Financial Analysis and Structural Considerations to the Problem of Rural Public Health in Pennsylvania*

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Abstract

Currently, none of Pennsylvania's 48 rural counties has a local health department (LHD). This is despite the existence of laws that provide locales with per capita funding for public health and environmental services. This study examines the financial issues that may influence the establishment of a robust public health infrastructure in rural areas. The study looks at 10 rural counties in the state and, through financial analysis of different LHD models (using the 2003-04 financial data) for rural counties, helps demonstrate that the relatively high levels of local funds required to establish LHDs would be a major financial undertaking. Testing three models – single-county, bi-county and tri-county LHDs – the study shows that locales would require an average of $16 per capita annually in local funds. The model analysis shows that small population size, large geographic area, and the low availability of primary care services drive expenses higher. Since rural counties have low population density, cover broad geographic expanses, and suffer from chronic lack of primary care services, rural LHDs covering rural counties have to cover a very large geographic area, a critical cost driver especially for environmental services such as water supply testing. Geographically large rural counties are also pressured to provide personal health services given the limited number of primary care providers. The result is a local health department with very high expenses. The paper concludes with policy considerations that may help to overcome these barriers, including establishing secondary formulas that are an alternative to per capita funding as well as creation start-up costs funds.

Introduction

In Pennsylvania, the creation of local public health departments (LHD) is left to the discretion of local government. This has meant that out of 67 counties in the Commonwealth of Pennsylvania, only five have a LHD. In addition, five municipalities have local health bureaus.[1] All of the 42 rural counties in Pennsylvania lack a LHD, meaning that 2,824,642 persons or 23% of the Commonwealth's population lack the services of a LHD. In the eventuality of a disease outbreak in any of the 42 rural counties of Pennsylvania, it is fair for the residents of these counties to ask, "Whom should we call?" In 2003, when 500 people in Beaver County, Pennsylvania, were infected with Hepatitis A as a result of eating at a local restaurant, the county had to rely on nurses and physicians mobilized by the Pennsylvania Department of Health from other parts of the state to complete the necessary vaccinations and carry out the necessary epidemiological investigations. While Beaver County is not rural, the hepatitis outbreak highlighted many of the difficulties faced by counties without a LHD. Although the source of the outbreak turned out to be contaminated food, the contrast between counties with LHDs and those without LHDs emerged. For example, it became evident that restaurants in Beaver County were inspected by the State Department of Agriculture, while those in Allegheny County, just over the county line, are regulated by one of 15 restaurant inspectors in the Allegheny County Health Department. While inspectors from both agencies look at the same food safety practices, the Allegheny County Health Department requires that restaurants always have an employee on-site who is trained in food safety by the county or an equivalent program in food safety (Rotstein and Snowbeck 2003). The events in Beaver County suggest that Pennsylvania's 42 rural counties lack the necessary resources to address a disease outbreak.

According to the Health Resources and Services Administration (HRSA), the estimated national public health workforce – including federal employees and the salaried staff of a limited number of voluntary agencies – is 448,254 employed workers, a ratio of 138 per 100,000 persons. Pennsylvania has 37 workers per 100,000 people, the lowest

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[1]Counties with health departments are Montgomery, Bucks, Chester, Erie, and Allegheny; municipal bureaus include Philadelphia, York, Allentown, Bethlehem, and Wilkes-Barre.

ratio of public health workers to population in the nation. Of the federal workforce, 3.6% are identified as holding official/administrative positions, 44.6% are in professional positions, 13.9% in technical positions, and 12.9% in clerical/support positions.[2] In stark contrast in Pennsylvania, 12% of the public health workforce is identified as holding official/administrative positions, 49% are in professional positions, 6% in technical positions, and 20% in clerical/support positions. Therefore, not only does Pennsylvania have the smallest public health workforce, it has a very low percentage of professionals in the technical fields, particularly in the areas of mental health and substance abuse (Gebbie 2000).

Pennsylvania Act 315, passed by the legislature in 1951, governs the establishment of LHDs. In accordance to Act 315, county health departments will receive a grant equal to 50% of the total of the department expenditures but not to exceed more than $6 for every person within the jurisdiction of the county department of health. Additionally, Act 12 provides established LHDs an additional annual grant of not more than $1.50 per capita resident for environmental health services provided by the county or municipality. Therefore, existing legislation provides any county with a LHD up to $7.50 per capita resident in funding. In addition to these grants, areas with LHDs have increased likelihood of qualifying for state and federal categorical health grant funding. Across the state, existing LHDs receive an average of $3.14 per person in categorical grants. Many federal categorical health grants are available only to local health departments, and even those for which it is not necessary to have a LHD, counties with LHDs have a significant comparative advantage.

Given these health and financial advantages to establishing LHDs, this paper identifies the structural and financial obstacles that keep rural counties from establishing LHDs and it examines LHD models suitable for rural counties.

Existing Literature

Similar to Pennsylvania, the national public health system varies greatly by geography, and fails to provide an equitable distribution of

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[2]The remaining 25% could not be assigned to a specific category.

services. As a nation, the United States has used a "Band-aid" approach to funding in public health, favoring short-term interventions instead of long-term investment in the country's public health infrastructure (Ohara 2001). Estimates show that 95% of United States' health spending goes toward medical interventions, and only 5% to population-based health interventions and various research activities (Levi et al. 2007). The Trust for America's Health (TFAH) showed that "the United States has made a major commitment to biomedical research, as evidenced by the $28 billion budget for the National Institutes of Health, but has not yet made a similar commitment to public health" (Levi et al. 2007).

