Three measures of disease prevalence: The good, the bad, and the ugly

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Abstract

Reliable measures of disease prevalence are crucial for answering many empirical research questions in health economics, including the causal structures underlying the correlation between health and wealth. Much of the existing literature on the health-wealth nexus relies on survey data, for example those from the Health and Retirement Study (HRS). Such survey data typically contain self-reported measures of disease prevalence, which are known to suffer from reporting error. Two more recent developments – the collection of biomarkers and the linkage with data from administrative sources such as insurance claims – promise more reliable measures of disease prevalence. In this paper, we systematically compare these three measures of disease prevalence.

1. Introduction

Reliable measures of disease prevalence are crucial for answering many empirical research questions in health economics, including the causal structures underlying the correlation between health and wealth. Much of the existing literature on the health-wealth nexus relies on survey data, for example those from the Health and Retirement Study (HRS). Such survey data typically contain self-reported measures of disease prevalence, which are known to suffer from reporting error. Two more recent developments – the collection of biomarkers and the linkage with data from administrative sources such as insurance claims – promise more reliable measures of disease prevalence. In this paper, we systematically compare these three measures of disease prevalence.

This work extends an existing literature that compares survey self-reports and biomarker-based measures of disease prevalence. These papers focus on diabetes (Goldman et al., 2003; Baker et al., 2004; Smith, 2007; Barcellos et al.; 2012, Chatterji et al., 2012) and/or hypertension (Goldman et al., 2003; Johnston et al., 2009; Barcellos et al., 2012; Chatterji et al., 2012). These are all diseases for which biomarkers can be obtained relatively easily in community surveys such as the U.S. Health and Retirement Study (HRS).[1] One paper, Yasaitis et al. (2015), compares survey self-reports of Acute Myocardial Infarctions (AMI) (with diagnoses documented in Medicare claims data that have been linked to the HRS data. The present paper combines these approaches. Focusing on diabetes and using HRS data, we perform a three-way comparison of survey self-reports, biomarkers (the HbA1c marker, described in section 2 below), and clinical diagnoses documented in linked Medicare claims.

Substantively, the results from prior literature show that survey respondents tend to underreport the prevalence of diabetes and hypertension, compared to `objective' measures from biomarkers. There are socio-economic status (SES) gradients both in prevalence itself and in the measurement error contained in self-reports, but they are not necessarily the same.

Goldman et al. (2003) find in data from Taiwan that survey self-reports vastly underestimate the prevalence of hypertension, but yield a reasonable accurate estimate of diabetes prevalence. The accuracy of self-reports is predicted by age, education, time of the most recent health exam, and cognitive function.

For the U.S., Smith (2007) documents predictors of diabetes prevalence and undiagnosed diabetes using data from three NHANES waves. He finds that diabetes prevalence is predicted primarily by excessive weight and obesity. Inheritance of diabetes through parents is also important. These forces were only partially offset by improvements in the education of the population over time. Further, Smith shows that about 1 in 5 male diabetics was

[1] Other surveys used in related studies include the National Health and Nutrition Examination Survey (NHANES) in Smith (2007) and Barcellos et al. (2012); the Health Survey for England (HSE) in Johnston et al. (2009); and the Canadian National Population Health Survey (NPHS) in Baker et al. (2004). A related study that uses the HRS Chatterji et al. (2012).

undiagnosed in the 1999-2002 NHANES wave. While race and ethnic differentials in undiagnosed diabetes were eliminated over the last 25 years, the disparities became larger across other measures of disadvantage such as education. Undiagnosed diabetes is a particularly severe problem among the obese, a group at much higher risk of diabetes onset. Also for the U.S. and with NHANES data, Barcellos et al. (2012) study undiagnosed diabetes among Mexican immigrants. The striking finding is that these immigrants might be much less healthy than previously thought because diseases remain undiagnosed at a much higher rate than among other groups of the U.S. population. With respect to diabetes, Barcellos et al. document that about half of recent immigrants with the disease remain undiagnosed.

An important issue is whether the measurement error contained in survey self-reports is related to socio-economic status (SES). The findings in Smith (2007) and Barcellos et al. (2012) suggest that this is indeed the case for diabetes in the U.S. Similar SES gradients in undiagnosed hypertension have been documented by Johnston et al. (2009) for England.

Curiously, for AMI the measurement error contained in survey self-reports goes the other way: Yasaitis et al. (2015) find that less than half of those who reported a heart attack in their HRS sample had evidence of acute cardiovascular hospitalizations in the Medicare claims data. Further, they did not find associations between demographic characteristics and the frequency with which self-reported AMI was verified by Medicare claims.

In particular the last result suggests that measurement error in survey self-reports can be subject to both Type I and Type II errors. While there is some evidence, the issue of whether these errors are predicted by SES is still open. Moreover, diseases might also be undiagnosed in claims data, and differential access to medical care might introduce an SES gradient there as well. An important consideration which we will not address in this paper is to what extent selectivity in linked samples – due to incomplete consent of survey respondents to either biomarker measurement or to claims data linkage – contributes to observed SES gradients in the various measures of disease prevalence and the associated measurement errors.

The remainder of the paper is structured as follows. We discuss the data used in Section 2. Section 3 contains the results, and Section 4 concludes with a summary of our findings and a discussion of avenues for future research.

2. Data

In the descriptive analysis presented in the paper, we use three linked datasets: biomarker data on diabetes prevalence are taken from the HRS (2006 and 2008), self-reports of diabetes are taken from the RAND HRS dataset (because SES covariates are readily defined there as well), and information on diabetes prevalence from Medicare claims that is linked to HRS respondents is provided by the Medicare Research Information Center (MedRic). Column 2 of table 1 displays the number of observations in each of these datasets. Column 3

shows the number of observations with non-missing diabetes indicators. Columns 4, 5 and 6 contain the diabetes indicators in each of the datasets. In the biomarker data, we use HbA1c levels with 6.5% as a threshold (the NHANES equivalent value)[2]; in the Rand HRS data, we use the self-reported diagnosed diabetes; in the claims data, we use an "ever had" diabetes claims indicator as provided by MedRIC.[3] In the 2006 Biomarker data, for instance, 12.38% of the respondents have diabetes according to their HbA1c threshold, while 19.6% of the respondents from 2006 HRS report ever having been diagnosed with diabetes in the HRS. In the linked MedRIC claims data 25.34% of individuals have insurance claims for diabetes. However, these samples contain different individuals that vary in age for example. The rates are thus not directly comparable.

After merging the 3 datasets, we have 4,118 observations for year 2006 and 3,904 observations for year 2008. This includes individuals with different types of Medicare coverage, in particular, individuals who are in traditional Medicare (in a fee-for-service (FFS) plan) and individuals who are enrolled in Medicare Advantage and are enrolled in a Health Maintenance Organization (HMO). For individuals in HMOs we do not observe all relevant claims and we thus conduct all analyses also excluding this group of individuals. If we only focus on non-missing diabetes-related variables, we have 3,956 observations for 2006 and 3,853 observations for 2008. Excluding HMO individuals and focusing on non-missing diabetes-related variables, we have 2,517 observations for 2006 and 2,370 observations for 2008.

