The Return on Investment of Public Health Services
El Paso County, Colorado

The Context of Public Health

From 1900 to 1999, life expectancy at birth increased from 47 years to 77 years. That incredible progress is largely attributable to advancements made in the care of babies and children since for most of human history high infant and child mortality pulled down average life expectancy at birth. However, remarkably simple interventions that we now take for granted, such as clean water, sanitation systems, vaccinations, and early detection of disease – all part of public health systems – have been estimated to account for 25 years of the life expectancy improvement.[1]

The challenge facing public health systems is that public health interventions are successful only when misfortunes do not happen.

Background: Shortcomings in Public Health Funding

According to the American Public Health Association, over the past few decades, 75% of health care dollars in the U.S. have been spent on treating diseases that are ***preventable*** while only 3% of health care dollars have been spent on disease prevention. Even after the height of the pandemic in 2021, the U.S. spent $4.3 trillion on health expenditures, but just 4.4 percent of that went to public health and prevention including disaster preparedness. [2]

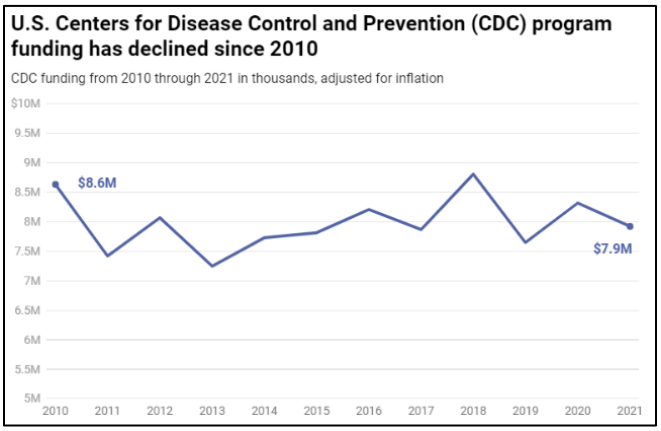
The Centers for Disease Control and Prevention (CDC) is the nation's leading organization protecting the public's health. In fiscal year 2023, the CDC spent $1.4 billion on its programs related to chronic disease prevention and health promotion out of a total 2023 fiscal year budget of $9.2 billion. This is roughly the same level as in recent years and below the FY 2014 level, after adjusting for inflation.[3] Even with increased attention and funding during a global pandemic, subpar U.S. funding on public health is a missed opportunity for higher life expectancy through less premature death, greater quality of life through lower disease burden, better business opportunities, and higher revenues through lower employee health insurance expenditures, and greater global competitiveness through higher labor participation and worker productivity.

In many ways, the underfunding of public health is ironic. High health care expenditures per capita in the U.S. are largely for curative purposes of individuals and not for prevention of costly diseases. Yet, public health expenditures which are largely to prevent disease, accrue benefits not only for individuals, but also for society at large.[4] For example, a study of health department expenditures from 1993 to 2005 found that a $10 per capita increase in local public health expenditures resulted in a 7.4 percent decrease in infectious disease morbidity and a 1.5 percent decrease in premature mortality at the county level.[5] A separate study focusing on only metropolitan areas showed that a 10 percent increase in public health department expenditures was associated with subsequent declines in mortality rates of 1.1 to 6.9 percent over a 13 year period from 1993 to 2007.[6] California conducted a study of their public health department expenditures and it showed that a $10 increase in per capita spending led to a 9.1 reduction in mortality per 100,000.[7] A corresponding return-on-

[1] Aaron E. Carroll, M.D., Austin Frakt, Ph.D. "It Saves Lives. It Can Save Money. So Why Aren't We Spending More on Public Health." The New York Times. May 28, 2018.
[2] Martin, Anne B., Micah Hartman, Joseph Benson, Aaron Catlin, and the National Health Expenditure Accounts Team. "National Health Care Spending In 2021: Decline in Federal Spending Outweighs Greater Use of Health Care." Health Affairs, 42(1): 6-17, December 14, 2022. https:// www.healthaffairs.org/doi/10.1377/ hlthaff.2022.01397. Accessed May 4, 2023.
[3] Centers for Disease Control and Prevention. "Operating Plans." Updated February 10, 2023. https://www.cdc.gov/budget/ operating-plans/index.html. Accessed May 4, 2023.
[4] McCullough JM . "The Return on Investment of Public Health System Spending," Academy Health. June 2018.
[5] Erwin PC, Mays GP, Riley WJ. Resources that may matter: the impact of local health department expenditures on health status. Public Health Reports. 2011;127(1):89-95.
[6] Mays GP, Smith SA. Evidence Links Increases In Public Health Spending To Declines In Preventable Deaths. Health Affairs. 2011;30(8):1585-1593.
[7] Brown TT. How effective are public health departments at preventing mortality? Econ Hum Biol. 2014; 13:34-45.

investment (ROI) analysis demonstrated that for every $1 invested in public health in California, between $67 and $88 were realized in financial benefits to society.[8]

Yet, the CDC's total FY 2023 $9.2 billion budget rose by just 6 percent over the past decade (FY 2014– 2023), after adjusting for inflation and is actually down from 2010 levels as the nearby chart shows.[9]



A branch of the CDC, Public Health Emergency Preparedness (PHEP), which funds programs in states, territories, and local areas increased slightly between FY 2022 and FY 2023, from $715 million to $735 million largely due to attention from the COVID-19 pandemic. However, Congress has cut PHEP funding by about half since FY 2003 after adjusting for inflation meaning baseline funding today is significantly compromised.[10]

The Healthcare Readiness and Recovery Program, which includes the Hospital Preparedness Program—administered by the U.S. Department of Health and Human Services' Administration for Strategic Preparedness and Response—is the primary source of federal funding to help healthcare systems prepare for emergencies, such as natural disasters and the COVID-19 pandemic. Its budget was $515 million in FY 2003 and just $305 million in FY 2023—a nearly two-thirds cut, after adjusting for inflation.[11]

The overall theme of public health budget cuts in the United States is apparent and pervasive despite the historical advances in life expectancy and quality of life that emanate from the relatively modest investments that go with those remarkable advances.

