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## Contingent Valuation Scenarios for Chronic Illnesses: The Case of Childhood Asthma

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### ABSTRACT

**Objectives:** We use a contingent valuation (CV) study of childhood asthma to discuss a central issue in designing CV studies of chronic illness—the need for a detailed, realistic scenario that minimizes confounding factors—and show how to address this issue. We apply our methodology to estimate households' willingness to pay (WTP) for reductions in asthma morbidity. **Methods:** By using a combination of focus groups, revealed preference surveys, and epidemiological surveys, we gathered information on health status, attitudes, and beliefs regarding asthma, risk-averting behaviors, perceptions of these behaviors, and household socioeconomic characteristics. We used this information to design a CV survey that we extensively tested for validity. In the survey, we elicited participants' WTP for a hypothetical device that would reduce symptom-days by improving asthma management; these data enabled us to estimate household WTP by using a variety of econometric models. **Results:** Our analysis of households with children with asthma yielded the following conclusions: the scenario should address both physical asthma symptoms and the

psychosocial stress of managing a chronic illness; the survey should measure household perceptions of the burden of asthma in addition to objective measures such as symptom-days; and the scenario should not involve substantial behavioral changes or a new medication, to avoid confounding household preferences with unrelated attributes of the scenario. Our primary models estimated mean household WTP for a 50% reduction in symptom-days (and accompanying reductions in psychosocial stress) at \$56.48 to \$64.84 per month. **Conclusions:** Our methodology can be used to inform CV studies of chronic illness. Our WTP estimates can help regulatory agencies assess a wide range of policies that affect the incidence or severity of asthma.

**Keywords:** asthma, attitudes and beliefs, chronic illnesses, contingent valuation, quality of life.

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### Introduction

Globally, more than 300 million people suffer from asthma, leading to approximately 15 million disability-adjusted life-years annually; an estimated 1 in every 250 deaths internationally is due to asthma [1]. In the United States, the cost of asthma was more than \$37 billion in 2007 [2]. More generally, chronic illnesses are internationally the leading cause of mortality and disease burden [3], costing approximately \$1.5 trillion annually in the United States [4].

Developing accurate tools for valuing changes in chronic illness is a high priority for health economics. In this article, we discuss a central design issue in valuing chronic illness and address this issue in the context of childhood asthma. To capture the total welfare impact of asthma on households, we chose the contingent valuation (CV) method over alternatives such as the cost-of-illness approach or the revealed preference method. We estimated a parent's willingness to pay (WTP) to reduce her child's asthma morbidity by surveying participants in an epidemiological study of children's asthma, combining data on households with a

revealed preference survey and the CV survey. To ensure that the WTP values we estimated were most informative for policy and program evaluation, we administered the CV survey to parents whose children currently have asthma symptoms and we specified that respondents would pay out of pocket for the hypothetical good. Thus, our data correspond to the privately financed, private goods scenario (described by Shackley and Donaldson [5]) and are appropriate for our suggested uses.

Because household quality of life is affected by both physical asthma symptoms and uncertainty about when an attack might occur, a valuation scenario should reduce both the frequency of asthma episodes and the accompanying psychosocial stress. The survey should measure the household's perception of its asthma burden in addition to objective data such as the number of symptom-days. Finally, the scenario should not require substantial behavioral changes or new medications, so that stated values do not reflect unrelated household preferences.

To promote the development of guidelines for health valuation, we describe the design of the survey as well as the model results. We used our WTP estimates to test the validity of the

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scenario. Our estimates can be used for multiple policy analyses, ranging from cost-benefit analyses of air quality regulations to evaluations of health programs.

## Previous Literature

Contingent valuation is a methodology for valuing changes in health status. CV arose in the environmental economics literature as an approach to overcome the lack of markets for public goods [6]. There have been more than 1500 applications of CV, many dealing with environmental goods [7]. CV has increasingly been applied to the valuation of health outcomes and regulatory review of health policies [8,9]; however, previous authors have noted that the overall quality of CV health studies is disappointing [8,10]. Policymakers have specifically noted the need for a valuation of the burden of child asthma [10].

The validity of a CV study depends on the quality of the hypothetical scenario, which should provide saliency through realistic, detailed descriptions but should also avoid embedding or anchoring to a reference good. The implementation of CV has been thoroughly discussed in the environmental economics context [11–13], but issues specific to health require further study, especially given concerns in the health economics literature regarding responses to hypothetical scenarios [8,14–16]. Most health economics CV studies do not conform to existing guidelines for a robust CV study [8,14]. Smith [8] finds that the hypothetical devices in 111 previous studies were poorly constructed and described. A valid CV study for environmental [6,11–13] or health outcomes [17–19] requires a hypothetical scenario that is realistic to the respondents and a sample that is representative of the population of interest.

