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The Regionalization of Public Health Services: A Review

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for the Advocacy Committee of the Connecticut Public Health Association



**Connecticut
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Association**

Promoting Public Health in Connecticut Since 1916

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Executive Summary:

In Fall 2016, the Connecticut Department of Public Health (CT DPH) released a proposal to consolidate Connecticut's local health agencies into 8 regions by 2020. Intentions of the proposal were to promote equity, secure local and federal grants, improve emergency response, and provide every Connecticut resident access to public health services (Health). Despite the promotion of public health regionalization in Connecticut, there is little information on how regionalization may impact population health outcomes. Because of the gap in the literature, a systematic review of the peer-reviewed literature was conducted to determine if public health regionalization is a cost-efficient method for improving population health outcomes.

Regionalization can be described as the addition of regional structure to supplement local government agencies, in some cases leading to consolidation of services (Koh, Elqura, Judge, & Stoto, 2008). Efficient delivery of services, sharing of specialized resources, better trained personnel with the capacity for specialized skills, a lower turnover rate and higher levels of coverage are the expected results that might appeal to the public health field.

The regionalization of public health services has been implemented to varying degrees in the U.S. and abroad. For example, in 2004, vaccine production issues were resolved in Massachusetts by creating a regional vaccine clinic. Contrary to expectations, autonomy was respected amongst new leadership. In Connecticut, the economic impact of regionalization was simulated, and there appeared to be a potential increase in spending on public health services, with departments serving larger populations having a tendency to overspend on local services (Bates & Santerre, 2013). An analysis of local health districts (LHDs) in Florida concluded that while LHDs varied in size, services offered, and population served, economies of scale were seen in many public health activities. For smaller LHDs however, having higher costs at lower volumes of service meant that participation may be limited, and specialization of services would not be as beneficial when constrained by smaller budgets. In Nebraska, most counties did not have health departments before a 2001 regionalization plan helped provide services to these areas. The consolidation of LHDs in Ohio suggested public health expenditures were reduced without sacrificing the provision or improvement of services.

The available evidence suggests that regionalization of public health services can decrease public health costs through economies of scale and improve population health outcomes. However, there is no evidence suggesting that one form of regionalization is inherently more efficient or effective than another. Indeed, stakeholder buy-in is likely necessary for any regionalization plan to be effective. Conversely, forced regionalization lacks stakeholder buy-in; may lead to a higher demand of services; and may lead to an overspending on public health services. Due diligence is needed by all involved parties before any regionalization plan is implemented.

Introduction

In 1950, Joe Mountin, founder of the United States (U.S.) Centers for Disease Control and Prevention (CDC), promoted a concept for regionalization of public health and hospital services. He favored the collaboration of medical and health facilities and the integration of hospitals and health departments. He believed that preventative and curative medicine had reached the stage where they were no longer separable and thought it necessary to bring them together functionally (Grant, 1953). The organization of public health services into regions, defined by geographical boundaries, population needs, residential type, or other methods, is a concept being implemented across the U.S., neighboring countries, and the world (Tidwell, 2011). Reasons for regionalizing public health services vary from area to area. Some states, such as Massachusetts, implemented regionalization schemes to improve emergency preparedness, while the Caribbean Community and Common Market (CARICOM) approached the idea from a standpoint of regulation of medicinal resources and health technology in resource-constrained environments (Preston et al., 2016).

A common argument for the regionalization of medical services is that such actions will be more resource efficient (Koh et al., 2008). If each area of a region contributed a set of unique services, all areas of the region could benefit from these services without duplication or overlap. Additionally, the creation of larger public health regions could address larger population areas and optimize service allocation. Moreover, matters of safety and health may often fall outside of the restrictions of city and town lines, and municipal services may benefit from coordination in order to address those matters.

