Public Health 2030:

Scenarios for the Cuyahoga County Board of Health, Ohio

Institute for Alternative Futures

Public Health 2030: Scenarios for the Cuyahoga County Board of Health, Ohio

by the Cuyahoga County Board of Health
and the Institute for Alternative Futures

supported by the Kresge Foundation
and the Robert Wood Johnson Foundation

Using These Scenarios

Comparable organizations and communities can use these scenarios as a living tool for strategy formulation by using them to:

1. Test whether current strategies will be effective in the different scenarios.
2. Formulate strategies to more effectively adapt to the changing environment.
3. Assure that strategic plans address the larger picture and longer-term futures for the public health community.

To use these scenarios in your own scenario workshop, visit *www.altfutures.org/publichealth2030* for a sample workshop agenda, instructions, worksheets, and presentation materials.

Table of Contents

Introduction

What will public health in the U.S. look like in 2030? What should public health leaders be doing today? The *Public Health 2030: Scenarios for the Cuyahoga County Board of Health, Ohio* offer a tool for the Cuyahoga County Board of Health (CCBH) and other comparable local health departments to explore these questions at the level of their own jurisdictions. Scenarios can become a living tool for strategy formulation by allowing organizations to test and design current strategies to be effective in the different scenarios. Using these scenarios can help leaders and their organizations more effectively adapt to the changing environment. The scenarios consider a range of forces, challenges, and opportunities shaping local and national public health. They also offer a plausible set of expectable, challenging, and visionary pathways for how public health in Cuyahoga County, Ohio, may change over the years to 2030, and what CCBH's role could be within these pathways.

Using preliminary sets of these scenarios, IAF designed and facilitated a scenario workshop with CCBH staff and leaders to explore the four scenarios on October 8, 2013 in Parma, Ohio. Together the participants considered potential public health goals and strategies for the future, as well as implications for the "robustness" of their contemporary strategies in light of the various scenarios. The recommendations that they developed for CCBH represent steps toward better public health futures for Cuyahoga County and deserve support to promote and develop more effective public health. To use the finalized scenarios in your own workshop, visit *www.altfutures.org/publichealth2030* for instructions, sample agendas, and presentation slides.

These Public Health 2030 scenarios for CCBH and others are an important part of a larger project – Public Health 2030 – conducted by the Institute for Alternative Futures (IAF) and supported by the Kresge Foundation and the Robert Wood Johnson Foundation. In addition to developing four local scenarios for public health departments from four jurisdictions, including CCBH, IAF developed a set of national public health scenarios available at *www.altfutures.org/publichealth2030*. Leaders and practitioners in public health and other sectors can consider their own work in the context of these national Public Health 2030 scenarios by challenging their own assumptions about the future, identifying emerging risks and opportunities, and formulating more robust strategies with greater potential to advance their mission over the decades to come.

Why Scenarios?

The future is uncertain. However, scenarios – different stories describing how the future may unfold – can be used to bound that uncertainty into a limited number of paths. These paths help us think about different probabilities in a larger space of possibilities. Scenarios also force us to consider the systems surrounding our topic and to clarify our assumptions. People who work with scenarios find more creative options than those who plan based only on the past and present. Strategies, plans, and actions can be "future tested" against the different scenarios to assure robust initiatives, rather than continued efforts based on outdated assumptions. Scenarios are thus a powerful method for systematically addressing the uncertain future.

Process of Developing These Scenarios

Given the diversity of public health agencies across the U.S., IAF determined that we should develop scenarios for a few state and local public health agencies. In selecting jurisdictions, we sought diversity in size, region, political and economic conditions, and organizational forms. We chose a rural jurisdiction, a mid-sized jurisdiction (population of 250,000 to 750,000) and a large jurisdiction (population over 750,000). With assistance from the National Association of City and County Health Officials (NACCHO), we recruited CCBH as a large jurisdiction case. We are grateful for the partnership of Terry Allan, health commissioner at the Cuyahoga County Board of Health and president of the National Association of City and County Health Officials.

IAF partnered with CCBH staff to develop the scenarios using the "Aspirational Futures" approach (see **Figure 1** below) which IAF has evolved over the last three decades. The "aspirational futures" approach helps people understand and clarify where current trends may take us, what challenges we face, and what success might look like. This technique develops forecasts and scenarios in three zones:

- A "zone of conventional expectation" reflecting the extrapolation of known trends, a "most likely" or expectable future (scenario 1);

- A "zone of growing desperation" which presents a set of plausible challenges that an organization or field may face, a challenging future (scenario 2); and

- A "zone of high aspiration" in which a critical mass of stakeholders pursues visionary strategies and achieves surprising success (scenarios 3 and 4). Two scenarios are developed in this zone in order to offer two alternative pathways to highly preferable or visionary futures.
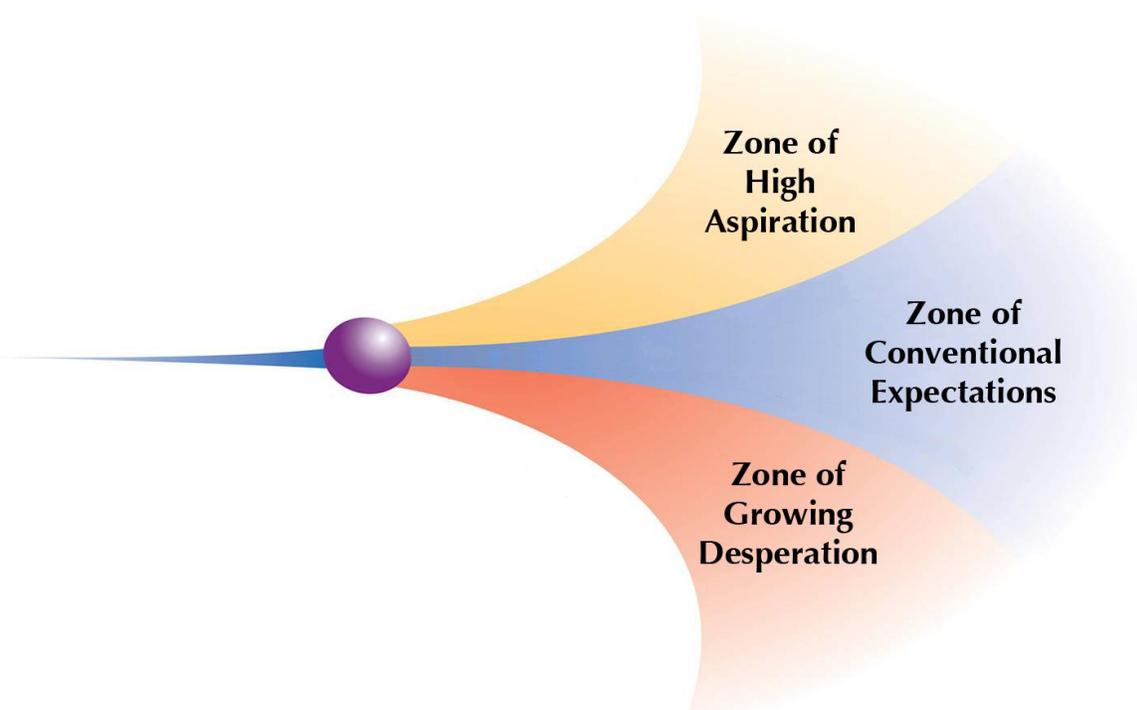

Figure 1**: IAF's "Aspirational Futures" Approach**

In developing these scenarios, IAF reviewed key CCBH program areas, plans, and documents; and interviewed individual CCBH program staff using a set of "driver forecasts" related to key factors shaping health. Based on this research, IAF then developed preliminary scenarios for review and discussion. Many of the comments we received during a CCBH scenario workshop held on October 8, 2013, have been incorporated into the final scenarios.