Column 4 and 5 of the bottom panel of table 1 display diabetes prevalence rates for the linked samples. Even in the linked sample diabetes prevalence is lowest according to the biomarker data and highest in the claims data. This pattern is similar in both years. We explore these patterns in more detail in the next section.

3. Results

We first consider diabetes prevalence by gender and by educational levels (Table 2). For education, we use the 5 education categories in the RAND HRS data: less than high school; GED; high school graduates; some college; college and above. Results in the lower panels of table 2 show educational gradients in diabetes based on all three diabetes indicators.

[2] To be added: Discussion of the HbA1c measure, including summary of the medical literature (Rohlfing et al. 2000; Reynolds et al., 2006; Bennet et al., 2007; WHO).

[3] In the MedRIC Claims data, the diabetes flag is coded either 0 or 1 with no missing values. However, in the other CMS Medicare Data, it is coded in 4 levels: (1) Incomplete claims coverage for the reference period and diagnosis not found; (2) Incomplete claims coverage for the reference period and diagnosis found; (3) Complete claims coverage for the reference period and diagnosis not found; (4) Complete claims coverage for the reference period and diagnosis found. In the MedRIC Claims data, we do not know how the cases with incomplete claims were coded. We have computed descriptive statistics in two samples: one uses the whole sample which includes those who ever have HMO months (and for whom we might thus not have all relevant claims information), the other uses the sub-sample which excludes the HMO individuals and focus only on the FFS respondents.

Furthermore, in all education groups, diabetes prevalence is lowest according the HbA1c and highest in the claims data.

Tables 3–6 show within comparisons for years 2006 and 2008. Take the results of the whole sample reported in table 3 as an example. For roughly 85% of respondents self-reported diabetes and diabetes according to the Hba1c biomarker are consistent. Specifically, about 74% of the respondents have HbA1c levels lower than 6.5% and reported no diabetes; about 11% of the respondents have HbA1c levels higher than 6.5% and reported diabetes. However, 15% of the respondents have inconsistent results according to the two diabetes indicators. Specifically, 3.26% of respondents have higher than 6.5% HbA1c levels but reported no diabetes (possibly under-diagnosis); 11.40% of the individuals have HbA1c levels lower than 6.5%. The latter cases may reflect over-diagnoses or diabetes cases that are successfully treated. We explore this in more detail below (in tables 7-10).

In the middle panel of tables 3-6 we compare diabetes according to biomarkers and claims data. In this comparison, roughly 20% of the respondents have inconsistent results. 4.85% of the sample have no diabetes claims yet have HbA1c levels that exceed 6.5%. 15.07% have diabetes claims, but their HbA1c level is below 6.5%.

The bottom panel of tables 3-6 compares HRS self-reported diabetes against diabetes claims. The discrepancies are smaller. 4.52% of the sample reported ever having been diagnosed with diabetes but have no diabetes claims (one of the reason might be that the sample includes individuals who were in an HMO and we therefore do not have their information on diabetes claims. But even when limiting the sample to individuals who are in FFS Medicare (table 4), 3.1% have HbA1c levels above 6.5% but no diabetes claims), while 6.6% of the respondents reported not having been diagnosed with diabetes but have diabetes claims.

In Tables 7–10, we look at over-diagnosis in more detail. Again, take the 2006 sample as an example. The first panel of Table 7 is similar to the first panel in Table 3 but we only focus on the group of individuals who have HbA1c levels below 6.5% but report having been diagnosed with diabetes. One obvious explanation for why individuals report diabetes yet have HbA1c levels below 6.5% is that they are under treatment. Among the 11.4% that belong to this group of potentially over-diagnosed diabetes cases, HRS self-reports show that 75.17% are currently taking oral medication for diabetes; 13.75% are using insulin; and in total 81.82% of the respondents are either using oral medication or insulin. The results in Table 8-10 can be interpreted in the same way.

In the remainder, we restrict attention to fee-for-service (FFS) individuals, i.e., we drop those in HMOs for whom we do not have claims data.

Table 11–12 provides some further analysis for the group of under-diagnosed cases, i.e. those individuals with high HbA1c levels but no self-reported diabetes. There are two main explanations that individuals reported no diabetes while their HbA1c levels are above 6.5%. One is that they have been diagnosed but they simply forgot to mention it during the

interview. The other is they did not know that they have diabetes. Therefore, for this group of people, we will further check their claims status. As before, we use the 2006 sample as an example. The first panel of Table 11 is similar to the first panel in Table 7. 3.26% of the respondents reported no diabetes but have HbA1c levels above 6.5%. Among this group, we find that 26.83% have diabetes claims, which means these likely are individuals who for some reason forgot to mention their diabetes at the HRS interview. 73.17% of them, however, do not have diabetes claims. These individuals have high HbA1c levels, but do not report having been diagnosed with diabetes and have no diabetes claims and are thus likely un-diagnosed diabetes cases. However, it could also be that these individuals developed high HbA1c levels just recently before the biomarker test. These individuals could have taken part in diabetes screenings before but diabetes has just not been detected yet.

To further identify the "undiagnosed" group, we checked the claims data for whether these respondents had ever taken a diabetes screening test. The CPT-4 code and ICD-9 diagnosis code for diabetes screening tests we used are as follows:

82947	Assay Body Fluid Glucose
82950	Glucose Test
82951	Glucose Tolerance Test (GTT)
83036	Glycated Hemoglobin Test
V77.1	Screen for diabetes mellitus

We construct 3 indicators: (1) any glucose test (2) any HbA1c test (3) any glucose or HbA1c test. For the individuals with no self-reported diabetes, high HbA1c levels and yet no diabetes claims, we investigate whether they have taken any screening test before the HRS survey date. In case the individual took the screening test several years ago but has not been screened lately, we further check whether this group of people has taken any screening test in the recent 2 years.

Results are reported in Tables 13 and 14. Take the 2006 sample as an example (Table 13). Among individuals with no self-reported diabetes, but high HbA1c levels and diabetes claims, about 45% had taken a glucose test before they were first diagnosed, around 68% of them has taken HbA1c test, in total more than 80% of this group has taken either glucose or a HbA1c test before they were diagnosed diabetes.

Among individuals with high HbA1c levels but no self-reported diabetes, and no diabetes claims, about 23% have ever taken a glucose test, 15% have taken an HbA1c test and more than 30% have taken either test. If we only focus on the screening tests taken in the recent 2 years, around 18% of this group has taken either the test.

Next, we study under-diagnosis by gender. Tables 15–16 present results for both samples in 2006 and 2008. Again, take 2006 sample as an example. In Table 15, for men, among the group that reported no diabetes but has HbA1c levels higher than 6.5%, around 34% have diabetes claims but did not report it during the HRS interview; around 66% of them do not

have diabetes claims and are potentially under-diagnosed. For women, among the group that did not report ever having been diagnosed with diabetes but has HbA1c levels above 6.5%, 21% have claims but failed to report during diabetes the interview, while 79% may be un-diagnosed diabetes cases. Women have a higher rate of these undiagnosed cases in 2006. Curiously, however, in the 2008 sample, the effect is the opposite.

