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Cost Estimates of Foundational Public Health Services: Results from Piloting the Expert Consensus Methodology in Kentucky

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Toward a deeper understanding of costs & returns

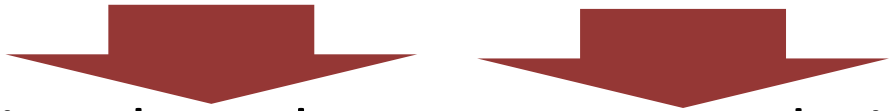
2012 Institute of Medicine Recommendations

- Identify the components and **costs of a minimum package** of public health services
  - Foundational capabilities
  - Basic programs
- Implement a **national chart of accounts** for tracking spending and flow of funds
- Expand **research on costs and effects** of public health delivery

Institute of Medicine. For the Public's Health: Investing in a Healthier Future. Washington, DC: National Academies Press; 2012.

Defining what to cost: the public health package

- Washington State's Foundational Public Health Services
- Ohio's Public Health Futures Committee: Minimum Package of Services
- Colorado's Core Public Health Services



- National Workgroup on Foundational Public Health Capabilities

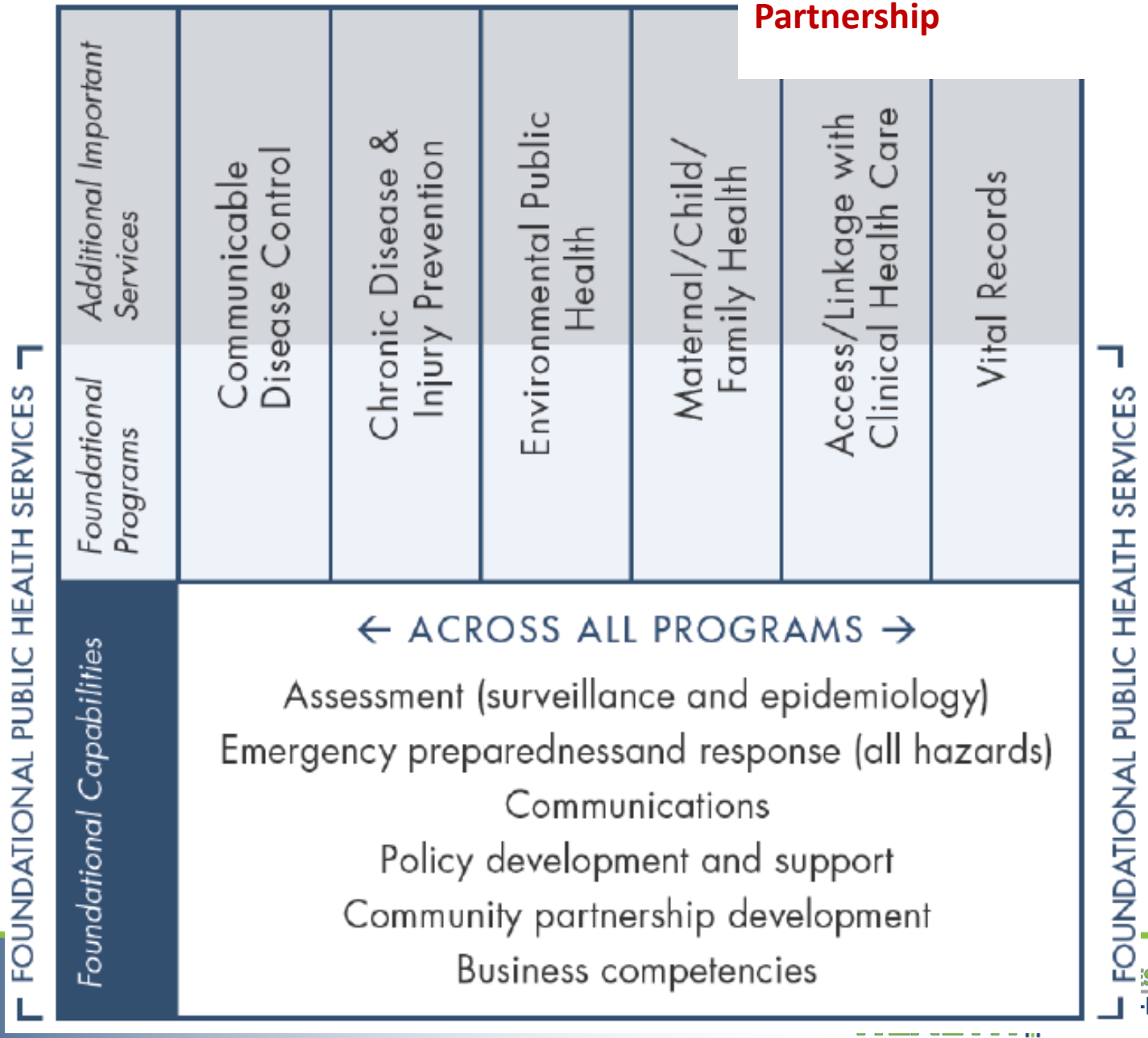
Defining what to cost: the public health package

- The National Workgroup developed definitions of foundational public health capabilities, specified in the Public Health Leadership Form's ***Articulation of Foundational Capabilities and Foundational Areas***

  http://www.resolv.org/site-healthleadershipforum/defining-and-constituting-foundational-capabilities-and-areas/

Defining what to cost

Washington Public Health Improvement Partnership



Cost-Estimation Workgroup – Review

- ***Workgroup on Public Health Cost Estimation*** convened to develop a methodology for estimating the resources required to develop and maintain foundational capabilities by governmental public health agencies at both state and local levels.

- First Meeting at RESOLVE – November 22, 2013
- Series of conference calls to specify methodology
- January 30, 2014 in person meeting to finalize cost-estimation methodology
- Final report on recommended methodology:

Estimating the Costs of Foundational Public Health Capabilities: A Recommended Methodology

Accessible at http://works.bepress.com/glen_mays/128/

Cost estimation methods

- Prospective “expected cost” methods
  - Vignettes
  - Surveys with staff and/or administrators
  - Delphi group processes
- Concurrent “actual cost” methods (micro-costing)
  - Time studies with staff
  - Activity logs with staff
  - Direct observation
- Retrospective “cost accounting” methods
  - Modeling and decomposition using administrative records
  - Surveys with staff and/or administrators

Key issues: What's the cost of capability?

- Delineating state vs. local roles and division of effort
- Identifying scale and scope effects
  - By population served
  - By range of programs supported (portfolio effect)
- Identifying input factors that affect costs
  - Resource prices
  - Case mix
- Identifying key output differences across settings
  - Intensity
  - Quality
  - Reach

Background and Overview: Piloting the Methodology in Kentucky

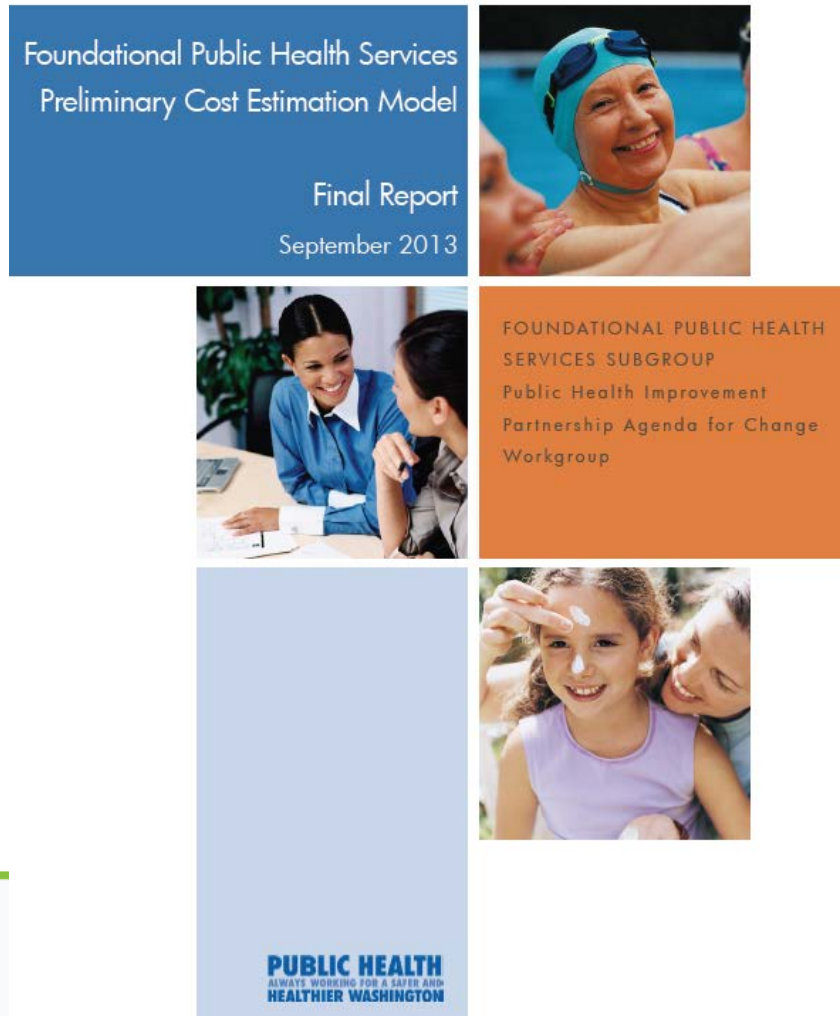
- Discussions with Kentucky Health Department Association (KHDA) to introduce & explain ***Foundational Public Health Services (FPHS)*** framework using RESOLVE FPHS articulation/definitions document
- Buy-in: KHDA formed a finance workgroup to evaluate how to incorporate FPHS framework into current financial & performance reporting system.
  - Crosswalk of chart of accounts with FPHS framework
- Participation in Cost-Estimation Pilot Project (6 members of workgroup serving as a representative sample – from small rural to large urban to multi-county health districts)
- Development of a cost data collection instrument

Drawing from and Building on FPHS Cost Estimation in Washington State

- Use Public Health Improvement Partnership's September 2013 Report on estimating the cost of Foundational Capabilities (Berk and Associates)

- Use Washington Delivery and Cost Studies (DACS) to cost out FPHS with additional granularity – disagregate labor resource use from non-labor costs, etc.

- Adapt Washington's Excel based data collection instrument to national FPHS definitions and national sampling frame



OCCUPATION CATEGORIES	Assessment (surveillance and epidemiology)	
	current	need
Public health manager	0	0
Registered nurse	0	0
Licensed practical or vocational nurse (LPN/LVN)	0	0
Nursing aide and home health aide	0	0
Public health physician	0	0
Oral health care professional	0	0
Environmental health worker	0	0
Laboratory worker	0	0
Epidemiologist	0	0
Health educator	0	0
Community health worker	0	0
Nutritionist	0	0
Information systems specialist	0	0
Public information specialist	0	0
Behavioral health professional	0	0
Emergency preparedness staff	0	0

OCCUPATION CATEGORIES	Total reported on FTE tab (Current)	Total reported on FTE tab (Need)	AVERAGE of Salaries + Indirects (Current)	AVERAGE of Salaries + Indirects (Need)	CALCULATED Total of Salaries + Indirects (Current)	CALCULATED Total of Salaries + Indirects (Need)
Public health manager	0	0			$0	$0
Registered nurse	0	0			$0	$0
Licensed practical or vocational nurse (LPN/LVN	0	0			$0	$0
Nursing aide and home health aide	0	0			$0	$0
Public health physician	0	0			$0	$0
Oral health care professional	0	0			$0	$0
Environmental health worker	0	0			$0	$0
Laboratory worker	0	0			$0	$0
Epidemiologist	0	0			$0	$0
Health educator	0	0			$0	$0
Community health worker	0	0			$0	$0
Nutritionist	0	0			$0	$0
Information systems specialist	0	0			$0	$0
Public information specialist	0	0			$0	$0
Behavioral health professional	0	0			$0	$0
Emergency preparedness staff	0	0			$0	$0
Administrative or clerical personnel	0	0			$0	$0
Communication Staff	0	0			$0	$0
WIC Coordinator	0	0			$0	$0
Other	0	0			$0	$0
	0				$0	$0

Communicable Disease Control	Public health manager		Registered nurse		Licensed practical or vocational nurse (LPN/LVN)		Nursing aide and home health aide		Public health physician		Oral health care professional		Environmental health worker		Laboratc worker	
	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	n
Provide timely, relevant, accurate information																
Identify assets, develop plans, advocate for initiaves																
Receive lab reports, conduct investigations, respond to outbreaks																
Per CDC, assure availability of notification services																
Per CDC, assure treatment of active TB																
Coordinate/integrate other programs and services																
Needs to total 100%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Chronic Disease and Injury Prevention	Public health manager		Registered nurse		Licensed practical or vocational nurse (LPN/LVN)		Nursing aide and home health aide		Public health physician		Oral health care professional		Environmental health worker		Laboratc worker	
	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	n
Provide timely, relevant, accurate information																
Identify assets, develop plans, a initiaves																

NON-LABOR CATEGORIES	Assessment (surveillance and epidemiology)		Emergency Preparedness (All Hazards)		Communication		Policy Development and Support		Community Partnership Development		Business Competencies		Communicable Disease Control		Chronic Disease and Injury Prevention		Environmental Public Health		Maternal/Child/ Family Health		Access/Linkage with Clinical Health Care		Vital Records		TOTAL	
	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need	current	need
Communication																									0	0
Supplies/Materials																									0	0
Travel/Registration																									0	0
IT																									0	0
Vehicles																									0	0
Printing																									0	0
Contract/Services																									0	0
Training																									0	0
Other																									0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FPHS Cost Estimation Work in Washington State (DACS) – Bekemeier, Marlowe, Whitman et. al. 2014

PUBLIC HEALTH | SERVICES & SYSTEMS RESEARCH PRACTICE-BASED RESEARCH NETWORKS

Costing Methodology (1/2)

- Adapt Washington DACS instrument as a starting template and modify & enhance accordingly
- Goal is for cost data collection instrument to be efficiently self-administered and capture estimates that account for uncertainty (i.e. dynamic nature of public health - FPHS demand and supply)
- Empirical approach: Estimate FPHS Costs by modeling uncertainty associated with cost data collected
    - Given sample size, quantify uncertainty through model simulation
- Generate probability distribution – the range of all possible values and the likelihood of their occurence
    - Independent variables / Inputs → Input Distribution
    - Dependent variable / Output → Distribution of output values calculated from all possible combinations ('scenarios') of input values
    - Best of all, these probability distributions can be graphed!