In the next section, we present the finalized scenario narratives, followed by a matrix that allows for side-by-side comparison of the scenarios across multiple categories.

Public Health 2030: Scenarios for the Cuyahoga County Board of Health

Scenario 1: Some Health Gains,

But Disparities Persist

Scenario Overview

Over the years to 2030, economic and environmental challenges required the Cuyahoga County Board of Health (CCBH) to take on more tasks with less funding and fewer staff members. Technological advances, a savvy workforce, and effective community partnerships helped CCBH better target its resources to the neighborhoods in greatest need and make some advances in community prevention and behavioral health. Climate change and its impacts fueled the rising prevalence of chronic conditions, mental health issues, substance abuse, and infectious disease outbreaks. In all, the county experienced a mix of regressions and advances in health over the years. Health disparities persisted and in 2030, over two-fifths of Cuyahoga residents are living with at least one chronic condition.

Scenario Narrative

Over the years to 2030, the United States experienced slow economic growth punctuated by recessions in 2015 and 2022. Federal spending for public health only increased slightly between 2013 and 2030, with funding largely devoted to emergency preparedness, some aspects of environmental health, and the prevention of specific diseases. As access to quality care improved with the implementation of health care reform, spending for some federal health services was reduced, including the Ryan White HIV/AIDS Program, breast and cervical cancer programs, and Maternal and Child Health programs.

On the state level, Ohio expanded Medicaid coverage to 275,000 Ohioans after a contentious political battle. Ohio's state legislature also required all local health departments to be accredited by 2018, and Cuyahoga County Board of Health (CCBH) had met this challenge by 2015. However, like many other states, Ohio experienced negative operating balances in some years due to health care payments and pension costs for state and local government employees and retirees, Medicaid expenditures, and other health care-related costs. As a result, state expenditures for CCBH and other local health departments fluctuated over the years.

In parallel, the state sought to mitigate the growing impact of climate change. Climate change had yielded hotter and drier summers, heat waves, short-term droughts, higher prevalence of water- and vector-borne diseases, reduced air and water quality, more intense smog, and increased rains during fall,

winter, and spring. However, during summers with no drought, local food production expanded as growing seasons lengthened and crop yields increased. More intense seasonal rains, and algal blooms and eutrophication in the lake, led a regional storm water authority to enhance the storm water infrastructure, thus improving Cuyahoga County's water quality. Controls were also placed on fertilizers in lawns and farms.

In response to the growing environmental challenges, and to prevent and reduce their adverse impacts on human health, environmental public health goals were included regularly by 2020 in community health priorities for the county. Under the leadership of CCBH, community health priorities were periodically set, pursued, and revised by the Health Improvement Partnership-Cuyahoga (HIP-C), a community collaboration. In the 2020s, HIP-C's priorities also integrated increased community resilience and community sustainability, particularly for low-lying, isolated, flood-prone, and low-income areas that tended to take the brunt of climate change.

To further support the prevention and reduction of environmental challenges, CCBH's Environmental Public Health (EPH) unit focused much of its activities on encouraging resilience, adaptation, and mitigation for extreme weather events and climate-induced disease outbreaks. EPH continued to recruit and train volunteer Community Emergency Response Teams, although these were distributed unevenly throughout Cuyahoga County. EPH also worked with local public schools to re-establish environmental awareness in the curriculum and helped develop and regulate farm-to-school food initiatives that distributed healthy, locally grown food (from community gardens and local farms) to schools. Through these and related efforts, Cuyahoga saw increases in healthy food consumption and physical activity in the school environment, reducing childhood obesity rates.

The CCBH Epidemiology, Surveillance and Informatics (ESI) unit frequently coordinates and collaborates with EPH. Throughout the 2020s, climate change as well as technological advances drove ESI to expand its work and engagement in emergency preparedness and response, disease outbreaks, and disease tracking. ESI analyzed increasingly larger amounts of data thanks to the widespread adoption of electronic health records (EHRs) – which included genetic profiles of patients, personal biomonitoring data and, by 2020, risk factors related to the social determinants of health. ESI was also accessing and investigating data from state health information exchanges, as well as private disease tracking tools (e.g. Google Flu Trends) to check against the most reliable government-provided data. These big data capabilities were supported by the automation of data collection, cloud storage in local and state health data "lock boxes," and the improving interoperability of data. These changes thus revolutionized ESI's ability to conduct surveillance of infectious and chronic diseases. By 2030, ESI offered enhanced analytics of disease and pre-disease conditions in a more timely and efficient manner, along with improvements in case identification. For its work, ESI continued to receive categorical federal funding to combat specific new and re-emerging diseases. Funding for emergency preparedness and response, however, proved to be more reactive than preventive, with modest temporary funding increases occurring only after significant natural disasters and during years when novel influenza strains emerged.

Furthermore, ESI and EPH had to meet the increasingly challenging needs of evaluating food safety. In especially troublesome seasons, anywhere between one to ten products nationally were deemed unsafe every week throughout the 2020s. CCBH had to determine if the contaminated products had come to Cuyahoga County and to ensure that members of the community were alerted to the contamination. For that, ESI relied on social media and public-private partnerships of CCBH to spread the word.

While food safety presented more challenges to ESI and EPH, the automation of some aspects and functions of inspections and surveillance freed CCBH employees to refocus their endeavors and activities. CCBH thus enhanced its work and capacities in analytics, community resilience, and addressing increasingly common virus and flu outbreaks. While control over these outbreaks gradually improved over the years to 2030, new and re-emerging diseases were added to the lists of national and state reportable diseases. Changing environmental conditions stimulated new viral and bacterial outbreaks, and national-scale pandemic outbreaks occurred roughly every five years beginning in the late 2010s.

CCBH's ESI and EPH units may have been overwhelmed at times by these emerging tasks and challenges, but the Prevention & Wellness (P&W) unit suffered the most from staff and budget cuts. The recessions in 2015 and 2022, along with the compounding impact of sequestration on federal funding sources, left P&W largely constrained and poorly funded. P&W frequently collaborated with other public and private organizations to improve population health, but extreme political polarization at the state and federal levels frequently interrupted or thwarted P&W's efforts. As a result, community prevention activities were limited to those that addressed priorities in the HIP-C plans regarding selected social determinants of health. For example, P&W promoted and helped to implement strategies for the development of "complete streets" in county and town plans as a form of "Health in All Policies". However, inconsistent implementation left many neighborhoods with lower levels of intervention.