In 2009, Connecticut's Governor's Council for Local Public Health Regionalization was formed to provide a practical regional approach for defining the local public health infrastructure. Members reviewed past efforts in other states to enhance the quality and equity of public health services. A proposal was put forth recommending regionalization of public health services, increasing certain fee structures, and decreasing per capita reimbursements from the state to each department of health region. Several municipalities expressed their concerns with this initial proposition. Many towns were satisfied with their current services, and saw no need for change. Others had already regionalized some services and did not want to erase their progress. There were also concerns regarding increased cost and a fear for decreased quality of service (Dixon, 2009).

By 2016, still without any major action to regionalize Connecticut's public health infrastructure en masse, Hartford officials began to consider the consolidation for their own services, with the intention of tapping into the spending savings that regionalization was to offer. Across the state, several programs consolidated. The Regional Performance Incentive Program, a capital source to encourage towns and regions to collaborate, was showing success, and the Nutmeg Network opened the opportunity to share resources, which produced savings (Sterns, 2016). There had also been removals of previous statutes which prevented towns, cities and boards of education from collaborating.

In Fall 2016, the Connecticut Department of Public Health (CT DPH) released a proposal to consolidate Connecticut's 73 local health agencies into 8 regions by 2020 in an effort to offer more efficient services

to a larger number of people. Prior to this proposal, some towns have voluntarily formed inter-municipal health districts (e.g., the Torrington Area Health District includes 18 municipalities) (Fitch). Under the proposed bill, Litchfield County would absorb these districts into a 29-town region. Likewise, Hartford would join into a region of 28 towns and cities for the Hartford county region. An alternative to this plan was to have districts follow county boundaries, but Connecticut's five largest cities, Hartford, Bridgeport, Waterbury, New Haven and Stamford, would maintain their existing individual health departments (Benson). Funding for the new districts would initially depend on the population of the district and the budget of each municipality, requiring each municipality to contribute 1.5% of their budget to the regional fund, and the commissioner of public health would approve the program and budget of each district (Fitch). Later amendments, made in March 2017 (i.e. HB5754 and HB7170,) would have required each district to receive \$1.85 per person covered from state coffers.

The public health regionalization proposals made in 2016 and 2017 were largely panned. The City of Stamford explained that HB7170 as written did not provide sufficient representation for larger cities and the potential economic impact to municipalities needed to be evaluated. There was also concern that the bill did not provide an adequate process for defining regional health district boundaries (Jankowski, 2017). What many refer to as a top-down approach did not seem appropriate to address the specific needs of an area, allow flexibility in the management of services, and ensure accountability from all parties involved (Henry, 2017).

Despite ongoing discussions of regionalization and consolidation of services in Connecticut, there is little information on how regionalization may impact the population's health. Because of this gap, a systematic review of the peer-reviewed literature was conducted to determine if public health regionalization can improve the general health of the population while also being cost efficient. The review includes evaluations of state and national attempts at regionalization within multiple sub-fields of public health.

Methods

For the present study, regionalization was defined as the addition of a regional structure to supplement local government agencies, which may lead to consolidation of services or agencies (Koh et al., 2008). We broadened the definition by providing examples of its iterations: creating an intermediary administrative structure with the responsibility for organizing and delivering health care services to a defined population, or guiding the decentralization of services to optimize their impact (Simpson, 2011). The definition also includes the act of negotiation and agreement processes between all parties involved, with attention to the needs of the area served (Sancho, Geremia, Dain, Geremia, & Leao, 2017). Following the National Association of County and City Health Officials (NACCHO), Local Health Departments (LHDs) were defined as a governmental public health presence at the local level, which may be a locally governed health department, a branch of the state health department, a state-created district or region, a department governed by and serving a multi-county area, or any other arrangement that has governmental authority and is responsible for public health functions at the local level ("Operational Definition Booklet," 2005).

SCOPUS, PubMed, and Google Scholar were searched. The search terms “regionalization AND public health” were used to locate articles relating the two topics. The search terms “Health AND (region OR district)” were used to locate articles on health service organization. There were no date restrictions because this information has not been previously reviewed. Article reference lists were reviewed to identify additional articles that were not in the search results. Studies were selected if they contained information on (1) reorganization of the delivery of health services, (2) had studied the effects of regionalization or reorganization of the delivery of services, or (3) pertained specifically to the pros and cons of regionalization public health services. Studies were excluded if they were unavailable in English, or were an editorial, opinion, or review article.