We explore these methodological issues through a study of childhood asthma. There has been little research estimating WTP to reduce asthma morbidity for children. Rowe and Chestnut [20] used a broad scenario eliciting willingness to increase taxes to “set up programs that could reduce pollens, dusts, air pollutants, and other factors.” Some studies on adult asthma [21–23] used CV to elicit WTP for hypothetical medications that would eliminate asthma symptoms or cure asthma. But these studies are in many ways flawed: it is difficult to disentangle preferences for air quality improvement from reductions in asthma morbidity [24]; survey responses include unmeasured bias against medications; the sample of respondents may not accurately represent the entire population of child asthma cases; and because improvements in our understanding of asthma suggest that a complete cure is not credible, the hypothetical presented is unrealistic. Furthermore, these scenarios do not value the broader psychosocial burden—uncertainty, daily management—associated with asthma, and therefore do not address the real-life experiences of respondent households. The stress caused by lacking control over one's health can have a detrimental effect on a broad range of outcomes [25–27].

## Methods and Application

We examine four essential components of a credible health valuation study.

### Population of Interest

Studies show substantial disparities by race/ethnicity and income in asthma-related hospitalizations, emergency room visits, and school absences [28–30]. For these reasons, it is important to base valuation estimates on a sample that reflects the increased prevalence of asthma morbidity among minority and low-income households. The consensus approach is to sample individuals

who are personally familiar with the health outcome [14,17–19] and make household money allocation decisions. This is essential for a chronic illness, because it is difficult for someone unaffected by a disease to appreciate its full impact on the quality of personal and family life. Our approach is consistent with that of previous studies that value the impact of a health intervention on both the child's health and the overall quality of family life [31,32]. Last, theoretical models suggest that parents are appropriate proxies for children [10], and the difficulties of administering a CV survey to children render doing so impractical.

Like Rowe and Chestnut [20] and Dickie and Gerking [33], we administered two economic surveys (a revealed preference survey and a contingent valuation survey) to participants in an asthma epidemiology study. This strategy reduces sample size (because such studies typically have small enrollments) but provides easy access to the target population. We combined our economic study of household behaviors with epidemiological and demographic data collected by the Fresno Asthmatic Children's Environment Study (FACES), a 5-year epidemiological study of households with children aged 5 to 11 years with clinically diagnosed asthma living in Fresno, CA.

### Qualitative Study and Scenario Development

Families vary in their WTP for improvements in their children's asthma. They also vary in their beliefs about and attitudes toward asthma [34–37], the degree to which the disease affects household quality of life [34,35,37], attitudes toward and trust in the health care sector [37–39], and their perceptions of the risk of asthma symptoms due to environmental pollution [40]. To the extent that these attitudes and beliefs are related either to WTP for medically irrelevant attributes of the valuation scenario or to standard explanatory variables, ignoring these sources of heterogeneity will produce biased estimates. Therefore, we used a preliminary qualitative study to measure these variables and designed a scenario to minimize their influence.

First, we conducted a revealed preference survey of FACES participants on four topics: health status, attitudes and beliefs, averting behaviors and their perceived risks and benefits, and socioeconomic characteristics. We supplemented the data from this survey with data from the epidemiological study on the child's asthma morbidity. Next, we conducted three waves of focus groups (four to five sessions with four to six participants each) to understand health behaviors and influences on household choices from the family's perspective. Focus groups included families in the Fresno area, Hampden and Hampshire counties in Massachusetts, and Oakland, CA. FACES participants were included in the first two waves but excluded from the third, so that we could administer the CV survey to the complete FACES cohort.

In the first wave, discussion topics were drawn from three models of health behaviors—the Health Belief Model, the Theory of Reasoned Action, and the Theory of Social Cognition—and covered perceptions regarding susceptibility to asthma, disease severity, benefits from taking action, barriers preventing action, health behaviors, and subjective norms concerning behavior. In the second wave, we developed a specific hypothetical product to be used in the CV scenario. The hypothetical product was inspired by two products consistently mentioned by parents: the pulmonary function tests used in the epidemiological study and the fingertip oxygen monitor used in medical offices. In the third wave, we identified the questions or concerns that respondents might have about our product, and we tested different hypothetical versions of it to minimize complicating issues.

This qualitative study provided three important lessons. First, the nonmarket welfare effects of asthma include both acute symptom episodes (physical effect) and the chronic stress caused by the lack of control over the disease (psychosocial effect).

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