship culture is combining with high housing costs, changing work practices, and the sharing economy to create different living arrangements.</p> <p>In 2018 and 2019, the number of purpose-built communal living rental properties massively increased: Common opened properties in five US cities; and WeLive raised more than a billion dollars to build 10.3 million square feet of similar properties. These differ from traditional bedsit, studio, or shared housing rentals as they focus on shared recreation and working areas. While shared housing has traditionally been used by young people who aspire to move to their own homes, these new designs are becoming a long-term lifestyle choice. People are also opting to share large houses in non-traditional family or commune arrangements to help with living costs, childcare, and avoiding loneliness. It is not just the young making this shift in living; 2018 saw an increase in retirees getting divorced and opting to move to shared living arrangements for companionship and to help with rising living costs.</p> <p>This emerging change is driven by rising living costs, piecemeal working arrangements, and growing levels of anxiety and loneliness. Additionally, social media facilitates the formation of interest-group communities: people can more easily find like-minded friends with common views on topics from diet to spirituality.</p>		
 Link to Sources		



3. Consequences of Health Foods

QUICK DESCRIPTION	Mainstreaming health food is invigorating alternative health movements and encouraging unregulated urban farming, both of which could lead to disease outbreaks thought to have been left in the past.	
 Context	 Upstream Trends and Issues	
<p>Amazon’s purchase of Whole Foods in 2017 represented peak commercialization of the trend toward healthy eating and healthy living. This market growth illustrates how some consumers have shifted to more health conscious and environmentally friendly food choices even though they are usually more expensive. The “Amazon-ification” of the health food industry exemplified consumer-driven change. The Amazon-Whole Foods merger will increase the reach of Whole Foods and thus the marketing of products said to be “healthy” or “clean.”</p> <p>A rise in movements such as shop local and food sovereignty, as well as the impact of food production on climate change, amplifies the reach of healthy lifestyle products. Urban farms featuring aquaponics (fish fertilization systems) and micro-cattle, goats, and chickens, etc., are popping up across US cities. These urban farms can produce food locally, (which increases access to more and healthier foods (a big positive in food deserts), provides local jobs, and improves blighted properties. However, such farms can also drive up housing prices in already expensive cities, increasing the number of people experiencing homelessness and dependent on food banks. Further, the lack of regulation of urban farms run by amateurs can lead to poor sanitation, which risks spreading communicable diseases through populations less protected by advances in medicine, potentially causing outbreaks of diseases not seen for years in developed urban populations. The potential risk of disease outbreaks is compounded by the spread of alternative health care views, which include anti-vax beliefs and practices.</p>		
 Link to Sources		



4. Marijuana Freedom

QUICK DESCRIPTION	Legalizing marijuana through effective policies could reduce some forms of inequality in society.	
 Context	 Upstream Trends and Issues	
<p>The US has the largest prison population in the world. US drug policy has resulted in larger numbers of Latino and Black people incarcerated on minor cannabis supply or possession charges than White people. A few of the factors contributing to this inequality include police and judicial prejudice and welfare policy, compounded by a long history of racist policy implementation through successive generations. Many pundits argue that the legalization of marijuana in many states will dramatically reduce incarceration on drug offences. Others argue that the grey economy has simply shifted to different illegal substances, and cannabis as a business has now moved beyond the reach of this section of society, leading to yet more inequality. In contrast, Oakland reserves legal cannabis business permits for those with previous cannabis drug charges. This enables the victims of criminalization to benefit from legalization. Federal legalization supported by such a policy across the US could significantly improve opportunities for this marginalized and previously incarcerated population.</p> <p>After legalization, many states are releasing inmates serving marijuana-related sentences and slowly expunging those charges from criminal records. Removing charges from records is giving people a second chance. Instead of criminal records forcing them into low-wage, dead-end jobs, career opportunities remain open to them. Policies enabling people with cannabis-related crimes to benefit directly from cannabis business opportunities could transform their lives. Reducing stigma could help change attitudes and shift policies to support harm-reduction programs and to provide help and support in the face of substance abuse. Global policy examples, such as those of Portugal, where marijuana was decriminalized, demonstrate that these approaches reduce prison populations and crime rates; improve health and well-being in the community; and reduce inequality. Legalization of marijuana in the US could have a similar impact.</p>		<ul style="list-style-type: none">• Marijuana legalization in many states• Harm reduction policy success globally• Growing legal marijuana industry
		 Link to Sources



5. Menstrual Equity

QUICK DESCRIPTION	Increasing public awareness of “period poverty” offers an opportunity to improve support and guidance for individuals and families seeking government assistance.	
 Context	 Upstream Trends and Issues	
<p>Public interest has amplified around “period poverty” as a concern. Menstrual equity movements work to ensure that the 50% of people who get a period every month have the right to care for it affordably and, by extension, obtain education and employment. Charities and businesses are responding to public concern through programs providing menstrual products and education to women living in poverty. They are campaigning to remove the tax on tampons to reduce their cost. However, US policy fails to acknowledge the impact of menstrual inequity on the US workforce. A repeal of the “tampon tax” and increased availability of free menstrual products in certain institutions does not fully address the broader health and well-being impacts of period poverty on low-income women. Menstrual inequity creates barriers to work and education and is a critical missing link in current public policy to assist women generally, and low-income women in particular. Rising awareness of this previously taboo issue could contribute to positive policy change and improve quality of life, employment opportunities, and health and well-being.</p>	<ul style="list-style-type: none">• Increased activity in support of removing the “tampon tax”• Availability of free menstrual products in schools, shelters, and prisons• Growing popularity of sustainable menstrual products• The #MeToo movement	
 Link to Sources		



6. Automated Transport Networks

QUICK DESCRIPTION	Automated transport networks could make transportation safer and change commuting.	
 Context	 Upstream Trends and Issues	
<p>Autonomous cars could be safer than human-operated cars and significantly reduce or eliminate traffic accidents. A decrease in road traffic accidents could reduce the burden on health care systems, but would also reduce organ donations. The transformation created by autonomous transport networks could reach much further than improved safety. Self-driving technologies could change the nature of the daily commute. Time wasted “stuck in traffic” could now become time spent on other activities. This should reduce stress and the risk of road rage. With fewer accidents and without the need to accommodate driving comfort, vehicle design will dramatically evolve. Many companies are already talking about integrated networks of transport pods capable of providing different rolling services such as restaurants, meeting rooms, workspaces, entertainment spaces, hotel rooms, gyms, shops, or even doctor’s surgeries.</p> <p>These changes are not limited to urban environments and automotive transformations. Hyperloop transit systems—trains travelling in depressurized tubes capable of achieving speeds over 900mph—are being built in the US, Europe, and the Middle East to connect major cities. These high-speed mass transit systems are expected to be operational in the next 10 years. France plans to switch to autonomous high-speed trains by 2023. Planes are also increasing in speed and size, both for passenger transit and cargo. The airline, trucking, and shipping industries are also transitioning to electric propulsion, harnessing renewable energy to reduce the need for fossil fuels. All of these transport innovations could dramatically change our time spent commuting, how our cities themselves are structured, and the accessibility of public services and health care.</p>	<ul style="list-style-type: none">• Artificial Intelligence• Climate change• Increased automation• Autonomous vehicle advances• Fifth generation wireless technology (5G)• Internet of Things (IoT)• Distributed renewables	
 Link to Sources		



7. Climate Crisis Impacts Health

QUICK DESCRIPTION	Climate crisis health impacts could rapidly increase and challenge the preparedness of our health care system, and poor people will be disproportionately affected	
 Context	 Upstream Trends and Issues	
<p>While the climate crisis will affect the health of everyone, people who are poor or under-resourced are likely to be disproportionately affected. Low-income communities, both rural and urban, already suffer higher levels of adverse medical conditions such as cardiovascular disease and are more likely to be exposed to environmental pollutants. They are also least prepared for climate-related weather disasters and take longer to recover from them. This disparity will only grow with increases in severe weather events, food and water supply shortages, water contamination, environmental degradation and pollution, and allergens, as well as changes in vector ecology (spread of diseases).</p> <p>Evidence is mounting that climate-related impacts are already affecting the health of patients vulnerable to heat stress and to respiratory conditions like asthma. Blood-borne tropical diseases are spreading to regions neither used to nor prepared for them. Increasing numbers of people will be affected by mental health stressors, malnutrition and diarrheal diseases, asthma, cardiovascular disease, and cholera and other water contamination illnesses. Forced migration due to the climate crisis (sea-level rise, extreme heat, food shortages, and droughts) will likely overtax health care systems already under strain. Our health system needs to futureproof its ability to adapt to the climate crisis.</p>		<ul style="list-style-type: none">• Forced migration due to the climate crisis• Increasing severe weather events• Growing cost of climate change
		 Link to Sources



8. US Economic Recession

QUICK DESCRIPTION	A growing number of observers and analysts are anticipating a contraction in the US economy.	
 Context	 Upstream Trends and Issues	
<p>Cycles, by definition, include both ups and downs, and business cycles are no different. This is a normal part of any economy. In the near term, despite a strong US economy and low unemployment in 2018, a growing chorus of voices is warning about an economic downturn. While America's recent economic expansion was one of the longest in recent history, analysts are now worried about recession. Tightening monetary policy in the US, volatile stock markets (responding in no small part to a continuing trade war between the US and China), and rising debt are all contributing to analyst concerns.</p> <p>Recent surveys of economists find the probability of a US recession by 2020 in the range of 35% to 50%. It is impossible to predict the timing and extent of an economic downturn exactly, but it is inevitable that it will happen. Given both the extensive duration of the current expansion, and the current turbulence across global and regional economies, a recession beginning in the 2019-2020 timeframe seems increasingly likely.</p>		
 Link to Sources		