We conclude by a brief analysis of SES variables as predictors of undiagnosed diabetes. Tables 17 and 18 describe some demographic, socio-economic characteristics and health variables of the 2006 and 2008 samples. We present the means of the variables by gender, high HbA1c threshold, self-reported diabetes indicator, diabetes claims indicator and for the group with "undiagnosed" diabetes. In general, we find that white people seem to be less likely to have diabetes. Hispanics seem to be more likely to have diabetes compared to others. Educational gradients exist. These patterns are similar across all the three diabetes indicators. Moreover, compared to the "no diabetes" group, the mean values of individual earnings, household income and household wealth are much higher in the "with diabetes" group are much higher.

In 2006 sample, the under-diagnosis group has a lower enrollment rate in Part D compared to the "with diabetes" groups. In addition, they seem to be financially disadvantaged with mean income and wealth lower than the average of the whole sample. In addition, they are less likely to be cover by EGHP, more likely to report poor general health status, and tend to have lower cognition level. However, in 2008 sample, these patterns do not seem to exist.

We first estimate the probability of having diabetes using Probit models (Tables 19 and 20). The sample is restricted to the FFS individuals in the linked data. The dependent variable is defined as one if an individual has diabetes according to at least one of the three measured (self-reported diabetes, diabetes claims or has higher than 6.5% HbA1c levels) and as zero otherwise. We include demographic variables, socioeconomic variables, health variables (self-reported general health status) and health insurance-related indicators (enrollment in Medicare Parts B/D, enrollment in an employer-sponsored health insurance plan, and enrollment in Medicaid).

There are 6 specifications. In the first specification, we only control for basic demographic characteristics such as age, educational level, marital status, gender, race and ethnicity. In the second specification, household wealth is added. In the third specification, health variables such as self-rated general health status and overall cognition are controlled for. In the fourth specification, we control for some health insurance indicators. In the fifth specification, we only focus on individuals aged 65 and above. In the last specification, we substitute household wealth with household income.

Results are in line with the results from the prior literature. In general, we see that white individuals are less likely; Hispanics are more likely; and female are less likely to have diabetes. Education does not seem to have much of an effect once we control for health and insurance status. Individuals with higher household wealth and income are less likely to have

diabetes. The relationship with self-rated general health status is strong. Individuals who rated their health as fair or poor are more likely to have diabetes. There is almost no significant relationship with the overall cognition measure.

With the final set of regressions, we study predictors of under-diagnoses (Tables 21–26). We define three different groups of undiagnosed diabetes:

(1) Undiagnosed1: no self-reported diabetes, high HbA1c level, no diabetes claims before the HRS interview.
(2) Undiagnosed2: no self-reported diabetes, high HbA1c level, no diabetes claims before the HRS interview, no glucose test in the past 2 years.
(3) Undiagnosed3: no self-reported diabetes, high HbA1c level, no diabetes claims before the HRS interview, no glucose/Glycated Hemoglobin test in the recent 2 years.

Results for 2006 are presented in Tables 21-23 and results for 2008 are presented in Tables 24-26. In all these regressions and specifications, individuals with poor self-rated health are significantly less likely to be undiagnosed. But it is also conceivable that diabetes diagnosis leads individuals to rate their health as poor or fair, so the question of causality has to be left open. There is no systematic relationship of undiagnosed diabetes with demographic or socioeconomic characteristics. Neither is there an impact of cognition and health insurance status. Given the richness of our data, this is perhaps a bit surprising.

4. Summary and outlook

In this paper we compare three measures of diabetes using HRS data: the commonly used survey measure on diabetes, diabetes according to HbA1c levels collected in the HRS biomarker data, and diabetes in the Medicare insurance claims linked to the HRS data. Self-reported diabetes and diabetes information from biomarker data align for a large part of our sample (85%). Using information on self-reported medication from the HRS as well as information from claims data help to shed light on the differences between the self-reports and the biomarker data. Most of the differences can likely be explained as treatment lowers HbA1c levels below the relevant threshold. When considering the three data sources, roughly 2% of individuals have diabetes according to HbA1c but do not report diabetes, have no claims and have not been tested for diabetes. Even in the Medicare population there is thus a fraction of individuals who likely have undiagnosed diabetes. Somewhat surprisingly, however, we do not find that the probability of being undiagnosed is related to socio-economic status.

We envision that future research will move beyond the descriptive analysis of the data we presented in this paper. One could start from a statistical framework (e.g., Wansbeek and Meijer, 2000) in which true disease prevalence is unobserved, with survey self-reports, biomarkers, and administrative claims data being three indicators which all potentially suffer from measurement error.

This or another, more structural approach could be extended into several directions. First, the statistical model could be used to obtain optimal combinations of the three indicators to provide an artificial, reliable measure of disease prevalence. Second, it seems important to account for the fact that typically not all respondents of a survey provide consent to biomarker measurement or administrative record linkage. Third, it would be interesting to explore whether measurement error in survey self-reports is differential by socio-economic status. Forth, we can envision a statistical decision framework motivated by a total survey error cost perspective that would address the question of whether collecting biomarkers or administrative linkage is the more cost-effective way to enrich survey data with more reliable measures of disease prevalence in the presence of item nonresponse (due failure to provide consent) on both measures. Fifth, it would be interesting to characterize the relative timing of the various measures. For instance, clinical diagnoses available in insurance claims are lagging indicators for disease incidence. We leave these issues to future research.

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Table 1

Datasets	N	N (no missing diabetes-related variable)	Diabetes Indicators		
			HbA1c>=6.5%	self-reported diabetes	ever had diabetes claims before the corresponding HRS interview
2006					
Biomarkers	6,735	6,517	12.38%	NA	NA
HRS	18,469	18,435	NA	19.60%	NA
MedRIC (HRS-Claims)	11,323	11,323	NA	NA	25.34%
2008					
Biomarkers (Total)	6,329	6,256	15.04%	NA	NA
Biomarkers (biosafe lab)		4,347	14.49%	NA	NA
Biomarkers (flex lab)		1,909	16.29%	NA	NA
HRS	17,217	17,185	NA	21.57%	NA
MedRIC (HRS-Claims)	10,597	10,597	NA	NA	29.86%
Linked Sample					
Including HMO Individuals					
2006	4,118	3,956	16.66%	22.27%	24.32%
2008	3,904	3,853	18.82%	24.27%	28.13%
Excluding HMO Individuals					
2006		2,517	16.01%	21.97%	26.36%
2008		2,370	18.99%	22.70%	30.51%