Estimated allocated employee hours per week by foundational capability, foundational area & employee category		Health department director	Public health manager	Registered nurse	Licensed practical or vocational nurse (LPN/LVN)	Nursing aide and home health aide	Public health physician	Environmental health worker	Laboratory worker	Epidemiologist
FOUNDATIONAL CAPABILITIES (Hours per week per individual for LHD employee/labor functions or services performed that may cut across multiple if not all foundational areas)										
Assessment (surveillance and epidemiology)	min									
	ave									
	max									
Emergency Preparedness (All Hazards)	min									
	ave									
	max									
Communication	min									
	ave									
	max									
Policy Development and Support	min									
	ave									
	max									
Community Partnership Development	min									
	ave									
	max									
Organizational Competencies	min									
	ave									
	max									
FOUNDATIONAL AREAS (Hours per week per individual for LHD employee/labor functions or services performed specific to each foundataional area or responsibility that is not related to any foundational capability as to avoid double-counting)										
Communicable Disease Control	min									
	ave									
	max									
Chronic Disease and Injury Prevention	min									
	ave									
	max									
Environmental Public Health	min									
	ave									
	max									
Maternal/Child/ Family Health	min									
	ave									
	max									
Access/Linkage with Clinical Health Care	min									
	ave									
	max									

Survey Instrument (1/4) Labor Resource Use

Minimum, average or most-likely, Maximum

weekly hours conversion rate: 37.5 hrs/week = 1 FTE

OCCUPATION CATEGORIES	Annual Salary + Benefits (per 1 FTE basis)		
	Minimum	Average	Maximum
Public health manager			
Registered nurse			
Licensed practical or vocational nurse (LPN/LVN)			
Nursing aide and home health aide			
Public health physician			
Oral health care professional			
Environmental health worker			
Laboratory worker			
Epidemiologist			
Health educator			
Community health worker			
Nutritionist			
Information systems specialist			
Public information specialist			
Behavioral health professional			
Emergency preparedness staff			
Administrative or clerical personnel			
Communication Staff			
WIC Coordinator			
Other (please indicate positions below)			

Survey Instrument (2/4) Wage Scale

Survey Instrument (3/4) Non-Labor Costs

Estimated annual non-labor costs by foundational capability, foundational area & non-labor category		Communication	Supplies / Materials	Travel / Registration	IT	Vehicles	Printing	Contracts / Services	Training	Other	TOTAL
FOUNDATIONAL CAPABILITIES (Estimated annual NON-Labor costs in dollars)											
Assessment (surveillance and epidemiology)	min										$0
	ave										$0
	max										$0
Emergency Preparedness (All Hazards)	min										$0
	ave										$0
	max										$0
Communication	min										$0
	ave										$0
	max										$0
Policy Development and Support	min										$0
	ave										$0
	max										$0
Community Partnership Development	min										$0
	ave										$0
	max										$0
Organizational Competencies	min										$0
	ave										$0
	max										$0
FOUNDATIONAL AREAS (Estimated annual NON-Labor costs in dollars specific to each foundataional area that is not related to any foundational capability as to avoid double-counting)											
Communicable Disease Control	min										$0
	ave										$0
	max										$0
Chronic Disease and Injury Prevention	min										$0
	ave										$0
	max										$0
Environmental Public Health	min										$0
	ave										$0
	max										$0
Maternal/Child/ Family Health	min										$0
	ave										$0
	max										$0
Access/Linkage with Clinical Health Care	min										$0
	ave										$0
	max										$0

Minimum, average or most-likely, Maximum

Annual total non-labor costs

Crosswalk of FPHS with Kentucky's Chart of Accounts

Additional Services	Programs/Activities Specific to Local Community Need Cost Centers - **715, 718, 730, 748, 769, 810, 813, 858, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 882, 891**				
Foundational Public Health ~~Programs~~ "Responsibilities"	Communicable Disease Control **801, 806, 807, 842, 843, 845**	Chronic Disease & Injury Prevention **722, 723, 738, 765, 805, 809, 818, 832, 836, 841, 856, 857**	Environmental Public Health **500, 520, 540, 560, 580, 591**	Maternal, Child & Family Health **760, 766, 767, 768, 803, 804, 808, 816, 833, 848, 852, 853, 854**	Access to & Linkage with Clinical Care **712, 741, 770, 800, 802, 811, 883**
Foundational Public Health Capabilities	*Across all Programs (i.e. cross-cutting)* Assessment (Surveillance and Epidemiology) - **844, 890** Emergency Preparedness & Response (All Hazards)-**746,747,749,757,759,763,771,815,821,822,823,824,825** Communications Policy Development & Support - **836, 890** Community Partnership Development - **735, 736, 740, 756, 761, 837, 893** Organizational/Business Competencies (Governance, Equity, IT, HR, etc.) - **724, 750, 888, 894, 897, 898**				

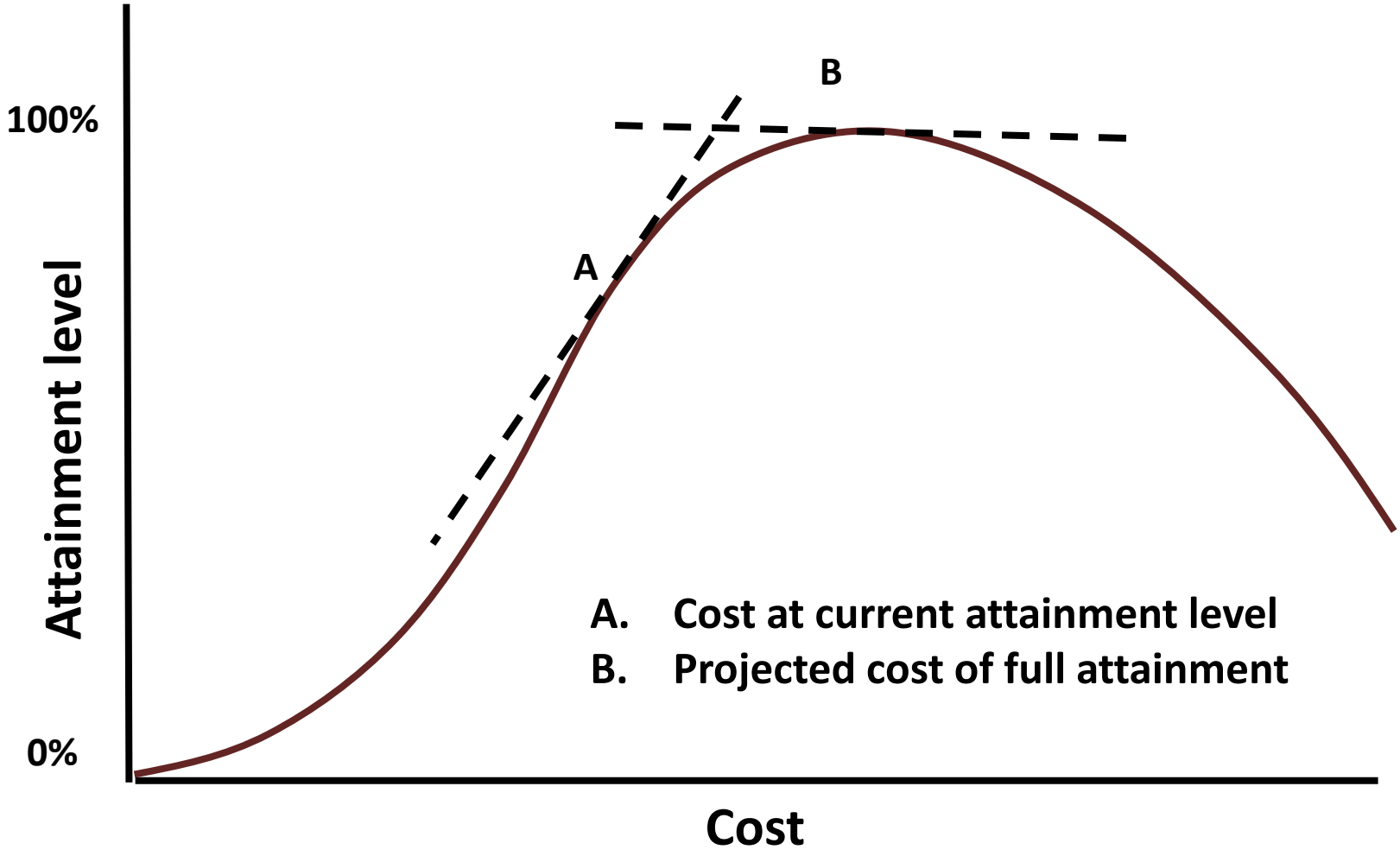
Survey Instrument (4/4): Current Attainment Scale
Used to derive FPHS Projected Costs

"Based on your understanding of how each public health foundational capability and foundational area is defined, please provide your **global or overall assessment** on the following question: ***For each foundational category, what is the estimated percentage currently being met by your health department?*** "

FOUNDATIONAL CAPABILITIES	Point Estimate	Range (Min, Most Likely, Max)
Assessment (surveillance and epidemiology)		
Emergency Preparedness (All Hazards)		
Communication		
Policy Development and Support		
Community Partnership Development		
Organizational Competencies		

FOUNDATIONAL AREAS	Point Estimate	Range
Communicable Disease Control		
Chronic Disease and Injury Prevention		
Environmental Public Health		
Maternal/Child/ Family Health		
Access/Linkage with Clinical Health Care		

Estimation of "projected" costs from current attainment ratings



Costing Methodology (2/2)

- Latin Hypercube Sampling
  - A sampling technique that will accurately recreate the probability distributions specified by distribution functions in fewer iterations, when compared with Monte Carlo sampling.
    - All possible values in input distribution are “sampled” for use in calculating total FPHS Costs (i.e. output values).
    - Output distribution generated from output values computed from “bins” or sets of scenarios containing all possible input values.
    - Iteration – Each time the outcome value is recalculated using a new set or combination of possible input values (i.e. cost estimate of each FPHS category)
- Sensitivity Analysis
  - Determine which inputs (i.e. FPHS categories) have the greatest impact on overall FPHS costs

Costing Methodology Outputs

- Methodology produces a ***cost distribution*** for each Foundational Capability (FC) and Foundational Area (FA) specified in the National FPHS Definition document
- Separate estimates of "current" and "projected" costs

  Current: cost of resources currently used to produce FCs and FAs

  Projected: cost of resources estimated to be required to fully meet FC and FA definitions, based on current levels of attainment

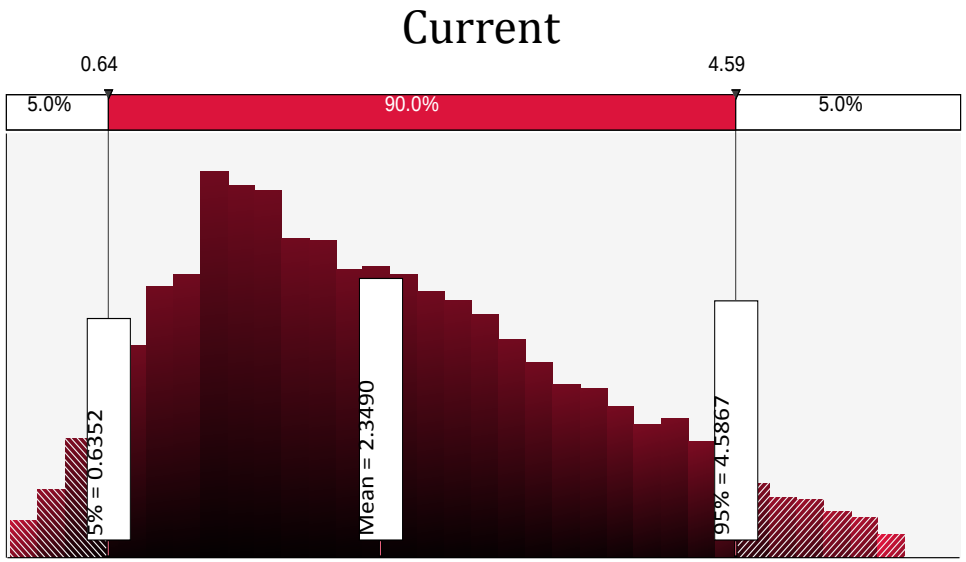
Costing Methodology Outputs

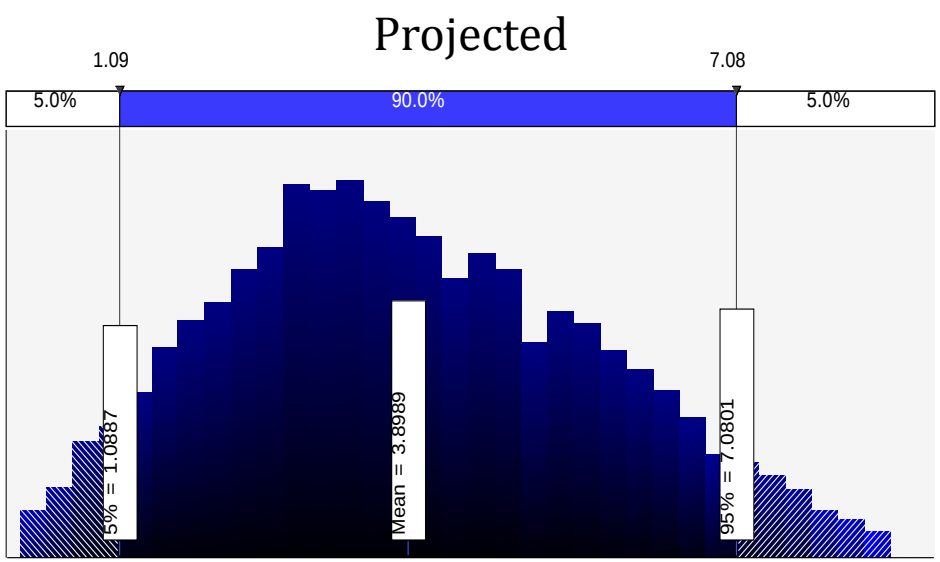
- Foundational Capabilities (FCs) Costs
  - Health Assessment
  - Emergency Preparedness
  - Communications
  - Policy Development and Support
  - Community Partnership Development
  - Organizational Competencies