Results

General Impact of Regionalization

Regionalization is described by Koh et al. (2008) as an addition of regional structure to supplement local government agencies, in some cases leading to consolidation of services (Koh et al., 2008). Efficient delivery of services, sharing of specialized resources, better trained personnel with the capacity for specialized skills, a lower turnover rate and higher levels of coverage are the expected results that might appeal to the field of public health. Such results are obtained because regionalized structures allow for more training and advancement opportunities, which produce better trained personnel, and are more cost-effective due to a reduction of service duplication. Becoming a part of a larger region may also allow each incorporated area to dedicate funds to the development and maintenance of a select few services, which would be their contribution to the region, instead of having funds spread across all potential service areas. This was thought to increase the likelihood that higher quality services would be available to all areas within the covered region.

Regionalization for Preparedness

Several areas within the U.S. have implemented regionalization plans with the motive of becoming better prepared for disaster and emergency situations. Six papers were found on this topic.

Because approximately 25% of the U.S. population lives in areas that surround state lines, regionalization would limit the confusion between federal, state, and local jurisdiction in times of emergency, as was needed during and after Hurricane Katrina (Katz, Staiti, & McKenzie, 2006). Furthermore, only 25% of U.S. local public health jurisdictions are able to provide 60% or more of the essential services needed to respond to a terrorist event and protect community health, with departments serving more residents often having a higher performance score (Stoto, 2008).

Regionalization has enhanced the response to emerging infectious diseases (Stoto, 2008). Regional surveillance aided the characterization of the West Nile Virus; regional epidemiology offices aided the investigation of potential cases of severe acute respiratory syndrome (SARS); and regionalization aided a

response to a Hepatitis A outbreak. The lack of comprehensive coordination, which regionalization can provide, may have contributed to the delays in the responses to these outbreaks.

In Massachusetts, the Massachusetts Department of Public Health (MA DPH) funds a regional coordinator and distributes preparedness funds to a fiscal agent in each state sub-region (Koh et al., 2008). Centralizing surveillance and communication has improved emergency preparedness, and Massachusetts has begun to standardize relevant equipment across regions as well. In 2004, vaccine production issues were resolved in Massachusetts by creating a regional vaccine clinic. Autonomy was respected amongst new organizational leadership, and with no formal governmental leadership assigned, the power dynamic that might produce tension was not apparent.

The University of North Carolina (UNC) Preparedness and Emergency Response Learning Center (PERLC) program serves North Carolina, Virginia, and West Virginia, helping to meet the needs of the public health workforce by providing epidemiology field training programs, distance learning tools, trainings for preparedness staff, and other resources (Horney & Wilfert, 2014). The project was able to leverage improvements on other projects related to preparedness, including the sharing of expertise and staff that would have otherwise been difficult to accomplish as smaller, independent projects. The UNC PERLC has also developed a survey to understand the impact of regionalization of public health workforces, particularly services provided by the Public Health Regional Surveillance Teams (PHRSTs) to North Carolina's LHDs (Horney, Markiewicz, Meyer, & Macdonald, 2011). Compared to Massachusetts, a significant improvement in networking and coordination of services within the PHRSTs was noted. Perceived quality of assistance varied, as did the package of services, support, and training provided by the PHRSTs. Needs assessments and resource development and provision were noted benefits of the North Carolina preparedness programs, but similar impacts in other participating states were not addressed.

Regionalization of Public Health in Connecticut

One paper was identified that focused on Connecticut. The economic impact of public health regionalization was simulated using data from several Connecticut communities. It was noted that regionalization appeared to increase spending on public health services, and departments serving larger populations would have a tendency to overspend on local services (Bates & Santerre, 2013). Overspending would primarily occur during the transition from local to regional health organization, and the financial resources would likely be pulled from education and other municipal services.