Before the events of 9/11, there had been a 10-year decline in public health infrastructure funding. From 1990 to 1993, the percentage of the nation's health care dollars spent on public health declined from 2.7% to 1% (Johnson 2001). In some parts of the country, the combination of the Balanced Budget Act of 1997 and government cutbacks saw the per capita spending in public health decline by 33% between 1997 and 2003 (NACCHO 2003). Surveys and studies conducted before September 11, 2001, found that many communities lacked adequate laboratories or epidemiologists trained to detect infectious disease outbreaks. Even the Centers for Disease Control and Prevention (CDC), the nation's premier public health agency, relied heavily on antiquated laboratories constructed in the 1960s and 1970s. Furthermore, prior to 1999, one-third of public health departments serving fewer than 25,000 people did not have access to the Internet or electronic mail, and almost 20% of all LHDs had no e-mail capacity at all (Frist 2002). After the anthrax outbreaks of 2001, CDC funds have increased from just under $4 billion in 2000, to $7.7 billion in 2003, and to $8.4 billion in 2006. However, much of this can be attributed to post-9/11 terrorism preparedness activities rather than core public health functions (Levi et al. 2007). For example, even though HIV continues to be a domestic epidemic, funding for HIV has decreased 21% since 2001 (Levi et al. 2007). Similarly, the current level of chronic diseases, which account for the vast majority of morbidity and mortality in the United States, capture only marginal public health interest or financial support (Beitsch et al. 2006).

This lack of a national commitment has meant that the tendency in the country is for local government control and funding of public health service. Today most states in the United States organize their public

health systems around county health departments[3] (Mays et al. 2004). The National Association of County and City Health Officials (NAACHO) has currently identified 2,865 local public health agencies in the United States (NACCHO 2005; Beitsch et al. 2006). Of these, 59% were county-wide, 14% covered a city and county, 9% covered more than one county[4] with the remainder (18%) covering smaller geographic areas (towns and townships) (NACCHO 2005). Sixty-two percent of LHDs in the United States serve populations of less than 50,000 persons and 40% of LHDs serve even less populated rural areas (NACCHO 2005). The existing LHDs vary immensely in their per capita expenditures. A comparison of the expenditures of small boards of health with the expenditures of large city departments shows an average differential of 600%[5] (NACCHO 2005). LHDs also vary with regard to workforce. More than 30% of LHDs have fewer than 10 full-time staff, with a median of 19 employees (NACCHO 2005). The small entities typically employ a manager/ director, nurses, an environmental specialist, and clerical staff, while the specialized staff such as nutritionist, health educator, emergency preparedness coordinator, and epidemiologist, are in LHDs serving larger jurisdictions (NACCHO 2005). The variation in resources resulted in variation of services provided. Of the 75 public health-related activities and services offered by LHDs, three-quarters or more of LHDs offered only eight of them (NACCHO 2005).

A strong reliance on local resources has been an important factor in the development of the United States' "fragmented and uneven" public health infrastructure (Baker et al. 2005). The NACCHO survey showed

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[3]An agency of local government, a local health department (LHD) develops and administers programs and services that are aimed at maintaining a healthy community. To ensure that these efforts address a community's most important health problems and concerns, the local health department encourages residents to participate in assessing public health needs and in formulating a community health plan. It also works with other community organizations to assure that needed services and programs are available.

[4]Bi-county or tri-county health departments are like single-county health departments except they serve a larger area and are responsible to more than one county board. With this arrangement, a board of health is created with representatives from each county. The revenues and expenses are shared proportionally.

[5]The median per capita expenditure is a low of $9 per capita in Massachusetts to a high of $94 per capita in Maryland (NACCHO 2005).

that 65% of the funding for existing LHDs comes from local government sources, the state, or is pass-through grants from the state. An additional 30% of the funding comes from fee-for-service programs and competitive grants sought by each department. Additionally, how LHDs access these funds varies, and states use multiple funding mechanisms to fund local public health programs. These include: 1) a combination of per capita funding and activity-specific or staff-specific grants; 2) negotiated contracts for local services; 3) formulas incorporating variables of health status and financial resources of the local population; 4) per capita distribution of state funds based on local population statistics; 5) reimbursement of allowable expenditures for pre-established set of services; and 6) state funding for local agencies that are extensions of the state agency (Potter and Fitzpatrick 2007).

The lack of an entity with comprehensive authority and responsibility for creation, maintenance, and oversight of the nation's public health infrastructure has resulted in the country's fragmented system. However, Potter and Fitzgerald found three key trends in state funding of public health that show that in cases where the state government plays a greater managerial role, funding increases. The three trends are: first, that the degree of state oversight and the procedures used for oversight of local budgets and programs are related to funding levels; second, an association between service mandates on LHDs and levels of state funding; and third, state mandates for local public health services appear typically to be funded mandates (Potter and Fitzpatrick 2007). In Pennsylvania, these trends are not present. There are no mandates requiring local governments to establish LHDs, however, if locales do establish LHDs, there are service mandates, but the state funds only 50% of the services. Overall, the public health infrastructure in Pennsylvania is reliant on local government to generate funds or identify funding, and there is a fragmented system depending upon whether or not a county has a LHD.

