

Analysis of the Value of Local Public Health Operations Funding

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EXECUTIVE SUMMARY

The Michigan Association for Local Public Health (MALPH) is a member organization comprised of Michigan's local public health departments. Each department endeavors to carry out its statutory responsibility of preventing disease, prolonging life, and promoting public health through organized programs in its area of the state. These organized programs encompass eight vital public health operations: immunizations, sexually transmitted disease (STD) control, infectious disease control, hearing screening, vision screening, food safety inspection, on-site sewage monitoring, and drinking water inspections.

The State of Michigan recognizes the importance of such programs; for that reason, the state has codified a cost-sharing formula into statute to share the responsibility of funding these programs. Unfortunately, Michigan's economy has steadily declined over the past decade and the state has not fulfilled its obligation to fund half the cost of these services. Local public health departments believe strongly in the importance of the programs they provide and have continued to manage these services with diminished resources. In order to demonstrate the value of these programs to the state, this report estimates the return on investment for these eight programs using data collected by the local health departments and by reviewing and applying existing return on investment research for similar programs.

- Every dollar invested in childhood immunization programs provides a savings of \$22 in direct and indirect costs. Local health departments administered and monitored more than 1.5 million doses of childhood vaccine in 2009 using \$4 million. The savings to the state as a result of this program were at least \$88 million.
- Every H1N1 vaccination administered saves between \$91 and \$141 in direct medical costs. As a result, every dollar spent to administer those vaccinations provides a savings of \$11.
- Chlamydia and gonorrhea are the two most commonly reported STDs and can be especially harmful to women. Left untreated, these diseases can develop into pelvic inflammatory disease (PID), which costs, on average, \$3,600 to treat. Based on the number of women screened and referred for treatment, every dollar invested in STD screening results in at least \$2.50 in savings.
- Surveillance of infectious disease is vital in understanding and halting disease outbreaks. Local health departments are responsible for tracking and reporting more than 100 diseases. Based on the costs of stemming the outbreak of just one of those diseases, bacterial meningitis, a conservative savings estimate for infectious disease control is \$2.00 for every dollar invested.
- Untreated hearing loss costs about \$250,000 in a lifetime, 75 percent of which is due to lost work productivity. Every dollar spent on hearing screening potentially saves \$112 in future work productivity with appropriate early intervention.
- Vision screening is effective in early detection of eye problems that can largely be prevented with early treatment. Every dollar spent on vision screening saves \$162.
- Local health departments are responsible for restaurant inspections, as well as investigation and follow-up when a suspected foodborne illness outbreak occurs. In 2009, approximately 187 confirmed cases of foodborne illness occurred, at an estimated cost of over \$1.5 million for treatment. Costly foodborne illness outbreaks would be more likely in the absence of this program.
- Proper sewage disposal and clean drinking water are without a doubt one of the most important historical breakthroughs in public health. Unfortunately, the few outbreaks of waterborne illness that still occur today can be devastating, as evidenced by a recent outbreak in Walkerton, Ontario, a town with a population of 5,000. Medical expenses of almost \$65 million were incurred when 2,300 residents became ill from ingesting *E. coli* through contaminated drinking water.

“Complacency is perhaps the cardinal sin for those charged with protecting public health. Infectious diseases, once thought conquered, are always marshalling their forces ready to strike back in the face of reduced vigilance. Recent years have demonstrated the remarkable potential for nature to generate new threats particularly when major changes are taking place in the human habitat and in behaviour.”

Sir Liam Donaldson,
*Journal of the Royal Society for the Promotion of Health*¹

LOCAL PUBLIC HEALTH OPERATIONS FUNDING

Michigan’s 45 local public health departments play a vital role in protecting the public health of the residents of Michigan. Their role is considered so vital, in fact, that Michigan law requires the state to provide a minimum level of funding for eight basic health services. Michigan statute requires local health departments to “continually and diligently endeavor to prevent disease, prolong life, and promote the public health through organized programs, including prevention and control of environmental health hazards; prevention and control of diseases; prevention and control of health problems of particularly vulnerable population groups; development of health care facilities and health services delivery systems; and regulation of health care facilities and health services delivery systems to the extent provided by law.”² The statute further defines local health departments’ responsibilities as implementing and enforcing laws; utilizing statistics and research to protect the public health; investigating cause of disease and especially epidemics; planning, implementing, and evaluating public health education; preventing and controlling environmental health hazards, diseases, and health problems of particularly vulnerable populations; and having power to perform such duties and exercising that power.