To target neighborhoods and blocks in greatest need, P&W turned to CCBH's partnerships with health care providers, hospitals, and Accountable Care Organizations (ACOs) to take advantage of the expanded use of big data analytics, EHRs, and community health assessments. Thus, despite funding and staff setbacks, P&W achieved some notable successes over the years to 2030. For example, P&W partnered with local schools to reinstate physical education as part of their curricula. P&W also supported a regional coordinating agency that encouraged more telecommuting among Cuyahoga residents to prevent and reduce emissions, car accidents, and auto-related injuries (the latter two had become more common as a result of increasingly frequent heavy rains in the fall and spring).

After the 2022 recession, P&W worked in partnership with a wide range of community agencies to improve mental health in the county, which – like many parts of the nation – had seen disturbing rises in depression, suicides, and drug and alcohol abuse. Moreover, Ohio and Cuyahoga County used to be known around the nation for their history of uniquely odd and violent events, particularly against women, including serial killings and decades-long imprisonments. By the late 2020s, however, sexual assault, abuse, and rape had been successfully reduced thanks to a wide range of violence prevention initiatives (in community planning, zoning, education, church activities, and community events).

As a result of budget cuts, advances in data analytics, and the partial automation of inspections and surveillance, CCBH's workforce was reduced to 120 staff members over the years to 2030. Along the way, all staff still had to meet all of the new challenges and were therefore required to be skilled in advanced informatics, social media, and data analysis. Luckily, by 2030, CCBH had no trouble finding the most talented applicants with a wide array of knowledge and abilities relevant to several of its departments. Potential and current employees were evaluated on their history of teamwork and teaching and transferring skills and knowledge to other team members, or their likely ability to do so. Current employees were also evaluated not only by measuring against their own personal performance goals, but also in relation to how they had contributed to required public health accreditation activities and to HIP-C's evolving goals and initiatives.

In all, Cuyahoga County experienced a mix of regressions and advances in health over the years to 2030. The health of many residents improved, but in 2030 over two-fifths of Cuyahoga residents are living with at least one chronic condition. Like much of the nation, the county had experienced increases in breast and prostate cancer, depression, mental health issues, and chronic disease complications and risk factors. The impacts of climate change had also challenged residents with water- and vector-borne illnesses, allergies and allergy-related illnesses (especially in the spring and summer), heat-related illnesses and deaths, air-related illnesses, and intense asthma attacks. While health disparities persisted, Cuyahoga County was at least fortunate enough to see reductions in violence and intentional injury, improved nutrition in at-risk communities, and some advances in community prevention and behavioral health (e.g. reduction of tobacco use).

Scenario 2: Big Challenges,
Public Health Constrained

Scenario Overview

In the years following 2014, the health and wellbeing of Cuyahoga residents took a turn for the worse amidst challenges with the economy, environment, and technology. Although technological advances helped improve some public health services, they disproportionately benefited communities that could afford them. Moreover, severe spending cuts, state actions to limit local public health initiatives, and public dissatisfaction with government led to reductions in public health endeavors. While health outcomes and disparities worsened, an overworked, undertrained, and short-handed Cuyahoga County Board of Health struggled just to keep up with emergency preparedness and mandated safety and inspection roles.

Scenario Narrative

In the 2010s, the slow recovery of the U.S. economy was undercut by another recession in 2016 with slow recovery thereafter. Recovery in the 2020s was intermittent and disproportionately benefited the affluent. State and local government finances were consistently strained. Low economic growth and job losses to increasingly sophisticated automation and expert systems deepened income disparities.

These poor economic conditions were made worse by the impacts of climate change. In Northeast Ohio, heavier winter and spring rains brought 100-year floods several times each decade, often followed by scorching summer droughts. Lake Erie got warmer and lower, and the smell from the dying fish and bacteria in nearby dead zones rendered Cuyahoga County beaches unusable. New diseases and antibiotic resistant bacteria periodically appeared in the county. Outbreaks of Cyclospora (parasites that cause severe stomach pain, gastrointestinal illness, and diarrhea) became common in the late 2010s, along with increased asthma rates. Overwhelmed hospitals and long-term care and nursing facilities served as grounds for increases in nosocomial infections. Winter and spring flooding was particularly damaging to low-income neighborhoods along creeks, rivers, and tributaries. In fact, the floods were so destructive in some communities that they produced "climate change refugees" within the county.

Adding to the difficulties of climate change and poor economic conditions, health departments – including the Cuyahoga County Board of Health (CCBH) – struggled to keep up with advances in technology and the Internet. By 2020, data from new social media platforms, Groupnets (groups of friends that are highly interconnected via wearable devices and provide near real-time feedback and reinforcement throughout the day), and personal biomonitoring technologies were integrated into electronic health records (EHRs) in the county. Environmental monitoring also became ever more sophisticated. However, use of these technological advances was very uneven. Primarily the affluent and some in the middle class were able to take advantage of these developments, leaving many low-income and middle class individuals and families behind with early-version technologies that failed to improve surveillance and response.

CCBH sought to avoid this fate by leading the adoption of technological advances into its public health services. However, CCBH's hands were tied by severe spending cuts, state actions to limit local public health initiatives, and public dissatisfaction with government. Public distrust in regulations and "interference" from the government hastened reductions in injury prevention programs and violence prevention activities reverted to aggressive police practices and harsh punishment. As a result, rates of injury rose, particularly among low-income and marginalized populations. Inequalities in the prevalence of chronic disease, obesity, and smoking in the county similarly rose along racial and socioeconomic lines.

Health challenges in the county were worsened by the failure of health care reform, which had been largely halted by 2016 and left many county residents uninsured. Health care providers had little incentive to move toward integrated care or to pursue goals in improving population health. Federal budget cutbacks also reduced funding for Federally Qualified Health Centers and other services for low income residents. Those with access to health care often had higher co-pays and received less comprehensive services. These challenges were further exacerbated by two severe pandemics that the nation experienced in the 2020s.

One positive aspect of cuts to health care and the safety-net was the co-location or merging of agencies or units involved in mental health, public health, and addiction control. This helped each agency and unit collaborate more effectively in addressing comorbidities. In contrast, county-wide partnership programs like the Health Improvement Partnership-Cuyahoga (HIP-C) had made a great start in the early 2010s but CCBH, HIP-C, and other programs lost much of their funding in subsequent years. CCBH therefore limited the focus of its environmental programs in the 2010s to indoor air pollution response and mandated inspections of restaurants, public facilities, pools, and some hazardous materials. Budget cuts also curtailed much of CCBH's Prevention & Wellness (P&W) unit's work in outreach and education, safety net services, surveillance and analysis, access to and affordability of health care, promotion of immunization completeness for children and youth, and healthy lifestyle promotion.

CCBH's Epidemiology, Surveillance and Informatics (ESI) unit saw reductions in its workforce as well and had to take on a supportive role for other areas. It functioned much like an IT support unit while simultaneously trying to tackle local outbreaks of disease. ESI sought to address and counter the uncoordinated distribution and delivery of vaccines for influenza, while providing the local medical community with information from state and national public health authorities. ESI also tried to extract EHR data from health care providers and the medical community in order to aid P&W in its population health efforts. But individual privacy concerns and the lack of public-private partnerships were hindering ESI access to this data. ESI's work in emergency preparedness and response was undercut by budget constraints with financing increases coming only after significant health disasters had already occurred. Overworked and undertrained, ESI staff members struggled to keep up with advances in EHRs and health information exchanges, and often could not use big data analytics to effectively improve case management and surveillance activities.