Workforce Shortcomings

The 2021 Beaumont Foundation/Public Health National Center for Innovations issue brief, "Staffing Up: Workforce Levels Needed to Provide Basic Public Health Services for All Americans" found that state and local public health departments collectively lost 15 percent of their workforce over the past decade and need to hire 80,000 additional full-time equivalent positions to establish an adequate foundational workforce and to deliver a minimum set of public health services to the nation. Specifically, due to existing staffing shortages, local health departments need to add approximately 54,000 full-time employees and state departments need to add 26,000 full-time employees across differing levels of categories and areas of expertise.[12] In addition, an analysis published in March 2023 found that nearly half of all employees in state and local public health agencies left that employment between 2017 and 2021.[13] The stated reasons for the departures included harassment of public health workers as well as planned retirements and departures.[14]

> ***80,000 to 100,000 more public health workers are currently needed to ensure that state and local health departments can perform minimum public health services.*** – de Beaumont Foundation

[8] Brown TT. Returns on Investment in California County Departments of Public Health. American Journal of Public Health. 2016;106(8):1477-1482.
[9] Centers for Disease Control and Prevention. "Operating Plans." Updated February 10, 2023. https://www.cdc.gov/budget/ operating-plans/index.html. Accessed May 4, 2023.
[10] Centers for Medicare & Medicaid Services. National Health Expenditure Accounts. Updated December 15, 2022. https://www.cms.gov/research-statisticsdata-and-systems/statistics-trends-andreports/nationalhealthexpenddata/ nationalhealthaccountshistorical.
[11] Centers for Disease Control and Prevention. "FY 2023 Operating Plan." https://www. cdc.gov/budget/documents/fy2023/ FY-2023-CDC-Operating-Plan.pdf. Accessed May 4, 2023.
[12] De Beaumont Foundation and Public Health National Center for Innovation. "Staffing Up: Workforce Levels Needed to Provide Basic Public Health for all Americans." October 7, 2021. https:// debeaumont.org/news/2021/staffing-up research-brief/. Accessed May 4, 2023.
[13] De Beaumont Foundation. "Public Health Turnover Threatens Community Health and Safety." Public Health Workforce Interests and Needs Survey, March 6, 2023. https:// debeaumont.org/news/2023/publichealth-turnover-threatens-communityhealth-and-safety/. Accessed April 10, 2023.
[14] Jonathon P. Leider, Brian C. Castrucci, Moriah Robins, et al. "The Exodus of State and Local Public Health Employees: Separations Started Before and Continue Throughout COVID-19." Health Affairs. The Exodus Of State And Local Public Health Employees: Separations Started Before And Continued Throughout COVID-19 | Health Affairs Accessed May 15, 2023.

A separate 2017 study of the nation's public health workforce found that 56,000 local health department jobs had been eliminated since 2008 due to funding cuts. The same study found that nearly half of the workforce planned to leave their job or organization by 2022 due to "inadequate pay," "lack of support," "lack of advancement," or "workplace environment."[15]

At any organization today, retention of qualified employees is extremely difficult due to sharp reductions in the working-age population relative to retirees. But due to the specific headwinds public health employees have it is not surprising that nearly one in three public health workers are "considering leaving their organization within the next year," with 39 percent of those intending to leave saying the pandemic increased the likelihood of their exit with staffing shortages, work overload and burnout being a top reason.[16]

El Paso County Public Health (EPCPH): Community-wide Return on Investment (ROI)

Although there are challenges in measuring the prevention of disease at both the individual and community levels, there are hundreds of academic studies that have been done over the years. A systematic review of those studies in 2017 is considered the gold standard for return-on-investment analyses. The systematic review included searches on all relevant databases of peer-reviewed studies (MEDLINE, EMBASE, CINAHL, AMED, PubMed, Cochrane, and Scopus). Both return-on-investment and cost-benefit ratio analyses of (relatively similar) high-income countries were included. The literature search identified 2,957 titles, but after highly specific inclusion criteria were incorporated, 52 studies were identified as qualified, and thus were incorporated in the meta-analysis. The methodological quality of each included study was assessed using the National Institute for Health and Care Excellence (NICE) criteria for assessing quality and external validity. Using those 52 studies, ROI and cost-benefit results of 29 public health interventions were included.[17]

The median ROI for all analyzed public health interventions was 14.3 to 1, meaning that for every $1 invested in public health, $14.30 is returned to individuals and communities. In the business world, a "good" return-on-investment is considered to be in the 5-7% range meaning that for every $1 invested, obtaining $5 to $7 is definitely a worthwhile investment. This rule of thumb is based on the average historic return of the S&P 500. An ROI of $10 or more is generally considered a "great" investment. Thus, public health's average ROI of 14.3 to 1 is impressive. And other studies, such as the aforementioned California Public Health Department analysis show a significantly higher ROI of $67-$88 to $1.