While these duties may seem vast, eight basic services have developed which fulfill the statutory responsibility of local health departments. These services are immunizations, sexually transmitted disease control, infectious disease control, hearing screening, vision screening, food safety inspection, on-site sewage monitoring, and drinking water inspections.³ The state, having recognized the resources required to adequately provide such services, developed and codified a cost-sharing formula to fund the delivery of these services. As of 1984, the state and local health departments were each required to fund half of these

¹ L. Donaldson, *Journal of the Royal Society for the Promotion of Health* 121 (2001): 146–151.

² Michigan Compiled Law, 333.2433.

³ Although on-site sewage inspection and drinking water inspections are considered separate programs, discussion of these two areas will be grouped because they are administered so closely together.

services.⁴ Despite this requirement, the state has not funded local health departments for these services at the statutorily required level in more than 15 years, leaving local health departments to scramble for supporting funds from other sources, either through fees or from local governing entities. Funding for these eight essential services in the local public health operations (LPHO) appropriation has decreased since 2003, when LPHO received \$40.8 million. If LPHO funding had been adjusted each year for inflation, LPHO would currently be receiving \$47.6 million. In fiscal year (FY) 2008–09, however, the LPHO appropriation was \$40.6 million for these mandated services (\$35.5 million General Fund; \$5.1 million School Aid Fund). If the state were meeting its statutory obligation, regardless of inflationary increases, LPHO would have received \$66.8 million in FY 2009–10.

Immunizations

Immunizations have been one of the most important tools in fighting and, in some cases, eradicating deadly infectious diseases. The importance of vaccinations cannot be overstated. The fear of polio, measles, and diphtheria is almost non-existent in today’s society because of our effective local public health childhood immunization program. Seasonal outbreaks of new strands of serious influenza can be quickly quelled with well-organized vaccination campaigns. Local public health departments play a vital role in educating the public on the importance of vaccinations; tracking and reporting the number of people who have been vaccinated; and distributing vaccines for emergency outbreaks.

Michigan local public health departments receive approximately \$4 million from the state to provide a comprehensive, statewide vaccination program that includes vaccine administration, technical support to private providers, and surveillance and reporting through the Michigan Care Improvement Registry.

Childhood vaccinations remain crucial in fighting the resurgence of deadly diseases. Routine childhood immunizations include DTaP (diphtheria, tetanus, and pertussis), Hib (Haemophilus influenzae type b), IPV (polio), MMR (measles, mumps, and rubella), and HepB (hepatitis B). In Michigan in 2009, more than 1.5 million doses of these vaccines were administered. Local public health departments record childhood immunizations so that children lacking proper vaccines can be easily identified. Local public health departments

Childhood immunizations provided \$22 in savings for every dollar invested.

In 2009, every dollar local health departments spent on H1N1 vaccinations provided up to \$11 in direct and indirect savings.

also work closely with schools and private providers to maintain appropriate vaccination coverage. The Centers for Disease Control and Prevention (CDC) reports that for every \$1 spent on these childhood immunizations in 2001, \$18.40 in savings were realized in direct and indirect costs.⁵ Today that would be about \$22 saved for every \$1 invested. (Throughout this report, cost estimates are adjusted based only on the consumer price index and assume all other factors have remained the same.) If the childhood immunization program had been the only vaccination program local public health departments administered, the amount of money save in 2009 with a \$4 million investment would have amounted to more than \$88 million.

Local public health departments’ responsibilities for immunizations are greater than just childhood vaccinations. When the H1N1 strand of influenza began spreading at alarming rates in 2009, local public health departments had the sole responsibility of acquiring and distributing vaccines to the most vulnerable populations in the most expedient manner possible. Research conducted in 2009 estimated the

⁴ Michigan Compiled Law, 333.2475.

