

Population Studies Center



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# Research Reports



# **Debt and Foregone Medical Care**

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Population Studies Center Research Report 12-767

July 2012

**ABSTRACT**

Most American households carry debt, yet we have little understanding of how debt influences health behavior, especially healthcare seeking. We examined associations between foregone medical care and debt using a population-based sample of 914 Southeastern Michigan residents surveyed in the wake of the late-2000s recession. Overall debt and ratios of debt to income and debt to assets were positively associated with foregoing medical or dental care in the past 12 months, even after adjusting for the poorer socioeconomic and health characteristics of those foregoing care, and for respondents' household incomes and net worth. These overall associations were driven largely by credit card and medical debt, while housing debt, auto and student loans were not associated with foregoing care. These results suggest that debt is an understudied aspect of health stratification.

## **INTRODUCTION**

Since the 1950s the amount of debt held by U.S. households has risen from negligible levels to approximately 13 trillion U.S. Dollars (FRED 2012). The Survey of Consumer Finances reports that 77% of Americans held some type of debt in 2007 (Bucks, Kennickell, Mach, and Moore 2009). Taking on debt has become a critical part of how many individuals achieve valued social statuses such as home ownership or a college degree, as well as how they may obtain material goods and services, including health care, when the costs exceed their immediate financial resources. Debt is a fundamental part of financial lives in the United States, but we have only a very limited understanding of what debt means for well-being. Scholars have long observed disparities in health and health behaviors by socioeconomic position, but a new wave of research has called for attention to a broader array of socioeconomic indicators than income and education (Braveman, Cubbin, Egerter, Chideya, Marchi, Metzler, and Posner 2005; Conley 1999; Duncan, Daly, McDonough, and Williams 2002; Herd, Goesling, and House 2007; Schnittker 2004). In this article we join a small body of research that has pointed out the health relevance of debt, an aspect of financial portfolios that has been virtually ignored by sociologists of health (Drentea 2000; Drentea and Lavrakas 2000; Drentea and Reynolds 2012; Ross and Huber 1985).

A handful of sociological studies have shown that debt is associated with poorer health and harmful health behaviors, even net of some other measures of socioeconomic status. Drentea and Lavrakas (2000) demonstrated links between credit card debt and risky health behaviors such as smoking or excessive alcohol consumption. Other studies have documented strong associations between carrying any debt or worrying about holding debt and poor mental health outcomes, such as anxiety, anger or depression (Drentea and Reynolds 2012; Reading and Reynolds 2001). Such studies have implicated the stress associated with carrying debt as the mechanism linking it to risky health behaviors or poorer mental health (Brown, Taylor, and Wheatley Price 2005; Chan, Yip, Au, and Lee 2005; Drentea 2000). These prior studies have often focused on particular types of debt, such as credit card debt, but have not considered other common debts, such as mortgages, auto loans, or medical debt. Additionally, they have been unable to adjust for some of the financial resources that could be used to service debt, often lacking measures of wealth or net worth. Moreover, extant studies have focused on mental health and the stress of debt-holding; we know little about how debt might affect other relevant outcomes or operate via other pathways.

In this paper, we argue that debt may also be linked to health via another mechanism: material constraint. To do so, we turn to a health-relevant behavior, health care seeking, a more proximal outcome and one that could contribute to the health status or behavior differences other studies have linked to debt. We study foregone medical care, which surveys frequently define as not going to the doctor (or other health care provider) for cost reasons when the respondent felt that they needed to go. Prior studies of the predictors of foregone care have considered the role of income or health insurance status, but have not considered debt. Indebtedness could increase the likelihood of foregoing care because it may constrain the use of financial resources, but the association could vary depending on the type of debt under consideration. Fundamentally, debt of any kind that exceeds the resources to pay it back could constrain healthcare seeking. In particular, unsecured debt such as credit card debt could reduce income or asset availability because it must be paid back relatively quickly to avoid high interest penalties. Other studies have suggested that unpaid credit card balances generate stress, so individuals may allocate resources to pay it back at the expense of other things they need. However, other forms of debt could signal positive financial standing, because the ability to take on some kinds of debt depends on credit-worthiness and collateral. Many individuals with substantial debt due to a sizeable home mortgage loan are capable of servicing this kind of secured debt because they earn high incomes or have sufficient assets. Debts that simply reflect credit worthiness and are affordable given financial resources should not be associated with foregoing needed medical care.

These potentially varying meanings and motivations associated with debt mean that we must consider the magnitude of debt, how it stacks up against financial resources, and potential variation across a range of different types of debt when we assess links with medical care access. In this study, we assess the links between debt and foregone medical care using new data collected in the wake of the late 2000s recession, an economically unstable time when many Americans were forced to rely on credit cards (Meier and Sprenger 2010) and spend down retirement savings in order meet ordinary living expenses (Helman, Greenwald, Copeland, and VanDerhei 2009). These data are from the Michigan Recession and Recovery Study (MRRS), a population based survey of working-age adults living in metropolitan Detroit area in late 2009. We examine information about the presence and magnitude of housing, auto, student loan, credit card, medical and other kinds of debt and adjust estimates of links with foregone medical care

for household income and net worth. This study adds further support to emerging arguments for the importance of considering debt when assessing the links between social position and health by extending the focus to health care access and highlighting the constraints posed by credit card and medical debt.

## **BACKGROUND**

### **Prior studies of material resources and foregone medical care**

According to the U.S. Centers for Disease Control (CDC), approximately 11% of working-age Americans decided to forego a doctor's visit they knew they needed because of cost in 2010. The figure was approximately three times higher among adults with no health insurance (31%) and reached 61% among adults with a disability but no health insurance coverage (CDC 2010). Understanding these high levels of foregone care is important because not attending to urgent medical needs leads to worse health outcomes (for examples see Osterberg and Blaschke 2005), and those who forego care thus face greater total financial burdens in the future (Epstein, Sokol, Verbrugge, and McGuigan 2005; Kane and Shaya 2008). Missed medical care also imposes costs on society at large by increasing rates of emergency room admissions and hospitalizations (Robin Dimatteo, Giordani, Lepper, and Croghan 2002; Sokol, McGuigan, Verbrugge, and Epstein 2005). However, while there seems to be a link between affordability and foregoing needed medical care in the U.S., we still have a relatively limited understanding of how individuals navigate the decision in light of their overall financial situation.

Prior studies have shown that those foregoing care have lower incomes (Mielck, Kiess, Knesebeck, Stirbu, and Kunst 2009; Wallace and MacEntee 2012) or are more likely to fall below the poverty line (May and Cunningham 2004). Other studies have focused on the role of health insurance and types of health insurance coverage in predicting foregone care. Factors consistently associated with foregone care are gaps in coverage (Callahan and Cooper 2007) and high deductibles that covered individuals cannot afford (Kullgren, Galbraith, Hinrichsen, Miroshnik, Penfold, Rosenthal, Landon, and Lieu 2010). While informative and relevant, many of these studies were limited to patients of a specific geographic area (Carlson, DeVoe, and Wright 2006) or targeted special populations (Callahan and Cooper 2007; Galbraith, Soumerai, Ross-Degnan, Rosenthal, Gay, and Lieu 2012; Sarmiento, Miller, Ford, Schoenbach, Adimora, Viadro, and Suchindran 2005). Although income and health insurance coverage characteristics are clearly important factors, debt may also influence the decision to forego needed medical care.