Methodology

The project methodology is divided into three general tasks – data gathering, data analysis, and modeling. The first task was acquisition and preparation of the data. Twelve rural counties without a LHD that were most similar to counties with LHDs were purposefully sampled (Table

1). The 42 rural counties in the state were grouped by health district. The counties were then stratified by income, population density, and poverty rates. Three counties from four of the six health districts were selected. The Southeast Health District was not used because it includes only one rural county, and the Southwest Health District was not sampled because it had an unrepresentative population density level among its rural counties. Three counties from the remaining four districts were sampled, using counties that were most similar with regard to the mean income, population density, and poverty rate of the counties with LHDs.

Table 1: Sampled Counties

Health District	County
Northwest	McKean
	Clarion
	Jefferson
Northcentral	Bradford
	Snyder
	Tioga
Northeast	Monroe
	Susquehanna
	Wyoming
Southcentral	Mifflin
	Fulton
	Juniata

The 2003-04 budgets from the sampled counties, as well as the budgets from the counties and municipalities with existing LHDs, were collected. Legislative language of Act 315 and Act 12 and the Pennsylvania Code guiding the establishment of LHDs were gathered. Policymakers from all counties with LHDs and from the Pennsylvania Department of Health were interviewed. In addition, a purposeful sample[6] of policymakers of the sampled counties was interviewed.

The data analysis consisted of analyzing the mandated financial requirements of the legislation. The financial statements of counties and

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[6]The sample consisted of policymakers who agreed to speak to the project researchers and who felt they had enough information on the process.

the existing LHDs were analyzed in order to determine the prototypical balance sheets, revenue streams and expense categories. The financial statements were also analyzed to identify the key cost drivers (per capita, per services, or personnel). Forecasted revenues were calculated by using the total population to be served as a multiplier for all potential revenue sources. In addition, the percent of the population living below poverty was used to determine categorical grant revenue since levels of poverty are a significant categorical grant revenue driver, and the grant revenues were forecasted by giving both factors (population and poverty level) equal weight.

The expenses were forecasted by categories. These figures were forecasted using population and land area covered, and medically underserved areas. Population and land area to be covered were used to forecast all of the expense categories. Underserved areas were used to forecast personal health expenses since the availability of primary care was a significant cost driver of personal health expenses.

Finally, the organizational structures of the existing LHDs were analyzed, and a prototypical organizational structure (personnel, programmatic, and decision-making) was developed. The final step, the modeling process, included the creation of an organizational, programmatic, and budget structure for a prototypical single county health department adequate for three of the sampled counties, for two bi-county LHDs (four counties), and two tri-county LHDs (six counties). Based on these structures, which provide a more specific expense structure, reconciled expense budgets for each model were developed.

Financial Requirements of Act 315 and Act 12

According to Act 315, the Secretary of Health annually computes the disbursement to LHDs based on LHDs' eligible public health expenditures. The State's 315 disbursement provides LHDs with 50% of the funding of all expenditures that are public health related and not paid for out of any special grants received from the state or the federal government. LHDs will also receive a disbursement $1.50 per capita from Act 12 for environmental health services. There is no required match of local funds for funds drawn down through Act 12.

As Table 2 demonstrates, the revenue structure of existing LHDs vary, but on average Act 315 and Act 12 funds represent about 30% of the funds employed by the LHDs.

Table 2

Extant LHD	Total Budget	Percent of Budget by Funding Source				Per Capita Cost	ROI	Per Capita Benefits
		Act 315/12	Grants	Fees	Direct Funds			
Allegheny*	$43,866,737	21%	51%	9%	20%	$6.93	399%	$27.62
Bucks	$ 9,056,640	42%	18%	10%	29%	$4.51	241%	$10.89
Chester	$ 7,493,410	43%	26%	21%	9%	$1.63	960%	$15.65
Montgomery	$ 7,200,000	42%	23%	9%	19%	$1.93	414%	$8.01
Allentown	$ 3,048,295	25%	22%	5%	48%	$13.74	108%	$14.85
York	$ 1,096,246	29%	44%	3%	21%	$5.72	383%	$21.89
Average	**$11,960,221**	**28%**	**40%**	**10%**	**21%**	**$5.74**	**417%**	*$16.48*

*The Allegheny LHD budget includes monies for its emergency medical system.

Usually, the second most important source of funding for LHDs are grants. These are usually either state or federal categorical and block grants. All of the existing departments and bureaus reported that any increase in funding is a result of the availability of non-Act 315 or Act 12 grants. Existing LHDs receive an average of $2.3 million dollars in federal categorical grants. The most common categorical grants received by LHDs are for immunization, family planning, clean water, HIV/AIDS, and cancer prevention. Existing LHDs receive an average of $1.8 million in state grants (non-Act 315 and 12). A majority of these funds are passed through from the Preventive Health and Health Services (PHHS) Block Grant that the state of Pennsylvania receives from the federal government. The PHHS block grant is the primary source of flexible funding that provides states the latitude to fund any of 265 national health objectives available in the nation's Healthy People 2010 Health Improvement Plan. In fiscal year 2001, Pennsylvania chose 17

priority areas for distributing its PHHS block grant and received approximately $8 billion.[7]

