Estimating the Cost of Providing Foundational Public Health Services (FPHS)

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Background of the Study

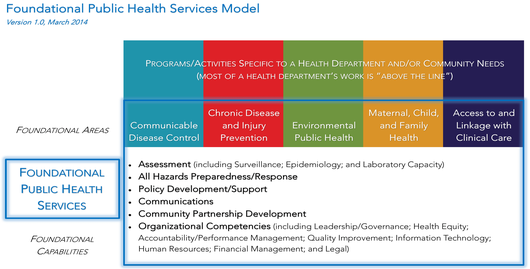
The impetus towards a deeper understanding of the costs & returns in public health was borne out of a 2012 Institute of Medicine (IOM) report that called for a "minimum package of health services" to be available in every U.S. community.

The report recommended the convening of expert panels to define the components of the minimum package in a way that allows for cost-estimation within an accounting and management framework.

Foundational Public Health Services (FPHS) Framework

In line with IOM recommendations, the Public Health Leadership Forum (**PHLF**) was convened with the support of RWJF in collaboration with CDC and other national professional associations. As part of the **PHLF** initiative, a national expert consensus panel workgroup articulated an FPHS framework for governmental health agencies (**see Figure 1**) identifying a set of 11 FPHS domains comprised of organizational skills and practices deemed essential for health agencies to support successful population health promotion and strategies. These elements are grouped into 2 broad categories, namely: ***Foundational Capabilities (FC) -*** Cross-cutting skills that need to be present in state & local health departments **everywhere** for the health system to work **anywhere**; and ***Foundational Areas (FA) -*** substantive areas of expertise or program-specific activities in all state & local health departments essential to protect the community's health.

Figure 1. FPHS Framework



Source: Public Health Leadership Forum (PHLF 2014)

Rationale and Aims

This study demonstrates the application and value of a cost-estimation methodology that combines survey-based economic resource allocation and stochastic simulation techniques to evaluate the level and variation of current FPHS implementation costs and resources required to meet full FPHS attainment. A simulation modelling approach is used to account for the variation and uncertainty associated with collected cost data and the inherent dynamic nature of public health service delivery systems.

Data and Methods

Cost data for each of the 11 FPHS domains were collected from a pilot survey sample comprised of governmental health agencies from KY & OH. Survey respondents were asked to provide upper- & lower-bound estimates of resource use for each FPHS domain, along with estimates of the most likely resource levels used in their agency. For the analysis in this study, the pilot sample data was combined with aggregate local health jurisdiction FPHS cost data from a Washington Practice Based Research Network (PBRN) led Delivery and Cost Study (DACS). In our simulation model, a PERT (*Program Evaluation and Review Technique*) distribution was assumed for input cost values which were treated as random input variables given the uncertainty associated with these estimates. We performed 10,000 iterations on our spreadsheet based simulation model using Latin Hypercube Sampling with a fixed random seed. Overall, we randomly sampled 22 separate input costs distributions across 11 FPHS domains to simulate a probability distribution for our primary output value of interest - **Total FPHS per capita costs**:

$$Total\ FPHS\ costs = \sum_{i=1}^{6} Cost\ of\ Foundational\ Capabilities + \sum_{i=1}^{5} Cost\ of\ Foundational\ Areas$$

Results and Discussion

Figure 2 plots the unweighted mean per capita cost survey sample estimates for each FPHS domain by population jurisdiction. **Table 1** presents weighted cost estimates for current and projected levels of full FPHS attainment by FPHS domain. Assigned sampling weights were calculated assuming a post-hoc two-stage stratified random sampling design based on the state-local governance system and scale of agency operation. The results indicate that there is a 90 percent probability that current FPHS per capita costs are between $35.32 and $61.50, with $48.14 as the most likely per capita cost value; and for full FPHS attainment, mean per capita cost ranges from $58.54 to $108.62, with $82.43 as the most likely value. The results are graphically represented in **Figures 2a** & **2b** with "delimiters" placed at the 5th and 95th percentile value of the probability distribution graph (PDF) to display the specified target probability of our analysis. **Figure 2c** overlays the 2 PDFs providing a graphical representation of the gap between current & projected FPHS costs. Results from the sensitivity analysis are presented in **Figure 4** and suggest that MCH and Organizational Competencies are the most influential drivers of overall FPHS costs.

Conclusion: The results suggest substantial variation exists across communities in the resources currently devoted to implementing FPHS, with even larger variation in the resources required for full attainment. Reducing geographic inequities in FPHS may require novel financing mechanisms and delivery models that allow resource sharing across local areas.