**Debt and foregone medical care**

Studies of health care access typically operationalize financial resources by measuring income, which can be used directly to purchase health care and pursue healthy lifestyles. In recent years, researchers have begun to recognize that potential harm of ignoring other aspects of resource portfolios, such as wealth, when trying to understand the social causation of health (Braveman et al. 2005; Drentea and Reynolds 2012). Nonetheless, only a handful of researchers have considered how debt might add to our understanding of the range of socioeconomic resources and obligations that could affect health and health care seeking. They have argued that debt could be added to a broader conceptualization of the fundamental causes of health because it can constrain ability to maintain health (Drentea and Reynolds 2012). It is also important to consider that debt is socially-stratified differently than other social determinants like income: people with the same level of income could carry very different levels of debt, and debt may not increase linearly with income. Moreover, different kinds of debt could be associated with health care access in a variety of distinctive ways.

It seems reasonable to expect that debt could lead some individuals to forego medical care, but there are two related caveats to consider. First, simply having debt does not indicate that finances are limited – debt becomes problematic when it exceeds the holder’s ability to service it and causes difficult spending choices. Second, different types of debt are likely to influence the decision to forego care to different degrees. For example, credit card debt could signal financial troubles and could harm health because of the stress of holding the debt and the demands of creditors. Paying off that debt may pose substantial constraints on spending, and it may represent unplanned and unwanted debt for some. However, individuals from across the income spectrum use credit cards, and higher income individuals may not often have to choose between needed medical care and making monthly payments. By contrast, secured debts like home mortgage loans traditionally have indicated credit-worthiness. When an individual’s income or assets make this normative form of debt affordable, it should not be associated with foregone care, or could even have an independent and negative association if it acts as an asset that can be drawn upon, such as with a home equity loan. Planned debts like these may not weigh on individuals as heavily when they are considering what expenses they can afford, such as a visit to the doctor when they are feeling ill or desire preventive care.

Finally, medical debt may represent a special type when considering the links between debt and health care utilization. Medical debt, more than other kinds of debt, is likely to be related to health problems in the household and a greater need for medical care. It could constrain spending when it exceeds a holder's ability to repay, as do other kinds of debt, but may be particularly unplanned, unwanted debt that accumulates quickly because of the high costs of health care in the United States, particularly for those who are uninsured or underinsured. Some recent studies have focused on the correlates and consequences of medical debt and medical debt-related bankruptcy, and how these may shape health-relevant behaviors. Their results typically suggest that having medical debt is correlated with foregoing physician visits, putting off needed care, and not filling prescription medications (Doty, Edwards, and Holmgren 2005; Tu 2004).<sup>1</sup>

### **The current study**

Because of differences in individuals' ability to afford the debt they take on, and because of the different meanings and underlying factors associated with different kinds of debt, there is likely to be heterogeneity in whether debt will restrict health care access. However, measurement of debt in prior studies of health has often been limited, in some cases to measures of credit card debt only (Drentea 2000; Nelson, Lust, Story, and Ehlinger 2008) or to a dichotomous indicator of debtor status (Drentea and Reynolds 2012), although there are examples of studies using debt to predict other health and non-health outcomes that use more comprehensive debt indicators (Brown, Taylor, and Wheatley Price 2005; Dwyer, McCloud, and Hodson 2011). However, no studies to our knowledge have examined varying types of debts and health care-seeking. In addition, failure to control for wealth or net worth in most prior studies may have disguised heterogeneity in ability to service these different types of debt.

In the present study, we address these limitations. We expect that incorporating adjustment for income, net worth, health and health insurance coverage will condition the association with foregone care, and may do so differently for different types of debt. We focus on foregone medical care occurring in the past 12 months to reduce the possibility that reverse causation explains associations we find with debt, and we assume that most debts were incurred and began to accumulate more than a year before the interview. We examine two research questions: first, is the total amount of debt, the ratio of debt to income, or the ratio of debt to

assets associated with foregoing medical care? Do these associations change after adjustment for income and net worth? And second, are there specific types of debt that put people at greater risk of foregoing medical care than others? Do these associations with different types of debt change after we adjust for income and net worth?

## **DATA AND METHODS**

### **Data**

We use data from the Michigan Recession and Recovery Study (MRRS). The MRRS was designed to follow a stratified random sample of English-speaking adults aged 19 to 64 who lived in Southeastern Michigan (Macomb, Oakland, and Wayne counties) at the time of the initial data collection in late 2009 and early 2010. The MRRS oversampled African Americans and includes mainly African American and non-Hispanic white respondents, reflecting the residential composition of the area. We use data from the first wave of in-person survey interviews. Administration of the first survey interview took approximately 60 minutes, and respondents were paid between \$50 and \$120 for their participation. A total of 914 respondents were interviewed, with a survey response rate of 82.8%.

### **Measures**

#### ***Foregone Medical Care***

We assessed whether respondents had not seen a health care provider because of cost in the last twelve months (22.6%) with an item that asked: “Was there any time in the past 12 months that you needed to see a doctor or dentist but could not afford to go?” This is a combination of two questions that are regularly used in the Survey of Income and Program Participation: “In the past 12 months, was there a time you/anyone in your household needed to see a doctor or go to the hospital but did not go?” and “In the past 12 months, was there a time you/anyone in your household needed to see a dentist but did not go?” (Ouellette, Burstein, Long, and Becroft 2004).

#### ***Debt, Asset, Net Worth and Income Measures***

We used measures of debt and financial resources at the household level because members often pool resources and are collectively responsible for debts. All respondents were

asked about multiple specific types of debt – a mortgage or home equity line of credit (Here referred to collectively as housing debt), student loans, car loans, outstanding credit card balances, medical debt, and other debt – and how much of each type they held. The question was phrased for each as, for example: “Do you have [any student loans]?” If they answered in the affirmative, we inquired about the specific dollar amount by following up with: “About how much do you still owe on your [student loans]?” In the sample overall, 47.8% of respondents reported having any housing debt (conditional mean – the mean among those who reported any of this type of debt – \$141,349), 18.9% reported student loans (conditional mean \$24,535), 46.7% had car loans (conditional mean \$12,285), 61.2% were carrying a credit card balance (conditional mean \$8,541), 28.6% reported medical debt (conditional mean \$5,572), and 19.8% had some other type of debt (conditional mean \$13,376). While we cannot be completely certain what “other type of debt” meant for every respondent, the survey advised them that other debt could include legal bills or unpaid taxes.

We collected information about respondents’ assets in the same manner as for debt. We included as assets: primary residence and any cars, and checking, savings and/or individual retirement accounts (IRA and 401K).<sup>2</sup> We asked respondents to estimate their total household income in 2008, the last full year before the interview for most respondents, from all sources before taxes. We used this information to construct debt to asset ratio (described below). We also constructed a net worth variable by subtracting respondents’ debts from their assets and used the net worth value as an independent variable (divided into quartiles and omitting the second and third quartiles as the reference category).<sup>3</sup> We adjust for household income as an independent predictor of forgone care (divided into quartiles and omitting the second and third quartiles as the reference category) and use income in the construction of a debt to income ratio (described below).