The third source of funding for LHDs is inspection fees and licensures costs. LHDs that carry out public and recreational pool and restaurant inspections charge the sites a fee for the inspection and license. Although these services are Act 12 reimbursable services, the LHDs use this money to not only offset their additional environmental services costs, but also as part of the funds that are eligible for the Act 315 match. Any income that LHDs can generate as a result of their services serves to offset the amount of funds that the county must generate as direct contribution to the LHD, which is the fourth source of revenue for LHDs. Direct funding is any source not generated from reimbursable grants, categorical grants, or fees collected. These direct funds are usually not new funds collected by the local government for the purposes of subsidizing the LHDs. These funds may support other health services that the local government has historically provided and which is protecting the public's health. These services include: county funds used for vector control (mosquito and Gypsy Fly control), drug and alcohol prevention programs, preventative health services provided to seniors in long-term care settings (chronic disease screenings), preventive health service provided to prisoners in county jails (STD screenings), solid waste and litter control programs, weights and measures certification, county/municipal health services information and referral systems, county/municipal health and wellness fairs, and any other service that is designed to protect the health of the public.

Since counties may not use financial resources from state and federal grants as match, direct funds are the most critical financial issue associated with the reimbursable grants (Act 315) because these are the most common source of financing available for the match. These funds usually emanate from revenues or from intergovernmental transfer from an existing department to a new department, in order for the LHD qualify for the grants. Although as the data shows (Table 2, page 107), the

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[7]Cancer, Diabetes, Educational and Community-Based Programs, Heart Disease and Stroke, Heart Disease and Stroke, Immunization and Infectious Diseases, Injury and Violence Prevention, Nutrition and Overweight, Oral Health, Physical Activity and Fitness, Public Health Data, Surveillance, Epidemiology, and Training, Respiratory Diseases, Rape or Attempted Rape, Administrative Cost.

investment made by counties with LHDs for LHD activities and the match demonstrate a return on investments (ROI)[8] of over 100%, the earmarking of these matching funds during the creation of a LHD represents a major barrier for counties. In the long term, these funds represent a very good investment with existing LHDs producing an average ROI of over 400%. For example, Chester County's Department of Health has almost an annual 1000% ROI. For its annual investment of about $700,000 of direct county revenues into the Chester County Health Department, that health department offers the county $7.5 million in services.

Revenue Drivers

The analysis looked at various different revenue drivers (factors driving revenue) to determine the factors that most influenced the LHD's ability to generate revenue. The drivers explored were population, poverty rates, geographic size of the areas covered, size of the local government, and the demographic structure of the population covered. These factors were selected based on the qualitative data generated from the interviews with LHD administrators. Each of these factors was identified by at least one administrator as being a factor that affected their ability to generate funds. The two factors that show the strongest influence on revenue are population and levels of poverty in the community served. The other factors were either not significant, or closely related to population (number of townships for example). Table 3 shows the Pearson correlation coefficient[9] between the different revenue sources and total population and percentage of the population below poverty. The data means that as the population covered by the LHD increases, so does the revenue. The same relationship exists between revenue and poverty levels. In other words, as poverty levels increase, revenues increase. Although this is an expected trend given that Act 315

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[8]The ROI was calculated by dividing the total amount of financial resources used to provide public health services (not including the direct funds) by the amount of LHD budgets stemming from direct funds.

[9]Pearson Correlation coefficient is a measure of how closely to variables relate to each other. A coefficient of close to one means that the two variables are positively correlated, or in other words as one rises the other also tends to rise.

and Act 12 funds are reimbursable on a per capita basis, the analysis shows these funds are not the only source that is dependent on population size. Table 3 shows there is a strong positive relationship between population and grants (a Pearson correlation coefficient of 0.84). This is explained by the fact that many of the non-reimbursable grants are formula grants based on the population covered. These trends are an important consideration for rural areas with small populations. Rural areas would be less likely to generate the additional funds from grants and fees, therefore requiring a relative greater proportion of the revenues to come from local government.

Table 3: Correlation[10] Between Sources of Revenue and Revenue Drivers and Types of Services

	Population	Poverty (%)	Personal Health Services	Environmental Health Services	Public Health Services
Act 315 & 12 revenue	0.96	0.98	0.144	0.54	-0.36
Grant revenue	0.84	0.99	0.580	0.06	-0.61
User fee revenue	0.88	0.92	-0.200	0.91	-0.38
Direct funds revenue	0.86	0.97	-0.550	-0.78	0.95

A second important revenue driver is the level of poverty in the county. Table 3 shows that there is a strong correlation between poverty levels and all the revenue funds, with the highest strongest correlation (.99) found between levels of poverty and grants (this is controlling for the difference between the municipal LHDs and county LHDs). This relationship is also expected given that poverty levels, like population, are key eligibility criteria in many competitive grants.

Cost Drivers

Act 315 and Act 12 funding require the recipient to provide a certain set of services and to maintain a certain personnel structure. Using the general structures established by the legislation, Table 4 shows how the

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[10]Pearson Correlations.

extant LHDs compare with regard to expenditure structures. Expenditures are grouped into four general and generic categories: administration, personal health services (immunizations, STD testing counseling, maternal and child health services, etc.), environmental health services (all of the Act 12 mandated services), and public health services (health education, public health laboratory, public health policy development, epidemiology, etc). On the average, existing LHDs spend an average of 18% on administration, 30% on personal health services, 40% on environmental services, and 12% on public health services.