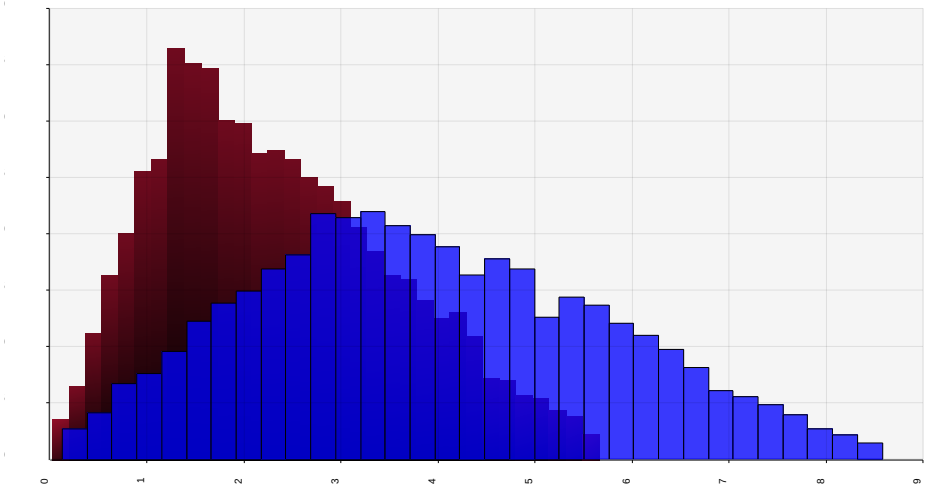
- Foundational Areas (FA) Costs
  - Communicable Disease Control
  - Chronic Disease & Injury Prevention
  - Environmental Health
  - Maternal and Child Health
  - Access and Linkage to Clinical Care

- Total costs = $\sum FC + \sum FA$

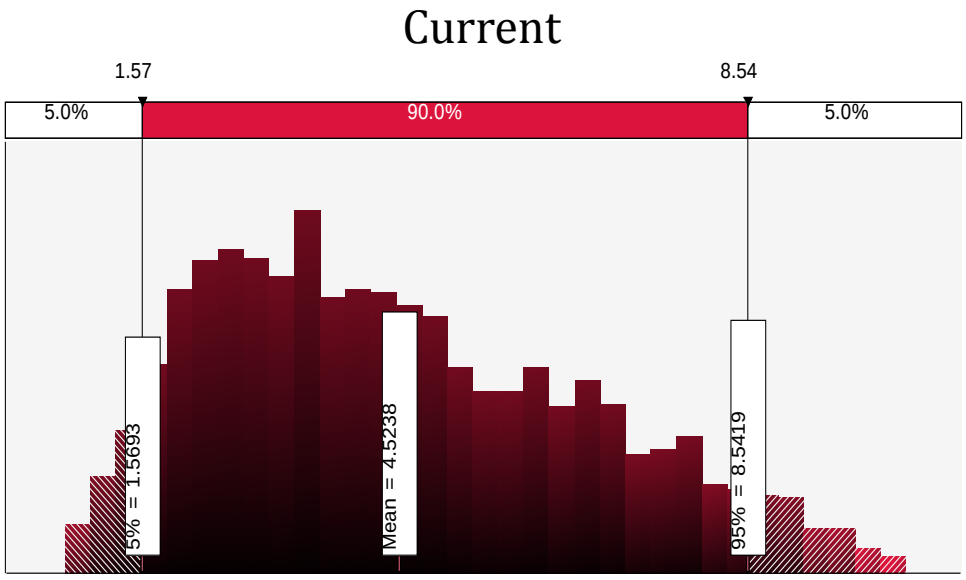
Foundational Capability (FC) – Assessment (per capita $)

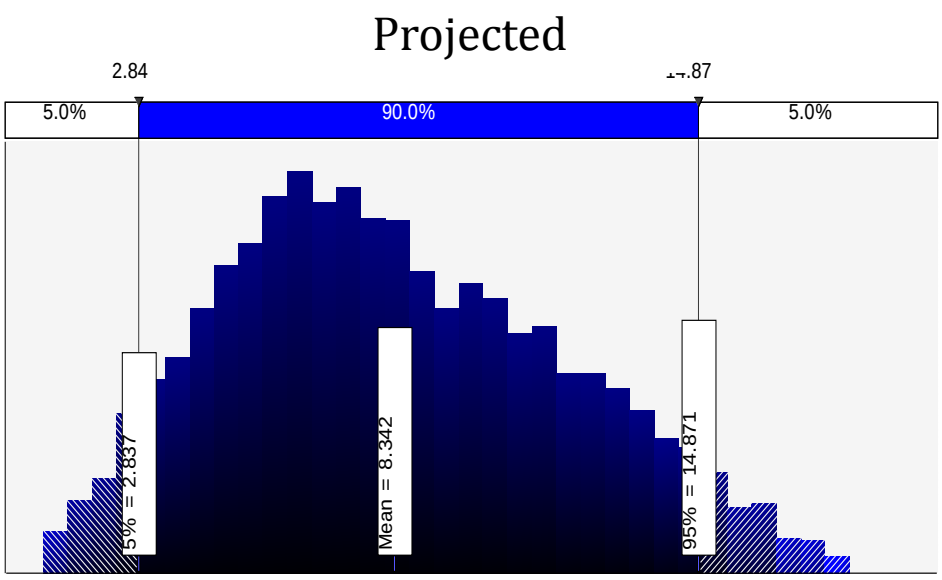


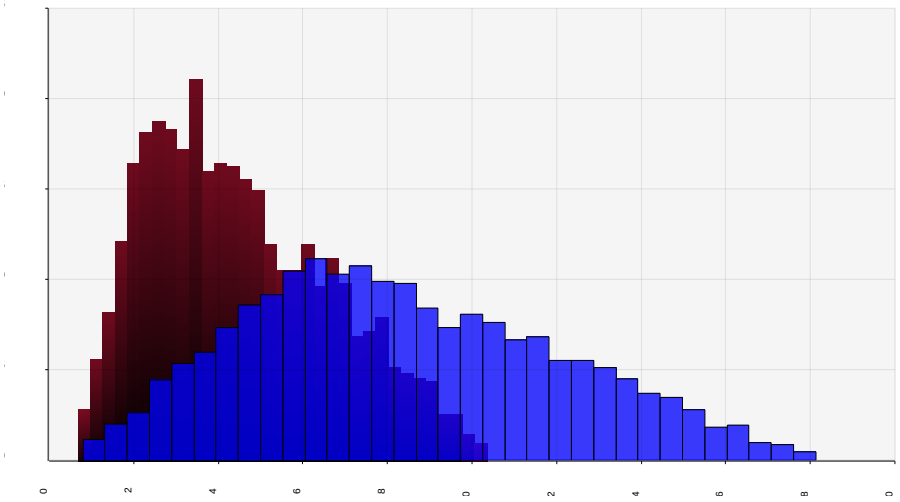




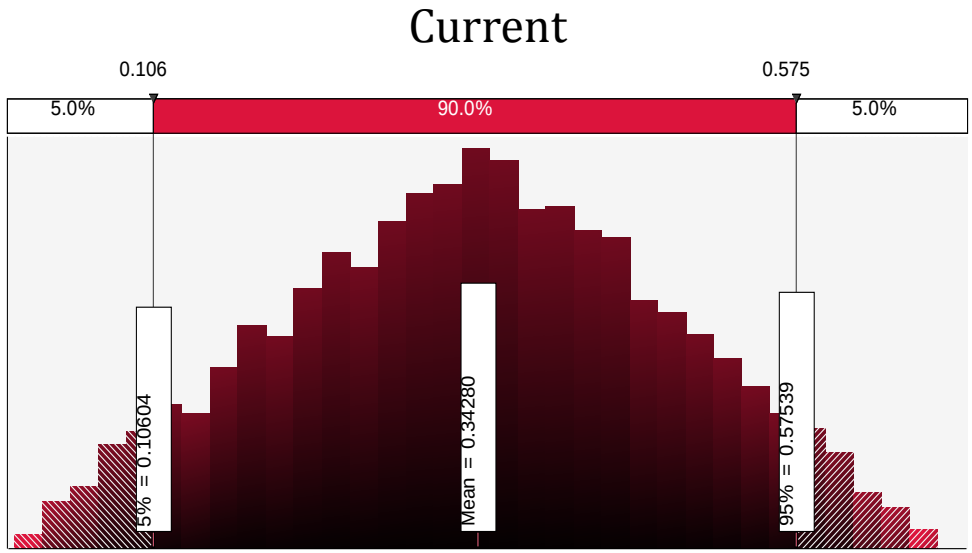
FC_Emergency Preparedness-All Hazards Response (per capita $)

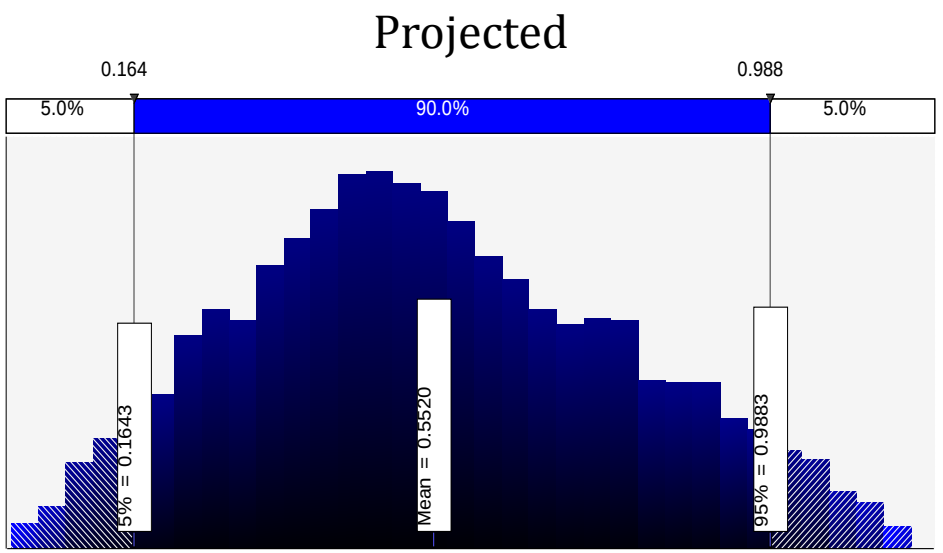


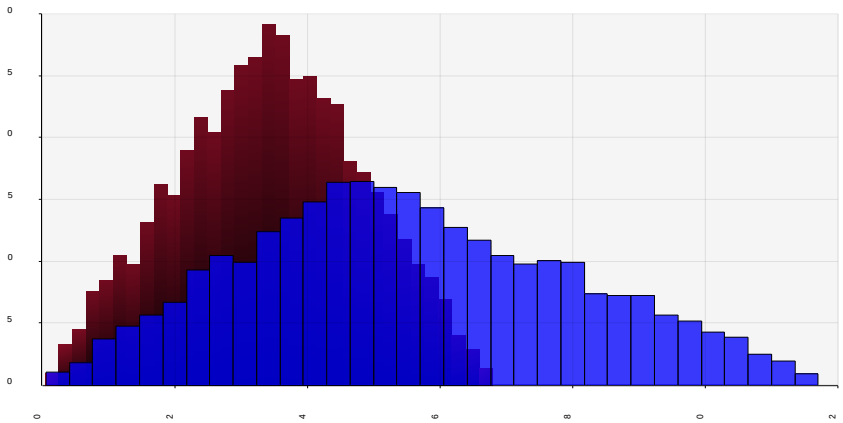




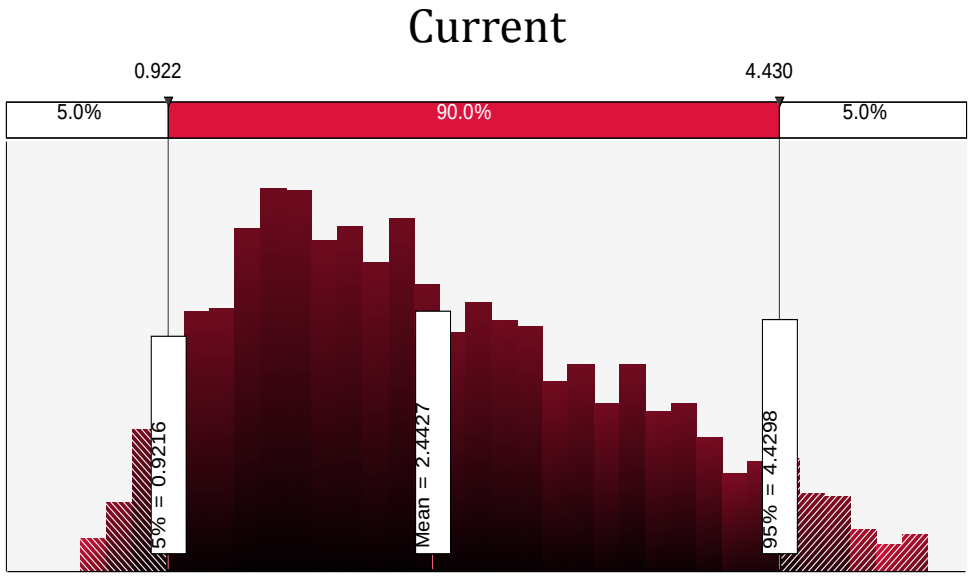
FC_Communications (per capita $)