To strengthen and protect its funding, CCBH achieved accreditation by 2016. However, cuts in certain services (i.e., those that were not funded in part or entirely through their own service fees, or that were not mandated) left CCBH to lose its accreditation in subsequent cycles as it could not meet even the minimum package requirements by 2020. As CCBH's income from foundations and from local, state, and federal programs declined during the prolonged economic downturn, policy and advocacy positions were largely eliminated. CCBH staff members with advanced analytic skills were often hired away by the epidemiology units of local health care providers and allied organizations. By 2030, CCBH staff decreased

to half its 2013 size, and employees were often asked to perform multiple roles usually without adequate training for their new tasks.

In all, health outcomes worsened among most county residents over the years to 2030. Previous goals in health equity were neglected, and the greatest increases in morbidity were found among the poor. In fact, the differences in mortality between the healthiest in the county and the sickest had grown from about 22 years difference in terms of life expectancy in 2010 to 30 years difference by 2030.

Scenario 3: Common Sense Returns, Public Health Wins

Scenario Overview

Over the 2010s and 2020s, the conditions for all to be healthy in Cuyahoga County, particularly for the most vulnerable, improved significantly. Although there were mixed news on the economic front, technological advances and a values shift among the public drove major policy changes. These included the establishment of the living wage, spread of community prevention approaches, and efforts to address climate change. As chief health strategist for the county and the region, CCBH guided and facilitated partnerships among public health, health care, nonprofit organizations, community associations, businesses, and governments. CCBH also mobilized real community support for shared objectives. As a result, the health of Cuyahoga County residents flourished over the years to 2030, including significant reductions in infectious disease and chronic disease.

Scenario Narrative

In the years following 2014, there was both good and bad news on the jobs front. The national economy continued to suffer periodic recessions, but these recessions were mild and recovery was strong. Yet job loss continued to grow throughout the 2010s and 2020s, particularly as automation, digital agents, and robots displaced many jobs in education, health care, and legal services. For example, inside the Cuyahoga County Board of Health (CCBH) the staff in its Epidemiology, Surveillance and Informatics unit declined by 20% and transitioned to conducting higher-order analysis of the data that it collected or accessed. Rising national unemployment in turn fueled the rise of "alternative economics" activities. These included community and home gardening, time banks, and sharing cars and equipment. In Cuyahoga County, CCBH promoted these activities over the 2010s and 2020s just as it had been promoting community gardening, farm-to-school food initiatives, and Safe Routes to School since the early 2010s.

In promoting alternative economics, CCBH built on growing local and national support for major changes. This movement was fueled by social and demographic trends, visibility of local and national injustices, threats and impacts of climate change, evolving and maturing social media, and citizen engagement. The public increasingly recognized that activities supporting local economics, broader community prevention, and health equity held economic benefits for communities. Decision-makers and the lay public also came to see violence and intentional and unintentional injury as preventable public health problems with the help of comprehensive and population-level strategies. As younger and more urban populations grew proportionately in Ohio and other states, they elected representatives who were more ready to pursue "common sense" policies that dealt with the changing economy, climate change, and health equity.

Indeed, cost-effectiveness, prevention, and "Health in All Policies" approaches across the nation stimulated healthy innovation and thoughtful coordination between planning and development to strengthen economic conditions and lower health care costs (particularly in low-income neighborhoods).

This included the adoption of "living wage" policies among hundreds of cities. The federal government soon followed by establishing a national requirement that the minimum wage be a living wage.

The nation also saw a "mind change" in environmental public policy, which included bi-partisan commitments to slow climate change and mitigate its effects, particularly by reducing, capturing, and/or recycling greenhouse gases. Climate change was bringing wetter winters, springs, and falls to Ohio. Like others in the state and the Midwest in general, Cuyahoga County saw periodic and serious drought and high temperatures in the summers. These challenges stimulated the development of environmental monitoring programs and citizen science teams that identified major polluters and opportunities for increased "greening" (including local plantings). Environmental sensing tools became ubiquitous and inexpensive, feeding into surveillance and early warning and response systems. In partnership with community and health care provider organizations, CCBH provided quality control of environmental and community monitoring, as well as interpretation and analysis of the resulting to help address climate-induced diseases and risk factors. CCBH also supported both upstream environmental mitigation as well as downstream repairs. These included permits that allowed more freedom for experimentation, and fostering community gardens and small parks in vacant lots.

Similarly in the spirit of community prevention, the federal "Farm Bill" became a "Food Bill" that considered prevention, environmental sustainability, and the wellbeing of farming communities and workers. Locally, CCBH supported the strengthening of localized food systems and discouraged the consumption of processed foods. CCBH also expanded its statutory food safety focus to a "Safe and Healthy" approach, encouraging healthy choices on local restaurant menus and widely acknowledging food service operators who excel in safe and healthy endeavors.

In community planning, re-developed and mixed-use neighborhoods spread throughout the county, radiating out from the Cleveland urban core, particularly after the successes of Ohio City and University Circle. "Smart design" also promoted buildings, neighborhoods, and products that promoted safety, prevented injuries, and improved quality of life. "Complete Streets" became well accepted, and when combined with expanded public transportation options they made much of Cuyahoga County easily and safely navigable without private ownership of cars. CCBH supported educational and systemic approaches to eliminating structural racism and discrimination, and its Epidemiology, Surveillance and Informatics unit participated in school curriculum development efforts that included "living labs" of community gardens and outdoor physical activity exercises, all of which helped to improve school performance in low-income areas.

To facilitate public engagement in environmental and community development efforts, CCBH drew on games, avatars, and simulations to help neighborhoods plan and build healthier, more sustainable communities. These tools also helped residents of all ages prepare for weather catastrophes, disease outbreaks, and food issues. CCBH's Prevention and Wellness unit coordinated much of the citizen engagement and health promotion work, including the promotion of affordable housing, neighborhood safety, accessible and affordable food, and increased physical activity (at times in conjunction with or supported by health care providers in the county). The Prevention and Wellness unit also worked with app developers and health care providers to incorporate the intelligence gleaned by the Epidemiology, Surveillance and Informatics unit into the protocols for apps and digital health coaches.

The proliferation of "common sense" policies, alternative economics, and community prevention thus fueled a culture of greater equity, resilience, and cooperation. Meanwhile in health care, most people – including Cuyahoga County residents – accessed care through Accountable Care Organizations (ACOs) by

2020. ACOs covered the poor and provided effective care and preventive services. In providing care, clinicians widely accessed and used integrated databases of neighborhood level data to link patients to walking clubs, healthy cooking classes, smoking cessation courses, and other wellness resources. For patients at high risk for environmental triggers of asthma, falls, and challenges in compliance with clinical care plans, medical providers referred cases to CCBH for home visiting and assessments (these services were covered by public and private insurance). In the mid-2020s, given the aging population of Cuyahoga County, CCBH also added nosocomial disease surveillance and inspection and rapid outbreak response in nursing homes (and eventually for other skilled care facilities). ACOs also took on a major role in community health assessments, and funded community groups – and occasionally CCBH – to work on the community's priority health issues. These included challenges with affordable housing, neighborhood safety, accessible and affordable food, and increased physical activity.