This same meta-analysis also incorporated another measuring method to quantify the benefits of public health investments: the cost-benefit ratio (CBR). Both ROI and CBR are somewhat interchangeably used in financial impact analyses as the ROI = (Cost/Benefit) - 1. Some of the selected 52 studies used ROI and some used CBR. All studies had varying time horizons of analysis although most were several decades long or over a "lifetime."

Not surprisingly, returns-on-investment varied greatly by intervention. For example, initiatives focused on health protection and legislative interventions generally yielded high returns-on-investment largely because they were one-off events (such as vaccination or a new taxation policy). Public health interventions that required more touch points (e.g., client interactions) and resources often incorporating more social determinants of health typically had lower returns-on-investment although still largely positive.

The seminal work in this meta-analysis enables public health agencies and its stakeholders to translate their specific dollar expenditures into aggregate dollar benefits to the community at large.

[15] De Beaumont Foundation and Association of State and Territorial Health Officials. "Public Health Workforce: Interests and Needs Survey." Bethesda, Maryland, 2019.
[16] De Beaumont Foundation. "The Impact of the Covid-19 Pandemic: Rising Stress and Burnout in Public Health." Bethesda, Maryland, 2022.
[17] Masters R., Answer E., Collins B., et al. "Return on Investment of Public Health Interventions: A Systematic Review." Journal of Epidemiological Community Health. March 7, 2017.

Aggregate Return-on-Investment for El Paso County Public Health Expenditures

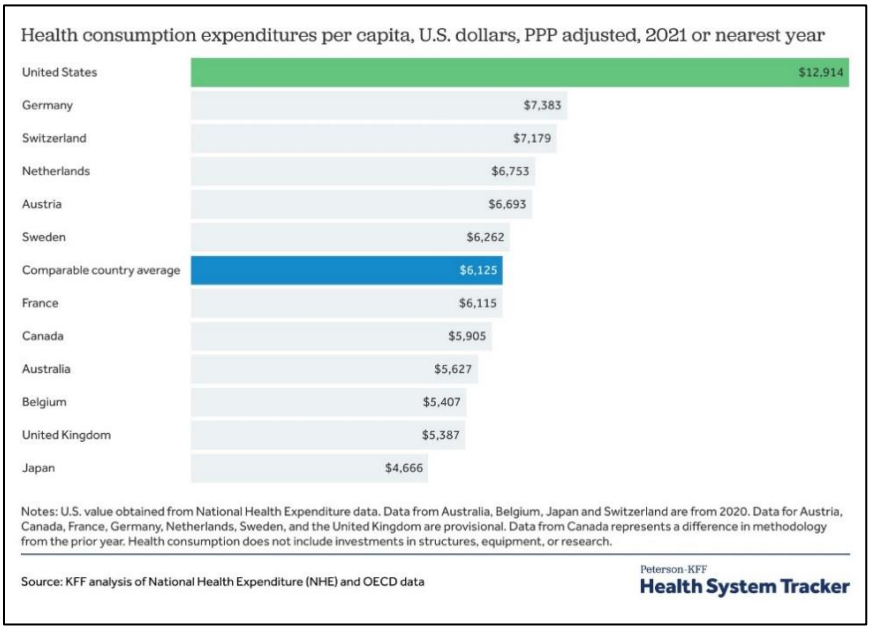
According to the (pre-pandemic) 2019 financial reports from El Paso County Public Health, $17,058,086 was spent on personnel and operations related to provision of services for county residents. A decision was jointly made to use pre-pandemic (EPCPH) expenditures as the pandemic introduced many distortions on both the user and funder side. Less than a quarter of the budgeted dollars emanate from El Paso County (taxpayer) dollars, but the contribution from the county and other critical funding sources (e.g., grants) enable public health to provide all of its core services.

If we use the results of the 52 studies described above and apply the $17.1 million in county public health expenditures in 2019, El Paso County residents yielded $244 million in financial benefit. The "benefits" vary by type of intervention, but examples include lower disease burden for children who are vaccinated with higher academic performance and better career trajectories. Similarly, there can be lower disease burden for adults who are vaccinated or who receive early diagnosis for treatable diseases (such as STIs, or sexually transmitted infections). Tied to this is fewer sick/disability days and therefore higher worker productivity for those adults, as well as higher quality of life as measured (typically) by QALYs. Public health measures also help prevent community-wide disease outbreaks, lower incidence of retail (e.g. restaurant) food borne illnesses, and lower incidence of water-borne illnesses through water safety testing. Other preventive and educational services such as childhood nutrition and developmental counseling and the administration of birth and death certificates are also a part of public health. Public health environmental interventions can lower incidence and prevalence of respiratory-related diseases through air quality monitoring and reporting. Increasingly, more access to health and social service-related providers through care coordination can aid those populations without health insurance or without the knowledge on how to navigate the complex U.S. health care system. At a broader level, legislation around health promotion can enable all of the initiatives mentioned above. This is not, however, an exhaustive list as many public health departments have a wider reach and include many more positive externalities for individuals, households, and the community at large. Appendix A has a full listing of departments and related services.

In 2019, El Paso County residents derived $244 million in financial benefit from a $17 million investment in public health via services provided by the El Paso County Public Health Department. Every dollar invested in EPCPH yields $14.30 in financial benefits.

Why Doesn't Public Health Receive the Attention and Funding Given This ROI?

