Evolution in Cost of Service Methodology: 
Human Health and Functional Cost Allocation

Rick Giardina & Manny Teodoro

February 2019

Introduction

This paper advances the idea of expanding the conventional water utility cost of service methodology to include *human health* explicitly as a core function of a drinking water utility.

Few utility leaders would dispute that protecting human health is absolutely central to a drinking water utility’s mission. Indeed, the American Water Works Association’s (AWWA) strategic plan declares that the Association’s first core principal is to “protect human health.” Yet despite its centrality and prominence to drinking water systems, *human health* receives virtually no consideration in current water cost-of-service (COS) methodology.

**Human health as a core function**

Providing water for basic human health needs—drinking, cooking, cleaning, and sanitation—is perhaps the principal reason that drinking water utilities exist. In addition to the literally essential good that drinking water service provides to private individuals, basic level of drinking water service can be understood as a *public good*. Outdoor irrigation and other discretionary water uses that drive average and peak water demands may not be public goods, but basic water use reduces disease and overall social costs. People who have access to safe, reliable drinking water are healthier and more productive. Just as current COS methodology provides for firefighting as a public good, so too could it provide for human health as a public good.

As articulated in AWWA’s *Manual M1*, the framework that defines cost-of-service ratemaking principles focuses on meeting a community’s average use, peak demands, total water volume needs, and fire flow requirements. Although *M1* has grown considerably in scope and complexity since its first edition in 1954, the functions that define cost of service for ratemaking purposes remain fundamentally unchanged. Thus, the foundational principles of ratemaking in the United States predate the Safe Drinking Water Act by twenty years. Today the overall cost of water utility service—and therefore financial burdens on ratepayers—are significantly greater than they were when *M1* was first developed. Failing to identify and allocate costs for human health needs limits the degree to which public health concerns can be reflected appropriately in rate design and broader utility policy decisions.
Toward a new functional cost

Incorporating human health into conventional COS methodology would involve introducing a fifth functional category to the four categories currently employed under the base-extra capacity and commodity-demand approaches to functional cost allocation. Consistent with current COS analyses, the new human health function would reflect the hypothetical costs of building, operating, and maintaining a system that was designed only to provide for basic human health needs. For example, the States of California and Texas have each identified water use of 50 gallons per capita per day (gpcd) as a basic indoor efficiency standard; alternatively, Chenoweth argued that 35.6 gpcd is the effective minimum water requirement for a developed society, and a 2014 Pacific Institute study identified an efficient indoor water use level of 32 gpcd. The precise definition of basic human health needs could be adapted to individual utility contexts.

In principle, the share of source of supply, treatment, storage, transmission, and distribution facilities that would be necessary to provide those basic needs would be allocated to the new human health function. Upsizing to provide for greater average demands, peak demands, and commodity volumes beyond what is necessary for human health would be allocated to the existing functions. These functional costs would be used to calculate unit costs and subsequently allocated to customers and/or customer classes, exactly as current cost-of-service methodology proceeds.

Implications and applications

Integration of human health into conventional cost-of-service functional allocation methodology would offer several advantages. First, theoretically and symbolically, recognizing human health as a core function for ratemaking purposes would bring this process into alignment with AWWA’s stated mission. In the same way, placing human health at the center of COS methodology helps underscore the connection between utility costs and community health.

Human health as a functional cost component would offer several practical advantages for COS-based ratemaking, as well. A human health function would provide the theoretical and legal rationale for rate structures that improve affordability. For example, human health functional costs could be used to help define volume allowances to be included with residential rates, appropriate charges for low-volume usage under volumetric structures, and/or lifeline

---

rates. These considerations are likely to become more important in future as Automated Meter Infrastructure (AMI) technology becomes ubiquitous and submetering in multifamily housing grows more common. Separating human health as a functional cost could also help clarify rate-setting for gray water systems, reclaimed water, and urban irrigation services.

Finally, articulating human health explicitly as a public good could provide a COS basis for “public health” rates and for rate-funded customer bill assistance programs for low-income customers. Establishing such a rationale for COS may be particularly important in places where state laws restrict or entirely prohibit ratepayer-funded assistance programs. Once fully integrated into M1, human health as a functional cost could in many cases help adjudicate claims over the legality and appropriateness of such programs.

The way forward

Affordability has moved to the forefront of the water sector; this evolution in COS is consistent with the Association’s and more importantly with its member utilities’ fundamental mission: clean, safe water for all.

Bringing this evolution from theory to reality will involve developing support from the AWWA’s Rates and Charges Committee as it begins the M1 Update process. At this time the way forward requires the initial support of R&C and AWWA to embrace and then integrate this new principle into the COS methodologies. Once support for the general principle is established, detailed methods for applying the human health principle into COS can be developed.