To support community health endeavors, ACOs provided aggregated and anonymized data from their electronic health record (EHR) systems to CCBH and community groups. Their EHRs integrated data that yielded evolving and unique profiles of each patient's history, genomics, and social determinant-related risks. CCBH improved surveillance and epidemiology further by drawing on Google Flu Trends and its successors, and shared resources across Ohio departments involved in health, social services, auto registration, environment, and other areas. Mapping, spatial analysis techniques, and geographic information system (GIS) tools that identify and detect disease clusters also helped enhance CCBH's understanding of personal proclivities, genomics, and vectors. The integration of all these data was aided by the uniform chart of accounts for local health departments and the development of state health cloud data services.

Beyond EHRs and environmental monitoring, the 2010s and 2020s also saw individuals, health care providers, and public health departments effectively deploy other technologies in ways that supported public health and sustainability endeavors. Personal biomonitoring tools and data were added to most people's EHRs where it was aggregated and monitored for health trends. In social media, Groupnets (groups of friends that are highly interconnected via wearable devices and provide near real-time feedback and reinforcement throughout the day) became the next big thing. Many Groupnets formed to tackle health issues or improve group health, and used biomonitoring tools, wearable devices, and ubiquitous smart phones and environmental sensing to enhance health across the socioeconomic spectrum. Moreover, the data collected improved with the reduction of the digital divide as smart phones became ubiquitous and subsidized minimum connection data packages enabled all users to link their biomonitoring data to their EHRs. Most people also got digital health coaches from their ACOs, and CCBH supported the use of these coaches for personalized and effective health promotion. Digital health coaches were driven by the ACOs' practice management protocols and offered analyses and recommendations informed by the individual's medical, environmental, and socioeconomic data. For many people, these digital coaches also coordinated with and included data collected through his or her Groupnet, which provided behavioral reinforcement for maintaining a healthy weight and activity level.

As medical, environmental, and socioeconomic data proliferated and improved in quality, CCBH worked closely with providers to do "big data analytics" on all of this information. The resulting analyses helped Cuyahoga County better deal with the interactions of disease patterns with the underlying genomic and social determinant profiles of the individuals and communities involved. CCBH's analyses and findings also informed personal digital health coaches. By 2030, ESI's enhanced work contributed to significant reduction of infectious disease in Cuyahoga County. Increasing focus on the social determinants of health, prevention, and behavioral health also successfully reduced the chronic disease incidence in the county and elsewhere.

Amidst these developments in policy, health care, environment, and economics, CCBH played an effective role as chief health strategist for the county and the region, and served as a leader in facilitating changes. Its Epidemiology, Surveillance and Informatics unit used big data analyses to show the value of CCBH's work and determine the most cost-effective interventions. CCBH also helped nonprofit organizations, community associations, businesses, and governments work well together on priority goals, periodically changing or adjusting them as they were achieved. CCBH sometimes led Health Improvement Partnership-Cuyahoga (HIP-C) endeavors and sometimes supported them in the background by mobilizing real community support for shared objectives. HIP-C thus reflected the new mode of public health that CCBH was providing.

Along the way, CCBH achieved accreditation by 2016 and successfully completed periodic reaccreditations thereafter. Accreditation fostered ongoing quality improvement and metrics around success. These metrics fed into more efficient, more effective activities around integration of health care and population health. As the list of accreditation requirements kept changing, CCBH was often ahead of the pack. Leadership by local health departments (LHDs) became even more important as some public health functions were automated and supported by other groups. This was especially the case for some aspects of inspections, surveillance, data collection, and interpretation, which were adopted or supported by health care providers and other groups that took on roles in improving population health.

While the traditional mix of funding sources that sustained CCBH and its activities continued, the towns and townships increased their payments per person to CCBH. Advanced analytics findings and demonstrated outcomes led the state to recognize the cost-savings that public health generated. It therefore increased and stabilized its funding for public health and CCBH, and the state legislature adopted and supported universal metrics for performance. The federal government continued its categorical focus, but after 2016 allowed far more latitude to health departments in how they used funds. However, as health care proved more effective and universally available, federal funding to CCBH for HIV/AIDs treatment and Maternal and Child Health safety net services was reduced.

In 2030, Ohio LHDs are better at what they do and are more financially stable than they were in 2013. They provide more comprehensive leadership, foster greater health equity, and enhance authentic and sustained community engagement. Staff training on the job and in academia has improved and includes an explicit focus on training for the promotion of health equity. These significant improvements occurred despite consolidation, which had reduced the number of LHDs in Ohio, and reductions in the LHD workforce over the years. In addition to automation and the growing role of other groups in the delivery of public health services, some former LHD employees who had left or retired had not been replaced. By 2030, the CCBH workforce thus declined to 120 employees, some of whom were part-time or shared a position between two employees. Furthermore, as CCBH's workforce aged, some older staff members continued to work long past the conventional retirement age (which had risen to 70 by 2025). These employees continued working partly because they needed to boost their retirement savings. More importantly, however, they enjoyed working at CCBH and witnessing long-sought successes in public health.

Scenario 4: My Code is Your Code

Scenario Overview

Over the next decade and a half, widespread grassroots involvement supported public health in promoting the conditions for all to be healthy, particularly by addressing community prevention, population health, and the social determinants of health. In Ohio, the Cuyahoga County Board of Health (CCBH) supported and led such endeavors with a knowledgeable, multidisciplinary, and fulfilled workforce. Although the county experienced a wide array of environmental challenges over the years to 2030, a combination of community engagement, citizen science, gamification for education and training, "alternative economics," and "environmental improvement" enhanced community prevention, health, and solidarity. As a result, the health of all residents substantially improved by 2030 and health disparities were greatly reduced.

Scenario Narrative

A slow and uneven recovery followed a major recession in 2017 and unemployment remained high. Unfair gaps in job opportunities and income were highly visible and attention was increasingly drawn to how low-income and unemployed persons were particularly hurt by increasingly frequent severe weather events (e.g., droughts and floods). Scientific and technological advances throughout the 2010s allowed for high levels of personalized health data and recommendations, but with visible and increasingly disturbing disparities in benefits. Netizen advocates (people who spent a lot of time learning about and promoting causes online) used online tools and apps to expose these disparities, fueling public recognition and awareness.

The growing attention to inequities led to a national social movement that did not tolerate digital divides, violence, marginalization, or disparities in job access, health, and income. The nation's leaders came to understand that the definition of public safety needed to expand to include health and quality of life, and that communities and the public sector needed to actively address prevention, health promotion, and the social determinants of health. Community prevention thus became a grassroots movement. People came to understand that their personal risk profiles, and those of their friends and neighbors, were largely out of individual control, and were shaped by environmental, social, epigenetic, and genetic factors. This fostered a sense of "structural health injustice" which in turn rallied people to change social and environmental conditions.

To counter this injustice, Cuyahoga and other localities joined the "My Code Is Your Code" movement by the mid-2020s. My Code is Your Code aimed to conduct "social programming" and "social coding" via four tenets:

1. There is an evolving *code of life* that calls for fairness;

2. None should face marginalization based on health differences inherited via *genetic codes*;

3. Where you live (your *zip code*) should not determine your health, your life expectancy, or access to opportunities; and

4. *Coding and programming* can be used to improve health and increase opportunities.