9. Sugar is the New Tobacco

QUICK DESCRIPTION	Growing scientific evidence on the health impacts of sugar may result in policies banning its use.	
 Context	 Upstream Trends and Issues	
<p>Scientific evidence has been growing regarding the detrimental effects of sugar in the diet. Nutritional studies have proven sugar to be addictive, to encourage overeating, and to heighten unhealthy weight gain. More recently, research has linked sugar to chronic illnesses such as diabetes, cancer, heart disease, and stroke. Government guidelines and policies have started limiting the amount of sugar that food manufacturers can include in products and have also required mandatory labelling specifying sugar content. Consumers are increasingly choosing to dramatically—sometimes completely—reduce sugar in their diets. The number of cookbooks containing sugar-free baking alternatives has risen sharply, and sugar-free sweeteners such as agave are growing in popularity.</p> <p>According to CDC statistics, death rates from diseases such as cancer, diabetes, heart disease, and stroke have more than doubled in the US since 1980. In 2016, more than 100 million Americans were living with diabetes. This creates a significant burden for insurance companies and state health care services. Diabetes rates are disproportionately higher among People of Color and in low-income communities, reflecting the availability of cheap, poor-quality, highly-processed food. Given the increase in obesity and obesity-related chronic diseases, it may be only a matter of time before more regulations attempt to limit sugar and sugary products.</p> <p>A partial sugar ban, modelled on the restrictions on tobacco, is not implausible. Health concerns also exist concerning artificial sweeteners and sugar replacement products. Such a change to the food industry could dramatically affect the distribution of health and well-being in communities across the US—with potential impacts worldwide.</p>		
 Link to Sources		



10. Digital Alienation

QUICK DESCRIPTION	An increasing reliance on big data analytics, financial technologies, and smart technologies could lead to alienation of marginalized populations.	
 Context	 Upstream Trends and Issues	
<p>As transactions and services increasingly move online and into the digital realm, some people will become increasingly alienated from society. Most dramatically affected will be those already isolated or economically disadvantaged. This includes people who are: elderly, recent immigrants, experiencing homelessness, experiencing mental health issues, experiencing unresolved trauma, or living in extreme poverty. For these groups, access to electronics and online services such as bank accounts or credit ratings are already out of reach. As big data platforms and the Internet of Things increasingly move data and services into the automated digital domain, more services will require consumer connectivity for access. This trend could amplify the isolation of disconnected, disadvantaged, and marginalized communities.</p> <p>Health services are also increasingly digital and connected. Interconnected hospital, clinic, laboratory, and general practitioner record systems are supported and augmented by big data analytics. People without access to these systems or lacking complete data from other services risk falling through the gaps of health care provision, further isolating and disadvantaging them. Designers of the digital health care systems of the future should bear these needs and contexts in mind to ensure access to and continuity of care.</p>		
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11. Male Birth Control Pill

QUICK DESCRIPTION	Changing attitudes could lead to widespread use of a male contraceptive pill.	
 Context	 Upstream Trends and Issues	
<p>Millennials and Generation Z are becoming more socially conscious. Traditional patriarchal gender roles regarding childcare responsibilities are evolving. Men are more involved in childcare, taking on the role of primary care giver or opting for shared parental leave where possible. Greater equality between the sexes, same-sex couples, and single parents are changing the dynamics of responsibility for childcare and, consequently, for contraception. At the same time, some sections of society are legislating for tighter abortion laws that limit women's options in the face of unwanted pregnancies and also limit access to female contraceptive products and health care.</p> <p>Clinical trials have been underway for some years to develop a male birth control pill, but side effects (similar to those caused by the female pill) prevented this product from coming to market. As attitudes change, as women have less access to birth control, and as men take on more responsibility, the demand for a male contraceptive could potentially grow. Without the difficulties associated with traditional gender roles, male contraceptives could be easier to obtain than women's historically have been. This may reduce the number of unwanted pregnancies and improve socioeconomic conditions for some sectors of society.</p>	<ul style="list-style-type: none">• Personalized medicine• Advances in medical technology• Proliferation of DNA sequencing• Stricter abortion laws• The #MeToo Movement• Growing social conscience• Changing US culture	
 Link to Sources		



12. Increasingly Extreme US Political Swings

QUICK DESCRIPTION	Political swings between Republican and Democratic administrations could create ever-more-extreme polarization.	
 Context	 Upstream Trends and Issues	
<p>The US two-party political system has always led to a degree of policy reversal when the administration changes from Republican to Democrat or vice versa. In recent years, the gap between the political ideologies has widened. As Republicans and Democrats fight out issues in the House and Senate, national politics is increasingly characterized by the need to block the ruling administration from passing legislation or reversing it when the opposition takes back power. These politics of division stoke animosity between the parties and their electorates. These divisions will probably continue growing, fueled by the echo chamber of the media, where people are increasingly able to hear validation of their opinions rather than facts. The current administration came to power on the back of a particularly divisive campaign, which escalated this whipsaw policy approach. As this escalation continues, longer and more regular government shutdowns could become common, and progress on policy issues could be stunted as decisions and funding are reversed every time the administration changes. The electorates might become more energized as polarization increases, which would only increase the frequency that administrations change.</p> <p>The policy stalemate caused by worsening political polarization could destabilize all sectors of society. Infrastructure would continue to decline from lack of funding. Reversed decisions would create instability impacting markets and international relations. Companies would need to put in place contingency plans to react to potential changes every four years, eating into their profit margins and making business very difficult. In the health care sector, both insurance companies and consumers would face constant uncertainty on how and whether care would be funded and who was liable for costs. Needless to say, low-income communities and middle classes would be hit hardest by this uncertainty, feeding further inequality.</p>	<ul style="list-style-type: none">• The US electoral two-party system• Increased political polarization• America's shifting faith landscape• Increasing diversity in the US	
 Link to Sources		



13. Collapse of a Generation

QUICK DESCRIPTION	Millennials, reeling from missed opportunities, could become a burden on society.	
 Context	 Upstream Trends and Issues	
<p>The 2008 financial crisis cost nine million people their jobs just as millennials were entering the job market. Many of those who had attended college have huge debts, but regardless of education level, many were left with no employment prospects. As a new business model, the gig economy has created more jobs, but they are low wage, benefit-free, and uncertain. Many millennials joined the military in desperation, finding themselves in wars in Afghanistan and Iraq that left them with life changing injuries or unresolved trauma, reflected in higher rates of post-traumatic stress disorder. Housing prices have rocketed, snatching the home-ownership opportunities from many, and leaving many completely homeless. Financial stress, lack of job opportunities, much less job satisfaction, overall bleak life prospects, and the climate crisis have all increased daily stress and anxiety. Many millennials are suffering depression or other mental health issues, and suicide rates are rising.</p> <p>The scale of these challenges for millennials could essentially create a lost generation of young adults unable to ever maintain viable employment or start families. This could affect the stability and shape of US society. Birth rates as well as marriage rates are falling, and as the older generations age, they could put significantly more pressure on health care systems and on society, which would lack support from this lost generation.</p>		
 Link to Sources		



14. Birthstrike

QUICK DESCRIPTION	Women delaying or not having children due to fear of political turmoil and the climate crisis may precipitate demographic shifts.	
 Context	 Upstream Trends and Issues	
<p>With the climate crisis forecasting a dire future ahead, more women could question the ethics of bringing children into a dying world. Economic instability and political turmoil make even the near-term future seem uncertain. This raises the possibility of a growing “birthstrike” that will further contribute to an already declining birthrate. The aging of the population, with fewer younger people to support the elderly, will affect the labor force, Medicare, Medicaid, and senior care—forcing adaptive transformation.</p> <p>Health care would need to focus more on keeping seniors as healthy as possible for as long as possible, both to keep them in the workforce and to delay costs of eldercare. Automation in the workplace could help mitigate the prospect of an aging workforce, but falling birthrates could dramatically impact demographics, counteracting projected population growth and reducing pressure on global food systems.</p>		<ul style="list-style-type: none">• Senior care• Labor force• Medicare and Medicaid• Mechanization and technology
		 Link to Sources



15. A New End of Life

QUICK DESCRIPTION	New intersections between palliative care and the death care industry may change cultural end-of-life traditions.	
 Context	 Upstream Trends and Issues	
<p>People are increasingly aware of the need to reduce their personal impacts on the environment. This awareness is expanding beyond merely lowering the amount of foods and goods they consume and waste to wider social issues, including end-of-life care and funeral services. This suggests that cultural views on the costs of natural death and current forms of burial may shift. More people are taking a critical look at both the high costs and significant climate and energy impacts of long hospital stays, medical treatments, and senior care. This could push health care systems to address energy use and impacts of available forms of treatment, resulting in improved sustainability and accessibility of health services. In addition, some patients have expressed interest in access to euthanasia as part of their end-of-life options in order to relieve their families of financial burdens and to lessen their environmental impact.</p> <p>The current landscape of palliative care and death care services will intersect in new ways to accommodate consumers' preferences for their desired end-of-life experiences. This will also encompass subsequent donation or utilization of their remains in ways that benefit the environment or society. These evolving perspectives on managing death could lead to a significant expansion of current green burial options. Entirely new kinds of burial grounds could evolve based on the use of human remains to develop green spaces through re-forestry, botanical gardens, wildlife reserves, and coral reefs to name a few.</p>		<ul style="list-style-type: none">• Green burial options• Environmental and social responsibility• Increased longevity• Public concern with unavailability and unaffordability of health care• Aging population
		 Link to Sources