Using these data, we constructed two types of debt measures. First, we considered debt amounts, including debt overall, calculated as the sum of housing debts, student loans, car loans, credit card balance, medical debt, and other loans. We also considered most of these separately, as amounts of specific types of debt. To mitigate the influence of outlier debt values, as is typically done for financial measures like income and wealth because they are highly skewed (Acock 2010), we transform these debt amounts by taking their natural log. Because the natural log function is defined only for values greater than zero, we add 0.001 to all values before log

transformation, in order to include also original zero values in our analysis. We also present untransformed values in Table 1 and in figures for comparison. We present conditional means in Table 1 but retain all individuals in all multivariate analyses, even those who reported no debt on that measure. The conditional mean of overall debt was \$95,340. Second, we constructed ratio measures to account for availability of resources to service debts. We created the debt to asset (DTA) ratio (mean 4.05) and debt to income ratio (mean 3.1) for all respondents by dividing total debt by the total value of income or assets. To construct these ratio measures for all respondents, including those who did not report any assets or income, we added a constant of \$100 to the total value of every respondent's assets and household income in 2008 (the denominators of the ratios).

### ***Health and Health Insurance Measures***

In our analyses we also examine health status because of its association with the need for medical care. For some individuals whose resources have been insufficient in the past, poor health could also have led to the accumulation of medical debt. To assess the association between health status and debt, we include an indicator of self-reported health, assessed with the typical item: "Would you say that your health in general is excellent, very good, good, fair, or poor?" We used this variable in its continuous form with excellent = 5 and poor = 1. Additionally, we include health insurance status of the respondents, considering every respondent who reports having no type of health insurance at the time of their interview to be uninsured (19.2% were uninsured). We address other possible categorizations of health insurance in the sensitivity analysis section.

### ***Other Measures***

Based on prior evidence about the socially-patterned nature of foregone care, we also adjust for the respondent's age in years, gender (male or not), race (African American or not African American), marital status (married or not), and educational attainment (bachelor's degree or more versus less than bachelor's degree).

### ***Analytic Strategy***

We first examined bivariate associations between foregone care and debt and all predictors; we also considered the bivariate associations between different measures of debt and

household income. Then we estimated logistic regression models to examine associations between foregone care and overall debt measures, the presence of specific types of debt, or the amounts of specific types of debt, net of other predictors. We performed all analyses using multiply imputed data with survey weights and applied Stata/SE 12 -mi- estimation techniques that applied Rubin's combination rules to conduct analysis across the five imputed datasets (StataCorp 2011).<sup>4</sup> We found little discernible difference when we used the original data and deleted cases with missing values, so we present the results using imputed data here (analytic N = 914).

## RESULTS

### Descriptive Results

Table 1 compares the characteristics of MRRS respondents who did not forego care with those who said they had foregone care in the past 12 months (22.6%). We present weighted conditional means and 95% confidence intervals or percentages as appropriate.<sup>5</sup> We examined bivariate associations using logistic regressions models with the outcome variable as foregoing care and each independent variable as the sole predictor and report p-values for differences.

Table 1 shows that nearly all respondents reported some type of debt, but the two groups of respondents differ substantially in the amount of debt they hold and the components that make up their total debt. Those foregoing care appear to have less debt overall than their counterparts who have not foregone care (\$59,093 versus \$106,666), and those foregoing care are less likely to have housing debt (28 versus 53%). However, among those who do have housing debt, the average amounts do not vary. There are no differences in student loan prevalence or magnitude, but those foregoing care are less likely to have any car loans (28 versus 52%). Among those who report auto loans, however, there are no significant differences in average amounts. We find little difference in the likelihood of carrying a credit card balance or the amount carried, but those foregoing care were much more likely to have medical debt (58 versus 20%) and had carried more of it (\$8,889 vs. \$2,783). Finally, those foregoing care were more likely to report other types of debts (30 versus 17%), but among those with any other debts, the amounts did not vary.

Table 2 presents similar comparisons for financial resources and sociodemographic characteristics of respondents by foregone care status. Respondents foregoing care in the past 12 months had substantially lower average total net worth (\$5,746 versus \$137,884) and household

income (\$29,407 versus \$71,046). We also find significant income differences when we compare respondents in the top and bottom income quartiles – even within these quartiles of the total distribution, those foregoing care tend to have lower values. We find a marginally statistically significant difference in net worth in the top quartile of the distribution, but none in the bottom quartile. Combining measures of debt with income and net worth, we find that those foregoing care carry more debt in relation to their assets (Ln DTA -0.21 vs. -1.44) and their income (Ln DTI -0.58 vs. -0.95), though the latter difference is only marginally significant (see Table 1). In addition to their relatively disadvantaged financial portfolios, Table 2 shows that respondents foregoing care recently also reported poorer self-rated health (2.9 versus 3.7) and were more likely to be uninsured (37% versus 14%). Those foregoing care were also more likely to be women and African American and less likely to be married or to have a bachelor's degree or more. They are slightly younger than their counterparts who have not foregone care (40 versus 42), but this difference is only marginally significant.

To further illustrate the ways that debt is stratified by income, Figures 1 through 3 present the associations between deciles of household income and magnitude of different measures of debt.<sup>6</sup> Panel A in Figure 1 shows a positive linear relationship between indebtedness and income – respondents with higher household incomes tend to carry more total debt. However, panels B and C in Figure 1 show generally negative relationships between debt to asset and debt to income ratios and household income, suggesting that while those with higher incomes carry much larger debts overall, they may be less burdened by them than smaller debtors with lower incomes.

In Figures 2 and 3 we show that the relationship between debt and income is not uniform across different debt types. Housing debt and car loans (Figure 2 panels A and B) display a pattern similar to that of total debt, indicating that people with large household incomes have greater access to these lines of credit. However, other types of debt show more mixed distributions. In panel C of Figure 2 for student loans, we see little relationship with household income level. Panel A in Figure 3 for credit card balances shows a generally positive association with household income, but this pattern may be driven by several large outliers among high income households. Panel B in Figure 3 for medical debt has a possible negative linear association, and high debtors are disproportionately distributed on the lower end of the income spectrum, although medical debt is present across all income levels in the sample.

The figures show there is more than one pattern of association between household income and indebtedness. Debt levels rise with income, but, as indicated by the accumulation of large DTI and DTA ratios among low income households, smaller budgets are likely more impacted by its presence. Housing debt, car loans, and to some extent credit card balances, rise with income, indicating differential access by income categories, while we see no such association for student loans, and we observe a more negative association between medical debt and income. Based on these figures we can speculate that high income households' debt portfolios are primarily made of secured loans, such as a mortgage or a car loan, while lower income households have more diverse debt portfolios that may include secure debt like student loans, but are also disproportionately more likely to include credit card balances or medical debt.