Regionalization of Public Health in Florida

One paper was identified that focused on economies of scale and regionalization in Florida. An analysis of LHDs in Florida questioned whether the concepts of economies of scale and economies of scope were seen in the delivery of public health services (Bernet & Singh, 2015). While LHDs varied in size, services offered, and population served, the study found that economies of scale were seen in many public health activities. LHD specialization, where each LHD within a region specializes in a different service

but shares the service region-wide, also reduced costs while eliminating duplicative efforts. For smaller LHDs however, economies of scale posed difficulties. Having higher costs at lower volumes of service means that small LHDs might not be able to participate to the same extent as larger LHDs, and specialization of services would not be as beneficial when constrained by smaller, more limited budgets. For example, smaller LHDs might lack sufficient bargaining power to negotiate fair rates for specialized services when partnering with larger LHDs. Breadth of services provided was not associated with variations in the cost of providing service, which suggests that no economies of scope were achieved and that the range of public health services offered would not be limited to financial factors. The study concluded that consolidation of service production could result in a net improvement of health of the population within the confines of the original budget.

Regionalization of Public Health in Other States

Other states also have experience implementing public health regionalization plans. Three papers are discussed here.

In Nebraska, most counties did not have health departments before multicounty departments were established in 2001 (Stoto, 2008). This regionalization plan has helped Nebraska provide essential public health services to areas that would otherwise lack these resources.

A study on the consolidation of LHDs in Ohio was conducted to determine whether there were subsequent changes in spending and service quality. The results suggested that LHD consolidation had financial advantages, including reduced public health expenditures without sacrificing the ability to provide public health services (Hoornebeek et al., 2015). Furthermore, consolidation enabled the improvement of services, especially for smaller cities, who may have otherwise been restricted in their access or unable to provide higher quality services for their residents.

A study of health districts and county health departments in Georgia was conducted to gauge whether multicounty health districts could serve as “Quality Improvement Collaboratives” and address the issue of meeting health problems and the demands of accreditation while working with limited resources (Livingood et al., 2012). The Quality Improvement Collaborative (QIC) regional public health model substantially improved accreditation standards of public health agencies; improved cross-jurisdictional sharing of resources; and aided in capacity building of smaller local health departments. The perception of local agencies ability to provide 10 essential public health services was substantially lower than perceptions of the same capabilities for regional agencies.

Regionalization of Public Health in Brazil

A large number of articles addressed regionalization and decentralization of services in Brazil. Five papers are discussed here.

Since the 1980's, Brazil has planned to decentralize the government provision of healthcare to optimize capacity, rationalize care, influence economies of scale, integrate municipal services, and overcome access barriers (Ribeiro, Tanaka, & Denis, 2017). Territorial organization alternatives have reinforced local management autonomy at times, and federal regulation at others. In the early 2000's, federal healthcare legislation and court rulings created criteria for health regions, regional-centric planning instruments, negotiation and management of care services, and integration of healthcare networks. Health regionalization requires the establishment of complex relationships within the government and within regions (Sancho et al., 2017). Incentives addressing autonomy and cooperation were used to institutionalize the new governing structures. Regionalized healthcare services reduced operational costs, and impacted innovation, performance management, and services provided. Notable negative effects were the lack of tools for establishing governmental and structural agreements. Acknowledgment of these challenges were reflected in Brazil's efforts to establish a governing model that had legal and institutional security, thereby improving efficiency in the regionalization process.

Recent strategies in Brazil were aimed to reinforce federal relations while allowing local powers to maintain responsibilities of setting priorities. Decentralized decision making, planning, and resource allocations lie in the hands of state and municipal governments (Ribeiro et al., 2017). The criteria for the demarcation of health regions include cultural, social, and economic factors, as well as consideration of existing communication and transportation infrastructure. To reinforce this idea, the Organizational Contract for Public Action (Contrato Organizativo da Ação Pública, COAP) was created. Under control of the Sistema Único de Saúde (SUS), COAP helped create healthcare networks for each region by defining responsibilities, health targets, performance assessments, and budgets. COAP also defined control, enforcement, and integrated implementation of regional actions.