Table 4

LHD[11, 12]	Total Budget	Administration (%)	Personal Health (%)	Environmental Health (%)	Public Health (%)
Allegheny	$18,405,300	20%	29%	40%	11%
Chester	8,426,541	13%	31%	48%	8%
Allentown	1,902,799	27%	15%	21%	37%
York	1,096,246	14%	54%	23%	9%
Average	*7,457,722*	*18%*	*30%*	*40%*	*12%*

All of the LHDs interviewed indicated that the most important determinant of their expense structure is their revenue stream. In other words, what they spend is determined by their success in obtaining funds. In particular, their grant revenues are most influential. The existing LHDs report that the only significant revenue growth experienced by LHDs emerges from grant funds. The analysis of the expenditures shows that a LHD's grant revenue is most influential on their personal health services. Table 3 (page 110) shows the correlation (Pearson correlation coefficients) between revenue sources and expenditure types. It also shows that as LHDs generate more grant revenue they are more likely to increase their personal health services

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[11]The revenues reported in the previous section do not necessarily match the expenses because the budgets reported here are strictly for the expenses of activities considered to be core public health functions (for example, Allegheny County has $500,000 pass-through grant to manage county jail health care) and because LHDs revenues streams have different fiscal years and therefore LHDs may carry a balance between fiscal years.

[12]These are the only reported budgets because of either difficulty in obtaining budgets or in obtaining budgets in which expenditures are reported per program.

(0.54). This again is consistent with the objectives of these grant sources, which include maternal and child health, STD treatment, counseling, and screenings, etc. There is also a very strong relationship between user fee revenue and environmental services (0.91). This is also an expected outcome since a major source of the user fee revenues comes from LHD's environmental services, and food handling facilities inspections. Finally, direct funds are most influential on public health services. While the reason for this is not completely clear, it is likely that these services are in part associated with LHD activities in policy development and consultation with government officials, not traditionally a reimbursable service.

Personal health services are also a significant cost driver for existing LHDs. Not only in Pennsylvania, but also throughout the country, LHDs that serve as safety-net providers are forced to invest a significant amount of resources in their personal health programs. The tendency has been that LHDs in areas with few safety-net providers tended to fill this void. Based on the examples examined here, the York City Health Department has the highest percentage of their funds expended on personal health services. The trend observed with these four LHDs correlates negatively (-0.71) with the number of primary care physicians per 100,000 persons. LHDs in areas with a limited number of primary care physicians tend to fill the service void and provide a wider array of personal health services, which in other areas private practitioners provide. It is important to highlight that nationally the trend has been for LHDs to reduce their personal health services as Medicaid has moved toward a managed care model because reimbursements have declined. As mentioned in section two, this has been a major factor in the reduction of funding for LHDs nationally.

Environmental services expenses are the largest expenditures of existing LHDs. While the reasons for this are not completely evident, there are four influencing factors. First is the size of the territory covered by the LHDs. Unlike the other types of services, environmental programs such as restaurant and pool inspections require periodic onsite visits increasing the need for staff and transportation. The percentage of overall expenditures that LHDs spend on environmental services correlates strongly with square miles covered by the LHD (0.97). Second, environmental services, compared to other services such as education and screening, for example, are more costly in that they involve testing

and laboratory procedures. Third, environmental services are a revenue-generating service for LHDs. Since LHDs charge an inspection fee from the sites that are inspected, LHDs have the incentive to provide extensive and continuous coverage so as to maximize their revenue-producing activities. In addition, administrators also report that environmental services are also the service that are most visible and most publicly and politically scrutinized. Since no local government, and more importantly no local elected official, wants to have an environmental incident in their jurisdiction (food poisoning or disease outbreak), local health officials feel compelled to provide thorough environmental services.

In summary, total population covered, geographic area covered, and availability of primary care services will be the key cost and revenue drivers used to assemble new public health models.

Rural LHD Models

This section constructs three different viable models: the single county health department, the bi-county health department and the tri-county health department for four regions of Pennsylvania. These models include a sample revenue structure, an expenditure budget, a personnel structure, and a program budget.

The models' budgets consist of creating a general revenue and expenditure budget using a basic forecasting method that uses the revenue and expenditure data of the existing county health departments in Allegheny and Chester Counties and municipal health bureaus in Allentown and York City, as a base. The models' forecasted revenues and expenses were based on total population covered, area covered, poverty level, and primary care provider availability. Then, specific sample program budgets (using the Allentown Health Bureau budget structure because of Allentown's resemblance in population), identify the costs of the specific services created for each of the models. In addition, potential match sources are approximated using the county budgets of the sample counties.