Figure 2. Current mean per capita costs by public health jurisdiction by FPHS domain

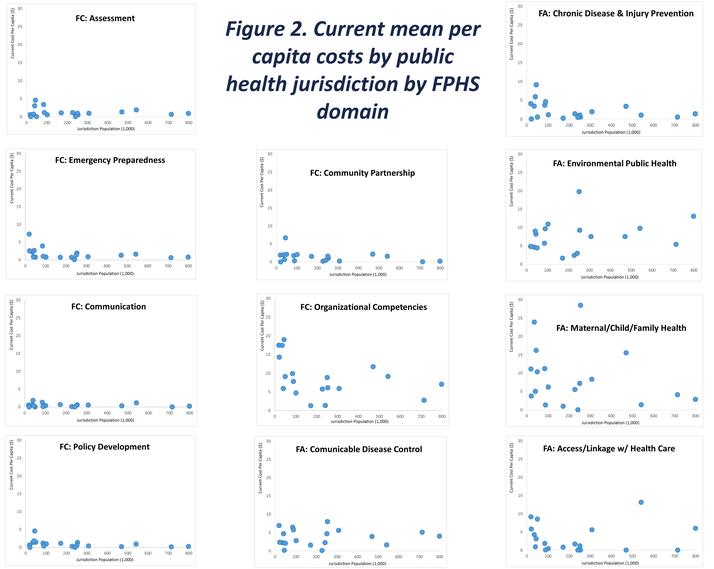
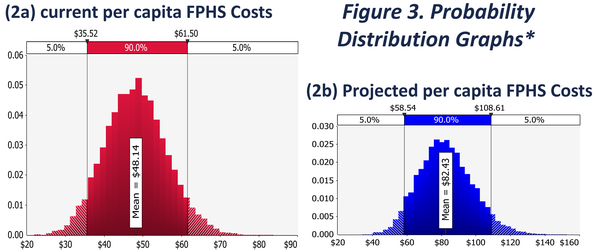
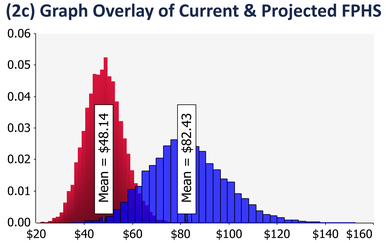


*Table 1. Estimated Per Capita FPHS Costs: Current & Projected Need (in $)**

FPHS DOMAIN	CURRENT				PROJECTED NEED / Full FPHS Attainment			
	Mean	Percentile 5th	Percentile 95th	coef. of variation	Mean	Percentile 5th	Percentile 95th	coef. of variation
Foundational Capabilities								
Assessment	1.70	0.45	3.18	48.8%	3.40	0.79	3.18	53.2%
Emergency Preparedness	2.57	0.66	4.91	50.6%	5.46	1.12	11.31	57.5%
Communication	0.63	0.02	0.22	50.8%	0.98	0.28	1.80	46.7%
Policy Development	1.52	0.35	3.00	53.3%	3.21	0.83	6.31	52.6%
Community Partnerships	2.22	0.52	4.37	53.2%	3.85	0.98	7.42	51.2%
Org. Competencies	9.82	4.38	15.39	34.1%	14.91	4.68	27.17	46.1%
Total Foundational Capabilities	*18.46*	*11.99*	*25.20*	*21.7%*	*31.82*	*19.18*	*45.94*	*25.8%*
Foundational Areas								
Communicable Disease	3.40	1.11	5.94	43.2%	5.53	1.81	9.59	42.9%
Chronic Disease	3.30	0.85	6.26	50.0%	6.72	1.70	13.02	51.6%
Environmental	7.49	2.92	13.34	42.7%	10.85	4.42	17.92	37.9%
Maternal Child Health	10.93	3.03	20.16	47.8%	19.08	4.15	38.27	54.9%
Access & Linkage	4.56	1.10	8.82	51.8%	8.42	1.71	17.26	56.8%
Total Foundational Areas	*29.68*	*18.84*	*41.37*	*23.2%*	*50.60*	*30.84*	*73.56*	*25.6%*
TOTAL FPHS per capita costs ($)	**48.14**	**35.32**	**61.50**	**16.4%**	**82.43**	**58.54**	**108.62**	**18.6%**

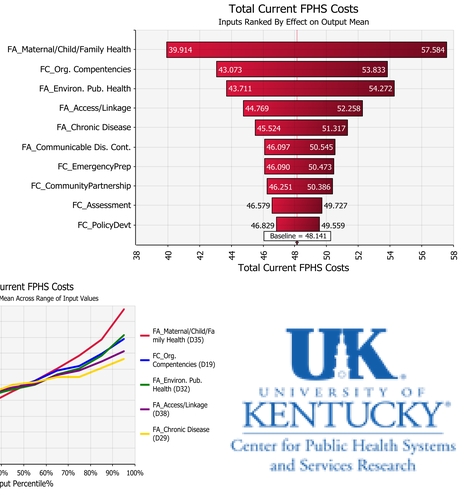
*Figure 3. Probability Distribution Graphs**





Note: * Per capita cost values represent weighted estimates derived from an assumed post-hoc stratified survey sample

Figure 4. Results of Sensitivity Analysis



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