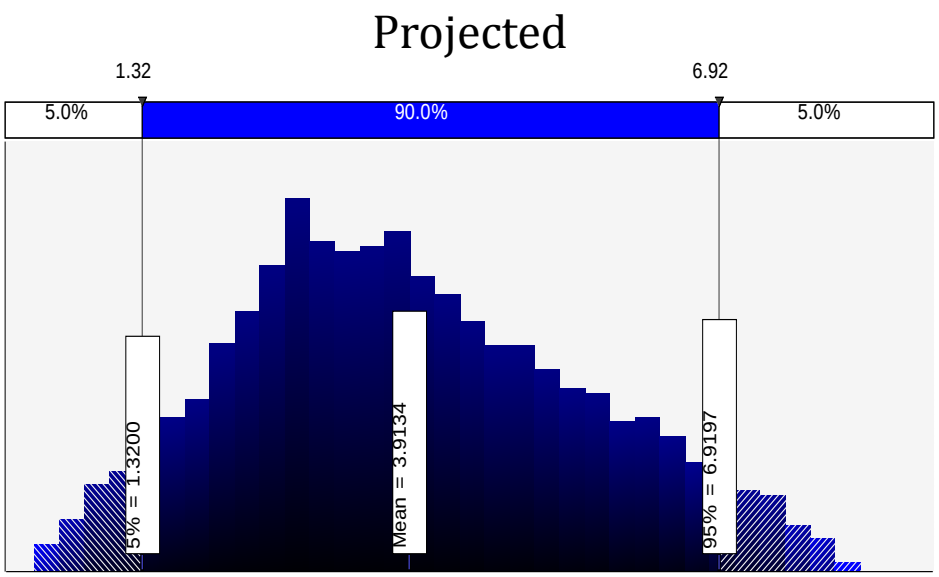


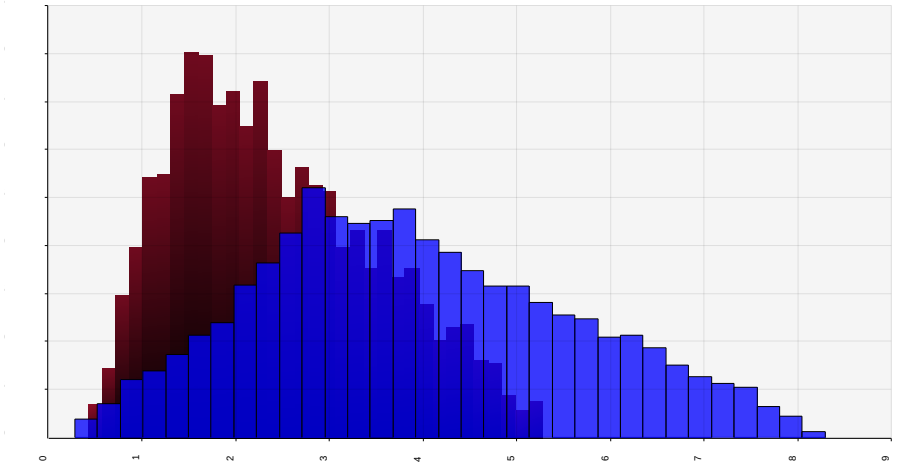




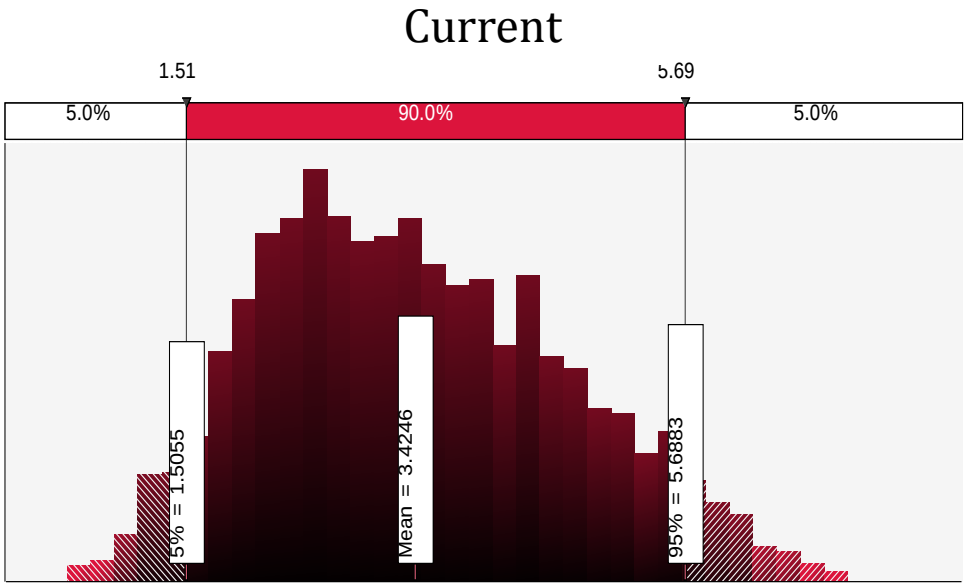
FC_Policy Development & Support (per capita $)

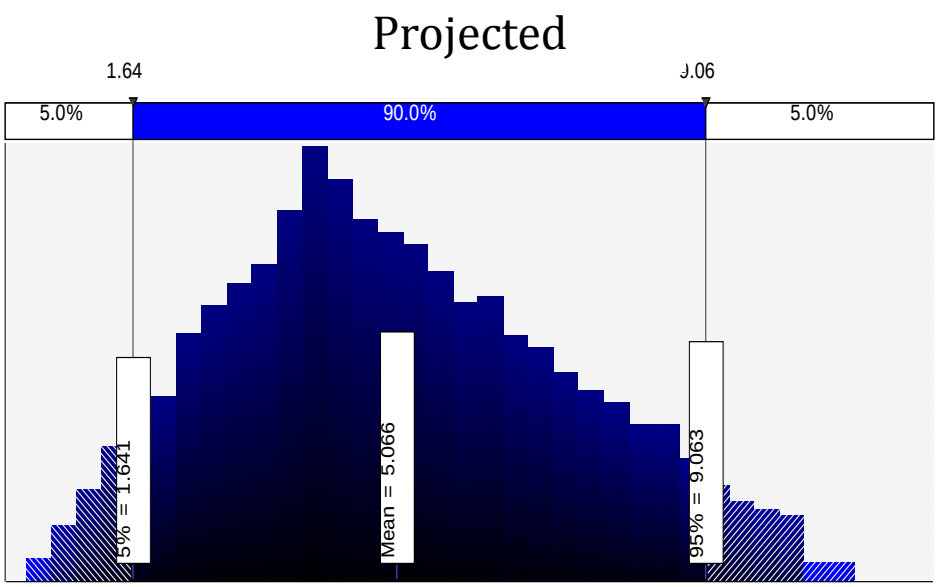


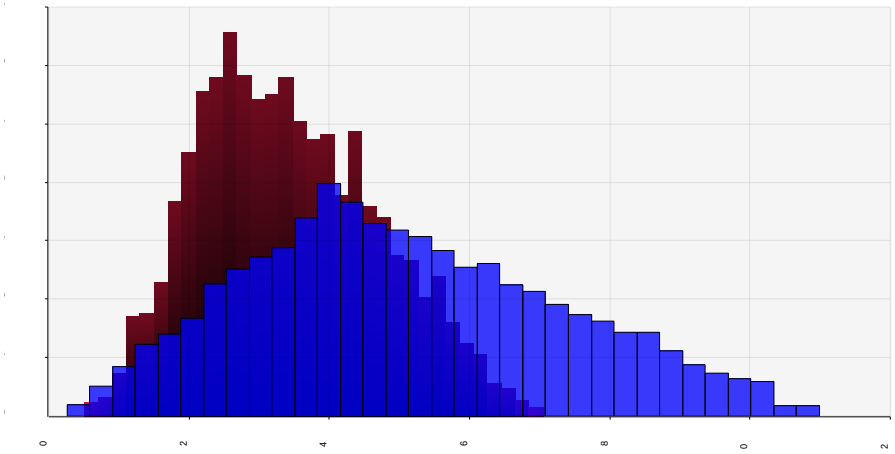




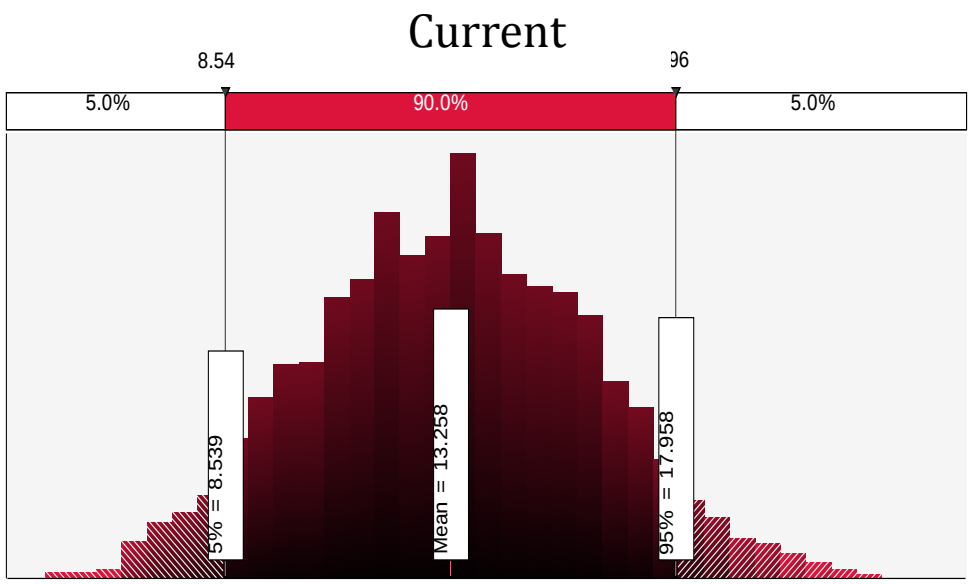
FC_Community Partnership Development (per capita $)