Each model's feasibility is discussed using the forecasted direct contributions required by the counties, on a per capita basis, as well as the potential match sources. The models constructed are exhibited on the following table and figure:

Table 7

Model	Land square miles	Population	Percent of persons below poverty (1999)	Number of PCP[13]/100,000	Staff
Tri-County Health Department Models (bordered by ■ ■ ■ in Figure 1, following)					
Bradford-Tioga-Wyoming	2,682	132,072	11.83	121.66	137
Mifflin-Juniata-Snyder	1,134	107,023	10.63	70.23	60
Bi-County Health Department Models (bordered by ▲ ▲ ▲ in Figure 1, following)					
Susquehanna-Wyoming	1,220	69,883	11.25	90.15	56
Clarion – Jefferson	1,258	87,134	13.6	93.85	70
Single Health Department Models (bordered by ● ● ● in Figure 1, following)					
McKean	982	44,884	13.1	74.0	35
Monroe	607	148,839	9.0	65.6	73
Fulton	438	14,365	10.8	49.1	23

Figure 1

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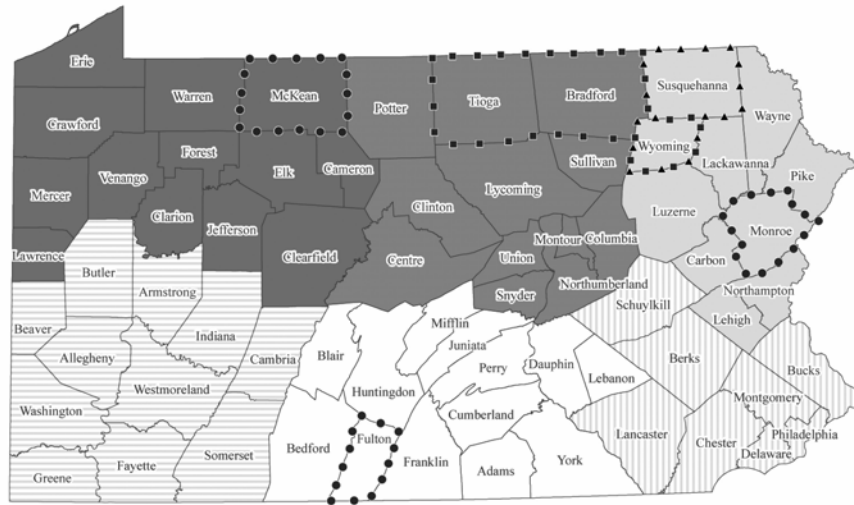
[13]Primary care provider.

Based on the characteristics exhibited in Table 7, a personnel structure for each model was developed. As the structures demonstrate, the models' personnel structure differs significantly based on population covered and most importantly on area covered. The tri-county model designed for Bradford-Tioga-Wyoming would cover only 132,000 persons but it would be spread over 2,500 square miles. The large geographic area covered by that model requires the largest personnel.

The potential revenue streams of the different models were developed using the total population that was to be served as a multiplier for all the potential revenue sources. In addition, the percent of the population under poverty was used to determine categorical grant revenue since level of poverty is a significant driver of categorical grant revenue. The grant revenues were calculated by giving both factors (population and poverty level) equal weight. Table 8 shows the result of the revenue forecasting. The forecasts show that the two tri-county LHDs would have multi-million dollar revenue streams, as would Monroe County because of the county's growing population (larger than any of the tri-county departments). All of the model LHDs show very high contributions from grants, over 40%. This is because of their relatively small populations, but relatively high level of poverty, in comparison to existing LHDs (almost twice the rate – 6.3 to 11.4). This means that these areas would be eligible for a greater amount of categorical grants relative to Act 315 and Act 12 formula grants.

Table 8

	Local Health Department Models						
	Bradford-Tioga-Wyoming	Mifflin-Juniata-Snyder	Susquehanna-Wyoming	Clarion-Jefferson	McKean	Monroe	Fulton
Forecasted Revenue							
Budget $	2,571,363	2,028,745	1,312,304	1,718,374	842,004	2,775,084	330,312
Act 315/12	29%	28%	24%	25%	18%	31%	22%
Grants	45%	45%	48%	48%	54%	42%	55%
User Fees	9%	9%	9%	9%	9%	9%	8%
Direct Funds	18%	18%	18%	17%	18%	18%	15%

	Local Health Department Models						
	Bradford-Tioga-Wyoming	Mifflin-Juniata-Snyder	Susquehanna-Wyoming	Clarion-Jefferson	McKean	Monroe	Fulton
Forecasted Expenses							
Budget $	7,809,675	3,259,014	2,321,767	2,906,886	1,362,989	2,991,986	431,135
Administration	28%	27%	26%	27%	24%	27%	15%
Personal Health	23%	26%	28%	27%	33%	27%	60%
Environmental Health	40%	38%	37%	38%	34%	38%	21%
Public Health	9%	9%	8%	9%	8%	9%	5%
Reconciled Revenue Budget Based on Forecasted Expenses							
Budget $	7,359,310	2,894,065	2,083,466	2,609,760	1,209,935	2,484,445	382,151
Act 315/12	10%	20%	15%	17%	13%	34%	19%
Grants	16%	31%	30%	32%	38%	47%	48%
User Fees	3%	6%	6%	6%	6%	10%	7%
Direct Funds	71%	43%	48%	46%	43%	9%	26%
Some percentages do not add up to 100 due to rounding.							

Table 8 shows the forecasted expenses in broad categories. These figures were forecasted using population covered, land area to be covered, and underserved medical areas. Population covered and land area to be covered were used to forecast all of the expenses categories. Underserved areas were used to forecast personal health expenses since the availability of primary care was a significant cost driver of personal health expenses. The forecasts show the clear effect of having to cover large areas. The two tri-county LHDs have very large budgets relative to their populations. The Bradford-Tioga-Wyoming model would have a budget of over $7 million. For both tri-county LHDs, environmental health expenses are significantly high because of the area to be covered. On the other hand, personal health services are a significant expense in the Fulton, Monroe, and McKean models because of the relatively low numbers of primary care providers in those areas.