As a final way to show the connections between income and different kinds of debt, as well as the interrelationship of different debts, in Appendix A we also show the correlation matrix for the amounts of combined debt measures, specific type of debt measures, and household income, all in their natural log transformed form. We find moderately strong correlations between household income and housing debt, car loans, and credit card loans. These loans are also moderately strongly correlated with overall indebtedness, indicating that these represent a major part of debt burden for most people.

### **Multivariate Regression Results**

Table 3 presents logistic regression models predicting foregone care in the past twelve months on the basis of three measures of overall debt at the time of interview in 2009-2010: natural log of total debt (Models 1 and 2), natural log of debt to asset ratio (Models 3 and 4) and natural log of debt to income ratio (Model 5 and 6). We adjust for age, marital status, gender, race, education, insurance and self-reported health in the first of each pair of models, and add household income and net worth in the second. Model fit statistics are reported at the bottom of each column. The results for Models 1 through 6 suggest that debt is positively associated with foregoing needed medical or dental visits for all three measures of overall debt. Table 3 also shows that being in the top quartile of income or net worth is associated with a lower likelihood of foregoing care, compared to being in the middle two quartiles. Being married and reporting better self-reported health are associated with significantly lower likelihood of foregoing care, while being uninsured is associated with higher likelihood and women are marginally more likely to have foregone care.

In Table 4 we decompose total debt into specific types and examine how associations with foregone care may vary. For Models 7 through 16 in Table 3 we show odds ratios with two levels of adjustment: first for sociodemographic characteristics in the top panel A and then additionally for income and net worth in the bottom panel B. The adjusted models include all covariates in Table 2 but since odds ratios values for these predictors change so little from those presented in Table 2, we do not present them to conserve space. Table 3 demonstrates the sharp difference between credit card debt and medical debt when contrasted with mortgage debt, student loans, and car loans. In panels A and B, those with any unpaid credit card balance (OR: 1.83 and 1.89, respectively) and greater credit card debt in natural log values (OR: 1.04 and 1.05, respectively) are significantly more likely to have recently foregone care. Respondents with any medical debt have odds of foregoing care 3.3 times as great as those of respondents with no medical debt after all adjustments, and the odds also rise as the magnitude of medical debt rises (OR: 1.10 in panels A and B). Because housing debt, student loans and car loans did not have any association with foregone care in multivariate models, the results support our hypothesis that these types of debts are more likely to signal of solvency and access to credit than to act as constraints on spending for medical care.

Because Table 4 showed much stronger associations between foregone care and credit card and medical debt than with other types that could comprise total debt, we explored some additional analyses (not shown). We considered the overall debt to asset and debt to income ratio results from Table 3 again, this time first considering only housing, auto and student loan debts when constructing the ratios, and then considering only credit card and medical debt in separate debt to asset/income ratios. Results were again clear: credit card and medical debt drive the associations between overall debt and overall debt ratios and foregone care. We found no associations when we included only car loans, housing debt and student loans in the constructed ratios. These results are robust regardless of which set of debt ratios included “other” debts.

### **Sensitivity Analysis**

We examined how sensitive our models were to changes in measurement or model specification in several ways (results available from authors). We re-estimated Models 1 through 6 using overall debt and debt relative to net worth or income in their non-logged form after removing a handful of extreme outliers. Extremely large values could be erroneous and in any

case may exert disproportionately strong influence on the estimates (Anguelov and Tamborini 2009), especially in a relatively small sample like the MRRS. We found that the positive associations reported between foregone care and total debt or debt to income ratio were still significant, while the ratio of debt to assets was no longer a statistically significant predictor. Further, when we re-estimated Models 7 through 16 using the total amounts of specific types of debt instead of logged values, our findings were unchanged from those presented: both credit card debt and medical debt remained significant predictors of foregone medical care while other types were not significant predictors. Finally, results from Models 17 through 19 were substantively unchanged when we substituted amount of medical debt for the indicator of any medical debt.

We also conducted sensitivity analysis with different specifications of the health insurance variable. We created a categorical version that separated respondents based on the type of insurance they reported: private only (65.81%), public only (11.44%), military (0.69%), private and public (2.03%), other (0.76%), or uninsured (19.27%). We found that the only significant difference in foregone care across the types of insurance coverage occurred among people who reported currently having no insurance at all and other groups. We then collapsed this version into three categories (private = private, private and public option, or other; public = public or military; uninsured = no insurance of any kind). We observed no difference in the association between foregone care and private or public insurance, while the uninsured remained significantly more likely to forego medical care. We estimated additional models that replaced self-reported health with adjustment for depressive symptoms, the number of chronic conditions the respondent has ever been diagnosed with, or the number of chronic conditions diagnosed in the past two years. In separate models focusing on each in turn, all three of these were powerful predictors of having foregone care in the past twelve months, suggesting that our findings are robust to these alternative specifications. However, the variable capturing the number of chronic conditions diagnosed with in the past is likely to be dependent on whether or not has someone been foregoing care and including it in the models could bias our results. Thus, we opted for self-reported health as an indicator of overall well-being because prior literature has shown that the measure captures both mental and physical health (Schnittker 2005). We did not include depressive symptoms in our models with self-reported health to avoid introducing collinearity.

## DISCUSSION

Scholars interested in the social causation of health and social disparities in health have called for more accurate assessments of individuals' resource profiles in recent years (Braveman et al. 2005; Duncan, Daly, McDonough, and Williams 2002; Herd, Goesling, and House 2007; Schnittker 2004). We build on a small body of research that has pointed out the potential health relevance of debt, an understudied aspect of total resource portfolios (Drentea 2000; Drentea and Lavrakas 2000; Drentea and Reynolds 2012; Ross and Huber 1985). Extant studies have shown associations between debt and poorer mental health, but we made novel contributions to this nascent literature by assessing whether debt has an association with lack of access to needed medical care. Foregone medical care is an important outcome in its own right and one that may also have implications for subsequent health and social disparities in health. Debt could constrain access to health care if individuals need to make tradeoffs between servicing debt and going to the doctor, but the need to do so depends on the resources they have to service their debt. Moreover, some kinds of debt may be more likely than others to change individual's assessments of what they can afford, including health care.

We found that respondents foregoing care in our sample of Michigan residents surveyed in the wake of the late 2000s recession were socioeconomically disadvantaged and had poorer health than their counterparts who did not forego needed care for cost reasons, similar to findings of previous studies of the predictors of foregone care (May and Cunningham 2004; Mielck et al. 2009; Wallace and MacEntee 2012). It was thus important to consider whether debt was still associated with foregone care even after we accounted for these disadvantages. We provided a more comprehensive assessment of the "affordability" of an individual's total debt burdens than some prior studies by considering how they aligned with available income and assets. Our first research question asked whether the total amount of debt, debt to asset ratio or debt to income ratio were associated with foregone medical care, and whether any associations we found changed after we adjusted for income and asset levels. We found positive associations with foregone care that persisted even when we adjusted for commonly-studied predictors, including health insurance status, self-rated health, and marital status. Associations were also robust to adjustment for quartiles of respondent's household income and net worth, suggesting that debt does not simply signal a lack of material resources. Moreover, plotting total debt against income showed a positive association, and we observed distinct patterns of certain debts being associated

with greater income and wealth more than others, further suggesting that we are not simply capturing poverty when we measure debt, and some debts indicate privileged access to credit rather than hardship.