Table 2

Datasets			Diabetes Indicators		
	N	%	HbA1c>=6.5%	self-reported diabetes	ever had diabetes claims before the corresponding HRS interview
				Gender	
Including HMO Individuals					
2006					
Male	1,670	42.24%	14.79%	23.83%	24.37%
Female	2,284	57.76%	13.65%	21.13%	24.32%
Chi-square test			1.0375	4.0752	0.0013
P-value			0.3080	0.0440	0.9720
2008					
Male	1,598	41.78%	18.23%	27.90%	30.25%
Female	2,227	58.22%	14.46%	21.65%	26.61%
Chi-square test			9.8582	19.9096	6.1689
P-value			0.0020	0.0000	0.0130
Excluding HMO Individuals					
2006					
Male	1,079	42.89%	14.92%	23.63%	27.53%
Female	1,437	57.11%	12.38%	20.72%	25.45%
Chi-square test			3.4204	3.0445	1.3660
P-value			0.0640	0.0810	0.2430
2008					
Male	997	42.41%	18.65%	27.08%	33.73%
Female	1,354	57.59%	14.39%	19.46%	28.12%
Chi-square test			7.7434	19.2020	8.5989
P-value			0.0050	0.0000	0.0030
				Education Levels	
Including HMO Individuals					
2006					
Less than High School	894	22.61%	18.46%	28.64%	32.77%
GED	205	5.18%	20.98%	25.37%	27.80%
High school Graduate	1,311	33.16%	13.25%	20.64%	23.69%
Some College	816	20.64%	10.91%	19.73%	20.59%
College and Above	728	18.41%	12.09%	19.37%	18.41%
Chi-square test			32.031	30.658	56.323
P-value			0.000	0.000	0.000
2008					
Less than High School	947	24.76%	22.23%	33.40%	37.58%
GED	181	4.73%	14.36%	27.07%	37.02%

High school Graduate	1,262	32.99%	14.40%	21.77%	26.26%
Some College	735	19.22%	16.31%	21.83%	23.72%
College and Above	700	18.30%	11.38%	18.21%	20.91%
		Chi-square test	42.810	65.022	76.848
		P-value	0.000	0.000	0.000
Excluding HMO Individuals					
2006					
Less than High School	515	20.47%	18.06%	29.13%	35.53%
GED	124	4.93%	19.35%	23.39%	28.23%
High school Graduate	840	33.39%	12.59%	20.78%	26.48%
Some College	516	20.51%	9.90%	18.83%	22.33%
College and Above	521	20.70%	12.48%	19.58%	20.54%
		Chi-square test	19.612	20.912	35.982
		P-value	0.001	0.000	0.000
2008					
Less than High School	520	22.12%	23.53%	32.26%	41.18%
GED	108	4.59%	17.59%	30.56%	41.67%
High school Graduate	777	33.05%	14.32%	21.74%	29.67%
Some College	455	19.35%	16.96%	18.26%	25.43%
College and Above	491	20.89%	10.37%	16.46%	22.56%
		Chi-square test	35.552	47.704	55.167
		P-value	0.000	0.000	0.000

Table 3

Including HMO Individuals: 2006		
obs= 3956		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.87%	3.26%
hba1c level (%) <6.5	11.40%	74.47%

	Diabetes Claims before the 2006 HRS Interview	
	Yes	**No**
hba1c level (%) >=6.5	9.28%	4.85%
hba1c level (%) <6.5	15.07%	70.80%

	Diabetes Claims before the 2006 HRS Interview	
	Yes	**No**
HRS Self-reported Diabetes: Yes	17.75%	4.52%
HRS Self-reported Diabetes: No	6.60%	71.13%

Table 4

Excluding HMO Individuals: 2006

obs= 2517

	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.21%	3.26%
hba1c level (%) <6.5	11.76%	74.77%

	Diabetes Claims before the 2006 HRS Interview	
	Yes	**No**
hba1c level (%) >=6.5	9.57%	3.89%
hba1c level (%) <6.5	16.77%	69.77%

	Diabetes Claims before the 2006 HRS Interview	
	Yes	**No**
HRS Self-reported Diabetes: Yes	18.87%	3.10%
HRS Self-reported Diabetes: No	7.47%	70.56%

Table 5

Including HMO Individuals: 2008		
obs= 3853		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.30%	3.74%
hba1c level (%) <6.5	11.96%	72.00%

	Diabetes Claims before the 2008 HRS Interview	
	Yes	**No**
hba1c level (%) >=6.5	11.24%	4.80%
hba1c level (%) <6.5	16.90%	67.06%

	Diabetes Claims before the 2008 HRS Interview	
	Yes	**No**
HRS Self-reported Diabetes: Yes	19.85%	4.41%
HRS Self-reported Diabetes: No	8.28%	67.45%

Table 6

Excluding HMO Individuals: 2008

obs= 2370

	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.15%	4.05%
hba1c level (%) <6.5	10.55%	73.25%

	Diabetes Claims before the 2008 HRS Interview	
	Yes	**No**
hba1c level (%) >=6.5	12.45%	3.76%
hba1c level (%) <6.5	18.06%	65.74%

	Diabetes Claims before the 2008 HRS Interview	
	Yes	**No**
HRS Self-reported Diabetes: Yes	20.93%	1.77%
HRS Self-reported Diabetes: No	9.58%	67.72%

Table 7

Including HMO Individuals: 2006		
	obs= 3956	
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.87%	3.26%
hba1c level (%) <6.5	11.40%	74.47%
11.40%	take swallowed medication=Yes	75.17%
	take swallowed medication=No	24.17%
	blank	0.67%
11.40%	take insulin =Yes	13.75%
	take insulin =No	85.59%
	blank	0.67%
11.40%	take swallowed medication or insulin =Yes	81.82%
	take swallowed medication or insulin =No	17.52%
	blank	0.67%

Table 8

Excluding HMO Individuals: 2006		
	obs= 2517	
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.21%	3.26%
hba1c level (%) <6.5	11.76%	69.61%

11.76%	take swallowed medication=Yes	73.65%
	take swallowed medication=No	25.68%
	blank	0.68%

11.76%	take insulin =Yes	14.53%
	take insulin =No	84.80%
	blank	0.68%

11.76%	take swallowed medication or insulin =Yes	81.42%
	take swallowed medication or insulin =No	17.91%
	blank	0.68%

Table 9

Including HMO Individuals: 2008		
obs= 3853		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.30%	3.74%
hba1c level (%) <6.5	11.96%	72.00%

11.96%	take swallowed medication =Yes	71.58%
	take swallowed medication =No	27.98%
	blank	0.43%

11.96%	take insulin =Yes	14.10%
	take insulin =No	85.47%
	blank	0.43%

11.96%	take swallowed medication or insulin =Yes	78.31%
	take swallowed medication or insulin =No	21.26%
	blank	0.43%

Table 10

Excluding HMO Individuals: 2008		
obs= 2370		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.15%	4.05%
hba1c level (%) <6.5	10.55%	73.25%

10.55%	take swallowed medication =Yes	68.80%
	take swallowed medication =No	30.80%
	blank	0.40%

10.55%	take insulin =Yes	13.20%
	take insulin =No	86.40%
	blank	0.40%

10.55%	take swallowed medication or insulin =Yes	76.80%
	take swallowed medication or insulin =No	22.80%
	blank	0.40%

Table 11

Excluding HMO Individuals: 2006

obs= 2516		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.17%	3.26%
hba1c level (%) <6.5	11.76%	74.80%

3.26%	Diabetes Claims before 2006 HRS: Yes	26.83%
(N=82)	Diabetes Claims before 2006 HRS: No	73.17%