⁵ F. Zhou, J. Santoli, M. L. Messonnier, H. R. Yusuf, A. Shefer, S. Y. Chu, L. Rodewald, and R. Harpaz, Economic Evaluation of the 7-vaccine Childhood Immunization Schedule in the United State, 2001, *Archives of Pediatric Adolescent Medicine*, 159, no. 12 (2005): 1136–44.

savings incurred as a result of H1N1 vaccinations. Each H1N1 immunization saves between \$91 and \$141 in medical costs, depending on when the vaccination is administered.⁶

Last year, 1,483,233 people in Michigan received the H1N1 vaccine. Local health departments received \$19 million in federal emergency funds to administer the H1N1 vaccination program. Based on the number of vaccines administered, the cost to administer each one averaged \$13, meaning every \$13 invested in this program saved up to \$141. As a result, every dollar invested in H1N1 vaccinations saved up to \$11 in direct and indirect costs. Without question, any money spent on immunizing the population provides a substantial economic return on investment.

Sexually Transmitted Disease Control

Local public health departments are required to provide screening for a variety of sexually transmitted diseases (STDs). Screening for STDs is vital to early treatment of infections and prevention of epidemics. Unfortunately, Michigan has seen an uptick in the number of STDs reported,⁷ paralleling a nationwide trend of increasing rates of STDs.⁸ More than 58,000 cases of STDs were reported in Michigan in 2009, up from 55,000 in 2007. With early treatment, many of these can be easily cured without causing further health complications. The majority of STD screenings are for chlamydia, gonorrhea, syphilis, and HIV.

**Each dollar allocated
for STD screening
through LPHO realized
\$2.50 in savings.**

Chlamydia and gonorrhea are two of the most common bacterial STDs occurring today, with chlamydia the most frequently reported. Both chlamydia and gonorrhea can lead to a number of serious health problems for women, including pelvic inflammatory disease (PID). PID is an infection

of the uterus that can lead to serious health consequences including infertility, ectopic pregnancy, abscess formation, and chronic pelvic pain. The CDC recommends annual chlamydia and gonorrhea screening for all sexually active women under the age of 25.

During FY 2008–09, local public health departments conducted 113,444 screenings for chlamydia for both men and women. Of those, 6,291 women received a positive diagnosis. The number of men and women screened for gonorrhea totaled 93,731. Of those, 1,302 women had a positive diagnosis.

From the total LPHO funds for FY 2008–09, \$5.7 million was disbursed among local health departments for STD screening. It costs less than \$30 to conduct each test. The economic impact of screening for STDs has been thoroughly studied and the savings are significant. In 1998, researchers in Baltimore determined that up to 40 percent of untreated chlamydia cases progress to PID.⁹ A similar study in 2000 determined that up to 40 percent of untreated gonorrhea cases can progress to PID as well.¹⁰ Treatment costs for PID averaged \$3,600¹¹ in 1998; adjusted for inflation, each case would have cost about \$4,800 in 2009. If 40 percent of the chlamydia and gonorrhea cases identified and treated for women in Michigan in FY 2008–09 (3,037) had gone undetected and progressed to PID, the costs associated with these diseases

⁶ N. Khazeni, D. W. Hutton, A. M. Garber, N. Hupert, and D. K. Owens, Effectiveness and Cost-Effectiveness of Vaccination Against Pandemic Influenza (H1N1) 2009, *Annals of Internal Medicine* 151, no. 12 (December 12, 2009), available online at <http://www.annals.org/content/early/2009/10/05/0003-4819-151-12-200912150-00157.full> (accessed 3/31/10).

⁷ Michigan Department of Community Health, Bureau of Laboratory Testing Database, January 2009.

⁸ Centers for Disease Control and Prevention (CDC), Division of STD Prevention, *Sexually Transmitted Disease Surveillance 2007* (Atlanta, Ga.: CDC, Division of STD Prevention, December 2008).

⁹ R. M. Howell, T. Quinn, and C. Gaydos, Screening for Chlamydia Trachomatis in Asymptomatic Women Attending Family Planning Clinics: A Cost-Effectiveness Analysis of Three Strategies, *Annals of Internal Medicine* 128, no. 4 (February 15, 1998): 277–84.

