Can Food Stamp receipt improve Diabetes control and reduce Medicare costs for Elderly Diabetics? Evidence from Biomarker Data

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Nearly one quarter of older adults in the United States currently has diabetes, putting them at increased risk of premature death, disability, heart disease, kidney failure, and other complications (Centers for Disease Control, 2008). These trends raise concerns about the medical and financial burden of elderly diabetics, particularly to the publicly funded Medicare and Medicaid systems. This study examines the relationships between participation in the United States Department of Agriculture's Food Stamp Program (FSP) and clinical indicators of diabetes management and food stamp receipt and Medicare costs for older, diabetic adults. The FSP may improve blood sugar control by improving access to a diet consistent with the American Diabetic Association's treatment guidelines emphasizing fruit, vegetables, whole grains and low-fat dairy (ADA, 2008). This diet is recommended to stabilize blood sugar (glucose) level, improve blood pressure and cholesterol levels and reduce weight. Food stamps can improve diabetes management if recipients use food stamps to increase spending on foods that facilitate diabetes control, using the food stamps as an input in health production functions. Improved health in turn can reduce Medicare spending by preventing adverse outcomes.

This study use including newly collected physiological indicators of diabetes control and survey data from the Health and Retirement Study (HRS) to assess the role of the FSP in meeting treatment goals for blood sugar (Hemoglobin A1c level); HDL cholesterol levels; and weight (body mass index) of elderly diabetics. Use of clinical outcomes avoids measurement error problems inherent in earlier studies which have attempted to evaluate the impacts of the FSP using dietary recall data (Currie, 2003). The quality of self-reported FSP participation by older adults in the HRS is high relative to other datasets (Haider et al., 2003). In addition to the key independent variable, whether a household received food stamps during each year, the HRS collects information about respondents' income, assets and participation in means-tested programs; clinical health measures including diabetes duration, comorbidities, and treatment regimen; health behaviors including diet and exercise; health access measures including insurance coverage, quality and continuity of care; and sociodemographic variables including age, race, education level, household composition and employment history.

Relative to other diabetics in the HRS sample, diabetic food stamp recipients are less likely to meet treatment guidelines for blood sugar and cholesterol control, though these differences are largely explained by sociodemographic characteristics.

Reduced form probit and OLS regression models will be used to examine the relationships between Food Stamp receipt and the measures of clinical compliance.

$$Pr(TG_i = 1|F_i,X_i) = \Phi(F\alpha+X\beta) \quad \textbf{(1)}$$

$$Y_i = \gamma F_i + \delta X_i + \varepsilon_i \quad \textbf{(2)}$$

where TG is an indicator equal to one if the respondent's level of each of the three dependent variables (HbA1c, HDL cholesterol and BMI) are within the ADA treatment guideline values; Y is the measured value for the dependent variables, F is an indicator of household food stamp receipt and X is a vector of demographic, income and health characteristics outlined in Table 1. Outcomes will be analyzed as dichotomous and continuous measures since food stamp receipt may affect diabetes management without pushing a patient across the recommended threshold.

Results from Models **(1)** and **(2)** will not necessarily yield causal estimates of the effect of food stamps. It is likely that other unobserved variables affect both food stamp participation and diabetes control. Several robustness checks can be used to examine the sensitivity of these results to variable specification and respondent characteristics. Take-up rates of FSP benefits are low for eligible elderly, a finding which has been difficult to explain empirically. Haider et al. (2003) present evidence that eligible non-participants are less needy than those who do enroll, though it is unknown whether this generalizes to elderly diabetics. I will compare food stamp recipients to eligible non-participants as well as those income but not asset eligible. An important component of this work will be descriptive comparisons of elderly diabetic food stamp recipients and other groups. This is an important population to understand both from a policy perspective and a research perspective to identify appropriate control groups.