16. Techno-Holistic Health Care

QUICK DESCRIPTION	As technology advances, all aspects of health care could be tailored just for you based on real-time data monitoring and analysis.	
 Context	 Upstream Trends and Issues	
<p>Technological sophisticates and pundits are already using wearable technologies, environmental sensors, constant algorithmic scanning of health data, and artificial intelligence to regulate their personal health regimes. Public health researchers are already investigating how big data analytics of social media and other online content can reveal communication patterns that signal emerging flu or cold outbreaks and diagnose mental health or physical health conditions. Primitive forms of techno-health are already available and monetized, such as: <i>Apple Health</i>, <i>Fitbit</i>, and <i>Health Tracker</i>. As these become more sophisticated and capable, they will attract more and more customers. Consumers will be continuously monitored by wearable technologies that record heart rates; electrocardiogram readings; and blood oxygen, blood pressure, hormone, and electrolyte levels. Central servers will use AI to analyze data and recommend changes to eating, exercise, and medications. These services could also include DNA testing to tailor individual health plans at a genetic level and maximize their effectiveness.</p> <p>The effectiveness of these services will improve over time, meaning they could contribute to an emergent ecology of health data combining with environmental quality monitors, global algorithms tracking health signals, electronic health and insurance records, and medical and public health research. The result could be a future public-health focused AI, coaching all of us to better health and well-being, dramatically reducing the costs of health care, and improving access to care for low-income, rural communities.</p>		
 Link to Sources		



Innovation Zone

17. Automation Driving Macroeconomic Reform

QUICK DESCRIPTION	Massive inequality may drive government to transform domestic economic policy and consider new fiscal policies, such as implementing universal basic income and ending services for profit.	
 Context	 Upstream Trends and Issues	
<p>Wealth inequality has risen dramatically in the last few decades. This has prompted discussion of a universal basic income—a regular payment from the government to every member of society. Economists predict inequality will rise even more sharply in the next 10 years due to increased automation. One study predicts automation will eliminate 25%, or 40 million, of all jobs by 2030. In comparison, the 2008 financial crisis only resulted in nine million lost jobs. Initially, the reduction in production costs could drive up profits, but this would probably be short lived as the number of customers with the means to purchase products drops dramatically. As profits decline with falling demand, the economy will spiral downward, bankrupting small- and mid-sized businesses and creating even larger corporate powerhouses.</p> <p>A crashing economy in which 80% of the population is struggling without disposable income could transform the macroeconomic picture. In this context, the concept of a guaranteed basic income could become popular. Without economic activity to fuel the economy as it currently does, the government would need to use government funds to implement policies that drive economic growth. A state-fueled economy could change the economic landscape, with less focus on profit and benefits to shareholders. Economic outcomes would focus more on service provision and population well-being. This could dramatically shift both the economic structure and the culture of the country.</p>		<ul style="list-style-type: none">• Automation of jobs• Wealth gap
		 Link to Sources



18. Food as Medicine and Social and Ecological Justice

QUICK DESCRIPTION	Prompted by climate impacts and medical needs, the way people eat could increasingly be seen both as medicine and as necessary to address social inequality and the climate crisis.	
 Context	 Upstream Trends and Issues	
<p>The confluence of climate impacts, public health crises, and social equality issues suggests a shift in the US diet is increasingly necessary. The US could look to other cultures, including its own Indigenous population groups, for models of eating that are easier on the environment, more sustainable, and healthier. Foods with the biggest climate footprints, such as beef, lamb, and cheese, should be replaced with climate-smart, sustainable proteins like lentils and beans. These diet adaptations would help society slow dangerous climate change and maintain food security for a growing population. Meat will be increasingly lab grown or 3D-printed; Burger King’s successful introduction of the Impossible Burger signals a decline in US resistance to beef alternatives.</p> <p>Changes to the food supply chain, agricultural methods, and the American diet could significantly impact emissions and social conventions regarding food, and also result in a healthier diet across society. This would help to address the US’s chronic disease burden, including type 2 diabetes, stroke, heart disease, and cancer. Many of these could be almost eliminated if the entire population had access to and adopted a healthier and more ecologically friendly diet. With today’s high correlation between food deserts and low-income communities, a shift in the US diet toward more sustainable, healthy, and less expensive food could produce significantly improved and equitable well-being and health across society.</p>		
 Link to Sources		



19. Elder Exploitation

QUICK DESCRIPTION	A significant increase in employed elderly people who are unable to retire or afford senior care may lead to new forms of elder abuse and worker exploitation.	
 Context	 Upstream Trends and Issues	
<p>With rising costs of living and less secure job markets, it will become harder for many Americans to retire. This trend could cause new employment-based forms of elder abuse and exploitation. Industries that provide care or services to an aging workforce, such as those providing medical and housing coverage, will need to be monitored to prevent unethical practices.</p> <p>A potential form of employment-based elder abuse might mimic the traditional structure of work-study grants in higher education. In work-study arrangements, college students obtain on-campus jobs to pay for their tuition and fees. Following that model, residents of senior living facilities might be required to perform on-site jobs to pay for their care as well as to alleviate the need for full-time staff. While it might have some benefits, this concept could easily be corrupted and threaten the health and well-being of the elderly participants. Another example derives from the growing gig economy: businesses could exploit the willingness of elderly job seekers and employees to accept contract work in exchange for health care or housing, leading to excessive work hours and physical and mental burnout. This could become a new form of modern indentured servitude.</p>		<ul style="list-style-type: none">• More Americans unable to retire• Increased cost of senior care and residential facilities• Room for retired Americans to participate in the gig economy
		 Link to Sources



20. Waste Inequity

QUICK DESCRIPTION	Increasing pressure on waste management systems combined with environmental degradation could overwhelm structures and require significant innovation to escape disaster.	
 Context	 Upstream Trends and Issues	
<p>Trash disposal and landfills are usually sited far from affluent communities, leaving low-income populations to deal with the health impacts of toxic landfills, industrial waste, and contaminated water. Waste disposal systems are vulnerable to climate disasters and increasing extreme weather could further threaten human health. China has stopped taking US recycling, making waste disposal less profitable and harder to manage. Being awash in waste could have dire consequences for our communities and the planet. However, a culture-wide shift to reusables, waste efficiency, and adaptive innovations could significantly alter the role of waste, making refuse valuable, challenging paradigms for classifying waste as garbage, promoting better health, and lessening environmental impacts.</p>	<ul style="list-style-type: none">• Pollution• Full landfills• Reduced Chinese market for recycling• Mass consumerism	
 Link to Sources		



21. Personalized Medicine

QUICK DESCRIPTION	From “up-to-the second” sharable health data to medication designed for specific genes, all aspects of health care may be personalized.	
 Context	 Upstream Trends and Issues	
<p>In the past, health care has been based on a “one-size-fits-some” model. People take over-the-counter medication in doses recommended for an average male consumer. But two key innovations are moving the health care system away from this model. The first is the use of personal health information; wearable technologies tracking users’ movements, activity levels, and heart rates are becoming more popular. As these technologies advance, data collection will spread and medical personnel or other caregivers will start to use it more effectively. These professionals will know how much patients really have been exercising, eating, and sleeping. The metrics will also provide real-time results of any new care regime a physician introduces, and they will be able to track effectiveness of doses of medication. All this information will help design personalized health care plans for each patient instead of vague suggestions based upon what works for some people.</p> <p>The next innovation to personalize health care is genomic medicine. Using analyses from easy-to-access genetic testing services, such as <i>23andMe</i>, health care providers can offer more personalized treatment plans to patients. An example is testing for BRCA1 and BRCA2 gene mutations that may be connected to breast cancer, as well as genetic testing for Alzheimer’s disease. Pharmacogenetic companies are developing genetically unique medications for depression, anxiety, attention deficit hyperactivity disorder, and folate deficiency, as well as differentiated cancer treatments. Pharmaceutical companies are now beginning to engineer medicine that works more effectively for certain populations or for an individual.</p> <p>While exciting, these advances are in their early days and potentially expensive. People can expect that the health care gap between rich and poor will affect who receives these types of treatments and how widespread their impact will be. Appropriate policies and structures could prevent this and share the positive impacts across society.</p>		<ul style="list-style-type: none">• Proliferation of DNA sampling services• Genomic sequencing advancements
		 Link to Sources



22. End of Personal Privacy

QUICK DESCRIPTION	In a world where people increasingly share their personal lives online, privacy concerns abound.	
 Context	 Upstream Trends and Issues	
<p>News stories surrounding data breaches seem to be a daily occurrence. No company that does business online is immune: car companies, banks, hotels, and email hosts have all been in the headlines. But health care companies are also susceptible to hackers stealing patient information. While internet security continuously innovates, it will just as continuously be threatened by security breaches. Hackers constantly test whatever security countermeasures exist. Users are at risk from foreign powers, commercial entities, and hacking groups. They could even have their privacy threatened by their own governments. With everything moving online and big data driving more and more systems it becomes impossible to imagine a world where anyone can expect privacy regarding personal data.</p> <p>China offers a dystopian view of how governments can use such information to control citizens. The Chinese government heavily monitors citizens' data under the auspices of security, and political dissent is tracked and punished. Websites are censored or blocked to prevent a free flow of ideas that may be counter to the will of the state. China is rolling out a "social credit" program based upon social media records of its citizens that will quantify a person's "goodness" with real-world consequences.</p> <p>How citizens and governments use big data and protect privacy in future will shape how the rest of the world develops, whether toward the Chinese model or another.</p>		
 Link to Sources		



23. Value of Caregiving

QUICK
DESCRIPTION

Automation means people might have more time. It could also make caregiving easier amidst increasing demand. Yet layered alongside automation's potential to decrease income, people could potentially turn their attention to family care.