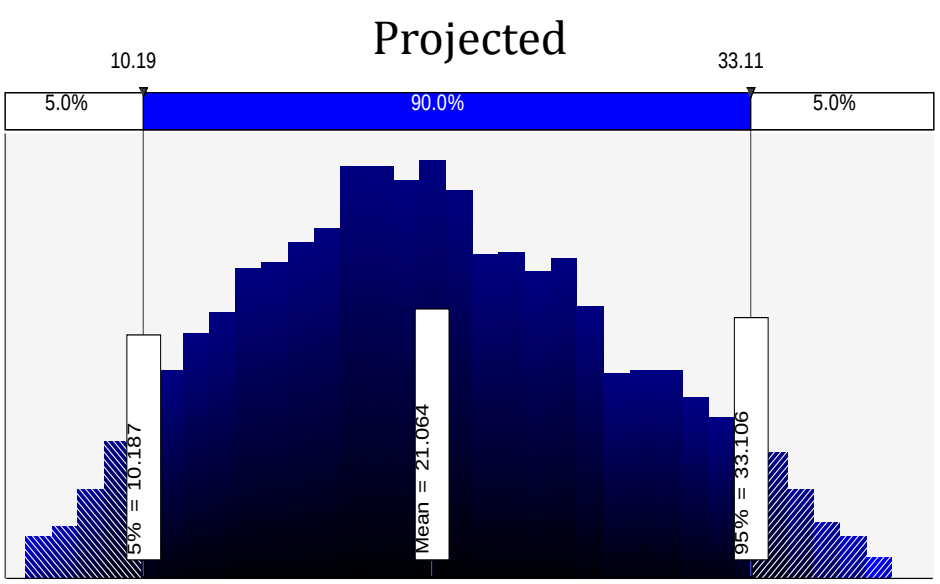


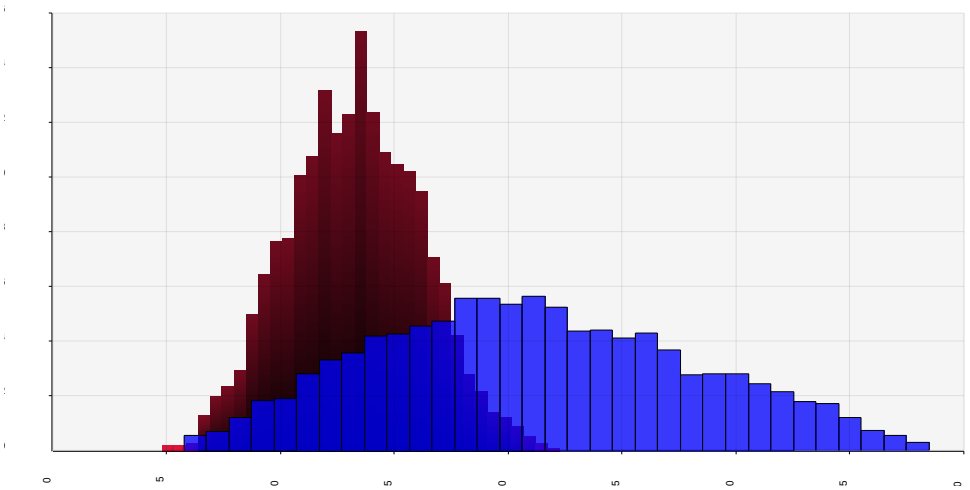




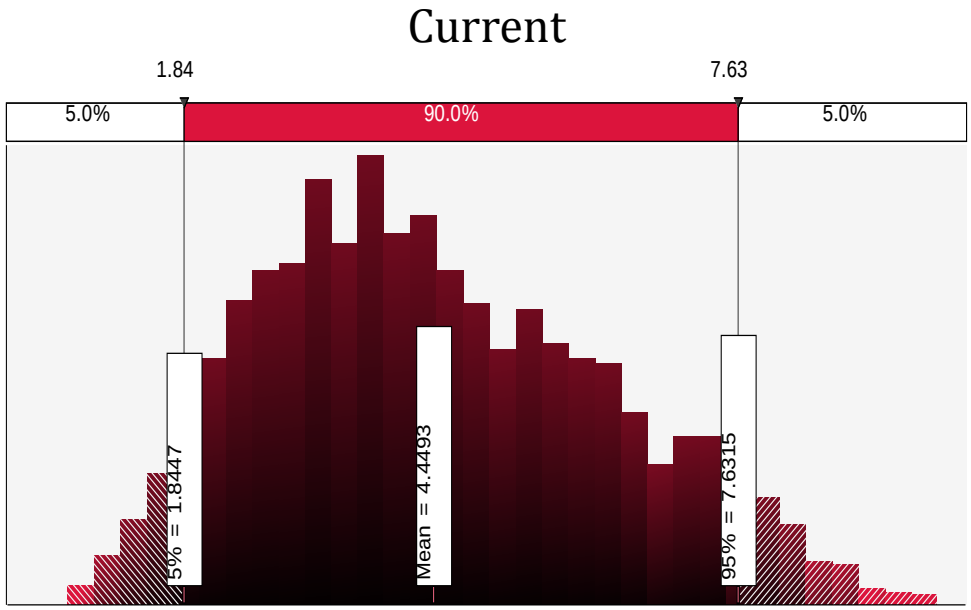
FC_Organizational Competencies (per capita $)

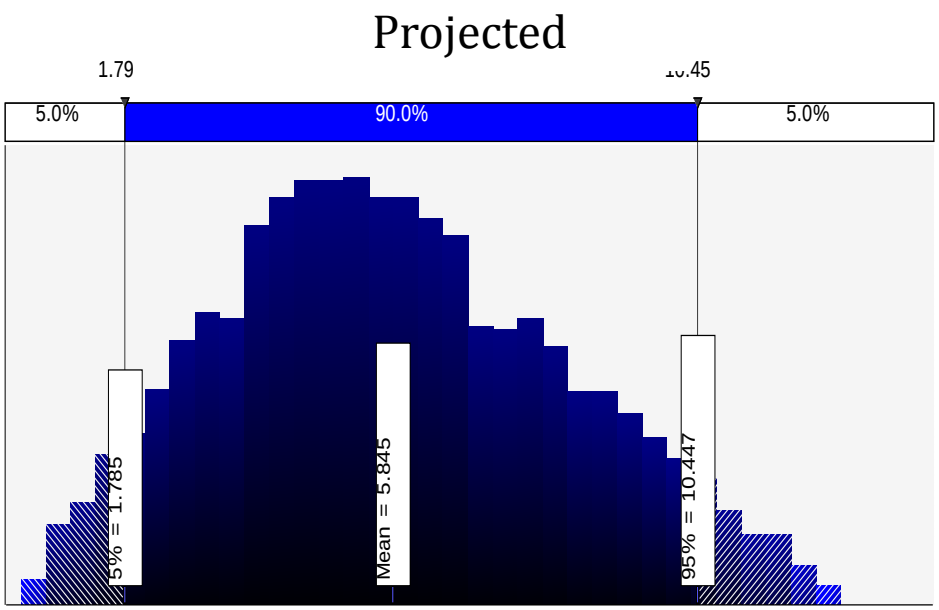


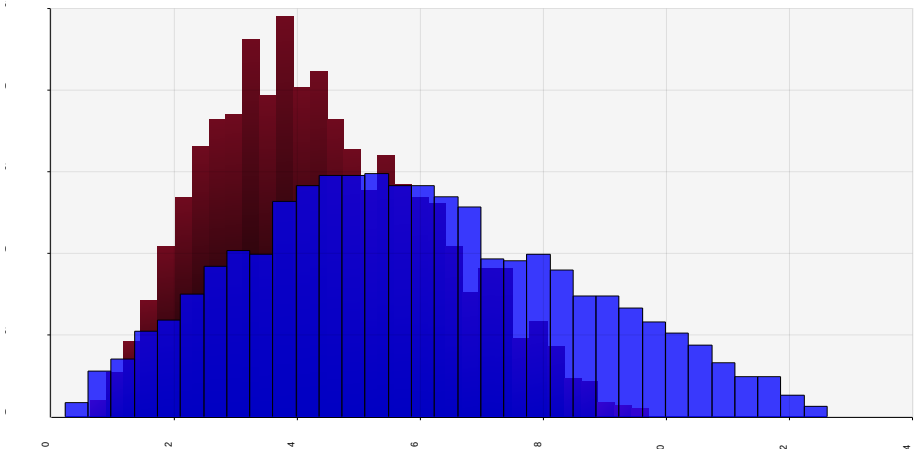




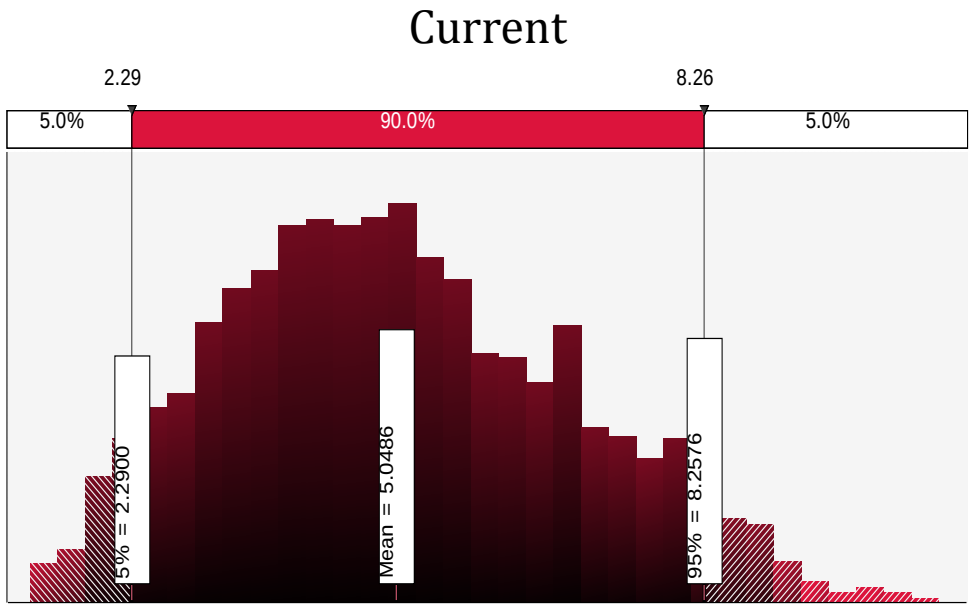
Foundational Area (FA)_Communicable Disease Control (per capita $)

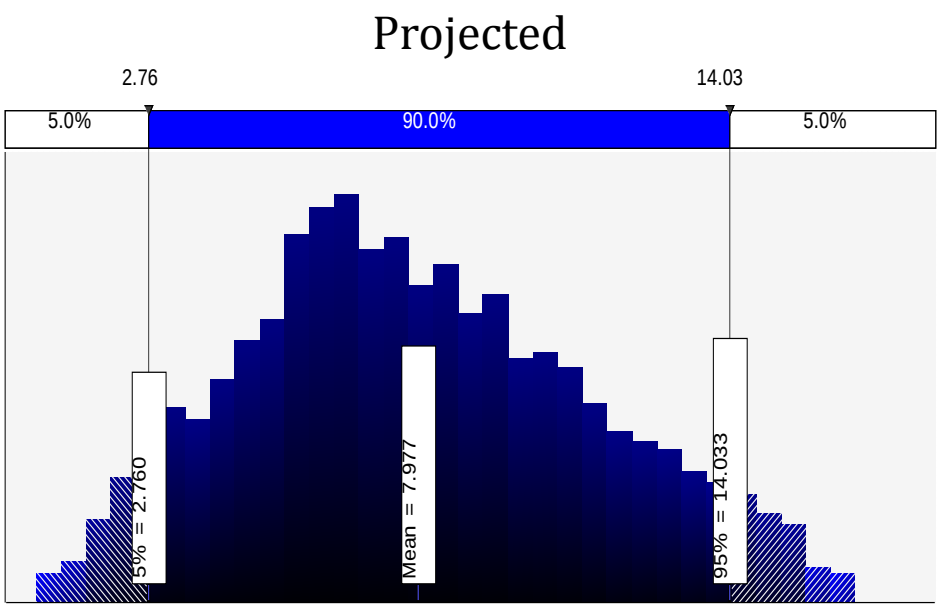


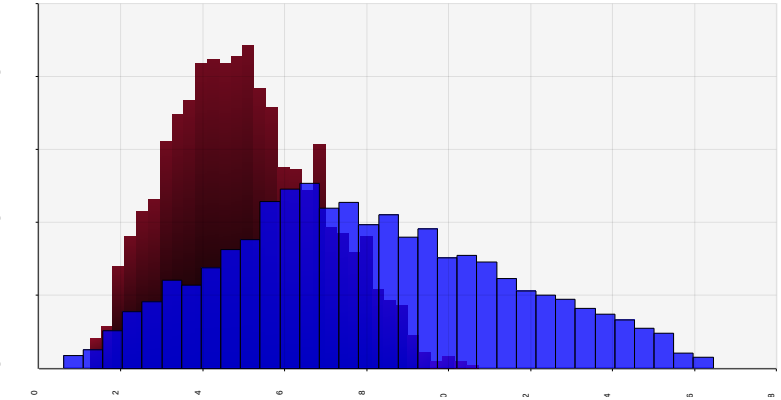




FA_Chronic Disease & Injury Prevention (per capita $)

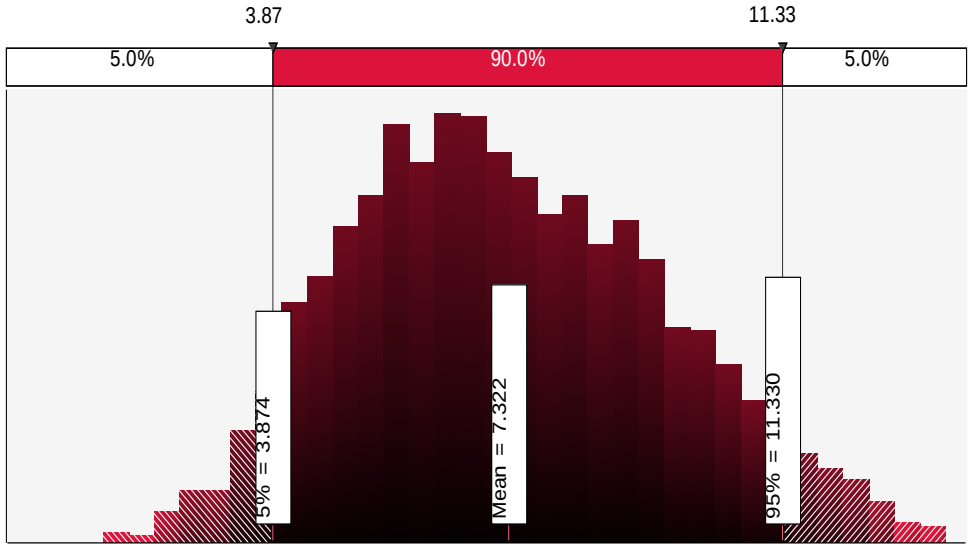




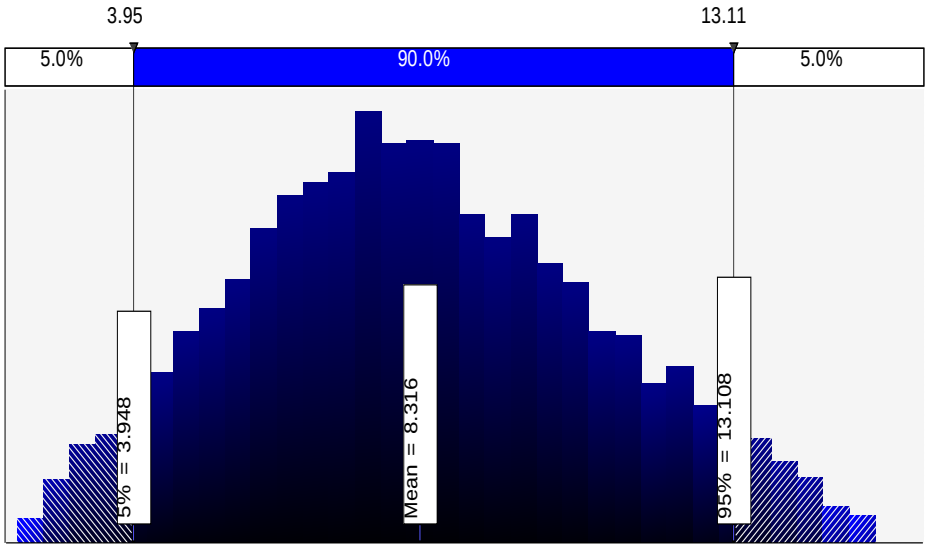


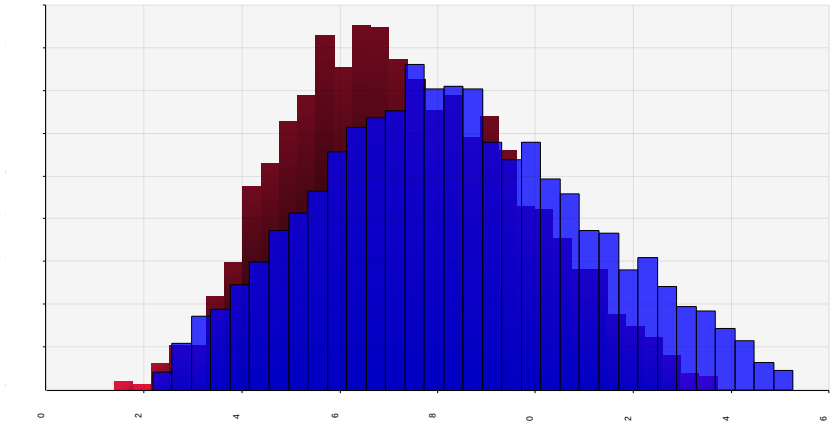
FA_Environmental Public Health (per capita $)