Coder and programmer activists created apps and games to promote personal and community wellbeing and equity. Community mapping helped people understand "zipcodeomics," and enabled strategies for improving the "profiles" of zip codes that included indicators for health, environment, education, and safety. Apps also alerted users to health and equity issues in their areas or social circles. This granularity of data also allowed for hyper-localized targeting of resources to maximize public health impact.

Citizen scientists were crucial to My Code Is Your Code. Citizens used traditional neighborhood teams to train each other in monitoring and data collection. Teams were active in all neighborhoods and engaged with members of Groupnets (constantly connected groups that use networked wearable devices to reinforce behaviors and provide real-time updates) to improve their health and the health of their social circles and communities. Community health dashboards (CHDs) became common and many were hosted by neighborhood groups gathering environmental and health data. CCBH monitored CHBs for quality assurance and helped some neighborhoods create them. Thus, CHDs served as informal "progress reports" for the community and for the My Code Is Your Code movement.

My Code is Your Code thus accelerated the evolution of public health. Enhanced and networked monitoring produced sophisticated real-time information of health threats and improvements. Biomonitoring tools and capacities became inexpensive. Social media, games and gamification, and Groupnets all facilitated the sharing, understanding, improvement, and reinforcement of healthy behaviors and health education. Employers supported health promotion to ensure the optimal health of their increasingly diverse workforce. Providers worked to improve population health, often getting personally involved in public health work.

The results of all these endeavors were astounding. By 2030, Cuyahogans were far healthier than had been expected. This was particularly true for communities that had been designated as "most vulnerable." The life expectancy in the sickest community had also risen significantly. In 2010, the life expectancy gap between the sickest and healthiest communities was about 22 years. By 2030, the gap had been reduced to seven years. Over the years, health equity had become much greater across all conditions. In light of cultural, social, and technological advances to achieve health equity and improve health, the Health Improvement Partnership-Cuyahoga (HIP-C) regularly updated its priorities as they were achieved. By 2020, activities linked to HIP-C priorities had made clear gains in addressing social determinants of health. Cuyahoga and the nation came to recognize health as an economic good and health equity as a right.

The perception of health as an economic good and benefit was also related to shifts in financial policy. Between 2013 and 2030, periods of recession and delayed recovery forced the federal government, states, legislators, and politicians to emphasize financial accountability, sustainability, cost-efficiency, performance-based funding, and returns on investment. This emphasis resulted in bipartisan political and legislative efforts to drive down the costs of illness and health care, while simultaneously improving health and health care. Various innovations, partnerships, and policies focusing on prevention and health creation and promotion resulted.

In Cuyahoga County, public-private partnerships formed between local businesses, nonprofit groups, and CCBH to improve overall community health, enhance education, and reduce disparities. CCBH provided leadership for HIP-C, and continued to play the role of health strategist and health facilitator in

many of these partnerships. CCBH also worked with government agencies to enhance prevention, improve built and natural environments, and reduce health care costs.

At the state-level, Ohio ensured that the public health programs that it funded were cost-effective. State funds for public health increased slightly but were periodically redirected to efforts with greater returns on investment. Additionally, the federal government reduced or eliminated some programs—such as Ryan White HIV/AIDS—as health care took over much of this work and nearly all U.S. residents gained access to good care.

Loss of jobs and income also increased the popularity of "alternative economics." High unemployment forced many individuals and families to become more self-reliant. Many people and communities adopted alternative economics activities and technologies such as home food growing, collaborative consumption and co-production, time banking, car- and bike-sharing, buying local, homesteading, community-supported agriculture, community gardening, crop swaps, urban agriculture, seed saving, aeroponics, aquaculture, aquaponics, and hydroponics. Throughout the 2020s, such approaches helped improve health, enhance community solidarity, and achieve local environmental goals. CCBH helped foster and monitor these activities to enhance Cuyahoga's sustainability.

Despite economic difficulties, health care reform continued. Health care organizations evolved first into Accountable Care Organizations (ACOs), then into Accountable Care Communities (ACCs) that joined with others working to improve population health by encouraging health and equity across a range of sectors (such as housing, transportation, health, environment, energy, education, and employment). ACCs educated and informed patients about individual practices that could contribute to community and population health. ACCs also consistently collaborated with health departments and community groups to achieve community and population health goals. Furthermore, as Cuyahoga's leading providers evolved into ACCs, their primary care advanced beyond patient-centered medical homes (PCMHs) to become community-centered health homes (CCHHs). CCHHs analyzed community health needs and pressed beyond clinical care to reshape community conditions.

One aspect of reshaping community conditions was the particular care given to the built and natural environments. The achievement of environmental goals became crucial as climate change took its toll across the nation. Resilience, sustainability, and mitigation became integral parts of local, state, and federal policies. Cuyahoga, led by CCBH and its partners, worked with citizens, businesses, and various agencies to reduce environmental impact and expand renewable energy. Cuyahoga thus proved a model for other counties in the 2020s in climate and environmental public health leadership. CCBH's Prevention and Wellness (P&W) and Environmental Public Health (EPH) units were crucial in supporting local policy makers and businesses to establish "no emissions" and "reduced emissions" areas.

Cuyahoga proved unique in pursuing health and climate goals. To contribute to slowing climate change, CCBH encouraged reduced reliance in the county on cars; promoted anti-idling policies for business fleets and school buses; worked with private and nonprofit agents to expand the number of hybrid and electric vehicles within the county; encouraged more biking, car-sharing, and ride-sharing; and fostered greater energy efficiency and onsite renewable energy production in buildings. Neighborhoods in the county were actively creating community health preparedness and resilience plans in the face of climate change.

One major project that CCBH helped promote was "Brighten Lake Erie." As temperatures rose, Lake Erie faced the risk of aggravated eutrophication. To overcome this, one large-scale project, completed in

2025, was converting parts of Lake Erie into "bright water" sites. Specific areas of the lake received injections of air microbubbles that increased the reflectivity of the water, slowing lake temperature rise and cooling the surrounding areas. Cuyahoga and other counties, citizen science groups, private enterprises, and nonprofit groups coordinated this activity, monitoring its progress and ecosystem impact. By 2030, this network also established wind turbines on the lake that supplied renewable energy to localities around Lake Erie.

Throughout the 2020s, CCBH also collaborated effectively with citizen scientists and Groupnets to enhance behavioral health, community prevention, surveillance, monitoring, and environmental public health. Within CCBH itself, P&W found a strong niche in direct collaboration with citizen groups, technology and social media, and schools to implement community prevention. Furthermore, by 2020, P&W had added environmental mitigation to its prevention activities, recognizing that climate change was challenging wellness. P&W funding for these community engagement activities was relatively secure as it came primarily from its towns and township contributions.

In light of environmental changes, EPH also coordinated with P&W in joint efforts to promote health and prevent illness and injury. EPH focused most of its activities on maintaining optimal community health, with actions designed to take into account the health impacts of climate change. EPH enabled resilience and adaptation for extreme weather events and climate-induced disease outbreaks, while serving as a strong partner for local renewable energy technologies and advancements.