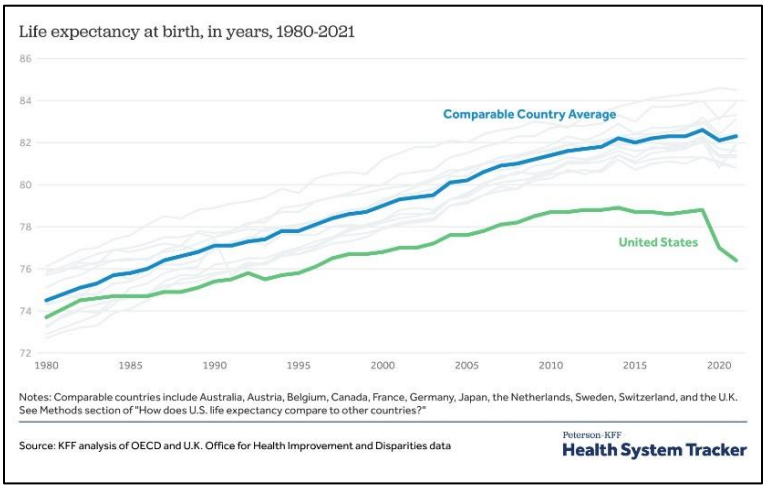
Expenditures on health care in the United States are approximately double that of peer (OECD) nations as the visual shows. In 2021, the U.S. spent 18.3% of GDP (or $4.3 trillion) on health care whereas comparable countries spent 11.2%.[18] And yet outcomes are significantly worse in the U.S. with lower life expectancy that has stayed relatively stagnant. Over the past decade, life expectancy even declined slightly from a peak of 78.9 in 2014 to 78.6 in 2017 – before the pandemic hit. The comparable country average in 2014 was 82.2 or 2.3 years higher. Although there is a plethora of reasons for the subpar health outcomes in the U.S.,



[18] Matthew McGough, Imani Telesford, Shameek Rakshit, Emma Wager, Krutika Amin, Cynthia Cox. "How Does Health Spending in the U.S. Compare to Other Countries?" Peterson-Kaiser Family Foundation Health System Tracker. February 9, 2023. https://www.healthsystemtracker.org/chart-collection/health-spending-u-s-compare-countries. Accessed November 30, 2023.

it is well documented that most other developed countries spend significantly more on public health services and prevention of disease.[19]

The erosion of public health funding over the past many decades and concomitant lack of health emergency preparedness was made painfully apparent during the pandemic. U.S. life expectancy at birth from 2019 to 2021 fell 2.4 years (from 78.8 to 76.4). In comparable countries, life expectancy fell by 0.3 years (from 82.6 to 82.3).[20]



Even with significantly diminished funding and staffing, public health agencies still managed to step up and save lives during the COVID-19 pandemic. Most recently, it is estimated that the COVID-19 vaccine prevented more than 2.2 million deaths in the United States.[21] Even with more than one million deaths and one of the highest mortality rates in the world, the pandemic could have been significantly worse in the U.S. were it not for the herculean efforts of the medical community including local and state public health agencies that performed round-the-clock to track, test, report and generally contain the disease. Often under great scrutiny and resistance.

Unfortunately, no U.S. state has a higher life expectancy than comparable countries tracked by Peterson-Kaiser Family Foundation and the Organization for Economic Co-operation and Development (OECD). This is true even for Colorado, which is one of the healthiest states in the nation.

The reasons for suboptimal public health funding in the U.S. include:

- It's inherently difficult to measure the benefits of prevention (e.g., what has *not* happened).
- A true comparison group, such as the elimination of free childhood vaccination in underserved regions, would be considered unethical due to the catastrophic health outcomes.
- The benefits of population-level public health interventions accrue over the long term and humans heavily discount future outcomes from today's actions. Individuals and communities are quicker to prioritize funding for immediate needs.
- The average person, households, and often even policy makers are not fully aware of the individual and aggregate community advantages of public health programming.

Service-Specific Returns-on-Investment for El Paso County, Colorado

Dr. Bailey, an independent public health researcher and economist, has obtained utilization and cost information for three specific services provided by El Paso County Public Health. These include MMR (Measles, Mumps, and Rubella) vaccination, WIC (Women, Infants and Children) administration, and retail food safety testing. These services were chosen because a) EPCPH has good data on these programs, b) they are not politically sensitive and have general "buy-in," and c) the average resident understands and values these services. Dr. Bailey obtained most of the necessary data in late December directly from financial analysts and other administrative leadership at El Paso County Public Health.

[19] Munira Z. Gunja, Evan D. Gumas, Reginald D. Williams II. "U.S. Health Care from a Global Perspective, 2022: Accelerating Spending, Worsening Outcomes." The Commonwealth Fund. https://www.commonwealthfund.org/publications/issue-briefs/2023/jan/us-health-care-global-perspective-2022. Accessed November 3, 2023.
[20] Kaiser Family Foundation. "How Does Life Expectancy Compare to Other Countries?" October 12, 2023. https://www.kff.org/slideshow/life-expectancy-in-the-u-s-and-how-it-compares-to-other-countries-slideshow. Accessed November 17, 2023.
[21] Schneider, Eric C., Arnav Shah, Pratha Sah, et al. "Impact of U.S. COVID-19 Vaccination Efforts: An Update on Averted Deaths, Hospitalizations, and Health Care Costs Through March 2022." The Commonwealth Fund, April 8, 2022. https:// www.commonwealthfund.org/blog/2022/ impact-us-covid-19-vaccination-efforts-marchupdate. Accessed May 4, 2023.