Table 8 shows a reconciled revenue budget based on the expenses forecasted. As the table shows under the reconciled revenue budget, the local direct contributions increase dramatically so that local contributions now represent over 40% of the budget revenue in all but two of the

models. The shortfall occurs primarily because most of the models do not generate enough funds under Act 315 and Act 12 and from user fees, because of their small population size, to cover the expenses related to the large geographical coverage area. This assumption is made because the projections show it is not reasonable to assume that the locales will be able to cover the shortfall from grants or fees. In the largest of the models, the Bradford-Tioga-Wyoming model, the direct funds would now represent 71% of the revenue.

These budgets show that the tri-county health departments have very high expenses relative to their Act 315 and Act 12 funding. For example, the Bradford-Tioga-Wyoming model has close to a $1 million deficit just as a result of the environmental services provided. In comparison, although the Mifflin-Juniata-Snyder model, the Monroe model, and the Fulton model still have a deficit, the deficits with regard to the environmental services are smallest. The reason for the small deficit in the Fulton model is because of its small size; however, the small deficits in both the Mifflin-Juniata-Snyder and Monroe models is a combination of the fact that they both have a substantial population within a manageable geographic area. This lowers expenses and maximizes funding. This is the trend throughout the budget calculations. In the models with small populations and large areas, the expenses are not offset by the revenue from grants and fees. The overall result is very high county contributions that make these structures unrealistic at the present funding levels.

Table 9 on the following page summarizes the overall trends in the revenue and expense analysis of the viable models. The table shows that with the exception of the single county health department models in Monroe and Fulton, all of the other models represent higher per capita investments than the existing LHDs. The large tri-county health departments with large geographical areas and small populations have the highest per capita investments. Of the two tri-county health departments, the Mifflin-Juniata-Snyder model is much more feasible because of its smaller geographic area and bigger population. However, even the two-county LHDs have relatively high per capita investments. This is again a result of the interaction between population and geography.

Table 9

	Direct Funds per capita Forecasting	Direct Funds per capita Program Budget	ROI
Bradford-Tioga-Wyoming	$40	$60	144%
Mifflin-Juniata-Snyder	$11	$ 9	341%
Susquehanna-Wyoming	$14	$22	208%
Clarion-Jefferson	$14	$14	260%
McKean	$12	$ 8	371%
Monroe	$ 1	$ 3	511%
Fulton	$ 7	$ 5	555%

In summary, the analysis predicts that the barrier that most local governments face when initiating a LHD is new funding. Although the model budgets represented here are representative of the expenses of a fully functioning LHD that most local areas would not see developed for a few years after inception of a LHD, they demonstrate the need for a combination of significant new funding or significant restructuring of local government funding and budgets in order to make LHDs viable. The most critical cost driver for these models is area to be covered. The existing funding stream dependence on population as the sole criteria for the Act 315 formula grant signifies that areas that require extensive coverage are at a major disadvantage. In the models that had a critical population and not as an extensive geographic coverage, the models become more viable. The tri-county LHD model covering Mifflin-Juniata-Snyder has local contribution amounts that are closer to the norm as are the single county LHDs in Monroe, Fulton, and McKean Counties. However, the other models highlight the problem of using population-based formula grants for rural areas.

Conclusions and Policy Implications

The fundamental assumption guiding this research is that a strong local public health infrastructure is a critical component of the health care continuum. However, the national trend, as was demonstrated by the literature review, shows a slow erosion of the national public health

infrastructure. Funding for public health has steadily decreased since the 1980s and this, in combination with the reliance on local funds, has created significant gaps in services and increased vulnerability to the spread of disease. The threat of bioterrorism and the preparedness that has followed since 2001 has highlighted these gaps. The research also showed that, relative to this national trend, the local public health infrastructure in Pennsylvania is very weak. With only five county health departments, five municipal health bureaus, and a network of state clinics in the remainder of the state, Pennsylvania has the lowest public health workforce in the country: 38 public health workers per 1,000,000 persons.

The state's limited public health infrastructure is despite the existence of legislation (Act 315 and Act 12) that allows local government to draw down state funds for the operation of local public health infrastructure. The areas of the state with LHDs have demonstrated a very good capacity to use both state and federal funding to assemble vibrant health departments that provide an array of public health services. These existing LHDs have been able to grow their locales' capacity to provide public health services by not only using the state formula grants, but also federal and other state categorical health grants. As a result of these grants, these LHDs have established LHDs that have an average of 420% return on investment. On average, the residents of the locales with LHDs contribute less than $5 per capita annually and receive services totaling over $2,000 per person. The existing LHDs have been very successful at expanding services without using local funds. Nonetheless, there are critical policy and financial issues that locales must satisfy in the process of establishing these LHDs. Among the most critical aspects faced by locales trying to establish LHDs are the need to identify local funds for initial start-up funds and for the financial match of state funds.