CCBH's Epidemiology, Surveillance and Informatics (ESI) unit helped in these and other efforts by using the information generated by citizen science groups, private companies, and health care providers. It enhanced its capacities in informatics and data analysis, and monitored indicators that gave the big picture of the community's health and its social determinants. ESI played an important part in evaluating the impact and cost-effectiveness of CCBH programs. ESI provided support for the data and algorithms of health games, digital health avatars, and Groupnets for health improvement. Citizen scientists and Groupnets collaborated with ESI in using geographic information system (GIS) tools and technologies to create highly sophisticated spatial analyses of health in Cuyahoga County. To address the needs of the aging population, ESI also collaborated with seniors involved in citizen science, Groupnets for seniors, and seniors' affiliates, families, and friends for nosocomial disease surveillance and inspection of nursing homes and other elder care facilities. ESI also monitored several alternative economics activities as some bacterial and infectious issues had arisen from home food growing and community gardening (although infectious disease overall had been significantly reduced since 2013).

Due to the automation and distribution of several public health services, CCBH had fewer employees in 2030 than in 2013. However, CCBH staff members were called on to do more varied tasks. To adapt to these changes, CCBH had sought employees with multidisciplinary knowledge backgrounds, brought out the best in current employees, and enhanced internal collaboration. To be considered for a position at CCBH, job candidates had to demonstrate a capacity for interdisciplinary collaboration, including the capacity to transfer skills and knowledge. There were positions for employees with skills in programming, app development, gamification, and Groupnet analysis and outreach in every department. Employees were evaluated in relation to their own goals and how they had contributed to the activities required for accreditation (which CCBH had initially achieved by 2015). Open-access profiles of employees, as well as consumer/customer ratings of individual employees and CCBH activities, increased accountability to the public. Most importantly, however, staff members were enthusiastic and felt pride in working for CCBH.

Scenario Matrix

The following pages offer a side-by-side comparison of the scenarios across multiple dimensions. Each column is consistent with but not solely duplicative of the respective scenario.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
THE MACRO AND OPERATING ENVIRONMENTS				
Economy	Slow economic growth and recessions in 2015 and 2022; state government has negative operating balances in some years.	Recovery disproportionately benefits the affluent and some in the middle class; automation is reducing jobs.	Strong recovery; living wage instituted; automation reduces jobs and fuels the rise of "alternative economics."	Strict economic and financial policies; high unemployment; health is understood as an economic good and benefit.
Climate Change Impacts	Hotter and drier summers; heat waves and short-term droughts; increased rains during fall, winter, and spring. Reduced air and water quality; more intense smog. Increased prevalence of vector- and water-borne diseases; changing environmental conditions stimulate new viral and bacterial outbreaks; national-scale pandemic outbreaks.	Heavier winter and spring rains brought 100-year floods a few times each decade, often followed by scorching summer droughts; Lake Erie got warmer and lower, and beaches were at times unusable. Intensifying dengue outbreaks periodically appear in the county. Periodic displacement within county due to flooding and other climate events – local "climate refugees."	Hotter and drier summers; heat waves and short-term droughts; increased rains during fall, winter, and spring. Challenges to air and water quality arise, but are better reduced or managed. Impacts of extreme weather events are minimized via community preparation and focus on resilience.	Hotter and drier summers; heat waves and short-term droughts; increased rains during fall, winter, and spring. Challenges to air and water quality arise, but are effectively managed or prevented. Impact of climate-induced disease is minimized via foresight, anticipation, and resilience.
Internet and Social Media	Social media and technology continue evolution. Specialized health and fitness networks, personal monitoring, and Groupnets all grow in use and influence.	Continued evolution in technologies and systems, but inequitable access exacerbates disparities.	Advanced social media, and intelligent and networked devices are ubiquitous and inexpensive; subsidized minimum connection data packages reduce digital divide.	Advanced social media, and intelligent and networked devices are ubiquitous and inexpensive; subsidized minimum connection data packages reduce digital divide.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
THE MACRO AND OPERATING ENVIRONMENTS				
Electronic Health Records	Nearly-ubiquitous; interoperable and accessible; includes genetic and personal biomonitoring profiles; public health access enabled.	High variability in use, quality, and scope; some systems include genetic and personal biomonitoring data; public health access limited.	Interoperable, accessible, and ubiquitous; includes genetic and personal biomonitoring and social determinants data; public health access.	Interoperable, accessible, and ubiquitous; includes genetic and personal biomonitoring and social determinants data; public health access.
Environmental Monitoring and Remote Sensing	Sophisticated; monitor status of the lake, regional sewer system, and farms; measure for conditions that could indicate extreme weather changes.	Quality, benefits, and use are highly unevenly distributed.	Ubiquitous and inexpensive, feeding into early warning and response systems; data is publicly accessible & used to reduce emissions.	Ubiquitous and inexpensive, feeding into early warning and response systems; data is publicly accessible.
Citizen science	Supports efforts to map, expose, discuss, and solve major social, health, and environmental problems.	Efforts focus on and benefit better off individuals, families, and communities.	Crowd-sourced and equitable participation; use smartphones and Groupnets to conduct their own analyses and hold regulatory bodies and companies accountable.	Most residents contribute to citizen science and participate in holding regulatory bodies and companies accountable.
Mitigation, Adaptation, and Resilience Efforts	Community groups take up preparedness and mitigation efforts.	Capacity and success constrained by significantly limited and reactive funding.	Widespread, equitable participation in emergency prep and community resilience activities successfully minimizes impacts of climate-induced disease and extreme weather events.	Widespread, equitable participation in foresight, anticipation, and resilience efforts successfully slows environmental impact, expands renewable energy, and reduces climate-induced diseases.
Water, Sewer, and Flooding	Regional system improves county's water quality; controls placed on fertilizers; efforts target communities most vulnerable to environmental threats.	Repeated major and polluted floods particularly hit low-income neighborhoods hard and create "climate change refugees"; frequent sewage pollution adds to eutrophication of Lake Erie.	Improved storm water infrastructure, and limits on fertilizing; heavy environmental monitoring tracks quality of water in the lake and drinking water system.	Parts of Lake Erie converted into "bright water" sites to prevent the lake from warming; controls placed on fertilizing; regional sewer system improvements reduce water pollution.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
THE MACRO AND OPERATING ENVIRONMENTS				
Health Threats	New and re-emerging infectious diseases, and outbreaks, periodic national-scale pandemic outbreaks. Increased prevalence of cancers, mental and behavioral health problems, asthma and other chronic diseases, and risk factors.	New diseases, antibiotic resistant bacteria appear periodically; increased nosocomial infections, allergies, heat-related deaths, asthma; two severe pandemics. Disproportionate increase in injury, chronic disease, obesity, smoking among vulnerable populations.	Heat-related illnesses and deaths, vector- and waterborne diseases, and air-quality related illnesses. Bacterial and infectious disease issues associated with increase in home food growing and community gardening.	Heat-related illnesses and deaths, vector- and waterborne diseases, and air-quality related illnesses. Bacterial and infectious disease issues associated with increase in home food growing and community gardening.
Health Care	Health care reform largely implemented. Most residents have access to good health care through a medical home. Major local systems become Accountable Care Organizations (ACOs).	Uninsured and under-insured grow, challenges with access to care, most care remains fee-for-service.	Nearly universal access; most though ACOs providing excellent care using technology (including digital health coaches) and primary care teams.	ACOs become Accountable Care Communities (ACCs), providing great care to all using enhanced teams and self-care tools and focusing on community health.
Health Care Providers' Role in Population Health	Population health activities focus on ACOs' patients and specific health conditions.	Limited population health activities; focus on patient panels and specific health conditions.	ACOs support population health activities with greatest need; fund community groups and CCBH to address the social determinants of health.	Population health activities press beyond clinical care to support comprehensive community prevention; ACCs add and support.
Health Outcomes	Declines in mental and behavioral health problems, and sexual assault, abuse, and rape. Health disparities persist.	Health outcomes worsen, particularly among low income and minority populations; health disparities increase.	Significant reductions in infectious disease, injury, violence, and chronic disease. Health disparities reduced.	Significant reductions in infectious disease, injury rate, and chronic disease. Significantly reduced health disparities.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
CUYAHOGA COUNTY BOARD OF HEALTH (CCBH)				
CCBH Partners	Health care provider organizations to improve population health, community health improvement partnerships, schools, businesses, other local government agencies.	Few agencies, professionals, or community entities see CCBH as a meaningful leader or collaborator for prevention and health promotion.	"Smart design" practitioners and advocates, health care provider organizations, other local businesses and gov agencies, community groups, and those fostering alternative economics.	Citizen science groups, Groupnets, health care providers, schools, local businesses, nonprofit groups, game and app developers, and alternative economics advocates.
Epidemiology, Surveillance and Informatics (ESI)	Provides timely and efficient analysis of disease and pre-disease conditions. Integrates data from EHRs, government, state health exchanges, and private disease tracking tools to target efforts to conditions and areas in greatest need. Automated data collection, cloud storage in local and state health data "lock boxes," improved interoperability.	Unable to keep up with advances in data tools to provide instantaneous disease investigation and control. Lack of partnerships and individual privacy concerns limit data sharing; private entities and citizens conduct their own health-related surveillance and analysis. CCBH's ESI unit serves as IT support unit for other divisions.	Staff downsized, but staff does high-order data analysis. Collaborates to enhance surveillance and analysis. Uses EHR data, mapping, and spatial analysis techniques and geographic information system (GIS) tools to detect disease and risk clusters. Responsible for showing the value of CCBH work and determine most cost-effective interventions.	Collaborates to enhance surveillance and analysis; incorporates crowd-sourced citizen science and data provided via private entities; does advanced analysis to give big picture of the social determinants of health. Fosters, monitors alternative economics activities including home food production and community gardening. Supports health games, digital health avatars, and Groupnets. Responsible for showing the value of CCBH work and determine most cost-effective interventions.
Big Data & Big Data Analytics	ESI & other CCBH units use big data analytics but not as effectively as private sector and health care providers.	Not effectively used or analyzed; ESI underfunded, understaffed, and unable to keep up with private sector capacity.	ESI & other units highly adept at collecting, analyzing, and manipulating big data for population health assessment, monitoring, and recommendation purposes; often works closely with health care providers.	ESI & other units highly adept at collecting, analyzing, and manipulating big data in collaboration with the public; use analytics capacity to leverage the social determinants of health and improve community health.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
CUYAHOGA COUNTY BOARD OF HEALTH (CCBH)				
Emergency Preparedness and Response Planning	Improved simulations, games, and community participation increase readiness and response capacity; however, funding is still reactive, and greatest after natural disasters have occurred.	Unstable funding decreases capacity to prepare for and respond to emergencies.	Environmental monitoring, citizen science, mapping and spatial analysis, simulations, resilience exercises, and resulting community changes lessen impact of flooding and other severe events.	Environmental monitoring, citizen science, mapping and spatial analysis, simulations, resilience exercises and resulting community changes lessen impact of flooding and other severe events.
Environmental Public Health (EPH)	Focuses on resilience, adaptation, and mitigation for extreme weather events and climate-induced disease outbreaks. Regulates farm to school food initiatives.	Limited to mandated inspections.	Supports upstream environmental mitigation, rather than downstream repairs. Offers interpretation and analysis for health care provider organizations and quality control of environmental and community monitoring.	Serves as a strong partner in reducing environmental impact and expanding local renewable energy technologies and advancements. Staff members serve on state and local boards for ensuring community health resilience and preparation.
Prevention & Wellness (P&W)	Focuses on physical education, telecommuting, mental health, and violence prevention. Struggles with consistent and complete execution of *Health in All Policies* approach. Continues to provide the same mix of low to no cost safety net services, but redesigns some of them for the growing population of senior citizens, some of whom are on both Medicaid and Medicare.	Significantly curtailed as funding diminished. CCBH retains its role in specialty testing for family planning.	Focuses on increasing environmental awareness, improving behavioral health and addressing the social determinants of health. Coordinates and collaborates with ACOs and community health centers as they expand safety net services.	Collaborates with citizens, citizen scientists, schools, Groupnets, gamification platforms, and providers to implement community prevention. Added focus on environmental mitigation. Supports self, family, friend and neighbor care.

