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Failure of care acquisition: identifying risk factors in American health disparities

Nicholas Downing¹ and Mamunur Rashid²

Abstract

We examined the effects of various demographic and socioeconomic risk factors that influence an adult's decision *not* to obtain medical care in the United States utilizing data from the 2015 National Health Interview Survey (NHIS). Bivariate analysis and multivariate logistic regression revealed that that family income, insurance status and whether one worries about paying medical bills make individuals nearly 80% less likely to obtain care than their counterparts. This study provides evidence that certain risk factors, especially those directly related to one's socioeconomic status, may put individuals at greater risk for failure to obtain care. Interventions in policy may be needed to combat and reduce the many medical inequalities present within American society.

Keywords: healthcare, multivariate regression, socioeconomic status

1. Introduction

Disparities in human health have been on the forefront of public discussion for decades and their eradication continues to serve as a future goal for our nation's leaders.^{1,2,3} Although some may not know the true importance of this task, it must be understood that, for many, their elimination is truly a matter of life and death.^{4,5}

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While it is known that various risk factors, such as socioeconomic status, can be used as indicators of patient health, it is of upmost importance to understand the cumulative effects that all of these factors play in influencing an individual's decision to obtain medical care.⁶ For future improvement, we must begin to face the complexities of client decision-making and pinpoint the exact reasons why people fail to access such important care. With this knowledge, social and political leaders, health officials and possibly even medical physicians, can begin to take the steps necessary in combatting the many barriers that some people face.⁷ Before a proper proposal for change can be made, however, we must first determine which risk factors are most influential in individuals' decisions to obtain care. The purpose of this study is to identify such factors.

2. Methods

2.1 Data

We used data from the 2015 NHIS, an annual cross-sectional health survey conducted by trained interviewers from the United States Census Bureau. See details about the study in Reference 8.

In this survey, each interview is conducted in a face-to-face format with questions that are guided by computer-assisted personal interviewing technology, allowing for a reliable manual entry of data into a computer. The NHIS' target population includes all noninstitutionalized civilians residing in the United States at the time of the interview; citizenship status does not affect the sample of those interviewed.⁸ Individuals that are not included in this sample include those that are in the Armed Forces, those in correctional facilities or those who are in long-term care facilities, such as mental institutions or nursing homes.

Although 42,288 families completed the interview process, we were only concerned with individuals aged 18 years or older and who answered meaningfully in all survey questions of our interest. Those who "refused" to answer, answered "unknown" or for whom the answer was "not

ascertained” were simply removed from our sample. Thus, 26,949 eligible adults completed all necessary aspects of the interview under our conditions, providing a response rate 63.9%.

2.2 Measures

Outcome. In the question provided by the NHIS, participants were asked: “*During the past 12 months, was there any time when [the individual] needed medical care, but did not get it because [the individual] couldn't afford it?*” This is our dependent variable (PNMED12M) for our study. The binary outcome of interest was the answer “yes” to this question, or to *need* care and *not get* care during the past twelve months. Individuals that did not respond with either of these responses, to get or not to get care, were removed from our sample and their responses for further questions were not considered in our analyses. The format of this question proved to be a limitation within our findings. However, we may utilize this point to evaluate the effectiveness of our model. Due to element of economic stability – “*because [the individual] couldn't afford [care]*” – we should expect to see that independent variables directly related to socioeconomic status hold greater statistical significance.

Independent Variables. Fifteen independent variables were selected for bivariate analysis. These variables are: age, sex, race, region, highest level of education, marital status, citizenship status, current employment status, current smoker status, current alcohol consumer status, whether or not an individual is worried about paying medical bills if he or she were to get sick or injured, family size, family income, food stamp reception, and insurance status. These variables were chosen due to their prevalence and interest throughout literature.

2.3 Statistical Analyses

We first compared the frequencies of each variable outcome present in the sample of eligible adults, thus allowing us to evaluate the estimated prevalence of each throughout society. We then

conducted a Pearson Chi-Squared (χ^2) test in order to observe the associations between each specific risk factor and the outcome *not* to obtain care when the individual *needed* it. The statistical significance of each of these fifteen independent variables is quantified by its p-value and the significant variable is thought to be considered in the multivariable analysis.