The financial analysis of the different model LHDs open to rural counties of Pennsylvania demonstrate that the relatively high levels of local funds required to establish LHDs will be a major financial barrier. On average, the three different models analyzed for rural counties, a tri-county health department, a bi-county health department, and a single county health department, require $16 per capita annually in local funds. The principal reason for this financial reality is that rural counties have relatively high levels of the factors that tend to drive expenses up and

relatively small populations, the major revenue driver for funding from Act 315 and Act 12. The analysis showed that primarily population covered, geographic area covered, and the availability of primary care services drive expenses. Although rural counties do not have very dense populations, they do cover broad geographic expanses and suffer from chronic lack of primary care services. This means that LHDs covering rural counties will have to cover a very large geographic area, a critical cost driver especially for environmental services, and will be pressured to provide personal health services in areas that have a limited number of primary care providers. This will result in very high expenses. This, coupled with the fact that these areas do not quality for high reimbursement rates from formula and categorical grants because of their small population and their relatively low levels of poverty (a major criteria for categorical grants), means that they will have to generate significant amounts of local funds to operate LHDs. This trend varies somewhat among the different models, and those models that are geographically large and have small populations have the highest levels of local contribution while those with smaller geographic areas and larger populations tend to rely less on local funding. In the models tested in this research, the tri-county model that included the Counties of Bradford, Tioga, and Wyoming, compared with the worst, and the models that included single counties, McKean, Monroe, and Fulton, demonstrated the most viable financial models. In general, the reality is that the existing funding mechanisms in place for local public health are not appropriate for the realities of rural counties in Pennsylvania.

Although the barriers to a robust public health infrastructure are significant, many of the barriers have a policy basis; therefore, the recommendations below present policy projects that can be accomplished by the Commonwealth's administrative and legislative entities and by local governments to improve the state's public health infrastructure.

1) Additional core funding for Act 12 would mean that these models would have additional financing for environmental services. As was demonstrated by the paper, most of the existing LHDs and all of the models analyzed have significant deficits as a result of their environmental services which then become part of their Act 315 reimbursable expenses. So, in fact, in many respects the limited Act 12 funding is resulting in counties having to limit the services they

can offer under Act 315. This additional funding would be critical for rural counties that would have to cover a wider geographic area.

2) A second critical aspect would be the need for start-up funds to be available. The availability of start-up funds would go a long way in lowering the financial threshold that local governments must meet in establishing a structure for the first year of a LHD. The greatest barrier faced by local entities is the identification of funds for the initial establishment of LHD before they can begin to draw down state funds or before they can generate revenues from grants and fees. An initial one-time grant to help locales hire the personnel that Act 315 mandates (a director and a personal health and environmental health manager) would allow the local governments a one-year time period to establish the infrastructure and begin to generate revenue from other sources.

3) The legislature should establish secondary formulas for calculating Act 315 and Act 12 funds for rural counties. Formulas that address the cost drivers faced by rural counties should be taken into account. These formulas would allow LHDs covering these areas to draw down the additional funds necessary to cover large geographic areas. The formulas could be revised to take into account population density, with an additional allotment for travel expenses as population density decreases. There are many examples of formula grants that take population density into consideration. For example, transportation grants to cities with fewer than 200,000 persons receive a greater subsidy than cities with more than 200,000 persons to offset the lack of local revenue because of low usage (U.S. Department of Transportation 2003). In the area of bioterrorism, homeland security grants have "updated formulas that better take into account threats, population density, and the presence of critical infrastructure" (Ridge 2003). The existing legislation could then create an additional subsidy for countywide LHDs that fall below a specified population.

Most of the counties in the Commonwealth have a State Health Improvement Plan (SHIP). SHIP is a statewide health plan that places emphasis on improving the health status of populations through planning that addresses the root or underlying causes of premature disease, death, and disability. The plan calls for engaging with organized community-

based health improvement partnerships to coordinate resources in meaningful ways and address local health improvement issues and priorities. These partnerships are made up of coalitions of local social service agencies, health providers, and other community-based organizations engaging in the delivery of health services (PADOH 2003). These organizations already have relationships with the state regional offices. A possible model for improving local public health infrastructure in areas that are expansive and lack the critical population levels would be to formalize the link between these partners and local government. Local public health services could be offered through community based organizations, but with a central public sector-based coordinating body. Therefore, a potential policy option would be a modification to Act 315 that would allow local government to use Act 315 funds to provide services through community-based organizations and still retain the coordinating and planning responsibility. This would allow for decentralized services and more flexible expense structures.

Another policy option that also entails a break from the Act 315 structure would be the creation of decentralized regional offices of the State Department of Health. This option would be responding to the national trend of LHD consolidation. Baker and Koplan (2002), for example, estimate that as a result of a national level consolidation trend, the number of local public health entities across the nation could diminish from 3,000 to an estimated 500-1,000 entities. Therefore, under this policy scenario, the option would not be to create more LHDs but to use the existing six health regional offices that now cover an average of 10 counties to cover areas that cannot be feasibly covered by a LHD. However, these regional offices would need to be restructured into a network of sub-regional offices that would cover three to four counties. This would allow the state offices to have greater access to these underserved areas, without the need to create new structures.

The results show that it is clear on the need for a strengthened public health infrastructure in all of Pennsylvania, and in particular rural Pennsylvania; however, in areas where the political will exists to create these structures, local policymakers are stymied by the initial financial threshold set for their establishment. Policies that help counties attain this threshold would boost political will.

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