To better understand the remaining association remaining between overall debt and foregone care even after we addressed income and asset differences between debt holders, our second research question asked whether there were specific types of debt that drove the association. Some debts colloquially thought of as “good” signal credit worthiness, such as housing debt, and probably do not influence decisions to consume need medical care if they are affordable. Other debts generally thought of as “bad,” such as credit card debt, may for some individuals have been unplanned and may accumulate beyond their ability to repay. Holders of such debts may be more pressure to repay them to avoid interest and stress. Finally, we considered the special case of medical debt, which could behave like other types of “bad” debt but may also signal health issues that could both necessitate more care but also lead to broader debt problems and inability to make debt payments. The results were very clear: net of income and assets, credit card debt and medical debt were strongly and positively associated with having foregone care in the past 12 months.

Our findings thus support and bridge two relatively unrelated sets of studies, some focused on credit card debt and its association with risky health behaviors and mental health (Drentea and Lavrakas 2000; Nelson, Lust, Story, and Ehlinger 2008) and others focused on the particularities of medical debt and medical bankruptcy and how they constrain health care consumption (Doty, Edwards, and Holmgren 2005; Herman, Rissi, and Walsh 2011). Using population-representative data, strong controls for income and assets, and a much fuller range of types of debt than these previous studies, we show support for credit card debt and medical debt as particularly potent predictors of foregone medical care.

Nonetheless, while it presents novel findings, this study has several limitations that point to the need for future research. First, we rely on cross-sectional data, and it is challenging to disentangle the temporal ordering of the accumulation of debt, health problems, and foregoing needed care. We assume that by asking about foregone care within the last year, it is plausible that debt was accumulated prior to the foregone care incident, but cannot rule out the possibility of reverse causality. Moreover, it is also possible that poor health, poor health insurance quality or coverage history and foregone care in the past have led to the accumulation of medical debt

measured in our study (Herman, Rissi, and Walsh 2011). We adjust for health status and health insurance coverage to the extent possible with our small and cross-sectional study, and even with limited measures find significant associations with foregone care. Future studies using longitudinal data and larger samples could better untangle this process and assess the role of health insurance quality and coverage. They could also explore whether health problems that drive the accumulation of medical debt could also catalyze other debts, such as growing credit card balances when individuals are too sick to work or do not have the income or assets to pay their medical bills on time.

Our sample is comprised of working-age residents of Southeastern Michigan, which limits our ability to generalize to the United States population. A relatively small sample also limits the power of our statistical analysis, but there are few sources of data on the working-age population of the United States that contain detailed information about debt, assets, and foregone medical care. Another important limitation is that the data we use are self-reported, and economists have shown that the actual magnitude of household debt and reported household debt vary considerably (Keese 2012). While it is plausible that the perception of indebtedness or of the stigma associated with certain kinds of debt link objective debt burdens to the decision to forego needed medical care, more data collection and mixed methods research is clearly needed.

Finally, we are facing a data limitation that could influence the validity of our conceptual framework. Even though we have a good sense of the overall debt burden of the respondents, and our measures allow us to draw conclusion about the overall burdens and foregone care, we did not collect information about how high monthly debt payments or interest rates on these debts may be. For this reason, we cannot construct the serviceable debt ratio, a measure of how much debt a household has to pay each month that is used by the Federal Reserve Board. Such a measure would allow us to more carefully consider the true impact of competing obligations on households' budgets, and to determine whether the association between foregone care and debt is similar to the association with any other type of expenditure.

Despite these limitations, we find novel associations between credit card and medical debt and unmet medical need. These suggest the value of further research for researchers, providers and policy makers focused on disparities in health behaviors and health outcomes. For example, understanding the complex links between debt and foregoing care for cost reasons will be important for evaluating the implications of major policy changes like the Patient Protection

and Affordable Care Act. Will reductions in the number of uninsured and underinsured Americans mitigate the restrictions posed by total debt burdens and different kinds of debt? Additionally, our results suggest that social policy interventions such as debt relief programs could remove an important barrier to care. For example, the Medical Debt Responsibility Act (H.R. 2086) introduced in June 2011 would allow people to erase medical debt bills from their credit reports, once their debt has been paid back. This could dramatically improve credit scores for many and give former medical debtors access to the forms of debt that our study identified as less threatening to access to medical care, like mortgage debt. Debt is a fact of life for most Americans, so further research is warranted to understand how enabling access to “healthier” forms of debt while minimizing the restrictions imposed on some by credit card and medical debt could potentially improve access to health care and population health.

## NOTES

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<sup>1</sup> Because medical and other types of debt refer to debts held in the household, the respondent may not be the individual who accumulated that debt, in which case their own health would not be a confounding factor. In most studies, the health status of others for whom the respondent may be responsible is not available, nor the specific origin of medical debts.

<sup>2</sup> Two respondents reported their housing values to be improbably high, so we set those values to missing and we considered two outliers among our house-worth responses to be too improbable and instead considered those responses as missing and imputed them along with the rest of missing values.

<sup>3</sup> We assessed other ways of including measures of household income and net worth, both highly skewed measures that could have nonlinear associations with foregone care. Other specifications yielded substantively similar findings, leading us to settle on this one as it combined parsimony with the ability to see whether a nonlinear association existed.

<sup>4</sup> With 68 respondents failing to report values, household income in 2008 had the most missing data, while all other variables had fewer than 10 missing responses each.

<sup>5</sup> Stata 12 software does not generate an estimate of the standard deviation for multiply imputed survey data, so we present the 95% confidence intervals instead.

<sup>6</sup> To show the general tendencies on a meaningful scale, we only include debt to asset and debt to income ratios less than 100 for the purposes of these figures, leaving us with 893 observations for DTA and 912 for DTI (all 914 values are included in all other analyses).

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**Table 1.** Debt characteristics of Michigan Recession and Recovery Study respondents, presented as conditional means and 95% confidence intervals or percentages