While COAP aided in the institutionalization of the health region as a healthcare organizational structure, such a contract does not ensure meaningful cooperation between tiers of government nor does it ensure effective regional-level organization (Goya, Andrade, Pontes, Tajra, & Barreto, 2017). In Ceará, Brazil, the Ministry of Health was engaged in a contract with local and regional officials; however, there was no political or technical consensus regarding how the contract would be used. This led to discrepancies in the interpretation of which powers lied with which parties. Based on this experience, procedures were developed to institutionalize the COAP goals by implementing ombudsmen and HÓRUS in municipalities, sharing state workforce information, and increasing transparency regarding the regional health budget. Despite these initiatives, operational procedures for the regions remained weakly developed. The SUS is challenged by the distribution of power and responsibility amongst the three governing sections of a region, and COAP is being modified to adjust for these unaddressed structural grey areas.

Reis et al. (2017) noted that the main challenge moving forward for the SUS is the need to redefine responsibilities of federal entities (Reis, Soter, Furtado, & Pereira, 2017). They emphasized the need for municipally integrated systems guided by the needs of the population. Access to care and financing could be addressed with regionally based modules of integrated care that are under public regulation.

Regionalization of Health Services in Other Countries

A portion of the literature addressed regionalization in other countries. Two papers discussed Singapore as well as a grouping of Barbados, Guyana, Jamaica, and Trinidad and Tobago.

In Singapore, who was ranked as the world's 6th most successful health care system by the World Health Organization, regionalization took the form of a shared database (George et al., 2015). The Regional Health System (RHS) database was a framework for population healthcare management that allowed the sharing of health information across healthcare services. Such knowledge was thought to aid in coordinating care across services, planning of effective population-level health interventions, and promoting programs that allow optimization of health service resources. Regionalization of information access facilitated a better understanding of the health of the population and the most effective use of resources for public health services.

The Caribbean Community and Common Market (CARICOM), consisting of Barbados, Guyana, Jamaica, and Trinidad and Tobago, implemented the Caribbean Regulatory System (CRS) (Preston et al., 2016). CARICOM used the CRS to leverage existing platforms to centralize cooperation, governance and infrastructure, and build human resource capacity amongst themselves. The anticipated benefits of the CRS were: pooling of limited resources, standardized rules and processes, information sharing, increased availability of safe, effective and high-quality medicines, improved market control of medicines, improved efficiency at which resources are allocated, reduced regulatory burdens, and improved human resource capacity for regulation enforcement. Challenges included division of power amongst the members of CARICOM, conflicting or incongruous goals, and the inability of each part of the region to contribute equally.

Discussion

Regionalization of public health services has been implemented to varying degrees in the U.S. and abroad. In emergency preparedness, regionalization may ensure more efficient use of resources that transcend geopolitical boundaries. However, regionalization might also risk a power struggle between local and regional agencies, which may lead to confusion in the event of a disaster. Economies of scale can reduce service costs and increase the quality and variety of services within regionalized health districts, and although health outcomes were not addressed, increased service quality will likely improve population health measures. In the CARICOM countries, regionalization provided strength in numbers for the provision of medical, technological, and regulatory resources.

The findings of the peer-reviewed literature are consistent with similar research published elsewhere. NACCHO released a comprehensive paper on the benefits of regionalizing public health services (Tidwell, 2011). North Dakota regionalized in response to resource constraints and saw increased efficiency. Kansas implemented 'functional regionalization,' in which LHDs of each county are separate but cooperate within a region to provide public health services. In their model, the state health department assisted with assessment, planning, legality, financial issues and communication. In Massachusetts,

regionalization through a state-funded structure has shown results of economies of scale and increased funding. Nebraska's regionalization allowed for autonomy and choice in selection of county partners within a region.