Two potential identification strategies will be used to isolate causal effects of food stamp receipt. Food stamp recipients will be matched to control groups described above using propensity scores. Causal inference using propensity scores requires the assumption that observed characteristics are the only confounding covariates between food stamp receipt and diabetes control. This assumption is more likely to be satisfied using HRS data than other studies because the HRS collects detailed information about behavioral, demographic and health characteristics that are unobserved in other datasets. Sensitivity tests prescribed by Rosenbaum

(2005) will be used to estimate the size of unobserved differences between food stamp recipients and other groups that would have to be present if unobserved selection is driving initial findings.

Variation in the food stamp benefit amount for which a household qualifies provides a potential source of identification since households eligible for larger benefits are expected to be more likely to participate in the program. Currie (2003) points out that benefit amounts reflect choices made by beneficiaries such as whether to work and thus face limitations as instruments. To minimize these complications, I instrument for food stamp receipt using the maximum benefit a household would qualify for based only on Social Security income and housing costs. The latter are assumed to be fixed in the short-run, and Social Security income is governed by program formulas and laborforce decisions which occurred well in advance of decisions about food stamps and diabetes treatment.[1]

The second portion of the study uses HRS data from 1996-2005 merged with Medicare enrollment and utilization data for respondents who have consented to have their Medicare records released to the HRS. The sample will be limited to respondents who have already been diagnosed as diabetic in 1996 or the earliest subsequent year for which Medicare claims data are available. The sample will be limited to those who qualify for Medicare at age 65. A subset of time-varying variables defined in Table 1; food stamp participation, household income, assets, health status and conditions, and employment will be included as independent variables. The dependent variable in this regression is total Medicare spending on behalf of the individual in each year. For Fee-for-Service enrollees, this is the sum of all provider reimbursements, for managed care beneficiaries this is the annual payment to a managed care plan.

Fixed effect regression of annual Medicare spending on food stamp receipt and control variables will be estimated following

$$S_{i,t} = \gamma F_{i,t} + \delta X_{i,t} + I + Y + \varepsilon_{i,t} \qquad \textbf{(3)}$$

where $S_{i,t}$ is total Medicare spending for beneficiary i in year t, I is a vector of individual fixed effects and Y is a vector of time dummies. Other variables are as defined previously. Equation **(3)** will be estimated using several specifications of F as in the previous analysis. Propensity

[1] One limitation of this design is that those who take early retirement age will receive reduced monthly Social Security benefits and thus qualify for more generous food stamp benefits all else equal. This will violate the IV exclusion restriction if diabetes influences the decision to claim early benefits. This will be tested by examining those who took early benefits separately and by analyzing diabetes survey data to determine whether there is a relationship between whether the beneficiary reports that diabetes affected the decision to stop working and estimated food stamp benefit amount.

score matching and instrumental variables approaches discussed in Part 1 will be used to address the potential endogeneity between food stamp receipt and Medicare costs.

I expect to find that participation in the Food Stamp program is associated with improved glucose and cholesterol control for elderly diabetics and lower Medicare spending on their behalf. Although dietary modifications can play a large role in reducing the prevalence and severity of diabetes, prevalence rates are increasing in the elderly population and medical outcomes for diabetics are not improving (Sloan et al., 2008). Very little is known about the role of the FSP in improving these outcomes though there is tremendous potential to reduce the Federal cost of diabetes through improved dietary quality for diabetics. The excess estimated Medicare spending on diabetics relative to non-diabetics alone is nearly twice the size of total Food Stamp spending (Gold et al., 2007).

Results have important implications for future changes to the FSP including efforts to increase elderly take-up rates and a greater focus on improving recipients' nutrition. Findings from this study will be used as pilot results in support of a larger study that can test for a causal effect of Food Stamp receipt on diabetes management, cost of care and other relevant outcomes such as mortality. Pilot findings will provide information about the data needs for further quasi-experimental evaluation, particularly whether future data collection efforts should focus on longitudinal biomarker collection or larger cross-sectional collection.