Context

Care for family members is a secondary responsibility that is sometimes outsourced to a professional or facility. The next 10 years will see the population continue to age, placing greater caregiving pressure on society. At the same time automation will replace 20% to 40% of jobs. A significant debate exists on what the impact of automation will be: will it increase economic productivity or not? Will it dramatically increase unemployment everywhere, or simply hit some areas? Will it transform the working world and change industries? How will it affect work-life balance? Regardless of how everything else plays out, the only sector analysts expect to increase their human employment levels are the caregiving and health care sectors.

Increased unemployment will inevitably be part of this transition, leading to reduced household income. This will force families to care for their own loved ones, share accommodation, share childcare, look after elderly relatives, and help each other, rather than outsourcing these duties. Large-scale unemployment and the changing nature of the workplace could prompt a change in the focus of society back to family and community. Rather than life goals and aspirations focused on making money and achieving career success, people could focus on each other, their families, and their neighborhoods, aspiring to create happy communities while machines generate economic growth.



Upstream Trends and Issues

- Aging population
- Rising childcare costs
- Automation of the workplace



Link to Sources



24. Climate Migrants and Adaptation

QUICK DESCRIPTION	The impacts of climate change and adaptation could drive population migration and worsen inequality.	
 Context	 Upstream Trends and Issues	
<p>Climate change—particularly in the forms of sea-level rise, uninhabitable temperatures, and extreme weather events—could create a surge of migration from the US southern and coastal areas to the north and inland. Those without means to relocate would be in critical need of large-scale government aid and intervention. Those who can afford to relocate would gentrify communities, further displacing low- and middle-income families. Northern cities, such as Duluth, Minnesota, and Buffalo, New York, are anticipating climate migrants and beginning to market themselves accordingly. Other cities should begin to plan for an influx of people, targeting issues like housing, transit, food rationing, and water supplies.</p> <p>As the impacts of climate change start to emerge, further adaptation and innovation as well as government policies and planning will need to be implemented to prevent negative impacts (such as heightened inequality) and enable continued stability.</p>		<ul style="list-style-type: none">• Food security and water supplies threatened by climate change• Migration• Adaptation
		 Link to Sources



25. A US Authoritarian State

QUICK DESCRIPTION	Erosion of the US democratic system could create a less free society.	
 Context	 Upstream Trends and Issues	
<p>Voter participation in the US has fallen in recent years as polarization and growing economic inequality has amplified the perception of disconnected political elites. Continually increasing costs of living that further reduce people’s living standards could erode voter participation further. Without a healthy electorate, marginal political movements can gain traction even if they counter majority views. There are concerns that the current administration is exhibiting some authoritarian tendencies: questioning protesters’ loyalties; challenging the free press; proposing violent solutions to domestic disagreements; and promoting prejudice in the Supreme Court. The increasing extremity of political views challenges both sides of the political divide, and this could result in policies that seek to control the media, to limit free speech, and to authorize force against opposition groups and factions.</p> <p>This rise in authoritarian governance may not always appear negative to parts of the populace. The erosion of the democratic principles and institutions that were established within the US government to limit ruling power and protect freedoms could alter the democratic landscape significantly. Such alterations would make possible the unchecked operation of authoritarian influence within the US. History has witnessed similar shifts before, and even today shifts are visible in world powers such as Israel, Brazil, China, Russia, and Turkey.</p>	<ul style="list-style-type: none">• Growing global populism• Crackdowns on journalists• Post truth (disappearance of shared objective standards for truth)• Fake news• “Deep fakes” (realistically replacing someone’s face in an existing image with another’s likeness)• Increased surveillance• Smart cities	
 Link to Sources		



26. Digital Countries

QUICK DESCRIPTION	Communities, countries, and cultures may no longer be defined by geographical borders.	
 Context	 Upstream Trends and Issues	
<p>Culture is created by common experience. Communities were traditionally geographically defined, but with technological advancement, communities are extending beyond physical borders. With increased digitization and more activities and services moving into the online space, more people are joining and identifying with virtual communities of interest. Technological advancements are enabling remote work and virtual teams and networks; online learning is expanding university campuses; and friends, coworkers, and significant others can live thousands of miles away but feel closer than ever.</p> <p>As technologies like cryptocurrencies and blockchain erode traditional mechanisms of governance, online communities could challenge the traditional roles of nation-states. In the future, a census might use IP addresses instead of physical residences to track and group citizens and communities. Virtual residences could also affect voting and representation systems where traditional geographical caucuses could be replaced with systems allowing representation based upon online interest groups. This could facilitate a more direct democracy. AI may sort citizens' political stances and beliefs. Traditional methods of reaching physical communities, such as door-to-door campaigns and billboards, would lose effectiveness and campaigning would shift online.</p>		
 Link to Sources		



27. Death of Pricing

QUICK DESCRIPTION	Dynamic pricing, which sets the value for goods based on factors like location, demand, scarcity, interest, and need, may increase as AI and data analytics improve.	
 Context	 Upstream Trends and Issues	
<p>AI and big data analytics will enable a new kind of truly dynamic, personalized pricing where prices will adapt in line with consumer behavior. While dynamic pricing can already help reduce food waste and regulate stock in grocery stores, it is likely models will evolve that seek to get consumers to pay for a product. Such models could significantly impact people with low-incomes and those with limited mobility, making them pay more for basic necessities than consumers who are more economically stable and in less need of medication or food. Consumers care about the “fairness” of pricing, so this system may create discontent in addition to disadvantaging the poor. Alternatively, this system could encourage people to create new sub-economies that depend on bartering and trading.</p> <p>As pricing feels more and more subjective and based on companies’ whims, consumers might turn back to traditional modes of exchange such as trading and bartering. Growing possibilities in the digital economy to exchange services for products and other services could open the market for other ways of living and relating to each other.</p>		<ul style="list-style-type: none">• Big data analytics• Artificial intelligence• Internet of things• Techno-holistic health care
		 Link to Sources



28. End of Abortion Rights

QUICK DESCRIPTION	An erosion of abortion rights could put women's health in jeopardy.	
 Context	 Upstream Trends and Issues	
<p>State laws criminalizing abortion or making it harder to obtain an abortion could lead to a federal ban. There are instances of American parents forcing children into marriage to avoid abortion. No birth control method is safe and effective for every woman. Access to birth control depends on secure income and is affected by government and insurance company policies, particularly for lower-income people. Forced to carry unwanted pregnancies to term, women could face health risks, severe economic hardship, and lost opportunities. Child marriage rates could increase as could the number of women in abusive relationships. With even miscarriages being criminalized, women could be less likely to risk conception, which would impact family structures.</p> <p>As the only developed country with an increasing maternal mortality rate, the US already has a maternal health problem. Removing women's reproductive rights without free and easy access to contraception and reproductive health care could escalate this to a crisis. Without reproductive rights, the inequality gap between the sexes would dramatically increase, with detrimental impacts for women, particularly low-income women, across the US.</p>		
 Link to Sources		



29. End of Meat in Global Food Supply

QUICK DESCRIPTION	The evolution of sustainable global food supply chains away from meat production could lead to improved health, well-being, and resilience in low-income communities globally.	
 Context	 Upstream Trends and Issues	
<p>Today, only 55% of crops grown feed people directly; the rest are grown for animal feed, for meat production, and for biofuels, requiring land and water that could be used to feed people. Population growth will add one billion more people to the world by 2050, creating more pressure on global agriculture to meet demand. Meat farming contributes between 15-20% of global greenhouse gas emissions annually to which agricultural deforestation adds a further 20%. Increasing global meat production to feed the additional population by 2050 could have devastating impacts. Consumers are increasingly choosing food responsibly, and sustainably grown plant-based products are becoming more popular. Plant-based “meat” production techniques are advancing, with <i>Beyond Meat</i> and <i>Impossible Burger</i> proving hugely successful. Advances in producing 3D-printed and laboratory-grown meat make it ever more likely they could become part of daily meals.</p> <p>If the shift toward non-meat diets continues, it could revolutionize global food chains. Dramatically reducing or completely ending meat production would free up huge volumes of crops for human use that farmers currently grow to feed animals. This would significantly improve food availability, particularly in developing countries where food security is poor. Cheaper, more readily available food would lower global food prices, making more nutritious diets available to poor communities both within the US and globally. The increased scale of plant farming would make supply chains more resilient to the climate crisis. Further, a decrease in the use of animal fat in food production would lower levels of saturated fat in cheap, mass-produced food, making it healthier. A population-level shift to a plant-based diet would not only support food security but improve the quality of food and people’s overall health. Such a shift could improve health and well-being equity across communities in the US and globally.</p>		<ul style="list-style-type: none">• Climate change• Population growth• <i>Impossible Burger</i> and other plant-based meat alternatives• Growing sense of environmental and social responsibility
 Link to Sources		