Table 12

Excluding HMO Individuals: 2008

obs= 2351		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.04%	4.08%
hba1c level (%) <6.5	10.68%	73.20%

4.08%	Diabetes Claims before 2008 HRS: Yes	23.96%
(N=96)	Diabetes Claims before 2008 HRS: No	76.04%

Table 13

Excluding HMO Individuals: 2006

obs= 2516		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	10.17%	3.26%
hba1c level (%) <6.5	11.76%	74.80%

3.26%	Diabetes Claims before 2006 HRS: Yes	26.83%	% Ever had glucose test before earliest indication of diabetes	45.45%		
			% Ever had HbA1c test before earliest indication of diabetes	68.18%		
			% Ever had screening test before earliest indication of diabetes	81.82%		
(N=82)	Diabetes Claims before 2006 HRS: No	73.17%	% Ever had glucose test	23.33%	% had glucose test in recent 2 yrs	11.67%
			% Ever had HbA1c test	15.00%	% had HbA1c test in recent 2 yrs	8.33%
			% Ever had screening test before the HRS 2006 interview	31.67%	% Ever had screening test in recent 2 yrs	18.33%

Table 14

Excluding HMO Individuals: 2008

obs= 2351		
	HRS Self-reported Diabetes	
	Yes	**No**
hba1c level (%) >=6.5	12.04%	4.08%
hba1c level (%) <6.5	10.68%	73.20%

4.08%	Diabetes Claims before 2008 HRS: Yes	23.96%	% Ever had glucose test before earliest indication of diabetes	43.48%		
			% Ever had HbA1c test before earliest indication of diabetes	78.26%		
			% Ever had screening test before earliest indication of diabetes	82.61%		
(N=96)	Diabetes Claims before 2008 HRS: No	76.04%	% Ever had glucose test	31.51%	% had glucose test in recent 2 yrs	6.85%
			% Ever had HbA1c test	23.29%	% had HbA1c test in recent 2 yrs	6.85%
			% Ever had screening test before the HRS 2008 interview	43.84%	% Ever had screening test in recent 2 yrs	12.33%

Table 15

Excluding HMO Individuals: 2006

	obs=1097		obs=1438	
	HRS Self-reported Diabetes: Male		**HRS Self-reported Diabetes: Female**	
	Yes	**No**	**Yes**	**No**
hba1c level (%) >=6.5	11.49%	3.19 %	9.11%	3.27 %
hba1c level (%) <6.5	11.76%	71.92 %	11.61%	76.01 %

3.19% (obs=35)	
Diabetes Claims before 2006 HRS: Yes	34.29 %
Diabetes Claims before 2006 HRS: No	65.71 %

3.27% (obs=47)	
Diabetes Claims before 2006 HRS: Yes	21.28 %
Diabetes Claims before 2006 HRS: No	78.72 %

Table 16

Excluding HMO Individuals: 2008

	obs=1008		obs=1362	
	HRS Self-reported Diabetes: Male		**HRS Self-reported Diabetes: Female**	
	Yes	**No**	**Yes**	**No**
hba1c level (%) >=6.5	15.28%	3.37 %	9.84%	4.55 %
hba1c level (%) <6.5	11.81%	69.51 %	9.62%	75.99 %

3.37% (obs=34)	
Diabetes Claims before 2008 HRS: Yes	20.59 %
Diabetes Claims before 2008 HRS: No	79.41 %

4.55% (obs=62)	
Diabetes Claims before 2008 HRS: Yes	25.81 %
Diabetes Claims before 2008 HRS: No	74.19 %

Table 17. Summary Statistics I

Excluding HMO Individuals: 2006

Variable	Whole Linked Sample	Men	Women	hba1c>=6.5%	hba1c<6.5%	SR Diabetes:Yes	SR Diabetes:No	Diabetes Claims: Yes	Diabetes Claims: No	Undiagnosis Group (6.5%)	Undiagnosis Group (6.5%+ no screening test in recent 2 years)
obs	2,517	1,079	1,438	339	2,178	553	1,964	663	1,854	60	49
Age	72.80	72.33	73.14	71.98	72.92	71.93	73.04	73.82	72.43	72.67	72.08
% Age>=65	0.88	0.89	0.88	0.86	0.89	0.86	0.89	0.93	0.87	0.90	0.90
Race (white)	0.88	0.90	0.86	0.79	0.89	0.82	0.89	0.83	0.90	0.80	0.78
Hispanic	0.05	0.05	0.06	0.10	0.04	0.09	0.04	0.09	0.04	0.05	0.06
Female	0.57			0.53	0.58	0.54	0.58	0.55	0.58	0.62	0.61
Married	0.63	0.80	0.51	0.60	0.64	0.62	0.64	0.60	0.65	0.57	0.57
Educ (hs and above)	0.80	0.80	0.79	0.73	0.81	0.73	0.81	0.72	0.82	0.78	0.78
Indi earning	5,449.77	8353.27	3271.14	4,301.37	5,628.52	3,436.00	6,016.79	2,706.23	6,430.88	6,658.27	7,882.57
HH income	57,303.95	66,958.34	50059.80	44,182.31	59,346.30	45,022.89	60,761.90	42,544.32	62,582.07	42,702.33	45,441.74
HH income (median)	36,380.00	43,340.00	30,578.00	31,988.00	37,381.00	31,060.00	38,400.00	31,164.00	38,376.00	27,404.00	30,651.00
HH wealth	577,488.4	666,384.8	510,785.2	413,044.5	603,083.7	429,214.0	619,237.8	428,920.2	630,617.2	317,605.80	337,720.0
HH wealth (median)	264,400.0	324,000.0	220,150.0	155,000.0	284,152.0	177,000.0	299,530.0	177,000.0	300,000.0	195,040.0	195,080.0
Covered by EGHP	0.46	0.48	0.44	0.41	0.47	0.43	0.47	0.43	0.47	0.37	0.41
GHS: Poor or Very Poor	0.29	0.29	0.28	0.41	0.27	0.45	0.25	0.42	0.24	0.23	0.22
Total Cognition	22.03	21.86	22.16	21.26	22.15	21.31	22.23	21.05	22.41	21.69	21.66
Part A Enrollment	0.92	0.92	0.92	0.94	0.92	0.93	0.91	0.99	0.89	0.97	0.96
Part B Enrollment	0.94	0.93	0.95	0.95	0.94	0.96	0.93	0.97	0.93	0.95	0.93
Part D Enrollment	0.34	0.27	0.40	0.41	0.33	0.39	0.33	0.43	0.31	0.45	0.39