¹⁰ H. W. Chesson, J. M. Blandford, T. L. Gift, G. Tao, and K. L. Irwin, The Estimated Direct Medical Cost of Sexually Transmitted Diseases Among American Youth, 2000, *Perspectives on Sexual and Reproductive Health* 36, no. 1 (Jan/Feb 2004): 11–19.

¹¹ Howell et al., Screening for Chlamydia Trachomatis in Asymptomatic Women.

alone would have been about \$14.5 million. Therefore, each dollar allocated for STD screening through LPHO realized at least \$2.50 in savings.

Infectious Disease Control

Local public health departments are the only central tracking source in the state for infectious disease incidence; that is, all new cases of infectious disease are reported to local health departments for monitoring and investigation. This surveillance is instrumental in preventing serious disease epidemics. The State of Michigan maintains a list of reportable diseases, including influenza, meningitis, and measles. Many of these diseases are capable of affecting vast portions of the population if they spread uncontrollably, which would have an untold fiscal impact on the state in terms of medical expenses and economic loss. Local health departments enter new diagnoses into a statewide tracking system each week; this tracking system allows for real-time monitoring and response to outbreaks. Local public health departments in 2009 monitored more than 777,000 newly diagnosed cases of the more than 100 reportable diseases throughout the state.

**Every dollar invested
in infectious disease
surveillance saved
at least \$2.00.**

Tracking reportable disease at the local level ensures proper identification and follow-up of diseases. Local health departments ensure that those affected receive appropriate treatment; track other people with whom infected individuals may have had contact for vaccination, treatment, quarantine, and education; and investigate and stop outbreaks. This surveillance helps public health authorities monitor incidence of reportable diseases, measure trends, assess and develop prevention and control strategies, and target at-risk populations. While surveillance is vital in controlling the spread of disease, it is also important to detect sudden changes in disease occurrence and distribution and to understand why those changes occur.

The CDC defines a reportable disease as one for which regular, frequent, and timely information regarding individual cases is necessary for the prevention and control of disease.¹² While many diseases on the list are of relatively little concern to many today (leprosy, plague, and polio, for example), some are illnesses that continue to manifest and evolve. Meningococcal disease, commonly called meningitis, is one such illness. Meningitis is an inflammation of the tissue surrounding the spinal cord, and can be either viral or bacterial. Bacterial meningitis is more serious than viral meningitis, but neither can be definitively diagnosed without extracting tissue from the spinal column, which is a very costly procedure. Bacterial meningitis can be treated with antibiotics; viral meningitis, although less serious, cannot be treated with antibiotics. Due to the difficulty of determining what type of meningitis a person has contracted, however, antibiotics may be administered as a precaution until test results are available. If practitioners are aware of an increase in viral meningitis incidence, they can follow best practices for treating viral meningitis instead of immediately ordering more expensive testing and treatments.

A study of a 1991 meningitis outbreak in Rhode Island estimated direct medical costs for 408 persons diagnosed to be more than \$585,000.¹³ Because of the difficulty of diagnosing meningitis, at least 359 patients were admitted to a hospital, although better coordination and communication about symptoms and diagnosis between the providers, public health, and hospitals could have prevented hospitalization. Only ten of these cases were bacterial infections; the overwhelming majority of cases were viral. On average, cost estimates for treating a person with bacterial meningitis are \$8,145.¹⁴ The authors of this

¹² Centers for Disease Control and Prevention, *Morbidity and Mortality Weekly Report: Summary of Notifiable Diseases – United States, 2007*, 56, no. 53 (July 9, 2009): 2.

¹³ S. Rice, R. Heintz, L. Thornton, and S. Opal, Clinical Characteristics, Management Strategies, and Cost Implication of a Statewide Outbreak of Enterovirus Meningitis, *Clinical Infectious Diseases* 20, NO. 4 (April 1995): 931–37.