30. Climate Crisis Impacts Food Supply

QUICK DESCRIPTION	Increasing stress on food supply chains, due to the global climate crisis, is likely to disproportionately affect the poorest and most vulnerable people.	
Context	Upstream Trends and Issues	
<p>In 2008, food prices dramatically increased across Europe due to mounting pressures on global food supply chains following the financial crisis, a drought in Russia, piracy in the Gulf of Aden, and rising oil prices. The price increases hit the poorest in society hardest, forcing many into greater food poverty.</p> <p>Food poverty in the US currently affects some 40 million people, including 12 million children, from the lowest-income households in the country. As the climate crisis and population growth put more pressure on food supply chains, food poverty could spread to become the norm in the US. Unhealthy, cheaply made, processed food already causes high levels of chronic diseases, such as type 2 diabetes, obesity, and heart disease. As food prices rise, healthy food will become even less affordable and out of reach for low-income families. This will be further compounded by increased automation, which will increase unemployment and lower wages.</p> <p>Food insecurity significantly contributes to inequality; those who experience it also experience increased maternal and infant mortality and childhood malnutrition, the impacts of which can extend across lifespans. For example, hungry children are more likely to perform worse at school, thus putting at risk their future career opportunities. Widespread food poverty could transform the US by expanding already marginalized population groups and creating new ones.</p>		<ul style="list-style-type: none">• Climate change increasing drought and reducing yield• Population growth• Rising inequality• Worsening chronic health• Rising prices
		Link to Sources



31. Data Sovereignty

QUICK DESCRIPTION	People may soon exercise stricter control over the circulation and use of their own personal health information.	
 Context	 Upstream Trends and Issues	
<p>Intersecting developments in digital technologies are increasingly challenging notions of privacy. Rising public concern about the present handling of data breaches and digital privacy could result in a form of sole proprietorship over people’s own health information. People are increasingly interested in improving accessibility and transparency regarding how third parties use personal information. This may create new opportunities for individuals to participate directly in the transfer and withdrawal of their own medical information between health care providers, which could have both positive and negative consequences. For example, individuals could sell their data or refuse to release it, both of which could lead to biased medical research. Similarly, a sole proprietorship model in which individuals control the movement of their health data could also drive significant changes to medical billing and insurance by means of increased transparency surrounding the billing process. Ownership and sovereignty of personal data could empower consumers to really participate in data analytic programs for medical research and health care delivery (e.g., digital fingerprinting and consent).</p> <p>Today, individuals must personally approve the sharing of their health information as a part of the referral process between primary care doctors and specialists. But another approach might be a kind of two-factor authorization in which individuals are directly notified when health care providers attempt to access their health information.</p>		<ul style="list-style-type: none">• Continued politicization of data privacy• Continued privacy breaches across multiple sectors including health, banking, and hospitality
		 Link to Sources



32. Radical Transparency

QUICK DESCRIPTION	Opening up data and sharing everything about everyone could bring unprecedented transparency and significant challenges.	
 Context	 Upstream Trends and Issues	
<p>“Radical transparency” is emerging as an extreme version of the open-source trend. It promotes airing and sharing of all details of decisions, designs, processes, and products—both the strengths and the weaknesses—as a means to understand and critique their underlying assumptions. In terms of business and government, this means revealing exactly what goes into goods and services, and how they function; it means, for example, publicly sharing detailed cost breakdowns and price lists. Research indicates that transparency both increases effective performance and generates consumer trust—and can rebuild damaged trust. Companies like Athena Health and the Dartmouth Atlas are pushing the evolution of “accountable care organizations,” mining Medicare cost and quality data to compare what different providers charge for the same service. Combined with easily transferrable electronic medical records (EMRs), such radical transparency on health services and their costs would allow patients to switch providers to maximize their value for money.</p> <p>Software advances such as blockchain platforms—Almond is one example—are increasingly designed to support efforts in radical transparency across businesses, government agencies, and institutional service providers. Almond enables customers to trace specific food ingredients from their point of origin to their use in a product. In hospitals, the equivalent would be for patients to track every medicine, instrument, and surgical supply used in their surgeries, and all the orders and recommendations in their care charts. The stumbling block is the legacy of fragmented, disparate, disaggregated data across the health care system. If that can be overcome, blockchain and AI innovations could provide secure EMRs and a radically transparent health information exchange.</p>		
 Link to Sources		



33. Ending Pain and Anxiety Through DNA

QUICK DESCRIPTION	Gene therapy to treat post-operative pain, chronic pain, post-traumatic stress disorder, wound healing, and anxiety could improve overall quality of life for many.	
 Context	 Upstream Trends and Issues	
<p>Chronic pain currently costs the US government around \$100 billion annually in treatment and lost wages. In addition, the country is facing a crisis with significant growth in rates of anxiety, depression, and suicide. Recently scientists identified a genetic mutation in a Scottish woman who feels no pain, heals more quickly, is incredibly happy, and feels no anxiety. A genetic mutation in one of her chromosomes raises the level of a naturally occurring brain chemical. Researchers hope that this may lead to potential gene therapies that could prevent post-operative pain and anxiety, chronic pain, and post-traumatic stress disorder (PTSD), as well as improve wound healing.</p> <p>A simple gene therapy that addresses both chronic pain and provides a non-drug cure for anxiety, depression, and PTSD has the potential to significantly reduce risks of addiction and reduce drug use. In addition to improving overall quality of life, this could also mean that chronic conditions would no longer render patients unable to work, potentially removing one trigger of poverty.</p>		
 Link to Sources		



34. Zombie Viruses and Toxic Threats Emerging from Melting Permafrost

QUICK DESCRIPTION

Infectious microbes, long since frozen, and reservoirs of environmental toxins emerging from melting permafrost could put populations at risk.



Context

In 2016, 70 people in Siberia were hospitalized and a small boy died from an anthrax infection traced to ancient reindeer corpses emerging from the thawing permafrost. Heatwaves are becoming more frequent at higher latitudes, with temperatures 25 degrees above normal altering the landscape. Acres of toxic mercury and infectious agents buried in permafrost are being released into the environment with unpredictable effects. While many microorganisms cannot survive extreme cold, some can last for thousands of years. Spores are particularly hardy, and viruses survive well, so these could present significant risks for animals and plants. Viruses previously thought dead, such as smallpox, Spanish flu, or plague, lie dormant in bodies buried across Northern Asia, Northern Europe, and North America.

The permafrost is microbial dark matter. Researchers resurrected two never-before-seen viruses from the same 30,000-year-old deposits. Both reawakened in laboratory dishes and infected living amoebas. These zombie viruses have been tucked away in the permafrost for thousands of years, unknown. What killed Neanderthals is also unknown. Could people be at risk from diseases in thawing Neanderthal remains emerging from the melting permafrost?

The melting permafrost is a Pandora's box of disease and toxicity, having provided perfect conditions to preserve bacteria, viruses, and toxic chemicals for centuries. Coupled with growing geographical ranges for diseases and the carriers, such as mosquitos, that spread them (for example, dengue spread to Texas and malaria occurs at higher and higher latitudes), the permafrost could resurrect a pandemic of ancient disease. At the same time, massive mercury reservoirs could release tons of the toxic pollutant into the water table and food chain, poisoning water, fish, and agriculture with devastating consequences.



Upstream Trends and Issues

- Climate change
- Melting permafrost
- Evolution of disease
- Environmental degradation



Link to Sources



35. Ready Player Escape

QUICK DESCRIPTION	The (potential) rise of escapism (people longing to “get away from it all”) aided by artificial intelligence (AI), virtual reality (VR), and augmented reality (AR).	
 Context	 Upstream Trends and Issues	
<p>TV streaming services such as Netflix have changed the way people consume entertainment, with smart phones and tablets taking entertainment wherever people go. E-sports, watching other people play video games, and interactive social games such as <i>Fortnite</i> are now multibillion-dollar industries. As AI, AR, and VR technologies improve, our experiences with them will become increasingly immersive. Anxiety and depression rates are rising, and the future looks bleak, with the prospect of growing unemployment from automation and the climate crisis. People are increasingly turning to media for escapism. This trend, amplified by more immersive media, could create a community of people opting to live more in the virtual world than the real world.</p> <p>These new technologies could provide avenues for assisting people with mobility limitations experience different lives, interacting with others through immersive technology. Immersive online worlds could enable people to leave behind the physical concerns of reality, but could also reduce social interactions and connections with the people around us.</p>	<ul style="list-style-type: none">• Sustained development of AI, AR, and VR immersive technologies• Mainstreamed prioritization of self-care and emotional well-being• Aging population• Micro-dosing• Increases in all types of streaming services• Growth in gaming, including e-sports• Rising mental health crisis• Climate crisis	
 Link to Sources		