	Did not forego care past 12 months	95% CI	Foregone care past 12 months	95% CI	p for diff.
% With any type of debt	89.40%	---	94.21%	---	
Mean of Total Debt	\$106,666	[85,602, 127,730]	\$59,093	[41,080, 77,106]	**
Mean of Ln Total Debt	10.44	[10.18, 10.70]	9.37	[8.81, 9.94]	**
% with any Housing Debt	53.45%	---	28.35%	---	***
Mean of Housing Debt	\$143,289	[112,274, 174,304]	\$128,818	[94,803, 162,833]	
Mean Ln of Housing Debt	11.57	[11.39, 11.76]	11.53	[11.25, 11.82]	
% with any Student Loans	22.48%	---	17.97%	---	
Mean of Student Loans	\$26,380	[15,031, 37,730]	\$19,482	[13,858, 25,106]	
Mean Ln of Student Loans	9.35	[9.06, 9.65]	9.37	[9.13, 9.61]	
% with any Car Loans	52.20%	---	27.80%	---	***
Mean of Car Loans	\$12,276	[10,824, 13,727]	\$12,349	[8,442, 16,255]	
Mean Ln of Car Loans	9.09	[8.94, 9.23]	9.09	[8.69, 9.48]	
% with any Credit Balance	60.33%	---	64.11%	---	
Mean of Credit Card Balance	\$8,604	[5,855, 11,353]	\$8,418	[6,468, 10,369]	
Mean Ln of Credit Card Balance	8.01	[7.73, 8.29]	7.85	[7.60, 8.10]	
% with any Medical Debt	20.06%	---	57.75%	---	***
Mean of Medical Debt	\$2,783	[1,803, 3,763]	\$8,889	[6,033, 11,745]	*
Mean Ln of Medical Debt	6.72	[6.41, 7.04]	7.95	[7.57, 8.32]	***
% with any Other Debt	16.92%	---	29.63%	---	**
Mean of Other Debt	\$16,397	[4,963, 27,830]	\$7,470	[4,593, 10,346]	
Mean Ln of Other Debt	8.47	[7.96, 8.99]	8.08	[7.65, 8.52]	
Debt to Asset Ratio	2.66	[1.16, 4.05]	8.81	[4.46, 12.68]	
Ln Debt to Asset Ratio	-1.44	[-1.78, -1.22]	-0.21	[-0.68, -0.01]	***
Debt to Income Ratio	1.97	[1.55, 2.39]	7.04	[0.80, 13.27]	
Ln Debt to Income Ratio	-0.95	[-1.32, -0.58]	-0.58	[-0.86, -0.30]	
N	651		263		

Note: \*p<.05, \*\*p<.01, \*\*\*p<.001. Figures are all weighted and based on estimates obtained from 5 imputed datasets, n = 914 in each. P-values obtained from logistic regression models for foregone care with each variable the sole predictor.

**Table 2.** Sociodemographic and financial characteristics of Michigan Recession and Recovery Study respondents, presented as means and 95% confidence intervals or percentages

	Did not forego care past 12 months	95% CI	Foregone care past 12 months	95% CI	p for diff.
Mean of Net Worth	\$137,884	[99,924, 175,845]	\$5,746	[-8,369, 19,861]	***
Mean of Net Worth in the Lowest Quartile	-\$59,749	[-77,985, -41,512]	-\$47,829	[-62,892, -32,766]	
Mean of Net Worth in the Top Quartile	\$328,554	[110,961, 237,859]	\$174,410	[257,727, 399,381]	
Mean of Household Income 2008	\$71,046	[62,948, 85,657]	\$29,407	[26,864, 41,176]	***
Mean of Household Income 2008 in Lowest Quartile	\$10,179	[5,093, 15,266]	\$8,170	[6,662, 9,678]	***
Mean of Household Income 2008 in the Top Quartile	\$121,099	[99,222, 142,977]	\$92,084	[62,609, 121,560]	***
Age in years	42.34	[40.64, 44.04]	39.86	[37.72, 41.20]	
% Married	60.40%	---	28.76%	---	***
% Female	47.66%	---	63.44%	---	*
% African American	22.00%	---	37.58%	---	**
% Bachelor's degree or more	31.11%	---	12.27%	---	***
Self-Rated Health (1 = poor; 5 = excellent)	3.68	[3.54, 3.82]	2.93	[2.72, 3.14]	***
% Uninsured (No health insurance)	14.09%	---	36.77%	---	***
N	651		263		

Note: \*p<.05, \*\*p<.01, \*\*\*p<.001. Figures are all weighted and based on estimates obtained from 5 imputed datasets, n = 914 in each. P-values obtained from logistic regression models for foregone care with each variable the sole predictor.

**Table 3.** Odds ratios and 95% confidence intervals from logistic regression models of foregone medical care, using various measures of overall debt (see column heading)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	LN Total Debt	LN Total Debt	LN Debt-to-asset Ratio	LN Debt-to-asset Ratio	LN Debt-to-Income Ratio	LN Debt-to-Income Ratio
Focal debt measure (see column heading)	1.08** [1.02, 1.13]	1.09** [1.03, 1.14]	1.23*** [1.11, 1.36]	1.20** [1.06, 1.35]	1.17** [1.08, 1.28]	1.22** [1.09, 1.36]
2008 Household income quartile <sup>a</sup>						
Bottom Quartile	---	0.99 [0.66, 1.48]	---	0.85 [0.56, 1.30]	---	0.74 [0.44, 1.25]
Top Quartile	---	0.38*** [0.25, 0.58]	---	0.40*** [0.27, 0.59]	---	0.32* [0.14, 0.74]
Household net worth quartile <sup>a</sup>						
Bottom Quartile	---	0.93 [0.55, 1.59]	---	0.82 [0.46, 1.47]	---	1.55 [0.90, 2.66]
Top Quartile	---	0.21 [0.10, 0.43]	---	0.27** [0.13, 0.56]	---	0.38** [0.21, 0.68]
Age (years)	0.99† [0.97, 1.00]	1.00 [0.98, 1.01]	0.99 [0.98, 1.01]	1.00 [0.99, 1.02]	0.99† [0.97, 1.00]	1.00 [0.99, 1.02]
Married	0.32*** [0.21, 0.47]	0.40** [0.24, 0.66]	0.34*** [0.22, 0.51]	0.44** [0.26, 0.72]	0.32*** [0.21, 0.48]	0.40*** [0.26, 0.64]
Female	2.03* [1.03, 4.01]	1.87† [0.98, 3.55]	1.92† [0.94, 3.96]	1.86† [0.96, 3.63]	2.02* [1.03, 3.97]	1.76† [0.90, 3.43]
African American	1.21 [0.76, 1.91]	0.93 [0.59, 1.49]	0.93 [0.58, 1.51]	0.79 [0.49, 1.27]	1.14 [0.71, 1.84]	0.80 [0.49, 1.31]
BA +	0.53† [0.25, 1.12]	0.92 [0.46, 1.82]	0.58 [0.28, 1.22]	0.96 [0.49, 1.88]	0.53† [0.25, 1.11]	0.85 [0.42, 1.74]
Uninsured	2.55*** [1.62, 4.03]	2.20** [1.43, 3.39]	2.42*** [1.59, 3.67]	2.12** [1.41, 3.19]	2.45*** [1.58, 3.79]	2.20** [1.40, 3.48]
Self-rated health	0.55** [0.40, 0.75]	0.61** [0.46, 0.81]	0.58** [0.43, 0.78]	0.64** [0.49, 0.84]	0.56** [0.41, 0.75]	0.62** [0.47, 0.82]
F	29.24	20.51	47.66	27.19	36.35	48.96

Note: \*p<.05, \*\*p<.01, \*\*\*p<.001. Estimates obtained using 5 imputed datasets, n = 914 in each.