¹⁴ L. Jackson, A. Schuchat, R. Gorsky, and J. Wenger, Should College Students be Vaccinated Against Meningococcal Disease? A Cost-Benefit Analysis. *American Journal of Public Health* 85, no. 6 (June 1995): 84345.

research conclude that “if the community response to the outbreak had been more focused, it might have cut costs considerably” because patients with viral meningitis do not benefit from expensive testing and treatment, like head CT or antibiotics.¹⁵

In 2009, 338 new cases of bacterial meningitis were reported in Michigan.¹⁶ Based on previous estimates for diagnosing and treating meningitis, each case would cost approximately \$11,500 today. Medical costs for those cases could have exceeded \$3.8 million. In FY 2008–09, Michigan’s local public health departments received almost \$6.6 million for infectious disease control. While it is impossible to guess how many other people would have contracted bacterial meningitis without the surveillance provided by health departments, if each of those persons had contact with even three other people who contracted meningitis (which is likely since many outbreaks of meningitis occur on college campuses, where young adults live in close quarters), medical costs would have been in excess of \$15 million, more than twice what the state invests in disease surveillance and investigation for *all* reportable diseases. Therefore, a very conservative estimate for the savings resulting from surveillance would be \$2 for every \$1 invested.

Hearing Screening

Hearing screening for school-age children is standard practice in the United States. The Individuals with Disabilities Education Act of 2004 requires states to identify children with disabilities, including hearing loss. Michigan requires that children be screened at least once between the ages of three and five, and every other year up to the age of 12. Local public health departments fund the cost of the screenings in conjunction with the state. Some children pass an initial screening, but are still at risk for hearing loss that fluctuates, is progressive, or is acquired later in development. Hearing loss can affect a child’s ability to succeed in school, and early intervention has been proven effective in minimizing any negative effects on learning. Hearing loss can also be an indicator for more serious disorders, including Hunter’s syndrome, a neurodegenerative disorder.

**Every dollar invested
in hearing screening
saves \$112 in future
work productivity.**

In FY 2008–09, local public health departments received \$2.5 million to conduct 500,000 hearing screenings. Three percent of children screened were referred for follow-up. Early intervention for children with hearing loss has proven to significantly improve future development. Children with mild to moderate hearing loss, on average, achieve one to four grade levels lower than children with normal hearing.¹⁷ With appropriate management, the achievement gap can be bridged.

Untreated hearing loss costs about \$250,000 in a lifetime; 75 percent of that amount is attributable to lost work productivity.¹⁸ On average, 0.3 percent of children have hearing loss.¹⁹ This would translate into 1,500 of the children screened by local public health departments in Michigan in the 2008–09 school year. If these children receive assistance early, the overall cost of hearing loss could be significantly reduced and could result in future work productivity savings of \$280 million. Therefore, each dollar spent on hearing screening potentially saves \$112 in future work productivity, with appropriate intervention.

¹⁵ Rice et al., Clinical Characteristics, Management, Strategies, and Cost Implications.

¹⁶ Michigan Department of Community Health, Michigan Disease Surveillance System, December 2009.

¹⁷ American Speech Language Association, *The Prevalence and Incidence of Hearing Loss, 2010*, available online at <http://www.asha.org/public/hearing/disorders/children.htm> (accessed 3/31/10).

¹⁸ P. E. Mohr, J. Feldman, and J. Dunbar, The Societal Cost of Severe to Profound Hearing Impairment in the United States, *Annual Meeting off the International Society of Technology Assessment in Health Care Meeting* 16, no. 4 (2000): 1120–35.

¹⁹ National Institutes on Deafness and Other Communication Disorders (NIDCD), *Outcomes Research in Children with Hearing Loss* (Bethesda, Md.: NIDCD, December 2006).

Vision Screening

Vision screening for school-age children is another program provided by local public health departments. Health departments fund the costs of vision screenings in conjunction with the state. Children must be screened at least once between the ages of three and five, and then every other year through the ninth grade. Vision screening is effective in early detection of eye problems that can largely be prevented with early treatment, such as amblyopia, or “lazy eye.”

**Every dollar invested
in vision screening
saves \$162.**

Local health departments screened 682,000 children for vision problems in 2008; more than 67,000 children were referred for follow-up and treatment, or just under 10 percent of children screened. For FY 2008–09, local public health departments received \$2.6 million for the vision screening program.