36. Techno-Hubris in Health

QUICK DESCRIPTION	Traditional scientific oversight could slow technological development and changes to health systems.	
 Context	 Upstream Trends and Issues	
<p>Entrepreneurial ventures in the past decade have prompted pundits to coin the term “stealth research” to describe biomedical innovation happening outside of peer-reviewed literature. Recent research tracking health care start-ups with valuations over \$1 billion noted multiple examples with “limited or non-existent participation in publicly available scientific literature.” This sometimes leads to health innovation (after all, not all innovation must come from formal academic institutions and research settings). Sometimes, however, it leads to fraudulent or unethical behavior. The exemplar case of fraudulent health technology entrepreneurialism is, of course, the exposure of medical start-up <i>Theranos</i> in a 2015 scandal that resulted in the company’s closure in 2019. Looking at more popular consumer products and services, the unproven treatments and products promoted at entrepreneur and actress Gwyneth Paltrow’s <i>Goop</i> summit also generated negative publicity and prompted questioning of the wellness industry.</p> <p>Digital platforms and technologies have outpaced regulatory frameworks and enabled the widespread sales of unproven medical devices and technologies. Regulatory guidelines pertaining to health-related technologies need to be updated. It is likely the proliferation and usefulness that could be presented by technological innovation in health care could be slowed.</p>		
 Link to Sources		



37. Humans Training Machines to Train Humans

QUICK DESCRIPTION	Continual mechanical and AI advancements mean machines are likely to perform complex, sophisticated tasks better than humans, and in turn teach humans better ways to perform those tasks and access knowledge.	
 Context	 Upstream Trends and Issues	
<p>AI machines are already outperforming humans in fields such as teaching and detecting cancer. As they are phased into other fields, they will continue to surpass human capabilities. Their successes will teach us new ways to do things and give us access to wider stores of saved knowledge than humans have ever had. AI brain implants will connect these capabilities directly to the minds of those individuals who can afford them, giving them a huge advantage over people who cannot access the technology. AI machine-based health services could address growing health care deserts in rural and economically depressed areas. Governments and non-governmental organizations could also potentially deploy such services to disaster sites more quickly and safely than deploying human responders.</p> <p>These machines, providing better diagnoses than their human counterparts, could depress or eradicate long-term career opportunities for radiologists, pathologists, and other specialists. AI knowledge pools could enhance medical training, delivering more individualized experiences virtually, meaning medical students would spend less time in classrooms. This could also provide ways for less-resourced hospitals and regions to secure training for medical professionals in efficient and cost-effective ways.</p>		<ul style="list-style-type: none">• Virtual education and teacher training/careers• Medical testing and careers• AI implants• Equity and access problems
 Link to Sources		



38. Biased Algorithms

QUICK DESCRIPTION	Humans embed bias in what they build, and it can last for generations.	
 Context	 Upstream Trends and Issues	
<p>Pharmaceuticals and medical protocols already suffer from built-in biases arising from medical trials too-often specific to young White men. Machine-learning algorithms and artificial intelligence software might make these biases worse rather than eliminate them.</p> <p>As the algorithms “learn” by analyzing historical data, they can be led astray when that data reflects historical bias against vulnerable and marginalized populations. This in turn can lead to skewed and inappropriate recommendations. For example, researchers who rely on current publicly available genomic data to study disease will be basing their conclusions on data from studies in which 81% of participants were of European descent. Without analysis of variations across populations, it is impossible to determine what impact those variations might have on treatment.</p> <p>Medical researchers are working to address analytic bias in a proactive effort to use machine learning to improve equity. This means addressing three different sources of bias. First, data itself may be more fragmented and incomplete for some populations and reflect built-in biases in assumptions about what is normal. Second, the actual algorithms are built on assumptions and, where researchers fail to critique those assumptions thoroughly, they can replicate bias. This is exacerbated when research objectives are not aligned with the need to avoid discrimination. Third, researchers may neglect to monitor and evaluate the outcomes of applying algorithms to patients and treatments. Ensuring equitable outcomes means constant questioning and dismantling of assumptions, evaluating outcomes robustly, and including patients of color, Indigenous peoples, women, and other medically marginalized patients in research design.</p> <p>Good design is critical in making the most of these analytic innovations. More and more health care institutions, hospitals, and clinics are betting that big data AI systems are the future of effective, value-for-money health care. Start-ups using AI for health care are attracting billions in venture capital. For any of this to be useful, these systems must be audited for bias, and the more serious the consequences of potential bias, the higher the standard should be.</p>	<ul style="list-style-type: none">• The US’s changing cultural values• The US is becoming increasingly diverse• Unequal burden of disease• Medical and health innovation is accelerating• Health care becoming increasingly digital and distributed	
 Link to Sources		



39. A Changing Understanding of and Response to Racism

QUICK DESCRIPTION	Anti-racism, which calls for the overhaul of system-embedded racist policies, could influence society's ability to achieve equity.	
 Context	 Upstream Trends and Issues	
<p>The impact of racism is evident in every aspect of society, with resulting inequities for Indigenous peoples and People of Color. The effects of racism in US society are evidenced in many ways, including: voter suppression; wealth gaps; health disparities; mass incarceration; deportation; unequal access to quality education; food deserts; redlining; and more. Historically, many have thought of racism as being exemplified by acts of hatred and prejudice. Today, more and more people in the US are recognizing an entire schema in which racism is baked into structures, policies, and practices that consistently produce inequities and disadvantage People of Color.</p> <p>Anti-racism seeks to dissect and rework the policies and practices in every aspect of society to overhaul system-embedded racist policies. If successful, it could have a profound impact on health and well-being by shifting the focus to meaningful policy and practice change that can produce equitable outcomes. Applied in this way, anti-racism is an emerging issue and concept that could have profound influence on society's ability to achieve equity.</p>		<ul style="list-style-type: none">• The US's changing cultural values• The US is becoming increasingly diverse• Unequal burden of disease
		 Link to Sources



40. Civil Rights-Based Disability Equity Framework

QUICK DESCRIPTION	People living with disabilities could bring about a new social model of disability that prioritizes rights-based accommodations and removes structural barriers.	
 Context	 Upstream Trends and Issues	
<p>People living with disabilities are increasingly seeing disability as a core facet of their identities and organizing toward an emerging social model of disability that prioritizes rights-based accommodations and removes structural barriers. For example, mental health diagnoses (including depression and anxiety) and learning disabilities are increasingly seen as disabilities that should be accommodated, while the neurodiversity movement is shifting the narrative around autism and other developmental disabilities toward one that promotes acceptance and accommodation, rather than behavior modification or cure. This is also creating momentum to ensure such disabilities are addressed within anti-discrimination laws.</p> <p>Disability is a complex concept that is impacted by both negative and positive social, political, and other factors. With respect to technology, innovations, such as robotic prostheses, sensory enhancements, gene editing, and AI coaches, may have significant impacts on disability in the future by radically expanding the capabilities of people with disabilities who have access to them and potentially mitigating or even eliminating the impact of certain conditions. Accommodations that may have previously been out of reach or seen as unreasonable in the workplace or community may become commonplace, along with an expectation of employment or community access.</p> <p>However, a shift toward technology as a response to disability, rather than accessibility and universal design, could create disparities between those who have access to new technologies and those who do not. In a world where expensive devices allow people with limited mobility to climb stairs, or people who are deaf to hear, institutions may become less willing to pay for elevators and American Sign Language (ASL) interpreters. Moreover, the potential of technological and medical advancements, such as gene editing, to eliminate certain disabilities will likely cause significant controversy, as many people in these communities (particularly in the deaf and autism communities) see their disabilities as core aspects of their identities that they do not wish to eliminate.</p> <p>Despite new opportunities on the horizon for people with disabilities, there are ongoing concerns, specifically regarding costs and access. As government programs seek to rein in health care spending, they may cut back on current expensive treatments or potential innovations needed to keep many people with disabilities independent and alive. An example is the rising use of value metrics, like quality-adjusted-life years, which presume that higher levels of disability warrants less spending to keep a person alive.</p>		
 Link to Sources		



Foresight Zone

41. Extreme Longevity for a Few

QUICK DESCRIPTION	A confluence of medical advances could give rise to longevity treatments that vastly extend lifespans for those able to afford them—and a new global elite of ultra-healthy people living ultra-long lives emerges.	
 Context	 Upstream Trends and Issues	
<p>The quest to “cure” aging has long resided on the fringes of medical science, but that is rapidly changing. Advances in genetics and biotechnology are suggesting new ways of undoing the damages of aging. More and more anti-aging biotech companies are receiving funding from big-name donors (e.g., Jeff Bezos and Peter Theil), and big-name companies like Google (operating under the name Calico) are also getting in on the act. Research into organisms that do not exhibit evidence of biological aging and regenerative medicine is accelerating. The notion of extreme longevity treatments—medical interventions allowing recipients to live healthy lifespans of 150 to 200+ years—is no longer purely in the realm of science fiction; it is an emerging issue with significant implications that society will need to address.</p> <p>Given the likely complexity of the medical interventions required, extreme longevity treatments will probably be prohibitively expensive (and not covered by insurance) at first, as well as very limited in availability. As a result, only people with great wealth will have access. This will not only blow open today’s already widening wealth gap, but could also result in qualitatively different strata of people. In time, widespread access to extreme longevity treatments could pose additional complications: from population growth (fewer people dying) to having to completely rethink retirement and social security systems.</p>		<ul style="list-style-type: none">• Accelerating medical innovation• Widening wealth gap• Increasing cost of medications• Personalized medicine
		 Link to Sources



