Children's Diet Quality and Nutrient Intakes in the Household Production Model

The household production model used by economists to study health behaviors and outcomes offers a rich framework for estimating and interpreting the determinants of children's nutrient intakes and diet quality (Behrman and Deolalikar, 1988; Strauss and Thomas, 1996). The model integrates biological, socio-demographic, and economic factors, all of which influence household production efficiency and consumption decisions. The basic idea behind this model is that households allocate time and goods to produce commodities, including the health of children and other family members, so as to maximize a joint utility function. Subject to technology, time, and income constraints, the household utility maximization generates individual and household demand functions for health, health inputs, and other consumption goods.

The reduced-form food and nutrient demand equations resulting from household utility maximization can be written as functions of a vector of prices **p**, income I, a vector of individual and household characteristics **x**, and unobserved household and individual effects, **u** (for example, Haughton and Haughton, 1997; Senauer and Garcia, 1991). The reduced-form nutrient demand functions resulting from the above maximization framework have the general form

$$\mathbf{c} = \mathbf{f}(\mathbf{p}, I \mid \mathbf{x}, \mathbf{u}) \tag{1}$$

where **c** is a vector of nutrients consumed.[1] Because a child's overall diet quality (measured here by the HEI) is a composite measure developed from the foods and nutrients consumed, its reduced form has an identical form given by

$$HEI = f(\mathbf{p}, I \mid \mathbf{x}, u). \tag{2}$$

Most cross-sectional studies using the household production approach assume that prices are either fixed or captured by regional dummy variables and focus mainly on income and components of **x**. The usefulness of the household production approach in estimating functions of the above form is in guiding what should be included among **x**. With respect to child-health inputs and outcomes, the vector **x** has traditionally included four sets of variables: child's characteristics, parental characteristics, household characteristics, and community characteristics (Strauss and Thomas, 1996). Introducing mothers' knowledge of health and nutrition as an additional variable into the above equation reflects its role as a factor mediating part of the influence of the **x** variables on children's health and nutrition. The major question in this regard is whether the effects on health of some of the variables in **x** reflect differences in parental knowledge of health and nutrition. Consider, for example, the effect of education. Several studies from developing countries (Barrera, 1990; Kassouf and Senauer, 1996; Senauer and Garcia, 1991; Thomas and Strauss, 1992) cite a link between mothers' education and the nutritional status and health of their children. Yet education is seen as working mainly by improving allocative efficiency: education increases the mother's access to knowledge and information, enabling her to select a better input mix for more efficient child health production (Grossman and Kaestner, 1995; Thomas, Strauss and Henriques, 1991).

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[1] In a fully specified household production model, the time and income constraints are expressed as a "full income" constraint that leads to reduced-form demand functions that contain wage rates (the value of time) and full or nonlabor income. In such a model, money income is subject to endogeneity because it reflects time allocated to work in the labor force. However, Senauer, Sahn, and Alderman (1986) found that empirical results are similar when either "full" or "money" income is used.

This view suggests that reduced-form health or health input equations estimated without explicit control for the effect of health knowledge may overstate the effect of education. Other characteristics that influence child health and nutrition, such as income, may also play a similar role partly through their effect on mothers' knowledge. These issues can be addressed by introducing a measure of mothers' nutrition knowledge into the reduced-form equations 1 and 2.

A key empirical issue in sorting out the maternal information effect concerns the potential endogeneity of any information measure. Any effect detected for mothers' information on children's diet quality may represent unobserved maternal and household factors that are influencing both. To some extent, such effects can be controlled by including parental background characteristics such as height, weight, and household characteristics in the HEI function or the nutrient intake equations. However, given that not all background characteristics are observable, children's diet quality and maternal information both need to be treated as jointly determined. In this case, equations 1 and 2 can be expanded and written as

$$\text{(3)} \qquad \begin{aligned} HEI &= f(\mathbf{p}, I \mid \mathbf{x}, K, u), \\ K &= g(\mathbf{z}, v), \end{aligned}$$

and

$$\text{(4)} \qquad \begin{aligned} \mathbf{c} &= \mathbf{f}(\mathbf{p}, I \mid \mathbf{x}, K, \mathbf{u}), \\ K &= g(\mathbf{z}, v) \end{aligned}$$

where K is a measure of mothers' knowledge of health and nutrition, $\mathbf{z}$ is a vector of knowledge determinants, and v is an unobserved individual effect that may be correlated with $\mathbf{u}$.