Vision screening has been shown to provide a cost savings. A study conducted in 2003 determined that all visual screening programs had a positive benefit-to-cost ratio, meaning that the benefits of screenings exceeded the costs of screenings. Every dollar spent on visual acuity screenings for preschool and school-age children realizes savings of up to \$162.²⁰ This means that the screening program in 2008 offered a benefit to the state of more than \$421 million with an investment of \$2.6 million.

Food Safety Inspection

Local health departments work in conjunction with the Michigan Department of Agriculture (MDA) to ensure the safety of food served in restaurants. The local health departments are responsible for planning reviews, conducting inspections, processing license applications, enforcing policies, and investigating complaints and foodborne illness outbreaks. The MDA provides evaluation, consultation, and training services to sanitarians in local health departments. In 2009, 194 full-time equivalent (FTE) inspectors conducted more than 94,000 inspections; 67 percent of those were routine inspections and the rest were follow-up or temporary food service activities. Each inspector conducts an average of 487 inspections annually.²¹

Local public health departments are responsible for investigation and follow-up when a suspected foodborne illness outbreak occurs. In Michigan, this is defined as an incident involving two or more cases, not in the same household, of people who have ingested a common food and have similar symptoms. In 2009, 150 potential foodborne illness outbreaks were identified. Of those, 20 were classified as probable foodborne illness outbreaks comprising 467 confirmed illnesses. Norovirus was confirmed as the cause of three outbreaks, clostridium perfringens caused two outbreaks, and salmonella was the confirmed cause of another three outbreaks, resulting in 187 cases of disease. The number of confirmed outbreaks and illnesses is low, however, due to indeterminate conclusions or lack of conclusions from investigations. The cost of these illnesses can range from the price of a simple medical visit to more severe cases that result in hospitalization and even death. Research on the cost of salmonella suggests that in 1999 a physician visit for salmonella infection cost \$315.²² Adjusted for inflation, that would be \$408 in 2009. For more severe cases, researchers estimate costs for salmonella at about \$5,460,²³ and for clostridium perfringens about \$6,400.²⁴ In 2009, that would be between \$7,000 and

²⁰ V. Joish, D. C. Malone, and J. M. Miller, A Cost-Benefit Analysis of Vision Screening Methods for Preschool-age Children, *Journal of American Association for Pediatric Ophthalmology and Strabismus*, 7, no. 4 (2003): 283–90.

²¹ Michigan Department of Agriculture (MDA), Food and Dairy Division, *Annual Report Fiscal Year 2009* (Lansing, Mich.: MDA, Food and Dairy Division, 2009).

²² P. Frenzen, L. Riggs, J. Buzby, T. Breuer, T. Roberts, D. Voetsch, and S. Reddy, Salmonella Cost Estimate Updated Using FoodNet Data, *FoodReview* 22, no. 2 (1999): 10–15.

²³ Ibid.

\$9,600 per case. These costs are for medical care only and do not take into account the cost to society due to lost productivity.

The food inspection program is funded jointly by the state and through local fees and taxes. In 2009, the state allocated \$8.25 million. Based on the number of illnesses identified and investigated with confirmed cause (187 norovirus, clostridium perfringens, and salmonella combined), medical costs due to foodborne illness outbreaks, using an average cost of \$8,300 per case, can be estimated at more than \$1.5 million. These costs likely would have been much greater in the absence of state inspections and investigations.

The investment by the state into ensuring food safety through local inspections and enforcement has provided incalculable savings by guaranteeing timely inspection and follow-up to prevent foodborne illness outbreaks and limit the impact when outbreaks occur. This service is not only vital for Michigan residents, but is also important for ensuring a safe and thriving tourist economy.

On-Site Sewage & Water Well Inspections

Protecting the state's groundwater is vital for the continued health of Michigan citizens. Effective systems for sewage disposal and vigilant testing of groundwater are two of the most important methods to protect Michigan's water. Properly disposing of sewage has proven throughout history to protect populations from serious infectious illness. Diseases such as cholera and typhoid that were capable of destroying entire cities are no longer an issue in the United States. Local health departments work with the Michigan Department of Natural Resources and Environment to survey and approve potential sewage systems within their communities, as well as approve new wells for drinking water. While quantifying the value of effective sewage disposal and clean drinking water is nearly impossible, the virtual eradication of diseases such as cholera and typhoid has clearly contributed to the economic success of developed nations.