Return on Investment of Measles, Mumps and Rubella (MMR) Vaccinations

One of the most "traditional" and well-understood public health services is childhood vaccination. Indeed, much of the 30+ years increase in life expectancy from 1900 to 1999 discussed in the background section of this report is due to declines in the infant and child mortality that prevailed for most of human history. Thankfully, ravaging diseases that resulted in long-term health complications and death are now largely in the rear-view mirror. Yet, it is easy to forget when something is not present that at one point it caused devastating losses for individuals, families, and society at large.

An ROI analysis that is purely financial, cannot fully capture the tragic loss of human life, especially of a child. However, for governmental and other agencies, it can be helpful to at least quantify the financial benefits of investments made to safeguard our society from those days of rampant infant and childhood disease.

In the case of MMR childhood vaccination, quantifiable benefits include inpatient and outpatient health care cost savings from treating Measles, Mumps, and Rubella at the time of exposure and manifestation of the disease, those same cost savings if there are long-term health consequences from disease, work absenteeism and lost productivity for parents or adults who contract one of the illnesses or have to care for a sick child, and overall lower disease burden from the herd immunity results of having more vaccinated children, among other quantifiable benefits.

In 2019, El Paso County residents derived $1.54 million in financial benefit from a $113,466 investment in Measles, Mumps, and Rubella (MMR) and Measles, Mumps and Rubella (MMRV) vaccinations. Every dollar invested in these vaccines yields $13.58 in financial benefits.

According to a 2017 National Institute of Health meta-analysis of peer-reviewed studies, for every dollar allocated to MMR vaccination, $13.58 were returned to society. In 2019, El Paso County administered 516 MMR vaccines and 275 MMRV vaccines. In this analysis for El Paso County Public Health, both MMR and MMRV (including Varicella) vaccinations were combined with the assumption that MMRV would provide at least the (financial) benefit of the MMR vaccine. Also, one dose of the vaccine was counted with the assumption the administered dose was either the second dose or a second dose was forthcoming. Across the county, 91% of children have had both doses of MMR or MMRV by the time they finish K-12.

Applying that ROI to MMR vaccinations in El Paso County in 2019, the county reaped $1.54 million dollars in benefit for the $113,466 in personnel and vaccine supply costs invested. This highly favorable ROI and sizable financial benefit emanates from 516 MMR and 275 MMRV vaccinations in 2019. Table 1 on page 8 shows the associated costs of this public health service, the derived financial benefit, and the return on investment in dollar terms.

Return on Investment of Women, Infants, and Children (WIC) Supplemental Nutrition Program

WIC is another prevention-related program that aims to improve pregnancy, birth and overall health outcomes for mothers and their children. The program provides funds for mothers to purchase healthy food that has been proven to improve health outcomes for both mother and baby, but by doing so also providing health benefits for those babies throughout their lives. The federal WIC program also includes breastfeeding support although this local analysis only focused on the supplemental nutrition program.

Since its beginning in 1974, the WIC program has earned the reputation of being one of the most successful federally-funded nutrition programs in the United States precisely because it targets pregnant women who are more likely to have poor nutrition, less prenatal care, and worse mother/baby health outcomes both in the short and long-term. Beneficial savings result from pregnancies that go to term, fewer premature births, lower incidence of moderately low and very low

birth weight infants, fewer infant deaths, and other positive externalities from receiving prenatal care.[22] Local public health agencies administer the WIC program.

The U.S. General Account Office (GAO) found in a seminal 1992 study that WIC has a return-on-investment of $3.50 for every dollar invested in the program.[23] Similarly, the National WIC Association found an ROI of $2.48 returned for every dollar invested.[24] Using the more conservative $2.48 ROI estimate and applying that to EPCPH expenditures for WIC yielded a financial community benefit of $8.12 million emanating from the $3.27 million in costs to administer the program locally. As mentioned above from the 2017 meta-analysis of 52 studies, higher-touch services like WIC (in this case, primarily in administrative and education time with WIC recipients) typically have lower returns-on-investment precisely because costs to administer and deliver the program are higher. This helps explain why a service like (only two-dose) MMR vaccinations have much higher ROIs than multiple-touch services like workplace health promotion, tobacco cessation, or even WIC nutrition programs. It's also likely that not all benefits are always counted in (even the most rigorous) ROI analyses because of the inherent difficulty in accruing lifetime cost savings or even measuring the costs of premature death. Nonetheless, the $8.12 million in financial benefit returned to the El Paso County community for the $3.27 million in associated WIC costs is significant. And the benefits impact many women and children. In 2019, 23,171 pregnant women and children up to age five received WIC benefits from El Paso County Public Health. Should additional residents receive WIC benefits through the county, those societal benefits could be multiplied almost three-fold. Table 1 on page 8 shows the associated costs of this public health service, the derived financial benefit, and the return on investment in dollar terms.

In 2019, El Paso County residents derived $8.12 million in financial benefit from a $3.27 million investment in the Women, Infants, and Children (WIC) Supplemental Food Program. Every dollar invested in MMR vaccines yields $2.48 in financial benefits.

Return on Investment of Retail Food Inspections

A different type of public health service that yields great benefit, but that is often overlooked relates to food safety. Specifically, El Paso County Public Health does routine inspections and re-inspections for restaurants, grocery stores, limited food service establishments such as bars and convenience stores, and mobile units like food trucks. Although most people have experienced at least mild digestive-related illness from a food establishment, we take for granted that the incidence of food-borne illness could be much higher were it not for routine, retail food inspections provided by public health departments.