Current

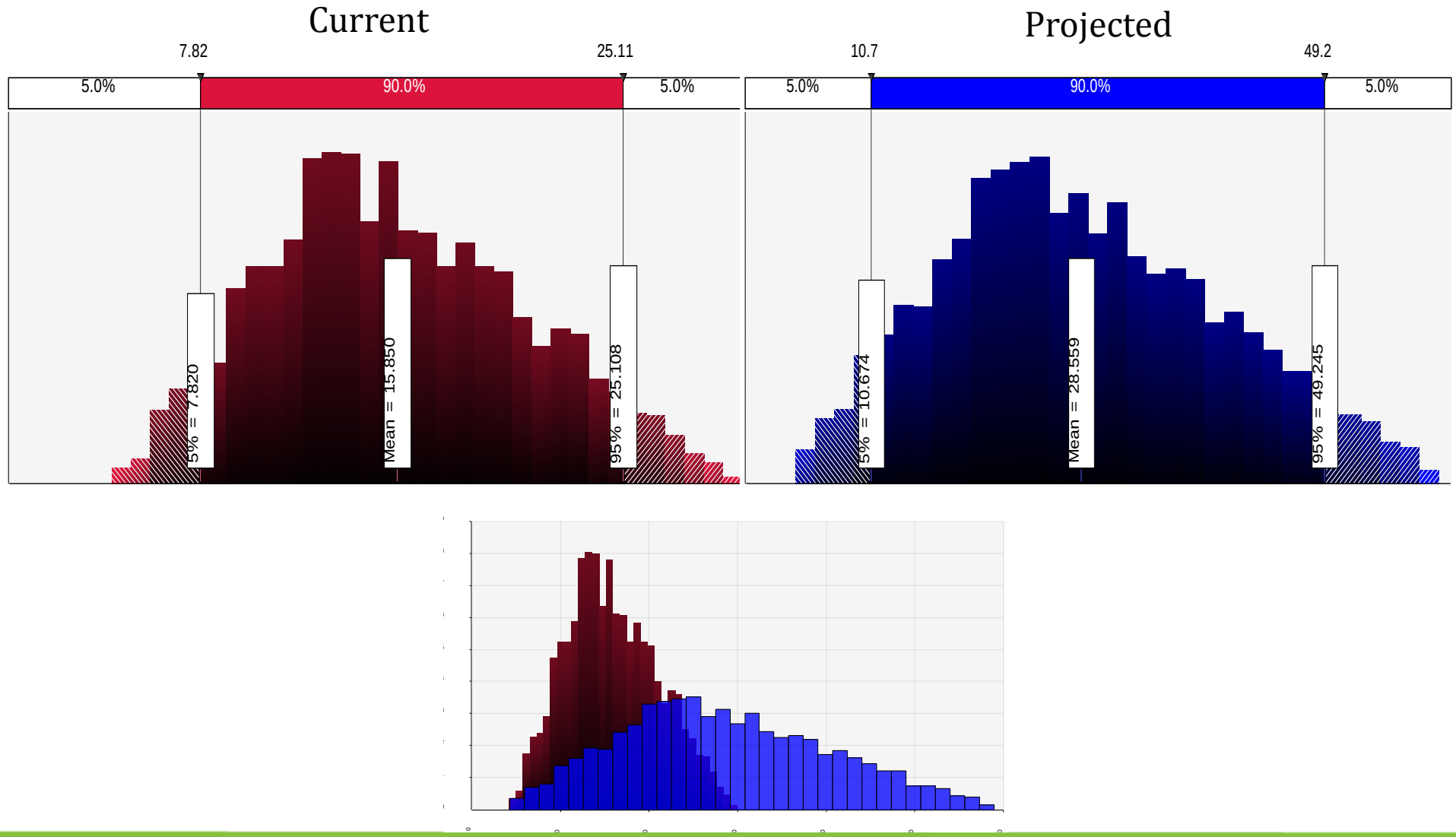


Projected

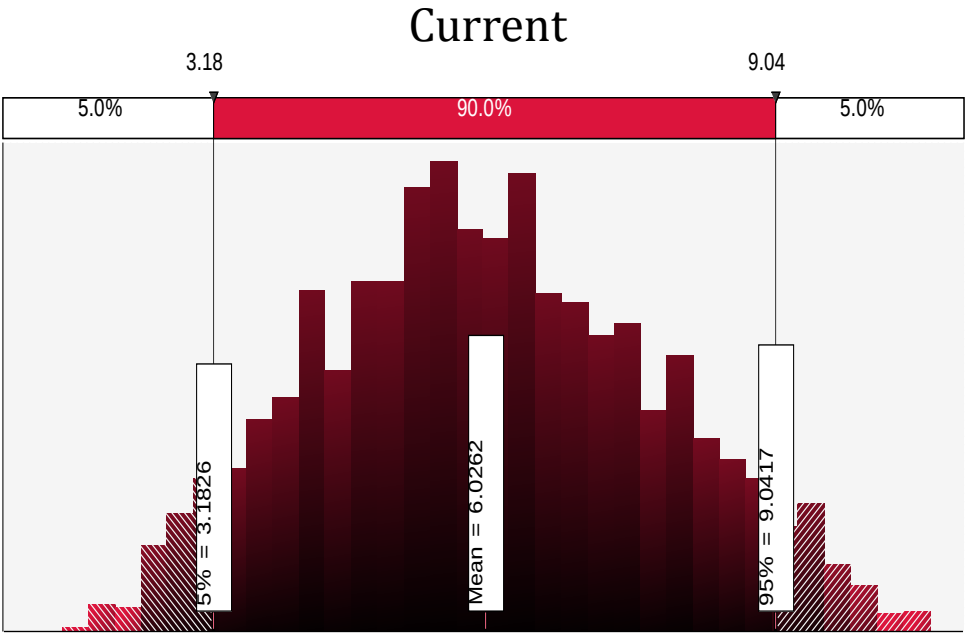


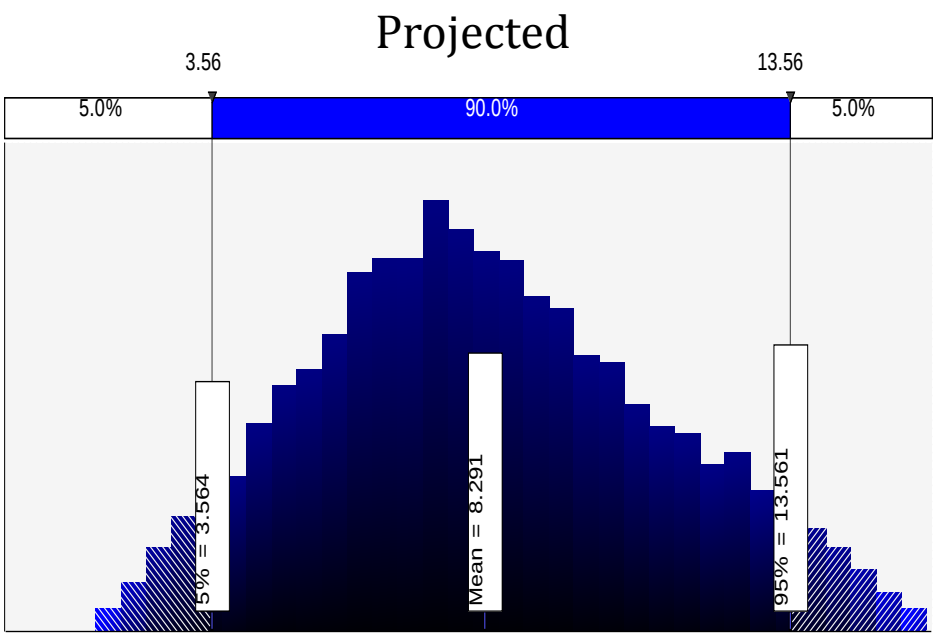


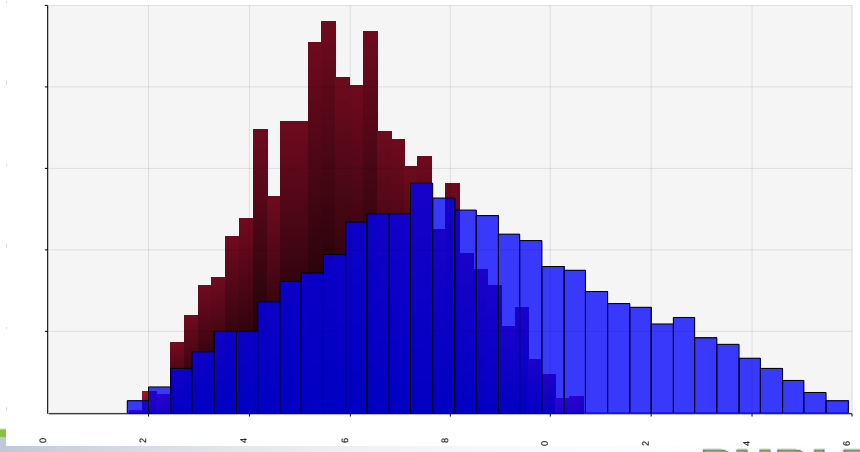
FA_Maternal Child and Family Health (per capita $)



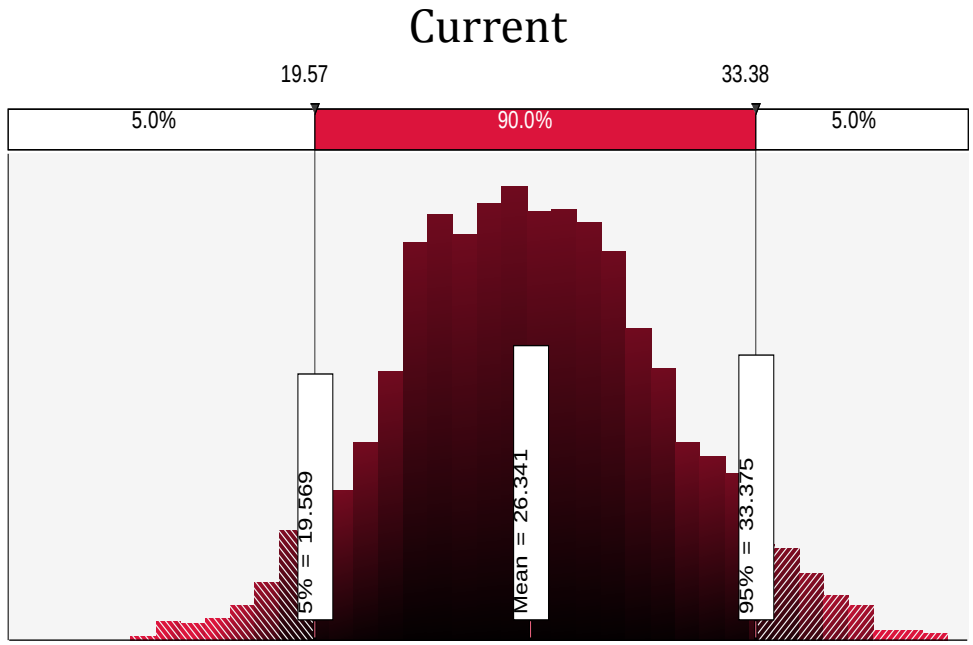
FA_Access to & linkage w/ Clinical Care (per capita $)