a. Middle two quartiles omitted

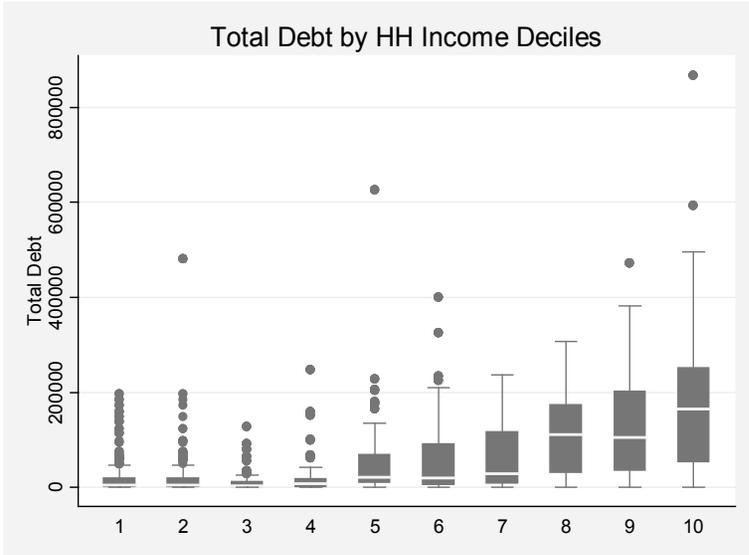
**Table 4.** Odds ratios and 95% confidence intervals for focal debt measure (see column heading) from logistic regression models of foregone medical care, using measures of specific types of debt, considering presence and amount

	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
	Any Housing Debt	LN Housing Debt Amount	Any Student Loans	LN Student Loan Amount	Any Car Loans	LN Car Loan Amount	Any Credit Card Debt	LN Credit Card Debt Amount	Any Medical Debt	LN Medical Debt Amount
Model A. Adjusted for age, marital status, gender, race, education, insurance status, self-rated health	0.73	0.98	1.27	1.02	0.64	0.97	1.83**	1.04**	3.62***	1.10***
F	[0.44, 1.21]	[0.96, 1.01]	[0.80, 2.04]	[0.99, 1.05]	[0.36, 1.13]	[0.94, 1.01]	[1.27, 2.65]	[1.02, 1.07]	[2.42, 5.40]	[1.07, 1.13]
	33.30	32.83	30.17	28.92	27.75	27.94	25.29	25.62	35.5	36.03
Model B. Model A + household income and net worth	0.81	0.99	1.11	1.01	0.60	0.97	1.89**	1.05**	3.32***	1.10***
F	[0.48, 1.36]	[0.96, 1.02]	[0.64, 1.93]	[0.97, 1.04]	[0.32, 1.12]	[0.93, 1.01]	[1.28, 2.79]	[1.02, 1.08]	[2.09, 5.27]	[1.06, 1.13]
	32.97	32.60	24.45	24.96	22.48	22.66	26.47	24.33	25.33	25.45

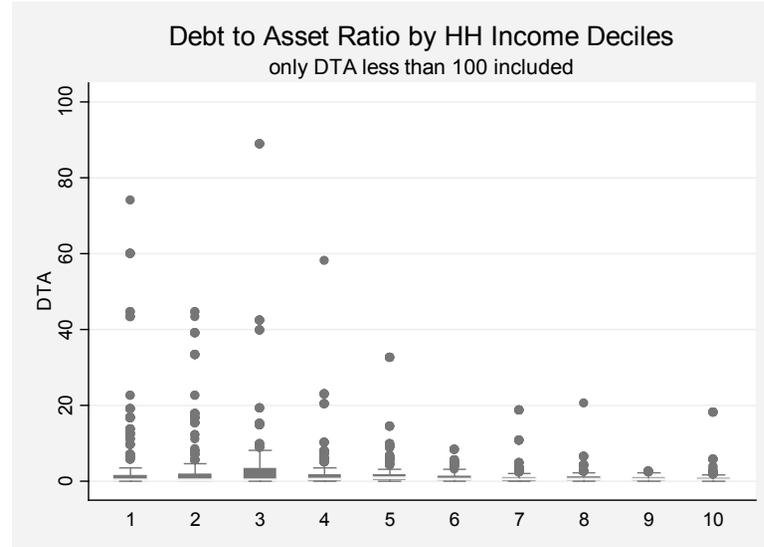
Note: \*p<.05, \*\*p<.01, \*\*\*p<.001. Estimates obtained using 5 imputed datasets, n = 914 in each.