Table 18. Summary Statistics II

Excluding HMO Individuals: 2008

Variable	Whole Linked Sample	Men	Women	hba1c>=6.5%	hba1c<6.5%	SR Diabetes:Yes	SR Diabetes:No	Diabetes Claims: Yes	Diabetes Claims: No	Undiagnosis Group (6.5%)	Undiagnosis Group (6.5%+ no screening test in recent 2 years)
obs	2,370	1,008	1,362	384	1,986	538	1,832	723	1,647	73	64
Age	73.88	73.74	73.98	72.95	74.06	72.48	74.29	74.16	73.76	73.41	73.33
% Age>=65	0.95	0.95	0.95	0.93	0.95	0.91	0.96	0.93	0.96	0.96	0.95
Race (white)	0.87	0.88	0.86	0.77	0.89	0.80	0.89	0.82	0.89	0.77	0.78
Hispanic	0.07	0.07	0.07	0.11	0.06	0.11	0.05	0.11	0.05	0.04	0.05
Female	0.57			0.51	0.59	0.49	0.60	0.53	0.59	0.63	0.63
Married	0.56	0.73	0.44	0.53	0.57	0.53	0.57	0.51	0.58	0.59	0.58
Educ (hs and above)	0.78	0.79	0.77	0.68	0.80	0.68	0.81	0.70	0.81	0.78	0.75
Indi earning	4,370.63	6614.70	2709.82	4,172.96	4,408.85	3,652.10	4,581.64	2,356.04	5,255.00	8,850.69	8,884.38
HH income	53,895.97	61953.81	47932.45	43,758.34	55,856.11	43,815.66	56,856.23	41,008.84	59,553.16	58,736.68	57,430.32
HH income (median)	35,009.00	44,883.49	29,313.00	30,300.00	36,000.00	28,804.00	37,936.00	28,804.00	37,936.00	41,235.00	41,197.50
HH wealth	577,099.4	683,624.4	498,261.5	401,678.5	611,017.6	356,055.1	642,013.1	393,180.8	657,835.9	439,706.5	428,768.7
HH wealth (median)	232,750.0	288,250.0	188,250.0	123,750.0	262,500.0	139,000.0	288,500.0	139,000.0	288,500.0	232,000.0	234,000.0
Covered by EGHP	0.43	0.45	0.41	0.39	0.43	0.42	0.43	0.41	0.44	0.48	0.45
GHS: Poor or Very Poor	0.32	0.32	0.31	0.49	0.28	0.48	0.27	0.46	0.25	0.32	0.28
Total Cognition	21.80	21.61	21.95	20.84	21.98	20.96	22.04	20.74	22.26	22.33	22.13
Part A Enrollment	0.99	0.98	0.99	0.98	0.99	0.98	0.99	0.99	0.99	1.00	1.00
Part B Enrollment	0.94	0.93	0.94	0.95	0.94	0.94	0.94	0.97	0.93	0.92	0.92
Part D Enrollment	0.41	0.37	0.44	0.46	0.40	0.47	0.39	0.47	0.38	0.40	0.41

Table 19

2006. wave 8

VARIABLES	Probability of Diabetes (comprehensive measure)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2006	0.006	0.006*	0.003	0.003	0.003	0.001
	[0.0034]	[0.0034]	[0.0044]	[0.0045]	[0.0045]	[0.0045]
white	-0.432***	-0.401***	-0.309***	-0.327***	-0.327***	-0.344***
	[0.0792]	[0.0797]	[0.0901]	[0.0936]	[0.0937]	[0.0933]
hispanic	0.458***	0.436***	0.388***	0.430***	0.428***	0.431***
	[0.1178]	[0.1180]	[0.1312]	[0.1376]	[0.1377]	[0.1376]
female	-0.095*	-0.101*	-0.091	-0.127**	-0.125**	-0.125**
	[0.0558]	[0.0560]	[0.0605]	[0.0625]	[0.0625]	[0.0624]
married	-0.042	-0.002	0.043	0.040	0.043	0.036
	[0.0591]	[0.0600]	[0.0651]	[0.0672]	[0.0673]	[0.0676]
educ: hs and above	-0.186***	-0.148**	-0.008	0.008	0.004	-0.005
	[0.0667]	[0.0674]	[0.0765]	[0.0800]	[0.0801]	[0.0799]
hh wealth/10,000		-0.001***	-0.001***	-0.001***	-0.001***	
		[0.0003]	[0.0003]	[0.0003]	[0.0003]	
hh income/10,000						-0.013**
						[0.0052]
poor/fair general health status			0.373***	0.368***	0.366***	0.377***
			[0.0648]	[0.0665]	[0.0665]	[0.0663]
cognition			-0.011*	-0.011	-0.011	-0.011
			[0.0068]	[0.0070]	[0.0071]	[0.0071]
enrolled in part B				0.217*	0.215*	0.215*
				[0.1299]	[0.1299]	[0.1304]
enrolled in part D				0.158**	0.161**	0.149**
				[0.0680]	[0.0681]	[0.0679]
has medicaid				-0.056	-0.046	-0.056
				[0.1319]	[0.1323]	[0.1320]
covered by employer-provided HI				0.103	0.106	0.119*
				[0.0656]	[0.0657]	[0.0658]
Constant	-0.300	-0.359	-0.198	-0.456	-0.479	-0.326
	[0.2682]	[0.2686]	[0.3952]	[0.4196]	[0.4206]	[0.4204]
Observations	2,517	2,517	2,215	2,137	2,135	2,137

Table 20

2008. wave 9

VARIABLES	Probability of Diabetes (comprehensive measure)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2008	0.001	0.001	0.001	-0.001	-0.000	-0.002
	[0.0035]	[0.0035]	[0.0043]	[0.0044]	[0.0044]	[0.0044]
white	-0.399***	-0.372***	-0.326***	-0.326***	-0.331***	-0.335***
	[0.0807]	[0.0811]	[0.0875]	[0.0905]	[0.0906]	[0.0903]
hispanic	0.382***	0.360***	0.267**	0.193	0.197	0.198
	[0.1106]	[0.1107]	[0.1188]	[0.1275]	[0.1276]	[0.1276]
female	-0.190***	-0.197***	-0.174***	-0.185***	-0.184***	-0.183***
	[0.0565]	[0.0567]	[0.0590]	[0.0601]	[0.0602]	[0.0601]
married	-0.126**	-0.102*	-0.082	-0.071	-0.069	-0.061
	[0.0583]	[0.0589]	[0.0617]	[0.0636]	[0.0636]	[0.0644]
educ: hs and above	-0.212***	-0.182***	-0.066	-0.032	-0.027	-0.034
	[0.0677]	[0.0682]	[0.0759]	[0.0793]	[0.0795]	[0.0793]
hh wealth/10,000		-0.001***	-0.001**	-0.001**	-0.001**	
		[0.0003]	[0.0003]	[0.0003]	[0.0003]	
hh income/10,000						-0.010**
						[0.0051]
poor/fair general health status			0.447***	0.453***	0.456***	0.455***
			[0.0629]	[0.0652]	[0.0652]	[0.0652]
cognition			-0.006	-0.005	-0.005	-0.005
			[0.0067]	[0.0070]	[0.0070]	[0.0070]
enrolled in part B				0.158	0.155	0.131
				[0.1250]	[0.1251]	[0.1255]
enrolled in part D				0.148**	0.147**	0.148**
				[0.0666]	[0.0667]	[0.0666]
has medicaid				0.221*	0.225*	0.217*
				[0.1150]	[0.1150]	[0.1151]
covered by employer-provided HI				0.199***	0.198***	0.211***
				[0.0668]	[0.0668]	[0.0669]
Constant	0.243	0.208	0.051	-0.198	-0.262	-0.098
	[0.2763]	[0.2769]	[0.3900]	[0.4143]	[0.4158]	[0.4151]
Observations	2,369	2,369	2,250	2,184	2,182	2,184