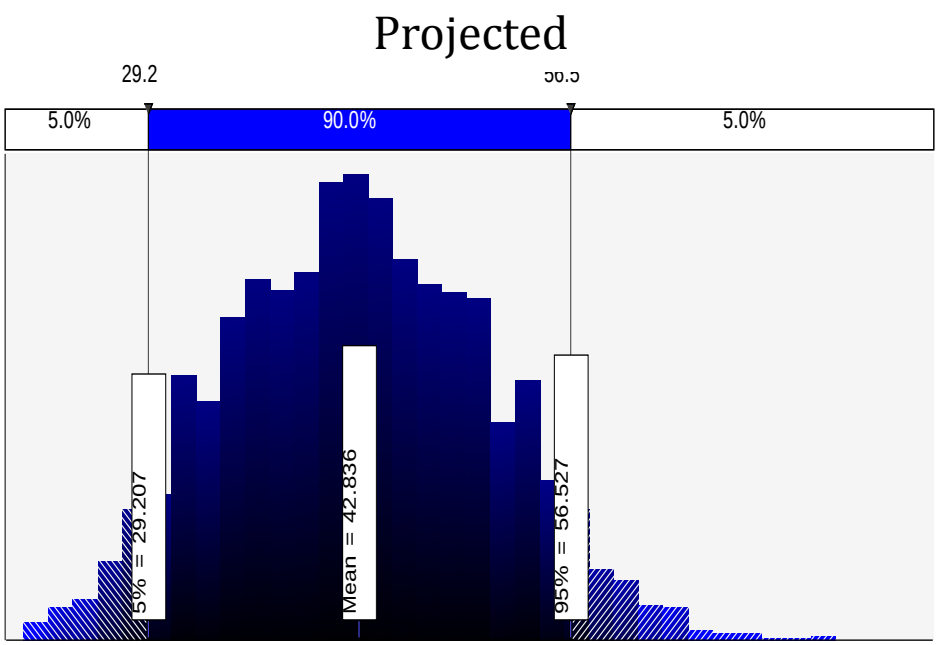


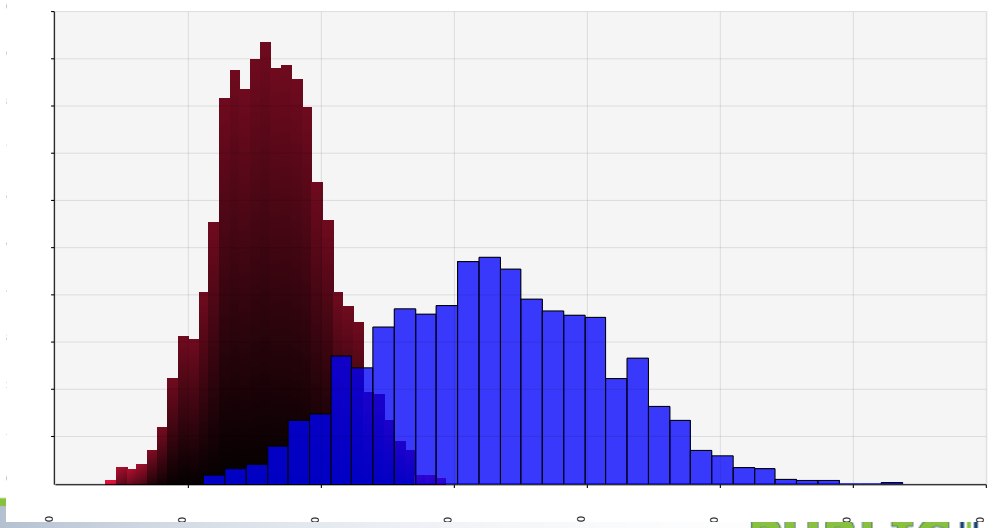




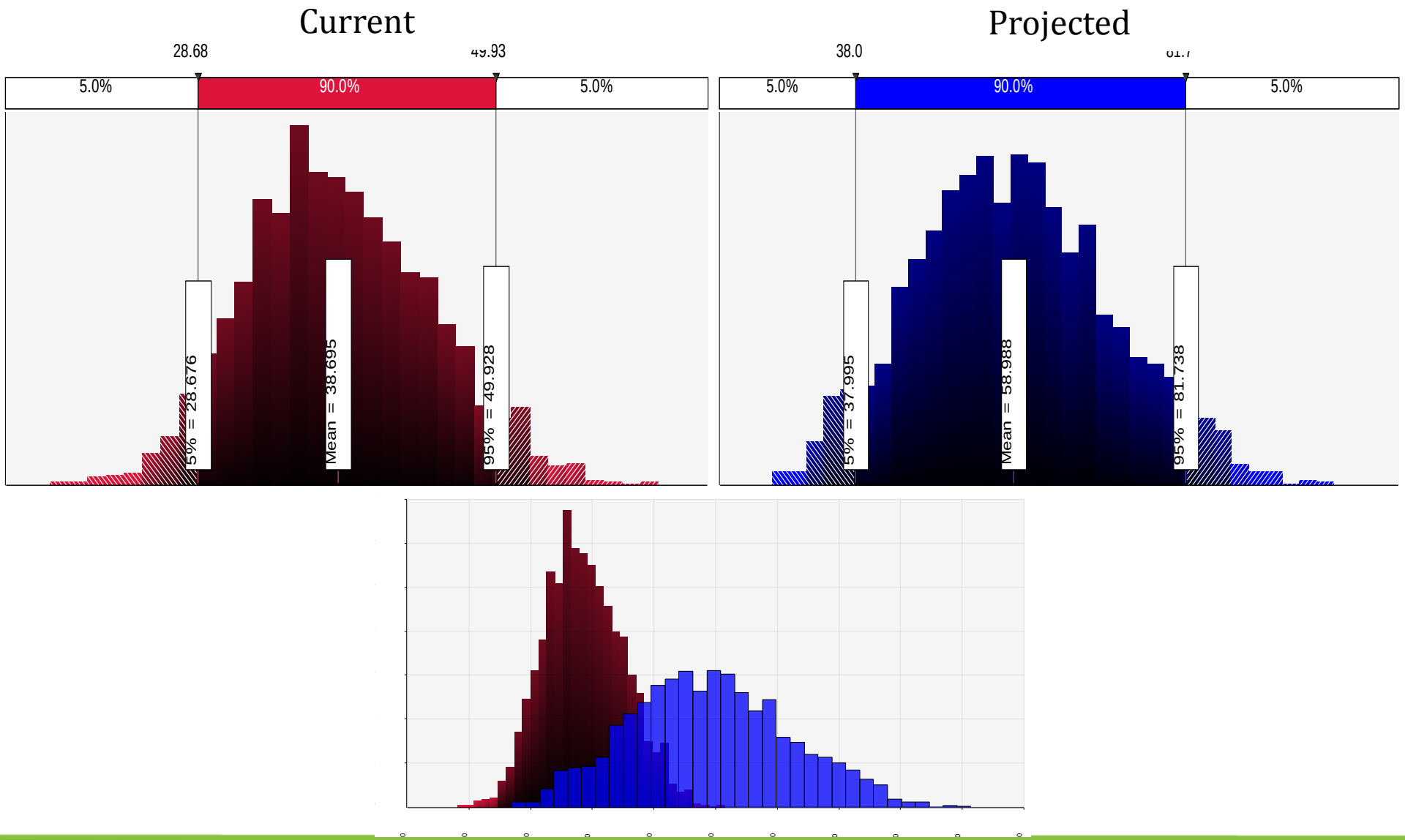
Foundational Capability – Total Costs per capita (Current & Projected)





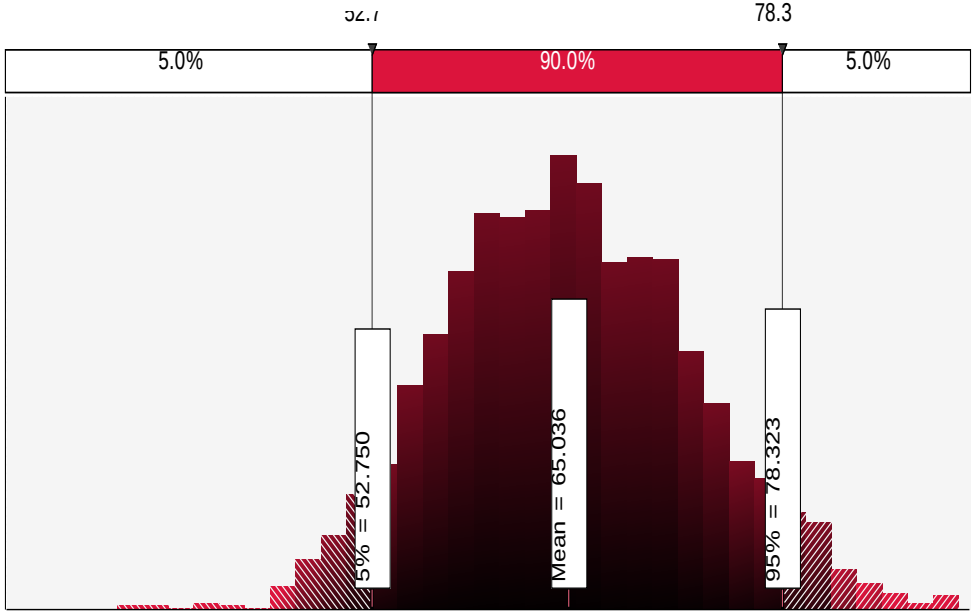


Foundational Areas_Total Costs per capita (Current & Projected)

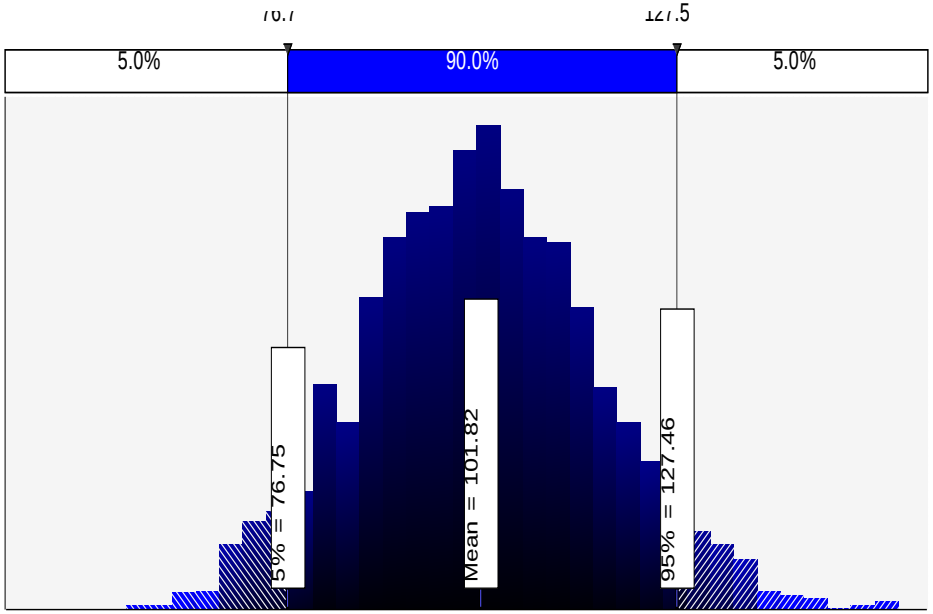


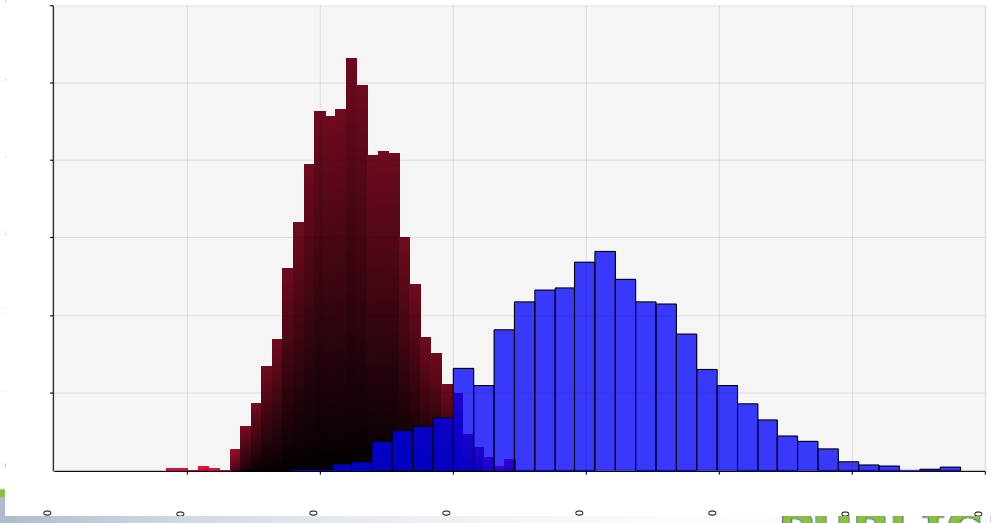
Total Local Per Capita Cost Estimates: Current and Projected