A study conducted by Michigan State University in 2021 showed that 48 million Americans were sickened by food-borne illness, 128,000 became sick enough to be hospitalized and 3,000 of those died. The estimated $15.5 billion in annual costs result from associated medical expenses and the loss of production from workers including premature death for the subset of those infected.

Unlike vaccination and WIC, there did not appear to be any ROI analyses that were sufficiently rigorous in their methodology. Hence, Dr. Bailey did her own analysis using the costs of 15 pathogens related to food-borne illness from a 2018 U.S. Department of Agriculture study.[25] From that study, the costs of those pathogens that account for about 95

[22] United States Department of Agriculture Food and Nutrition Service. "About WIC: How WIC Helps." https://www.fns.usda.gov/wic/about-wic-how-wic-helps. Accessed January 30, 2023

[23] United States General Accounting Office. "Early Intervention, Federal Investments Like WIC Can Produce Cost Savings." https://www.gao.gov/assets/hrd-92-18.pdf. Accessed December 15, 2023.

[24] National WIC Association. "Powerful WIC Outcomes! New Study Shows How $1 Invested in WIC Saves About $2.48 in Medical, Educational, and Productivity Costs." https://www.nwica.org/blog/powerful-wic-outcomes-new-study-shows-how-1-invested-in-wic-saves-about-2.48-in-medical-educational-and-productivity-costs. Accessed December 22, 2023.

[25] United States Department of Agriculture Economic Research Service. "Cost Estimates of Foodborne Illnesses." https://www.ers.usda.gov/data-products/cost-estimates-of-foodborne-illnesses/. Accessed February 1, 2024. The 15 pathogens used in this study included: Campylobacter spp. (all species), Clostridium perfringens, Cryptosporidium spp. (all species), Cyclospora cayetanensis, Listeria monocytogenes, Norovirus, Salmonella (non-typhoidal species), Shigella (all species),

percent of all food-borne illnesses were divided by the number of cases to obtain a cost per case. That amount was converted to 2023 dollars for this EPCPH study since service cost data provided by EPCPH staff was for 2023. That inflation-adjusted cost per case came to $2,386 for those individuals who sought care.

The incidence of disease was then calculated by taking the number of cases in the study (8,914,713) and dividing by the population included in the study (51 million people in 10 U.S. regions). That incidence was then converted to incidence per 100,000 people, which came to 144.6 cases of food-borne illness per 100,000 people.

Using that figure and applying it to the population in El Paso County in 2023 (according to the CO State Demographer's Office), it was estimated that 1,084 known cases of food-borne illness occurred. It is important to highlight that this is likely an understatement of disease as many people suffer deleterious health effects from unsafe (retail) food, but don't get tested, report illness, or seek care.

In 2023, El Paso County residents derived $3.0 million in financial benefit from a $2.4 million investment in the Retail Food Inspection Program. Every dollar invested in retail food inspection yields $1.27 in financial benefits. These benefits do NOT count the sizable economic impact of a robust and safe restaurant industry in the region.

It's also important to remember that retail food inspections provided by public health agencies are one part of the chain in overall food safety (see Appendix B). For example, food safety during transport is another part of the chain as is food storage. This ROI only accounts for the benefits of inspections at restaurants, grocery stores, limited food service entities (e.g., bars, convenience stores), and mobile food trucks. Although there are other sources of foodborne illnesses, as one example, restaurant testing alone is critical as past studies have shown that half of U.S. expenditures on food is spent at restaurants [26]. With both under and over-estimates, a return-on-investment for food safety testing is nonetheless a rough approximation of the financial benefit provided by the general (food safety) oversight of public health agencies. These estimates show that for every dollar invested in food safety testing in El Paso County, $1.27 of community benefit resulted from the retail food inspections and re-inspections.

In absolute terms in 2023, El Paso County spent $2.4 million on personnel costs and other costs[27] related to food inspection, and $3.0 million were derived in corresponding financial benefit (through foregone costs of illness). A total of 2,804 inspections and re-inspections occurred in 2023 (320 of those were re-inspections).

For the three services studied for this analysis, Table 1 below shows the associated costs of each public health service, the derived financial benefit, and the return on investment in dollar terms.

Table 1.

Service and Number of People Served	EPCPH Expenditures	Accrued Benefits	Return on Investment ($)
MMR & MMRV Vaccinations (791 in 2019)	$113,466	$1,541,242	**$13.58**
WIC Program (23,171 in 2019)	$3,273,932	$8,119,351	**$2.48**
Retail Food Inspections (2,804 in 2023)	$2,363,088	$3,009,488	**$1.27**
Aggregate Public Health Services (725,497 EPC residents in 2019)	$17,056,086	$243,902,030	**$14.30**

Shiga toxin-producing Escherichia coli O157, non-O157 Shiga toxin-producing Escherichia coli, Toxoplasma gondii, Vibrio parahaemolyticus, Vibrio vulnificus, Vibrio non-cholera species other than V. parahaemolyticus and V. vulnificus, Yersinia enterocolitica.

[26] Jones TF, Angulo FJ. "Eating in restaurants: a risk factor for foodborne disease?" Clin Infect Dis. 2006 Nov 15;43(10):1324-8. doi: 10.1086/508540. Epub 2006 Oct 4. PMID: 17051501.

[27] Retail Food activities include routine inspections, re-inspections, complaint inspections, pre-operational inspections, change of owner inspections, foodborne illness inspections and investigations, enforcement actions, application reviews, plan reviews, license renewals (creating, printing, mailing, phone calls, and site visits), mandatory employee training, FDA standardization, education for establishment operators, CORA requests, department, division and program meetings, customer service, database upgrades, and issues, collection of civil penalties, quality assurance, and other routine correspondence. Special event vendor inspections and providing basic food safety training are also included.