Table 21

2006. wave 8

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed1)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2006	-0.004	-0.003	-0.007	-0.009	-0.009	-0.010
	[0.0084]	[0.0084]	[0.0112]	[0.0116]	[0.0117]	[0.0116]
white	-0.045	-0.021	-0.068	-0.085	-0.082	-0.107
	[0.1726]	[0.1739]	[0.1998]	[0.2096]	[0.2097]	[0.2090]
hispanic	-0.260	-0.278	-0.401	-0.347	-0.349	-0.323
	[0.2871]	[0.2878]	[0.3456]	[0.3524]	[0.3525]	[0.3505]
female	0.102	0.090	0.054	0.062	0.059	0.075
	[0.1431]	[0.1439]	[0.1545]	[0.1604]	[0.1605]	[0.1595]
married	-0.080	-0.051	-0.032	-0.050	-0.055	-0.072
	[0.1448]	[0.1475]	[0.1622]	[0.1671]	[0.1676]	[0.1672]
educ: hs and above	0.107	0.132	-0.003	-0.029	-0.027	-0.046
	[0.1630]	[0.1651]	[0.1898]	[0.1982]	[0.1982]	[0.1970]
hh wealth/10,000		-0.001	-0.002	-0.002	-0.002	
		[0.0013]	[0.0015]	[0.0014]	[0.0014]	
hh income/10,000						-0.006
						[0.0148]
poor/fair general health status			-0.427***	-0.392**	-0.389**	-0.376**
			[0.1652]	[0.1681]	[0.1682]	[0.1671]
cognition			0.004	0.008	0.008	0.007
			[0.0172]	[0.0178]	[0.0178]	[0.0178]
enrolled in part B				-0.229	-0.227	-0.192
				[0.3400]	[0.3399]	[0.3361]
enrolled in part D				0.093	0.090	0.090
				[0.1679]	[0.1681]	[0.1672]
has medicaid				-0.433	-0.434	-0.428
				[0.3603]	[0.3603]	[0.3597]
covered by employer-provided HI				-0.170	-0.172	-0.164
				[0.1643]	[0.1645]	[0.1649]
Constant	-1.175*	-1.234*	-0.755	-0.398	-0.364	-0.339
	[0.6530]	[0.6553]	[0.9936]	[1.0761]	[1.0811]	[1.0779]
Observations	801	801	712	687	686	687

Table 22

2006. wave 8

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed2)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2006	-0.008	-0.007	-0.009	-0.013	-0.013	-0.013
	[0.0087]	[0.0087]	[0.0117]	[0.0124]	[0.0125]	[0.0125]
white	-0.069	-0.050	-0.102	-0.132	-0.128	-0.152
	[0.1777]	[0.1789]	[0.2065]	[0.2209]	[0.2211]	[0.2203]
hispanic	-0.189	-0.204	-0.313	-0.185	-0.188	-0.160
	[0.2894]	[0.2901]	[0.3481]	[0.3728]	[0.3730]	[0.3712]
female	0.063	0.053	0.003	0.037	0.034	0.051
	[0.1481]	[0.1488]	[0.1606]	[0.1675]	[0.1677]	[0.1665]
married	-0.100	-0.078	-0.060	-0.113	-0.119	-0.136
	[0.1502]	[0.1526]	[0.1689]	[0.1744]	[0.1750]	[0.1742]
educ: hs and above	0.144	0.164	0.008	-0.060	-0.058	-0.075
	[0.1717]	[0.1735]	[0.2011]	[0.2127]	[0.2128]	[0.2115]
hh wealth/10,000		-0.001	-0.001	-0.001	-0.001	
		[0.0013]	[0.0014]	[0.0014]	[0.0014]	
hh income/10,000						-0.003
						[0.0144]
poor/fair general health status			-0.434**	-0.383**	-0.379**	-0.367**
			[0.1738]	[0.1796]	[0.1797]	[0.1786]
cognition			0.007	0.010	0.010	0.008
			[0.0182]	[0.0192]	[0.0192]	[0.0192]
enrolled in part B				-0.266	-0.264	-0.230
				[0.3422]	[0.3421]	[0.3382]
enrolled in part D				-0.017	-0.021	-0.020
				[0.1786]	[0.1789]	[0.1778]
has medicaid						
covered by employer-provided HI				-0.157	-0.160	-0.154
				[0.1702]	[0.1703]	[0.1708]
Constant	-0.974	-1.021	-0.655	-0.024	0.019	0.015
	[0.6737]	[0.6756]	[1.0403]	[1.1428]	[1.1493]	[1.1461]
Observations	801	801	712	631	630	631

Table 23

2006. wave 8

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed3)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2006	-0.008	-0.007	-0.016	-0.021	-0.022*	-0.022*
	[0.0090]	[0.0090]	[0.0122]	[0.0129]	[0.0130]	[0.0130]
white	-0.112	-0.098	-0.108	-0.123	-0.119	-0.141
	[0.1790]	[0.1802]	[0.2081]	[0.2226]	[0.2227]	[0.2220]
hispanic	-0.160	-0.171	-0.308	-0.205	-0.209	-0.181
	[0.2893]	[0.2899]	[0.3483]	[0.3722]	[0.3724]	[0.3708]
female	0.085	0.078	0.046	0.053	0.050	0.068
	[0.1516]	[0.1523]	[0.1645]	[0.1707]	[0.1709]	[0.1697]
married	-0.075	-0.059	-0.084	-0.127	-0.133	-0.151
	[0.1537]	[0.1559]	[0.1719]	[0.1772]	[0.1779]	[0.1771]
educ: hs and above	0.098	0.113	-0.027	-0.070	-0.068	-0.084
	[0.1732]	[0.1748]	[0.2039]	[0.2154]	[0.2155]	[0.2143]
hh wealth/10,000		-0.001	-0.001	-0.001	-0.001	
		[0.0012]	[0.0013]	[0.0013]	[0.0014]	
hh income/10,000						-0.001
						[0.0141]
poor/fair general health status			-0.477***	-0.449**	-0.445**	-0.434**
			[0.1809]	[0.1870]	[0.1871]	[0.1861]
cognition			0.000	-0.002	-0.002	-0.003
			[0.0187]	[0.0196]	[0.0196]	[0.0196]
enrolled in part B				-0.294	-0.291	-0.259
				[0.3427]	[0.3425]	[0.3390]
enrolled in part D				0.031	0.027	0.029
				[0.1813]	[0.1816]	[0.1806]
has medicaid						
covered by employer-provided HI				-0.148	-0.151	-0.146
				[0.1738]	[0.1740]	[0.1745]
Constant	-0.957	-0.990	-0.017	0.842	0.887	0.872
	[0.6945]	[0.6959]	[1.0812]	[1.1852]	[1.1920]	[1.1880]
Observations	801	801	712	631	630	631