42. “Everywhere” Living Online

QUICK DESCRIPTION	A new sort of social media could create an online that changes traditional prejudices and mindsets, reshaping society.	
 Context	 Upstream Trends and Issues	
<p>For years, science fiction writers and futurists have predicted a computer-based virtual world that will change our society. Today, society is closer than ever to making that a reality. Social media started as a fad and has completely reshaped society, creating polarization, fake news, and even influencing the outcomes of elections.</p>		
<p>The online game <i>Fortnite</i> is a new kind of social media. This interactive social space offers a place where people can hang out and develop friendships through shared experiences, as opposed to traditional platforms where users scroll in isolation. In 2018, 10 million users logged into the game to experience a short live music concert, and <i>Weezer</i> launched its new album through the game. Pundits are now viewing <i>Fortnite</i> as the mainstream successor to <i>Second Life</i>, the 2003 immersive computer experience once heralded as capable of social transformation. <i>Second Life</i> never gained traction outside of the gaming community. In contrast, <i>Fortnite's</i> popularity outside the gaming community has grown more quickly than any previous game.</p>		
<p><i>Fortnite's</i> success in leveraging the norms of social media and computers integrated into people's everyday lives suggests the beginning of a transformative change. Computer developers are now working on new platforms similar to <i>Fortnite</i>: immersive, fun, social gaming experiences connected to daily life that will provide more revenue-gathering opportunities, encouraging users to spend even more time in the game. Teens and tweens are <i>Fortnite's</i> main audiences, many of whom spend an average of 10 hours a week on the platform. In <i>Fortnite's</i> online world, gender, race, class, physical appearance, wealth, disabilities, and privilege do not exist. People interact with a shared goal and relationships are formed in a space free from external prejudice. Increased time in the game during the developmental teenage years could significantly reduce prejudice and inequality in society. Ready player one?</p>		
<ul style="list-style-type: none">• Social media and immersive online spaces, particularly <i>Fortnite</i>, gaining popularity• More products and services moving online• Internet of Things (IoT)		
 Link to Sources		



43. Machine Charities

QUICK DESCRIPTION	Smart technologies may give rise to “machine charities” through which networks of AI-powered devices generate money and make donations to the most effective charities or even make direct microloans.	
 Context	 Upstream Trends and Issues	
<p>A new form of philanthropy, dubbed “machine charities,” is rising from the confluence of smart grids, secure and transparent cryptocurrency, ubiquitous computing, and ever-more capable AI. These are networks of smart devices that sell excess capacity (electricity, processor cycles, etc.) to generate funds. Then AI financial programs donate those funds via smart contracts—autonomous contracts that ensure performance requirements are met—to those charities proven most effective by big data analysis. Machine charities, as they grow more sophisticated, could bypass traditional processes make individual, grassroots-level micro-donations or loans.</p> <p>The technologies enabling machine charities, like blockchain-powered cryptocurrencies, could ensure fully transparent transactions. Coupled with AI analysis of big data pools, these technologies could provide rapid-response funding when disasters strike. As smart networks spread around the world, machine charities could come to dominate the philanthropic realm, with millions of contributing devices part of a single charity. At the same time, their emphasis on transparency and their reliance on AI could mean that people trust such charities to handle global problems more than they trust traditional, human-driven philanthropy.</p>		<ul style="list-style-type: none">• Internet of things• Blockchain• Cryptocurrency• AI personal assistants
		 Link to Sources



44. World Without Money

QUICK DESCRIPTION	There is a possibility of a new economy functioning beyond traditional finance.	
 Context	 Upstream Trends and Issues	
<p>The 2008 global financial crisis, subsequent austerity measures, growing inequality, and awareness of inequality kicked off social movements demonstrating an increase in anti-capitalist sentiments. Since then, the looming impacts of issues such as the climate crisis, fast fashion, the growing number of poor people, and inequality have spurred a collective social conscience, particularly for younger generations. While these critical economic values were emerging, the sharing economy evolved—some would argue away from its core values—through apps such as <i>Airbnb</i>, <i>Uber</i>, <i>WAG</i>, and <i>Truro</i>. Although these platforms operate on a capitalist, profit-based model, they have encouraged greater interaction between people and a more open attitude to sharing. People’s interest in, and exploration of, the gifting and trading economies has also increased. The growing popularity of the <i>Burning Man Festival</i> highlights this, as does the replication of this model in the mass climate protest <i>Extinction Rebellion</i> movement.</p> <p>If such sentiments continue to grow, communities around the world could adapt and evolve away from markets based on profit to markets based on local or regional markets, the commons, community, and gifting and exchange. In this new model, citizens could share what they can, when they can, in exchange for other needs and services. The commons sharing economy existed before capitalism and comes out of shared values and a sense of community. As values shift and social conscience grows, such an economic system could increase in popularity and potentially evolve beyond traditional capitalism. Crowdfunding could facilitate a distributed version where gifting and sharing could spread across geographical boundaries as well as within the immediate community.</p>		
 Link to Sources		



45. Living Medicine

QUICK DESCRIPTION	<p>“Living pills” of genetically engineered or even synthetic bacteria could be used to deliver medicine precisely, to alter the microbiome, to perform immunotherapy, and even to cure antibiotic resistant infections.</p>	
 Context	 Upstream Trends and Issues	
<p>The ability to alter a person’s microbiome by introducing outside microbes is garnering increasing attention. Recent discoveries suggest that the microbiome plays a major role not only in gut health, but also in mental and brain health (particularly in depression and autism, and potentially in Parkinson’s and Alzheimer’s). Genetically modified bacteria are already being used in the lab to produce therapeutic compounds like insulin, and clinical trials are beginning for microbial oral vaccine delivery as well as for fecal transplants to fight the superbug <i>C. difficile</i>.</p> <p>In the future, “living pills” containing modified microbes tailored to the specific patient will be used to deliver medicine more precisely, to perform immunotherapy, to alter a person’s microbiome, to enhance brain health, and to cure disease (viral bacteriophages to combat resistant infections). Our microbiomes are directly affected by how people live their lives, from the food they eat to the amount of stress they experience. Taking a “living pill” could potentially correct many of the negative health effects of poor living.</p>		<ul style="list-style-type: none">• Personalized medicine• Genetic modification• Rapid and cheap DNA sequencing• Synthetic biology
		 Link to Sources



46. Demographic Assumptions Overturned

QUICK DESCRIPTION	Challenges to “population bomb” narratives imply a future of fewer people crammed into smaller viable environments, as climate breakdown forces large-scale migrations to remaining viable temperate zones.	
 Context	 Upstream Trends and Issues	
<p>Bricker and Ibbitson document a rising challenge to long-entrenched demography dogma, the ongoing “population bomb.” “In roughly three decades, the global population will begin to decline,” they write. “Once that decline begins, it will never end.” Watershed changes are affecting values and worldviews and women’s childbearing aspirations; “external forces that used to dictate people having bigger families are disappearing everywhere.”</p> <p>In developing economies, more and more women are educated and digitally connected, and much of Africa is urbanizing at twice the global average. In developed economies, childlessness has been rising for decades. Considering the uncertain future, this may accelerate as more women decline to have children at all because “apocalypse is part of their family planning.”</p> <p>Increased lifespan is another assumption of the population bomb narrative that may be eroded by increases in ambient insults to health, such as pervasive contamination of air, water, and the food chain; antibiotic-resistant microbes; and climate challenges to human health, such as impacts of heat stress on the immune system. With the melting of the Himalayan glaciers, the world’s largest population—comprised of much of India, Nepal, and China—will face diminishing water supplies. By mid-century these conditions may drive millions to the remaining temperate zones, cramming global population into reduced viable space.</p>		
 Link to Sources		



47. Co-ops at the End of Capitalism

QUICK DESCRIPTION	Inequality, automation, and rising communalism could create an economy based on shared ownership beyond capitalism.	
 Context	 Upstream Trends and Issues	
<p>Wealth inequality reached new heights in 2019, with 26 of the world's richest people owning as much as 50% of total global finances. Automation is expected to increase unemployment by as much as 40% in the next 20 years, and this will only worsen inequality. Increasing inequality in society is attracting concern, illustrated by movements such as <i>Black Lives Matter</i> and <i>#MeToo</i> that draw attention to widening divisions across society. In response, the sharing economy is also growing, with people increasingly using internet platforms to rent and contract services directly from each other. Currently, apps such as <i>Airbnb</i>, <i>Uber</i>, <i>WAG</i> and <i>Truro</i>, operate on a capitalist model, often generating greater profits for hosts than for the people advertising or purchasing through them. However, as use continues, people are becoming accustomed to interacting directly with each other rather than through a service provider. Movements such as <i>Occupy</i> and <i>Extinction Rebellion</i> are bringing people together who sense growing exploitation, inequality, and lack of social justice in the currently dominant boss-worker model.</p> <p>Activists are searching for a working model that is nonhierarchical and based on shared values. One growing in popularity is the worker cooperative, where members come together to spread risk and share capital in order to have ownership of their business interests. Cooperatives have been around for centuries, but what is new is the motivation to form cooperatives intentionally, both to challenge big corporations and to operate more sustainably.</p> <p>The composition of communities working together in cooperatives is also changing. Technology now enables global collaboration, where people from different continents and societies can invest in each other, working together along lines of shared interest and belief rather than mere geographical proximity and lack of alternatives. If this movement gains traction, it could change the current way we approach capitalism into something different; something smaller, more equitable, and based on community rather than on profit. Something global, but local and ecologically and economically stable.</p>		
 Link to Sources		