Current

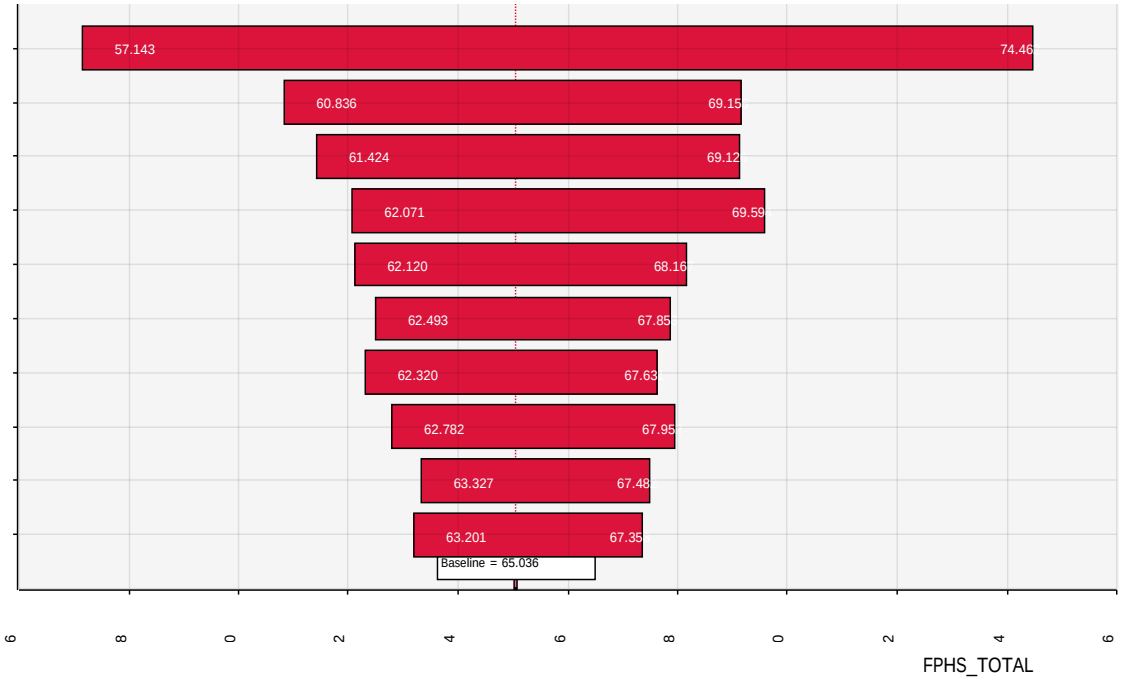


Projected

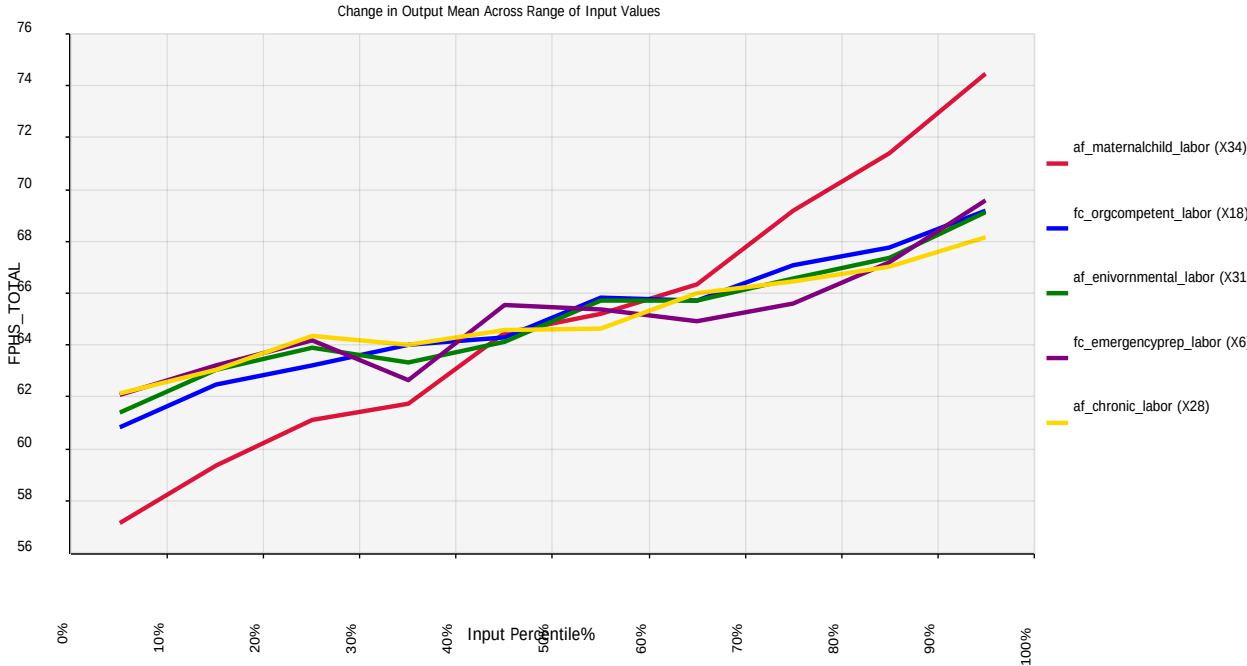




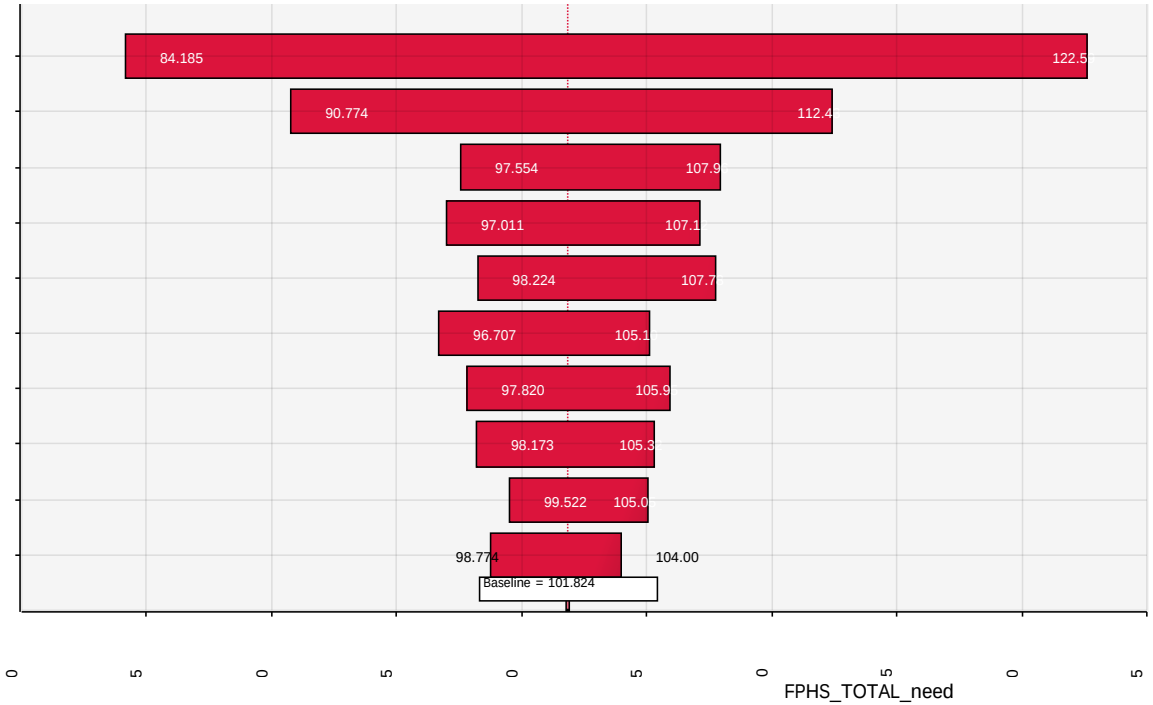
Drivers of Total Current Costs: Which FCs and FAs are Most Influential?



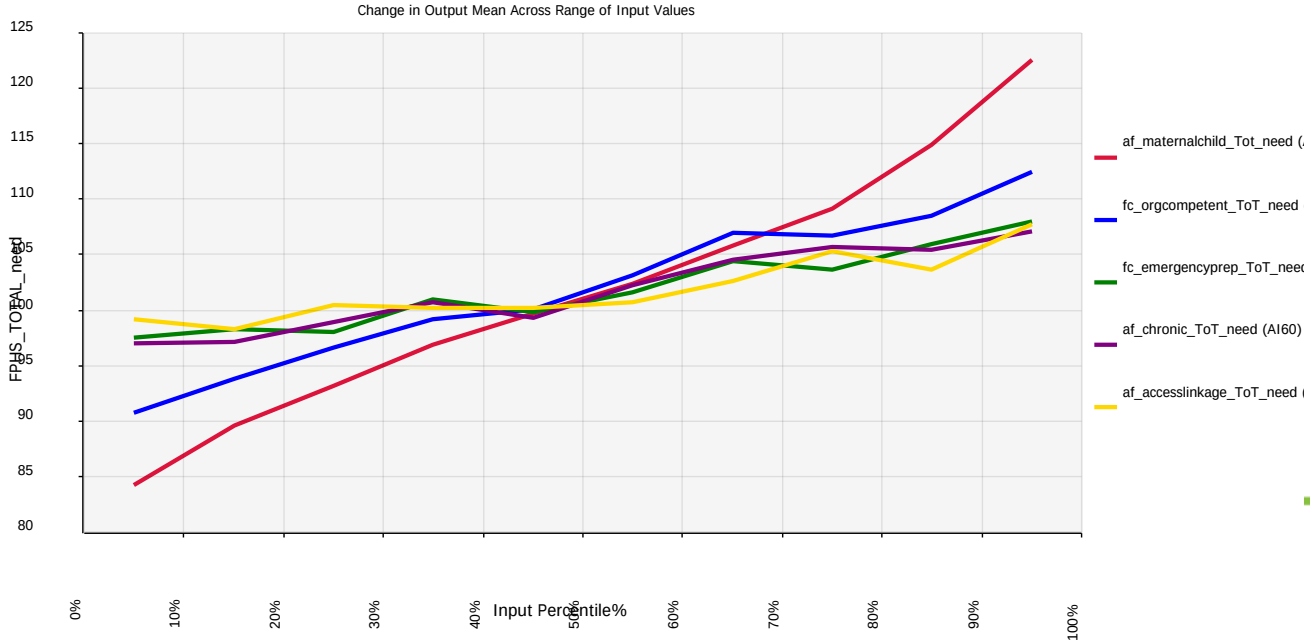
Sensitivity Analysis for Total FPHS Costs per capita (current)



Drivers of Total Projected Costs: Which FCs and FAs are Most Influential?



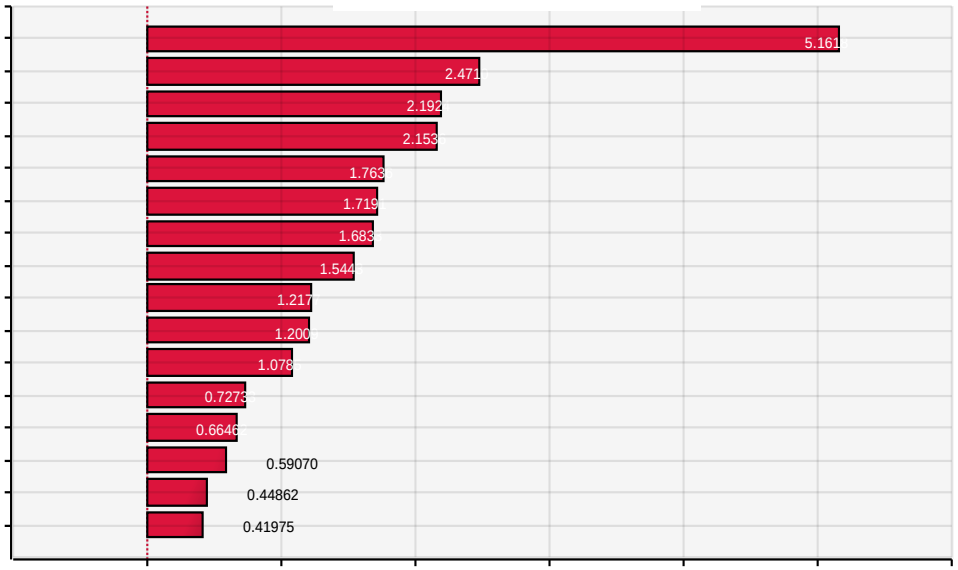
Sensitivity Analysis for Total FPHS Costs per capita (Projected)



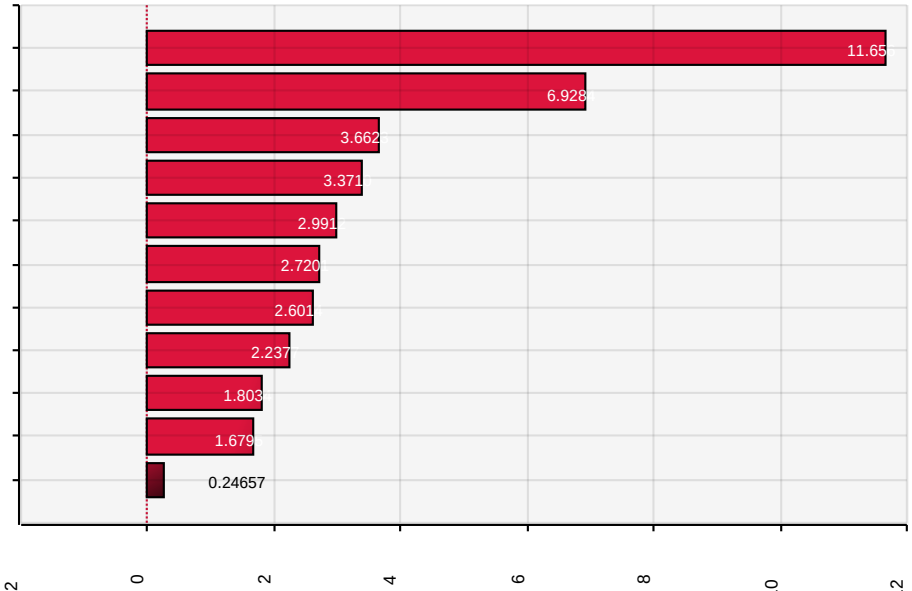
How Sensitive Are Total Costs to FCs and FAs

Sensitivity Analysis for Total FPHS Costs per capita (current & projected) – standardized beta coefficients

Current



Projected



Comparison of Cost Estimates

Washington PHIP - BERK Foundational Cost Report

- $328 million total annual cost projected (state+local)
- $165 million local annual cost projected
- $47 total per capita cost projected
- $24 local per capita cost projected

Kentucky Pilot Project Baseline (i.e. most likely)

- $286 million local annual current cost
- $65 local per capita current cost
- State cost estimates TBD

Other State Estimates (different definitions & methods)

- Ohio: $32 local per capita current cost
- Colorado: $37 local per capita current cost

Next Steps: National Estimates

- National stratified, nested sample of state and local jurisdictions
- Selection of 6 states stratified by administrative structure:
  - Centralized: AR, SC
  - Shared: FL, GA (KY)
  - Decentralized: NY, CA (WA)
- Selection of 3 local jurisdictions in each state, stratified by population: <50k | 50-299k | >=300k
- Supplement data already collected from KY, WA
- Web-based survey administration with telephone support

For More Information

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National Coordinating Center

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