Return on Investment to El Paso County Taxpayers

Since benefits in public health accrue to not just individuals and families, but society at large, government helps fund public health services. El Paso County in 2023 allocated $7.8 million to help fund services provided by El Paso County Public Health.[28] Grants and other contributions amount to over $20 million[29] and without those supplemental dollars the public health services and associated benefits in El Paso County would not likely occur. The ability of public health agencies to leverage grants and philanthropic dollars provides residents with the great value of public health services, but with modest taxpayer contributions.

If one thinks of the $7.8 million as the "public expenditure" on public health via taxpayer dollars, the return on investment becomes $30.22 benefit for every dollar invested via taxes. This is a return-on-investment calculation[30] from the perspective of each taxpayer dollar that goes toward El Paso County Public Health. The impressive dollar returns for each dollar of public health expenditures result from the prevention of diseases and outbreaks that are so costly downstream.

El Paso County allotted $7.8 million to public health, but taxpayers received $244 million in financial benefits. Every regional taxpayer dollar invested in public health yields $30.22 in financial benefits.

Conclusion

As discussed in the introduction to this report, an overall ROI of $14.30 for every dollar invested in (combined) public health services is a stellar investment by any financial or economic benchmark. The financial gain to the El Paso County region of $244 million is astounding when juxtaposed to the $17 million in associated operating costs for the provision of EPC Public Health services. Similarly, taxpayers derived the $244 million in benefits with a smaller taxpayer contribution to public health services of $7.8 million (or $30 returned for every dollar invested). In today's context of approximately $4.5 trillion in U.S. health care spending, or nearly 20% of U.S. GDP, modest public health expenditures represent a highly cost-efficient way to prevent illness and reduce U.S. health care expenditures overall.

In today's context of approximately $4.5 trillion in U.S. health care spending, or nearly 20% of U.S. GDP, modest public health expenditures represent a highly cost-efficient way to prevent illness and reduce U.S. health care expenditures overall.

Table 1 above provides program-specific examples of the financial benefits derived from MMR vaccinations ($1.64 million in 2019), the WIC program ($8.12 million in 2019) and retail food inspection ($3.0 million in 2023), as well as the aggregate ROI for all EPCPH services ($244 million in 2019). The three specific services quantified for this analysis represent a small subset of the plethora of services provided by EPCPH, which include eight programs under Communicable Diseases, fourteen programs under Environmental Public Health, three programs under Maternal, Child, Adolescent & Family Health, five programs under Clinical Care, three programs under Chronic Disease, Injury Prevention, and Behavioral Health Promotion, three programs/departments under Assessment and Planning, Emergency Preparedness and Response, and General Administrative public health reporting including birth and death records (See Appendix A). The list is long, the preventive work is arduous, but the associated benefits far outweigh the relatively modest costs.

Paradoxically, public health initiatives, particularly over the past 125 years, have made such large improvements in life expectancy and quality of life that many people subsume the benefits as a routine part of life today. But the reality is that there are maintenance services that are necessary to ensure those remarkable public health achievements stay in play. This includes vaccinations, good prenatal nutrition for healthy pregnancies and birth outcomes, clean food establishments,

[28] This figure was provided by Michelle at EPCPH, but she asked to verify it with Sara from Finance at EPCPH, and it has been confirmed.
[29] According to the Budget Book for 2022, operating grants and other contributions totaled $24.7 million.
[30] ROI is calculated by subtracting the initial cost of the investment from its final value, then dividing that resulting number by the cost of the investment. This will give a dollar value for each dollar invested. To obtain a percentage, you would multiply by 100.

early diagnosis of communicable diseases such that widespread outbreaks do not happen, early diagnosis of disease to avert costly and serious health complications or premature death, to name a few.