48. Redefining Childbearing

QUICK DESCRIPTION	Exo-wombs could change traditional structures and presumptions around childbearing.	
 Context	 Upstream Trends and Issues	
<p>Technology leading to the mainstream use of artificial wombs, or exo-wombs, is steadily advancing.</p> <p>The psychological, social, and economic impacts of a working artificial womb could be profound. The womb is essential for gestation, but an artificial womb could dramatically alter people’s assumptions about childbearing. Human childbirth is risky—about 700 women a year still die from pregnancy or delivery complications in the United States. If women are no longer required for childbearing, their roles and responsibilities related to raising children could change as well.</p> <p>In a world where the physical burden of childbearing no longer rests unequally upon women, pregnancy would no longer have health or career implications for women, and they would not risk death in childbirth. Child rearing responsibilities could begin with daily care and monitoring of the exo-womb, setting expectations and habits of childcare responsibilities shared equally between partners. This in turn could contribute to true gender equality in the home and workplace. As childbearing risks would no longer increase with age, couples could opt to start families much later in their lives and careers, when they had achieved financial stability. In addition, basic reproductive rights could more easily parallel universal gender rights, with the childbearing process becoming identical for all couples regardless of sexual orientations and gender identities.</p> <p>As with any sophisticated new technology, exo-wombs would most likely begin as a luxury option available primarily to the wealthy. Over time, as with other innovations, costs would drop. If widely used, exo-wombs could dramatically level the playing field for gender and sex equality in the US. Furthermore, as women of color, especially Black women, face higher risks of child and maternal mortality, this transformation in childbearing could reduce those risks substantially.</p>	<ul style="list-style-type: none">• In vitro fertilization (IVF)• Growing anti-abortion legislation• Expanding definition of family• Increasing gender equality	
	 Link to Sources	



49. Zoonotic Outbreaks Become the New Normal

QUICK DESCRIPTION	Zoonotic infections could become more frequent, severe, and widespread as more human populations displaced by the climate crisis are exposed to different species.	
 Context	 Upstream Trends and Issues	
<p>Zoonotic diseases—diseases that make the jump from animals to humans—are emerging at an increasing rate around the world as humans encroach more and more into wild areas. Zoonotic diseases arise when humans and animals inhabit the same local environment, especially when humans eat those animals or are exposed to their droppings. Such diseases can come from both domestic and wild animals and have always existed; for example, Ebola from bats, avian flu from birds, swine flu from pigs, and toxoplasmosis from cats.</p> <p>Soon, the growing impacts of global economic development and over-consumption will amplify the accelerating climate and environmental crises. This suggests that zoonotic outbreaks could become much more common and severe in the future as populations mix with more animal species. Climate change impacts animals’ natural geographic ranges—weather-related disasters, food and water availability, habitat loss, and rising sea levels all drive human and animal populations to relocate. With reduced habitable land, more animals will move into urban areas while stressed food supplies will increase demand for bushmeat and traditional animal-based medicines. Growing populations and food demand could lead to exploding populations of farm animals in the developing world.</p> <p>Researchers are monitoring the emergence of novel zoonotic diseases by deploying new surveillance programs, including social media monitoring and mapping wildlife movements. Experts are pessimistic, suggesting that the world is unprepared for a future of more zoonotics: most experts point to a zoonotic infection from wildlife as the most likely candidate for the next global pandemic.</p>		
 Link to Sources		



50. Runaway Microbial Tribbles

QUICK
DESCRIPTION

Synthetic microbes introduced into the environment for bioremediation purposes could prove too successful and escape control with significant consequences.



Context

Naturally occurring microbes able to digest plastic and other modern waste products have been used successfully in bioremediation efforts. Synthetic biology could allow the creation of much more efficient micro-organisms able to tackle a wide array of waste substances. The goal: synthetic organisms able to eliminate human-made contaminants in ecosystems around the world. The nightmare: synthetic microbes that get out of control in the general environment; eating entire ecosystems, the food supply, or plastic items that are still very much in use; and potentially passing “synthetic genes” to natural organisms. Introducing a new organism into an existing ecosystem always carries risk. Scientists could engineer safeguards—such as genetic firewalls that use non-natural DNA bases or amino acids incompatible with natural life—into synthetic organisms to prevent these nightmare scenarios. Other specialized cellular mechanisms could also potentially control survivability and reproduction.

Carefully crafted synthetic micro-organisms with built-in safeguards are likely to become invaluable tools in environmental restoration. However, the increasing availability and decreasing cost of synthetic biology design tools increases the risk that a local, do-it-yourself effort could produce an extremely potent organism *without* safeguards. In 2016, for example, a team of high school students genetically modified a natural bacterium to break down plastic with the hope of one day introducing the bacteria into Baltimore Harbor.



Upstream Trends and Issues

- Bioremediation (using synthetic microbes to eliminate human-made contaminants in eco-systems)
- Rapid and cheap DNA sequencing
- Synthetic biology
- Living medicine



Link to Sources



51. Kids Curing Kids

QUICK DESCRIPTION	Advances in synthetic biology could enable kids to develop do-it-yourself (DIY) cures to help their peers.	
 Context	 Upstream Trends and Issues	
<p>Advances in DIY synthetic biology will enable just about anyone to design and produce their own biologic and genetic treatments. Children are already being taught to code; in time, they will be able to create personalized treatments using DIY biolabs by accessing ever cheaper biotech tools such as DNA sequencing; a rapidly expanding library of online biohacking tutorials; and burgeoning biohacker communities, both online and offline.</p> <p>These biosynthetics might more effectively treat depression via tailored therapeutics, or provide an escape via designer hallucinogens. Kids may seek to cures for their families and peers, while others might seek to enhance their academic or workplace performance through nootropics (drugs and supplements that may improve cognitive function) and other enhancers that are purported to improve cognitive function. Some may even hack their genetics to improve themselves or perhaps to edit out depression, addiction, and other health challenges.</p> <p>The proliferation of home biolabs and the resulting production of personalized medications and biologics, like at-home insulin, could significantly disrupt today's health care system. More and more patients could simply bypass doctors, pharmacies, and hospitals for cheap, DIY treatments. These could not only present serious problems due to reduced oversight and safety mechanisms, but could also drive down the costs of health care delivery and restructure the system.</p>		<ul style="list-style-type: none">• Personalized medicine• Genetic modification• Rapid and cheap DNA sequencing• Synthetic biology
		 Link to Sources



52. Editing Out Addiction

QUICK DESCRIPTION	A gene-editing tool, such as CRISPR, could edit addictive substances out of the environment (e.g., by creating nicotine-free tobacco plants) and even reprogram or remove addiction pathways in the brain.	
 Context	 Upstream Trends and Issues	
<p>Human addictions to alcohol, tobacco, gambling, opiates, other drugs, sex, etc., have significant negative personal and societal impacts. The US is currently gripped by a significant opioid addiction epidemic. Biotechnology could help end addiction by potentially editing the brain to switch off addiction pathways or altering substances to reduce addictive qualities. CRISPR, the gene-editing tool, is already providing innovative possibilities in the fight against addiction. Scientists are using CRISPR to study the interactions between certain proteins and the genes responsible for addiction in the human brain. They have created CRISPR-modified mice that are resistant to cocaine addiction and immune to overdoses. Others have used CRISPR to grow tobacco plants with 99.7% less nicotine than natural plants, yielding a significantly less addictive cigarette. Similar genetic edits could alter the opium poppy and the coca plant.</p> <p>In the future, this two-pronged approach to addressing addiction, coupling brain and environmental modification, could lead to the elimination of addiction as a human response. This would have significant impacts on health and society, both positive and negative (e.g., we could eliminate depression at the expense of artistry). Further, research suggests that obesity and many conditions related to overeating are caused by natural addictions to sugar and fat, so this could even cure the obesity epidemic.</p>		<ul style="list-style-type: none">• Biotechnology• Living medicine• Kids curing kids
		 Link to Sources



Conclusion

The possibilities for health and well-being in the US cover a broad range of futures, with a vast array of factors that could influence well-being over the next 30 to 50 years.

Based on recent trends, as well as a diversity of testimonials reflecting the challenges that individuals are experiencing today, the US has entered a period of increasing complexity and stress—ranging from worsening inequalities, deteriorating health outcomes, and increasing environmental hardships to a generational shift toward increased diversity and liberalism, rising secularism, and rapid technological change. This period of turbulence poses threats if the US “locks in” its current trajectories of inequity and inequality, squandering the chance to dramatically improve health and well-being through transformative new health care and societal arrangements. It also offers opportunities for a new generation, concerned with inclusion and sustainability, to wield powerful new tools and introduce new solutions to the challenges surrounding health and equity.

These are only potential trends; none of them are guaranteed to mature or find widespread adoption. All will have unintended consequences—some good, some bad. Given how power is distributed today in American society and how powerful stakeholders have traditionally made the choices that shape and impact American well-being, drifting on the rapids of change is not tenable. Equitable policies, practices, and conditions that form the basis for and bring about health and well-being will require intentional, concerted action by the many rather than the few. To this end, FORESIGHT offers this report to support people and organizations across the US as they co-design and activate the strategies and partnerships that will bring about a future of health and well-being for all.



Supporting Sources, Data Sets, and Scan Hits for Each Trend and Emerging Issue

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Emerging Issues Sources and Scan Hits

Emerging Issue	Supporting Scan Hits
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