	Scenario #1	Scenario #2	Scenario #3	Scenario #4
CUYAHOGA COUNTY BOARD OF HEALTH (CCBH)				
Community Health Efforts	Extreme political polarization limits scope and effectiveness of community health efforts. Challenges with consistent implementation of efforts and promotion of *Health In All Policies* approach. Focus on flood-vulnerable and low-income populations, mental health, emission reduction, prevention of car injuries and accidents, and violence prevention.	Community health efforts lose much of their funding. Distrust in government and public health thwarts advocacy efforts. CCBH specifically prohibited from using staff on unfunded efforts.	Complete Streets, localized food systems, community prevention, injury prevention, and environmental enhancement seen as "common sense" activities. Shared commitment to slow climate change, reduce/capture/recycle greenhouse gases. CCBH facilitates, leads, or supports all of these.	Approaches include alternative economics and collaborative consumption. Community understands the links between personal health choices and environmental impact. CCBH facilitates, leads, or supports these.
CCBH Workforce *(150 employees in 2013)*	120 Technologically savvy staff retrains itself to meet new job demands; include developers of apps, gamification platforms, and simulations.	75 (many part-time) Overworked, and often undertrained; few policy and advocacy positions; hired away by health care provider organizations; unfilled full-time analytics positions.	120 Technologically savvy; good on-the-job staff training, retraining; older staff members enjoy working long past traditional retirement age.	120 Technologically savvy and interdisciplinary; often collaborate with community members and groups.
CCBH Funding *(Towns and townships paid $3.75 per person in 2010)*	Funding is often reactive. Decreased state funding; some federal programs increased, others cut. Towns and townships have increased payments to $5.00 per person.	Severe spending cuts by local, state and federal programs as well as foundations; state action to limit local public health initiatives. Towns and townships cannot even meet their 2010 payment level of $3.75 per person.	Increased, stabilized, and more flexible funding for public health; greater coordinated state and federal funding. Towns and townships have increased payments to $5.00 per person.	Slightly increased, more stable state and federal funding. Towns and townships have increased payments to $5.00 per person.