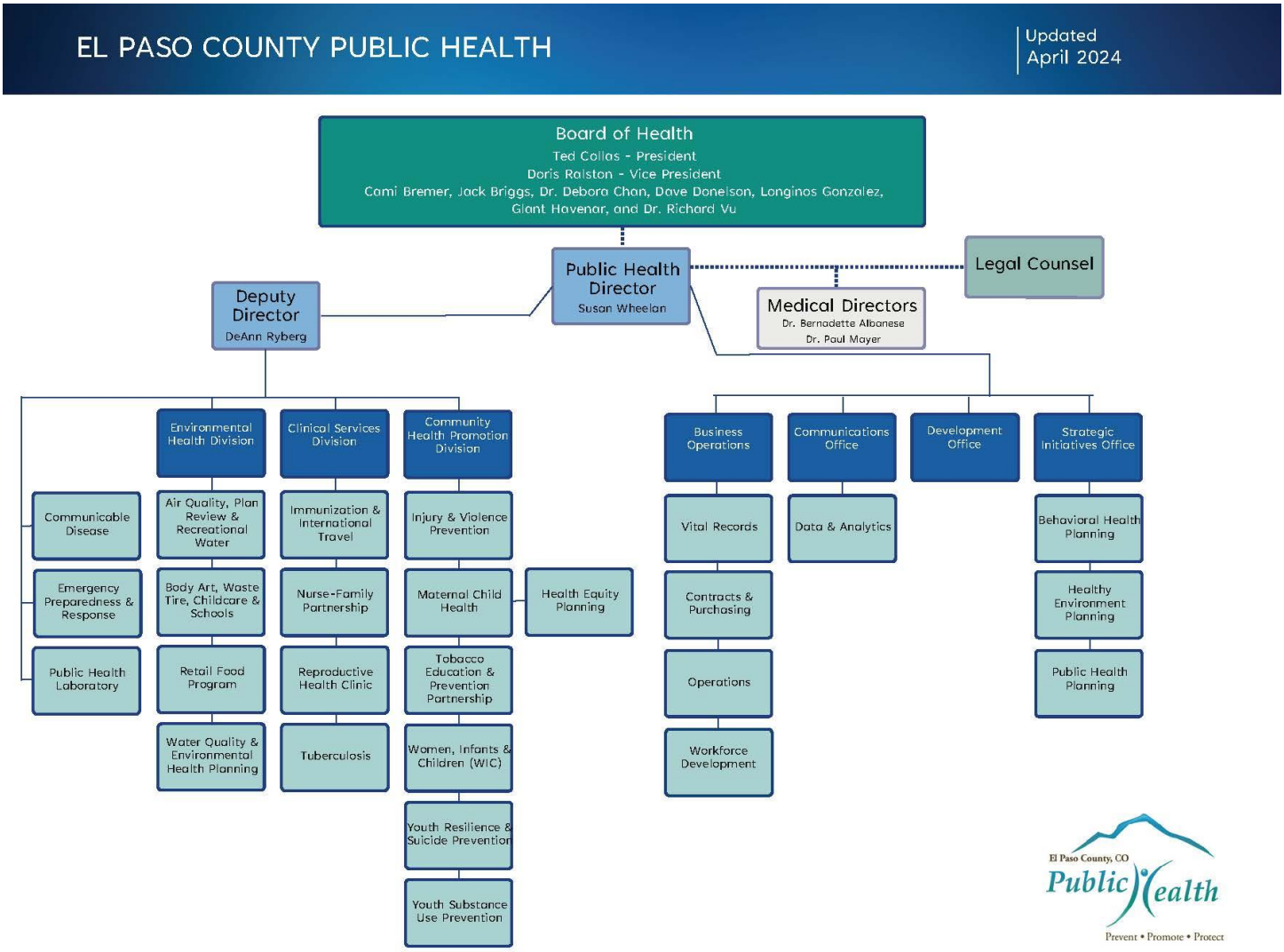
And the role of public health seems to only be expanding. There is now a mental health crisis, a housing affordability crisis, and acute shortages in quality childcare among other challenges. Public Health is now attempting to ameliorate these societal ills with new preventive and assistance programs. This also includes care coordinators, who act like health navigators for those in the community without health insurance, knowledge on and connection to available community resources, or other needed assistance. Today's problems call for more investment in public health, not less, and this ROI study demonstrates that funding the underlying physical and behavioral health challenges can go a long way in addressing some of the societal challenges that cost logarithmically more downstream.

Next Steps: Amplification of Results to Stakeholders and Public at Large

One of the goals of this ROI analysis is to enable the staff and leadership at EPCPH to effectively communicate the benefits of what they do. This can help them solidify funding, so they do not follow the unfortunate trajectory of chronic funding cuts as described above, chronic understaffing, and as a result higher community disease burden. Dr. Bailey will work closely with EPCPH leadership to communicate the ROI results for (the) aggregate study as well as the ROI for the three specific programs delineated above.

Some specific ideas were suggested in the proposal for work. For example, Dr. Bailey hopes to dedicate two Fox21 (local TV news) segments to the ROI analysis, a couple of corresponding articles in the Gazette with slightly more detail, and participation in some relevant public health events as requested by EPCPH leadership. There is also the possibility of submission and publication of local results to a peer-reviewed journal. Dr. Bailey can also work with EPCPH communications to design and/or amplify infographics, social media messaging, etc. Specific strategies will be discussed with EPCPH leadership in the first part of 2024.

Appendix A


EL PASO COUNTY PUBLIC HEALTH
Updated
April 2024
Board of Health
Ted Collos - President
Doris Ralston - Vice President
Cami Bremer, Jack Briggs, Dr. Debora Chan, Dave Donelson, Longinos Gonzalez,
Giant Havenar, and Dr. Richard Vu
Public Health Director
Susan Wheelan
Legal Counsel
Deputy Director
DeAnn Ryberg
Medical Directors
Dr. Bernadette Albanese
Dr. Paul Mayer
Environmental Health Division
Clinical Services Division
Community Health Promotion Division
Business Operations
Communications Office
Development Office
Strategic Initiatives Office
Communicable Disease
Air Quality, Plan Review & Recreational Water
Immunization & International Travel
Injury & Violence Prevention
Vital Records
Data & Analytics
Behavioral Health Planning
Emergency Preparedness & Response
Body Art, Waste Tire, Childcare & Schools
Nurse-Family Partnership
Maternal Child Health
Health Equity Planning
Contracts & Purchasing
Healthy Environment Planning
Public Health Laboratory
Retail Food Program
Reproductive Health Clinic
Tobacco Education & Prevention Partnership
Operations
Public Health Planning
Water Quality & Environmental Health Planning
Tuberculosis
Women, Infants & Children (WIC)
Workforce Development
Youth Resilience & Suicide Prevention
Youth Substance Use Prevention
El Paso County, CO
Public Health
Prevent • Promote • Protect

Appendix B


The Food Production Chain
Everyone has a role to play in keeping food safe.
Production
Distribution
Processing
SUPERMARKET
Restaurant
Retail
Food service workers and customers
Home cooks and consumers
CDC
www.cdc.gov/foodsafety