The Center for Sharing Public Health Services published a case study in 2014 about the Eastern Highlands Health District, based in Mansfield, Connecticut. Formed in 1997, this district now provides public health services to about 2% of the population of Connecticut. The region was experiencing high staff turnover, and in some cases, the quality of services offered suffered. Towns sought to increase the scope and quality of public health services while reducing expenses and intended to do so by pooling resources. This allowed them to establish a full-time public health staff, provide competitive salaries to skilled employees, and raise the level of professionalism to the provision of public health services. It is estimated that the centralized model has helped the town of Coventry save 30%-35% in costs by helping to form and participate in the health district. Some towns were apprehensive about losing autonomy in the merge, and there was an adjustment period for frequent inspections and other methods of imposing the same standard across the board that some found intrusive initially. The Connecticut Department of Health held workshops to facilitate the transition; state law helped dictate how the changes would occur; and the appointment of town representatives were steps taken with the intention of directing the new structure into a form that fit all its towns (Services, 2014).

Regionalization has also been proposed as a solution to socioeconomic disparities in the U.S. (Koh et al., 2008). Income and race already play roles in the uneven distribution of local public goods and services. Regionalization of municipal services have addressed some disparities between economically variable areas and might thereby be used as an example to address health disparities based on income, geography, and population density. Efficient use of resources and building economies of scale, two motivations previously referred to when considering public health regionalization, have been the primary motivating factors in the regionalization of municipal services such as police, fire, education, and wastewater.

As an expansion of its Project Public Health Ready (PPHR), NACCHO identified four approaches to achieving emergency preparedness that incorporates the concept of regionalization. Networking was described as the most informal quality of regionalization, which allows for the sharing of preparedness information between organizations (Koh et al., 2008). This interaction can involve contact sharing or pooling of educational materials. The second approach was Coordinating, which described departments in each region working together to plan meetings, trainings, and exercises related to preparedness. Standardizing is the approach to creating uniformity across departments, via an adoption of tools, press releases, and response procedures. Responses might still be controlled by individual departments, but procedure would be determined as a region. Finally, Centralizing suggests that planning and response resources such as notification systems, web portals, training or even epidemiologic support would fall under one regional entity.

Factors and algorithms for determining an optimal method for assigning regional boundaries were explored in a comparative study from 1979 (Thomas, 1979). The 'implicit enumeration' algorithm was

appropriate for problems of relatively small size only. Constraints on region population size, number of hospitals per region, and other factors limited the number of combinations to be considered, allowing the algorithm to function more efficiently. The 'greedy modern' algorithm produced solutions for populations of any size and was conceptually the simplest of the three. It has also been used in other efforts to define health region boundaries. The efficiency of the 'max-flow/min-cut' algorithm was influenced by the number of counties and regions, as well as the density of the county to county patient flow matrix. It was very efficient in portioning states into multi-county regions. In terms of proportion of patients using health services in their regions, the 'max-flow/min-cut' algorithm produced slightly superior solutions than the other two algorithms. The paper concluded that the 'max-flow/min-cut' and 'greedy' algorithms had greater general applicability than the 'implicit enumeration' algorithm. The 'greedy' algorithm used less computer time for areas with relatively dense patient flow matrices while the 'max-flow/min-cut' algorithm identifies a slightly superior solution.

Limitations

The primary limitation of this review is the coverage of available information. Additional search terms and databases may have increased the number of relevant articles included. The concept of regionalization can be implemented to many different degrees and might not always be titled as such, which may have led to an oversight of relevant studies that may not have been shown using the search terms of this study. Moreover, non-peer-reviewed reports produced by government agencies, non-governmental organizations, and consultant firms were explicitly excluded from the results. While these sources may be informative, they may also lack the scientific rigor of the peer-reviewed literature.

Conclusions

The available evidence suggests that regionalization of public health services can decrease public health costs through economies of scale and improve population health outcomes. However, there is no evidence suggesting that one form of regionalization is inherently more efficient or effective than another. Indeed, stakeholder buy-in is likely necessary for any regionalization plan to be effective. Conversely, forced regionalization lacks stakeholder buy-in; may lead to a higher demand of services; and may lead to an overspending on public health services. Due diligence is needed by all involved parties before any regionalization plan is implemented.

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