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MEMORANDUM

Subject: Health Risks of Low-Income Households

To: John Regnier, National Rural Water Association

From: Scott J. Rubin

Date: September 5, 2006

At your request, I have conducted a preliminary review of the academic and medical literature on the relationship between income level and public health risks. As we have discussed, my work is very preliminary and by no means represents a comprehensive literature search in this field. In addition, as you know, I have not conducted any original data analysis in preparing this memorandum. NRWA may want to consider sponsoring this type of analysis, using for example health-related data collected annually by each state and compiled by the U.S. Centers for Disease Control and Prevention (CDC) as the Behavioral Risk Factor Surveillance System (BRFSS).

There is a growing body of academic and medical literature examining the relationship between income and public health.[1] In 2005, Krieger et al. published the results of a comprehensive analysis conducted at the census tract (CT) level for two states (Massachusetts and Rhode Island). A census tract consists of approximately 4,000 people, so such an analysis provides a very close link between observed effects (in this case, 18 specific diseases or other serious health effects) and various demographic characteristics, including income and poverty. The authors concluded:

> Significant trends of increased risk associated with living in increasingly poor CTs were evident for virtually all outcomes except breast and colon cancer incidence … Within the total population, the rate ratio for persons in the most impoverished CTs compared with persons in the least impoverished CTs exceeded 2.0 for 10 of the 18 outcomes analyzed.

That is, poverty was associated with a significant increase (on average a doubling) in the incidence of serious health outcomes, such as low birth weight, lead poisoning, tuberculosis, lung cancer, diabetes, and others.

[1] One study that reached a slightly different result is Mansfield et al. (1999). The authors studied the relationship between various socioeconomic factors and premature mortality at the county level. They found that per-capita income was not a significant explanatory variable, but that related factors, such as race, education level, unemployment, and welfare spending were highly significant and strongly correlated with the prevalence of death before age 75.

The authors also found that for 10 of the health outcomes studied, "more than 50% of cases would not have occurred if population rates equaled those of persons living in the least impoverished CT." In other words, if everyone had the income of the wealthiest census tracts studied, the health of the population would increase dramatically. Thus, they emphasized "the widespread and often profound extent to which socioeconomic deprivation adversely shapes population health, from infancy to death."

Studies that look at different measures of public health have reached similar conclusions. For example:

- Beckles and Thompson-Reid (2002) evaluated the incidence of diabetes in women by income level, and found that "women with diabetes were approximately twice as likely as women without diabetes to have an annual household income < $25,000."

- Zabran et al. (2003) evaluated a broad measure of health, known as the Health-Related Quality of Life (HRQOL) for adults in the United States. They found that "low-income adults [annual household income less than $15,000] aged 45-64 years have worse HRQOL than all other adults."

- Hayes et al. (2005) found that more than 50% of low-income people (annual household income < $20,000) had two or more risk factors for heart disease and stroke, compared to fewer than 29% of high-income (≥ $50,000 annual household income) people.

- Hesser and Jiang (2005) analyzed HRQOL in Rhode Island and concluded that poor health indicators were greatest "for persons with household incomes less than $25,000 and lowest for persons with household incomes of $50,000 or more." Further, they concluded that by almost every measure "the rates for the lowest income group were twice, or more than twice, as great as the rates for the highest income group. These differences were all statistically significant. The most extreme difference occurred for general health status, where 28% of the lowest income group reported poor/fair general health, a rate 7 times greater than for the highest income group."

Another important example is evident in the study of influenza in the elderly. Influenza is one of the United States' (and the world's) greatest public health problems. Dushoff et al. (2005) estimate that 41,400 deaths per year occur in the United States from influenza. Nichol (2005) concludes that in the elderly, influenza vaccinations reduce the level of hospitalizations for pneumonia and influenza by more than 30% and the number of deaths by almost 50%. Yet, Lemon et al. (2004) found that the likelihood of a person age 65 or older receiving an influenza vaccine decreased significantly as income decreased. Specifically, the authors found that only 58.5% of the elderly with incomes less than $15,000 were vaccinated, compared with 71.2% of those with incomes of $35,000 or more.

A further element of the problem is evident in the literature involving food insecurity and hunger. Food insecurity is defined as the lack of access, "at all times, to enough food for an active, healthy life for all household members." USDA (2005). Hall and Brown (2005) summarize much of the literature on food insecurity and conclude it is a serious public health concern because it is linked to inadequate nutrition that "may contribute to or exacerbate disease, quicken the advance of

aging-related degenerative diseases, and delay recovery from illnesses." Further, they explain that, in the elderly, food insecurity has been shown to "increase disability, decrease resistance to infections, and extend hospital stays."

USDA's most recent data on food insecurity show that 34% of households with incomes less than 130% of the poverty level were food insecure in 2004. Moreover, 12.3% – 1 in every 8 households – at that income level experienced hunger (the most severe form of food insecurity) during 2004. The level of food insecurity is 7 times higher for low-income households than it is for higher-income households (incomes of at least 185% of the poverty level).

In summary, there are numerous indications that the level of health experienced by low-income households is significantly lower than that experienced by the typical, higher-income household. Low-income households are significantly more likely to be afflicted with various diseases including lung diseases, various types of cancer, diabetes, and others. Low-income households have a higher prevalence of risk factors for heart disease and stroke, are less likely to be vaccinated against influenza, are significantly more likely to lack adequate nutrition (which can lead to numerous adverse health consequences), and are more likely to give birth to low birth-weight children.

Our concern, as you know, is that as the cost of drinking water increases – purportedly to improve public health – it will further diminish the already limited resources available to low-income households to provide for their other health needs. For example, influenza contributes to the death of more than 41,000 Americans each year. The health benefits from improved access to flu vaccines are orders of magnitude greater than the benefits from removing a particular chemical from drinking water. Yet, by increasing the cost of water, low-income people are less able to afford flu vaccines, thereby increasing their health risk.

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