Although industrialized nations have been successful in stemming outbreaks of deadly diseases such as cholera, health officials must still be vigilant against other infections, like *E. coli*. In Michigan, some bodies of water have been damaged due to lack of public health oversight.

Twenty years ago, the quality of Lake St. Clair, in Macomb County, had been severely compromised. In the late 1990s, a group of government officials came together to address the problems resulting from the water quality: compromised drinking water, depressed tourism resulting from beach closures and the safety of the lake for swimming, damage to the plants and animals of the Lake St. Clair watershed ecosystem, and the safety of using the lake for recreational sports.²⁵ Many recommendations for protecting the watershed focus on the responsibilities of the local health department to enhance and maintain ongoing water quality monitoring, establishing education programs for septic owners, and instituting preventive and corrective action steps for nonfunctional septic systems. Recognizing the importance of protecting water resources keeps citizens safe and is important for many sectors of our economy, including agriculture and tourism.

A sobering example of the danger and expense of contaminated drinking water can be illustrated by an *E. coli* outbreak in the city of Walkerton, Ontario, located 200 miles northwest of Detroit. In May of 2000, a severe rainfall resulted in an influx of contaminants into one of the city's wells. Days later, 20 children were home from school and two children were admitted into the hospital with *E. coli*-like symptoms. The public works department had tested the well and found adverse results, but did not take the appropriate steps necessary to detoxify the water with chlorine, nor did they notify the health department of the risk

²⁴ United States Department of Agriculture (USDA), Food and Consumer Economics Division, *Bacterial Foodborne Disease: Medical Costs and Productivity Losses* (Washington, D.C.: USDA, Food and Consumer Economics Division, August 1996).

²⁵ Macomb County Blue Ribbon Commission on Lake St. Clair, *Report and Recommendations* (N.p.: Macomb County Blue Ribbon Commission on Lake St. Clair, September 5, 2008). Available online at <http://www.macombcountymi.gov/publichealth/EH/Documents/Blue%20Ribbon%20ReportII.pdf> (accessed 3/21/10).

posed by the tainted water. Within six days, seven people had died and 2,300 had become ill because of the *E. coli* in the drinking water. The economic effect on this town of 5,000 residents as a result of the contaminated drinking water was \$64.5 million in direct medical costs, or \$13,000 per resident, and \$90 million in indirect costs. Additionally, real estate values declined by a total of \$1.1 million and costs to local businesses were estimated at about \$651,000.²⁶ Michigan invests almost \$9.3 million annually to maintain clean drinking water and ensure appropriate sewage disposal. In 2008, local health departments issued almost 19,000 permits for new sewage disposal construction, in addition to conducting 20,000 inspections and performing over 16,500 land evaluations for future sewage systems. In 2009, 11,700 sites were evaluated for drilling and 12,000 new well permits were issued.²⁷ The costs avoided by preventing just one epidemic far exceed the costs of these activities.

Conclusion

The practice of modern public health has evolved over centuries. A solid public health framework is one of the characteristics that separate industrialized nations from the developing world. Our health departments' ability to administer vaccinations, monitor the spread of disease, identify hearing and vision deficiencies to assure educational success, protect against foodborne illness, and ensure the safety of drinking water undoubtedly contribute to the health and safety of our communities. Living in communities with a diminished risk of contracting life-threatening illnesses enables Michigan's residents to make important contributions to the economy of the state, the nation, and the world.

As demonstrated for each of the eight statutorily required program areas, the investment made by the state provides real economic value and saves money in terms of both direct medical expenses and indirect costs from lost productivity. Based on the examples in this report, one can safely estimate that overall, every dollar invested in local public health activities realizes a significant cost savings. And this says nothing of the lives that public health saves. These are investments—in lives and in dollars—that are well worth preserving and strengthening.

²⁶ Ontario Ministry of the Attorney General, *Part One: Report of the Walkerton Commission Inquiry* (Toronto, Ontario: Publications Ontario, 2002).

²⁷ Michigan Department of Natural Resources and Environment, Water and Sewage Database, March 2010.