**Figure 1.** Means in dollars of overall debt and debt relative to resource ratios by deciles of household income

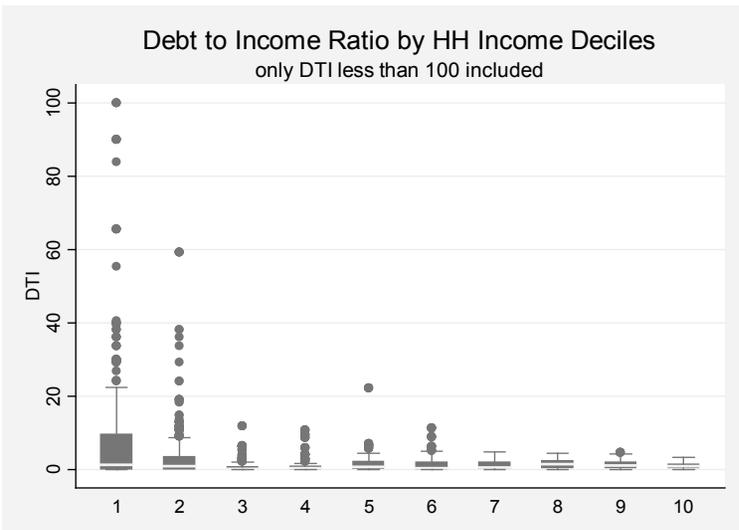
A. Total Debt



B. Debt to Asset Ratio (only DTA values < 100 shown)

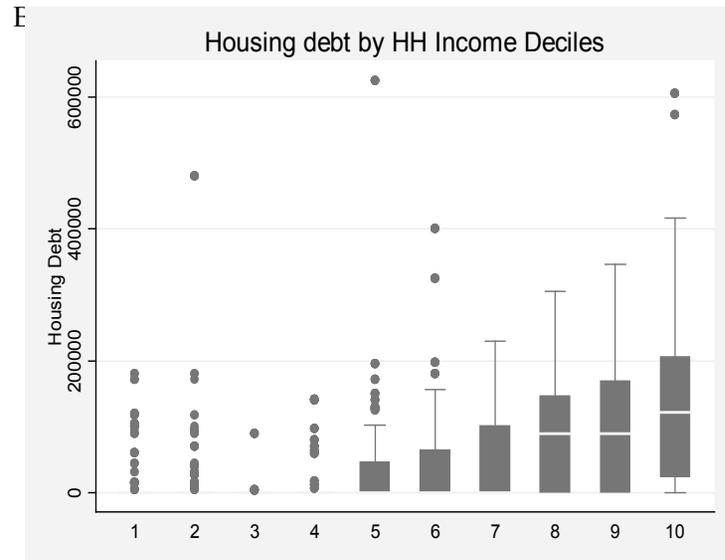


C. Debt to Income Ratio (only DTI values < 100 shown)

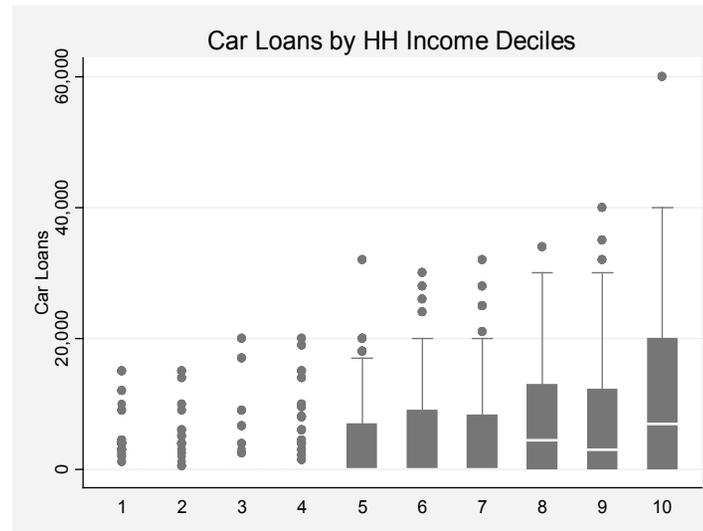


**Figure 2.** Means in dollars of housing debt, car loans and student loans by deciles of household income

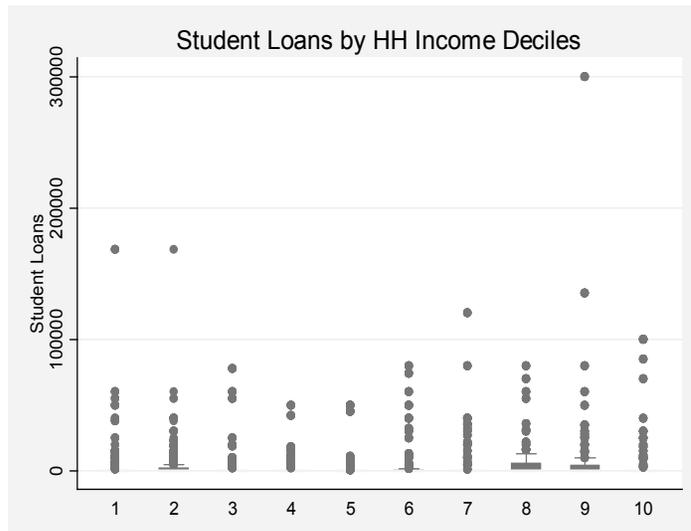
A. Housing Debt



B. Car Loans

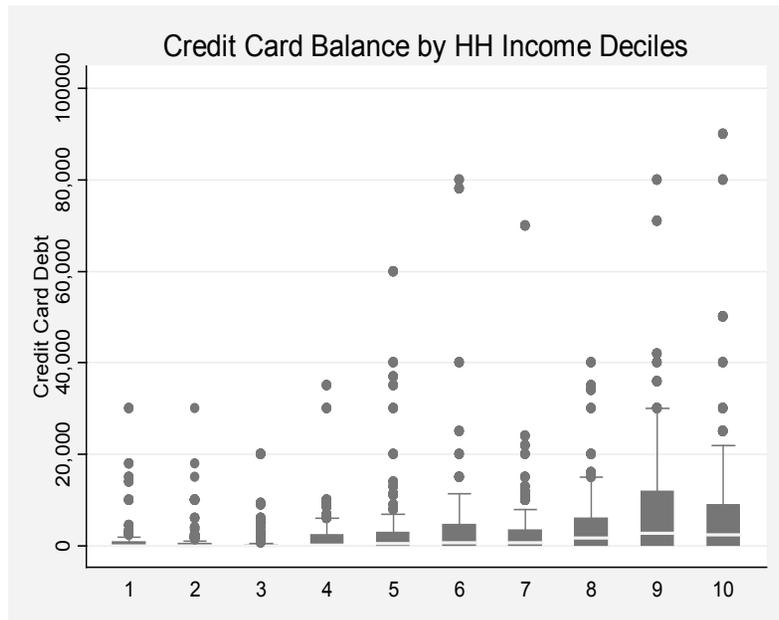


C. Student Loans

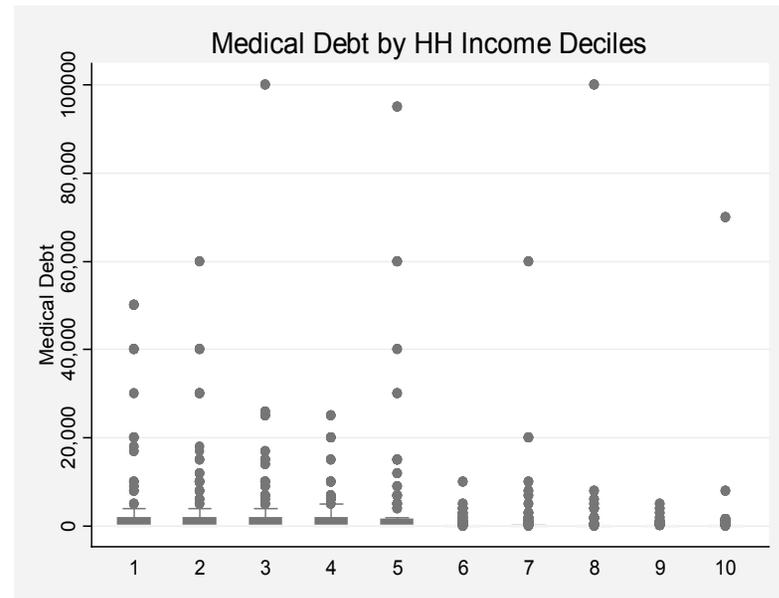


**Figure 3.** Means in dollars of credit card balances and medical debt by deciles of household income

A. Credit Card Balances



B. Medical Debt



**Appendix A.** Correlations between amounts of specific types of debt, debt ratios, total debt and household income (natural log form)

	1	2	3	4	5	6	7	8	9	10
1. Medical Debt	1.00	--	--	--	--	--	--	--	--	--
2. Car Loans	-0.12	1.00	--	--	--	--	--	--	--	--
3. Credit Card Debt	-0.01	0.34	1.00	--	--	--	--	--	--	--
4. Student Loans	0.04	0.07	0.15	1.00	--	--	--	--	--	--
5. Housing Debt	-0.12	0.36	0.27	0.00	1.00	--	--	--	--	--
6. Other Loans	0.10	0.05	0.09	0.04	0.05	1.00	--	--	--	--
7. Debt-to-Asset Ratio	0.39	0.11	0.25	0.32	0.14	0.25	1.00	--	--	--
8. Debt-to-Income Ratio	0.24	0.33	0.39	0.29	0.51	0.22	0.77	1.00	--	--
9. Total Debt	0.22	0.40	0.48	0.25	0.49	0.23	0.67	0.87	1.00	--
10. Household Income	-0.16	0.40	0.31	0.01	0.46	0.07	-0.01	0.11	0.38	1.00

Note: Estimates obtained using 5 imputed datasets, n = 914 in each. Column numbers refer to labels in first column for specific measures.



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