Table 24

2008. wave 9

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed1)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2008	-0.001	-0.001	-0.003	-0.002	-0.003	-0.002
	[0.0082]	[0.0083]	[0.0100]	[0.0102]	[0.0103]	[0.0102]
white	-0.211	-0.214	-0.297*	-0.353**	-0.348*	-0.366**
	[0.1619]	[0.1626]	[0.1733]	[0.1777]	[0.1780]	[0.1772]
hispanic	-0.415	-0.413	-0.286	-0.174	-0.179	-0.173
	[0.2807]	[0.2809]	[0.2923]	[0.3085]	[0.3088]	[0.3093]
female	0.270**	0.270**	0.218	0.220	0.220	0.221
	[0.1336]	[0.1337]	[0.1393]	[0.1405]	[0.1405]	[0.1405]
married	0.236*	0.233*	0.178	0.148	0.146	0.114
	[0.1383]	[0.1393]	[0.1455]	[0.1482]	[0.1482]	[0.1506]
educ: hs and above	0.113	0.110	-0.039	-0.115	-0.119	-0.122
	[0.1559]	[0.1566]	[0.1731]	[0.1788]	[0.1791]	[0.1793]
hh wealth/10,000		0.000	-0.000	-0.000	-0.000	
		[0.0006]	[0.0007]	[0.0007]	[0.0007]	
hh income/10,000						0.011
						[0.0105]
poor/fair general health status			-0.249*	-0.240*	-0.244*	-0.227
			[0.1430]	[0.1456]	[0.1457]	[0.1458]
cognition			0.024	0.021	0.021	0.019
			[0.0167]	[0.0173]	[0.0173]	[0.0173]
enrolled in part B				-0.108	-0.104	-0.048
				[0.2813]	[0.2814]	[0.2893]
enrolled in part D				-0.082	-0.080	-0.079
				[0.1584]	[0.1584]	[0.1585]
has medicaid				-0.455	-0.459	-0.445
				[0.2789]	[0.2790]	[0.2796]
covered by employer-provided HI				-0.125	-0.124	-0.138
				[0.1603]	[0.1603]	[0.1611]
Constant	-1.438**	-1.429**	-1.482	-1.126	-1.067	-1.192
	[0.6290]	[0.6316]	[0.9011]	[0.9432]	[0.9498]	[0.9450]
Observations	837	837	781	758	756	758

Table 25

2008. wave 9

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed2)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2008	-0.001	-0.001	-0.001	-0.000	-0.001	0.000
	[0.0083]	[0.0084]	[0.0102]	[0.0104]	[0.0105]	[0.0104]
white	-0.156	-0.160	-0.233	-0.295	-0.289	-0.307*
	[0.1669]	[0.1676]	[0.1802]	[0.1845]	[0.1847]	[0.1841]
hispanic	-0.405	-0.401	-0.257	-0.165	-0.171	-0.166
	[0.2814]	[0.2816]	[0.2945]	[0.3100]	[0.3103]	[0.3111]
female	0.274**	0.275**	0.225	0.225	0.226	0.226
	[0.1367]	[0.1368]	[0.1435]	[0.1449]	[0.1449]	[0.1450]
married	0.235*	0.230	0.180	0.160	0.157	0.123
	[0.1414]	[0.1425]	[0.1497]	[0.1529]	[0.1529]	[0.1555]
educ: hs and above	0.053	0.048	-0.138	-0.199	-0.204	-0.207
	[0.1571]	[0.1579]	[0.1767]	[0.1822]	[0.1826]	[0.1828]
hh wealth/10,000		0.000	0.000	-0.000	-0.000	
		[0.0006]	[0.0007]	[0.0007]	[0.0007]	
hh income/10,000						0.013
						[0.0106]
poor/fair general health status			-0.362**	-0.363**	-0.366**	-0.350**
			[0.1499]	[0.1529]	[0.1530]	[0.1532]
cognition			0.025	0.024	0.023	0.022
			[0.0171]	[0.0177]	[0.0178]	[0.0178]
enrolled in part B				-0.027	-0.024	0.049
				[0.2993]	[0.2994]	[0.3102]
enrolled in part D				-0.079	-0.076	-0.074
				[0.1611]	[0.1611]	[0.1613]
has medicaid				-0.409	-0.413	-0.396
				[0.2820]	[0.2821]	[0.2828]
covered by employer-provided HI				-0.190	-0.189	-0.207
				[0.1645]	[0.1646]	[0.1656]
Constant	-1.490**	-1.472**	-1.620*	-1.363	-1.303	-1.463
	[0.6387]	[0.6415]	[0.9211]	[0.9689]	[0.9754]	[0.9726]
Observations	837	837	781	758	756	758

Table 26

2008. wave 9

VARIABLES	Probability of Undiagnosed Diabetes (undiagnosed3)					
	demographics	+ economic var	+health indicator	+insurance status	65+ only	hh income stead of hh wealth
age in 2008	-0.003	-0.003	-0.005	-0.003	-0.004	-0.003
	[0.0085]	[0.0085]	[0.0103]	[0.0105]	[0.0106]	[0.0105]
white	-0.127	-0.129	-0.186	-0.245	-0.239	-0.256
	[0.1698]	[0.1704]	[0.1833]	[0.1878]	[0.1881]	[0.1874]
hispanic	-0.397	-0.395	-0.258	-0.159	-0.165	-0.158
	[0.2819]	[0.2822]	[0.2951]	[0.3103]	[0.3106]	[0.3110]
female	0.245*	0.246*	0.198	0.198	0.198	0.200
	[0.1387]	[0.1388]	[0.1456]	[0.1471]	[0.1470]	[0.1470]
married	0.200	0.198	0.146	0.125	0.122	0.093
	[0.1434]	[0.1445]	[0.1520]	[0.1552]	[0.1552]	[0.1576]
educ: hs and above	0.012	0.010	-0.151	-0.214	-0.219	-0.222
	[0.1583]	[0.1591]	[0.1779]	[0.1834]	[0.1838]	[0.1838]
hh wealth/10,000		0.000	-0.000	-0.000	-0.000	
		[0.0007]	[0.0007]	[0.0007]	[0.0007]	
hh income/10,000						0.011
						[0.0109]
poor/fair general health status			-0.378**	-0.376**	-0.380**	-0.365**
			[0.1527]	[0.1556]	[0.1557]	[0.1559]
cognition			0.018	0.015	0.015	0.014
			[0.0172]	[0.0179]	[0.0179]	[0.0179]
enrolled in part B				-0.077	-0.073	-0.016
				[0.2991]	[0.2993]	[0.3089]
enrolled in part D				-0.102	-0.099	-0.098
				[0.1643]	[0.1642]	[0.1644]
has medicaid				-0.401	-0.406	-0.391
				[0.2828]	[0.2830]	[0.2836]
covered by employer-provided HI				-0.192	-0.191	-0.205
				[0.1676]	[0.1677]	[0.1685]
Constant	-1.347**	-1.339**	-1.231	-0.935	-0.871	-1.001
	[0.6471]	[0.6497]	[0.9335]	[0.9805]	[0.9876]	[0.9834]
Observations	837	837	781	758	756	758