A multivariate logistic regression model is utilized to observe the combined effect that independent variables have in influencing individuals' decisions not to obtain medical care. Among the fifteen independent variables, only ten variables (age, sex, race, marital status, current employment status, current smoker status, whether or not an individual is worried about paying medical bills if he or she were to get sick or injured, family income, food stamp reception, and insurance status) were selected for their inclusion into our logistic regression model. These variables are selected based on the significance of the bivariate analysis and some variables are not considered in the model to avoid multicollinearity effects.

3. Results

Of the eligible adults interviewed, 5.27% of the sample had been uninsured during the 12 months prior to the interview; thus, it can be estimated that there were over twelve million uninsured adults in the United States in the year leading up to the 2015 NHIS. Table 1 provides both demographic and socioeconomic information showing the frequency of each survey question response for all eligible individuals in our sample. Approximately 37.46% of the adult population had a total family income less than \$35,000. Additionally, 14.49% of adults, either themselves or their families, benefited from food stamps during the 2014 year.

Table 2 provides the results of the Pearson χ^2 Test and the respective levels of significance that each variable has in influencing an adult's decision not to obtain medical care. Three independent variables (citizenship status, current alcohol consumer status, and family size)

had p-values greater than the $\alpha=0.05$ level of significance; thus, there is insufficient evidence to state that these variables are statistically significant. Therefore, these three variables are not included in our multivariate model.

The results from the multivariate logistic regression are summarized in Table 3. We found that risk factors closely related to socioeconomic status held the most significant effects. As can be observed from the calculated odds ratio, OR, insured adults are approximately 0.20 times more likely not to obtain medical care when compared to uninsured adults. For clarity, uninsured adults are 80% less likely to obtain care than insured adults, because they could not afford it.

Likewise, there is evidence to suggest that as combined family income increases, the odds that the individual will not obtain medical care decreases remarkably. To illustrate this relationship, adults with family incomes between \$35,000 and \$74,999 are approximately 33% more likely to obtain care when compared to adults with family incomes less than \$35,000. Compare this result to an even more extreme income gap: adults with family incomes over \$100,000 are expected to be 78% more likely to obtain care than those whose family incomes are less than \$35,000.

Lastly, adults who are not worried about paying medical bills in the event of an illness or injury are approximately 0.20 times more likely not to obtain needed medical care when compared to adults who are worried. In other words, worried adults are 80% less likely to obtain care than adults who are not worried.

4. Discussion

To be able to help those in need, one must first ask the question: *Who* is in need? Or rather, who fails to obtain medical care even though they may be in need of it? As we have shown,

socioeconomic status may play an important driving force in individuals' decisions to obtain care; however, future studies could be conducted in order to identify more specific groups or to isolate particular risk factors that could be addressed by policy change. Ideally, questions asked by the NHIS should be objectively neutral in nature, as not to introduce bias in statistical findings. For example, the question posed for our binary dependent outcome -- "*During the past 12 months, was there any time when [the individual] needed medical care, but did not get it because [the individual] couldn't afford it?*"-- could have been revised to exclude any dimension of socioeconomic status. Alternatively, the question could have read: "During the past 12 months, was there any time when [the individual] needed medical care, but did not get it?"

Although there is a bias of socioeconomic status in our outcome, the use of a multivariate logistic regression model proves to be a powerful tool in evaluating the reception of healthcare in the United States. It's utilization, especially with pre-existing data collected and made public by the NHIS, can offer important insight into the disparities that plague a large portion of the American resident population. By providing our nation's leaders with statistically significant evidence, beneficial reform at the institutional level may be made possible.

References

¹Han, X., Call, K., Pintor, J., Alarcon-Espinoza, G., and Simon, A. (2015) "Reports of Insurance-Based Discrimination in Health Care and Its Association With Access to Care." *American Journal of Public Health* 105, no. S3. Pg. 517-25.

²Cooper, L., Hill, M., and Powe, N. (2002) "Designing and Evaluating Interventions to Eliminate Racial and Ethnic Disparities in Healthcare." *Journal of General Internal Medicine* 1.6. Pg. 477-86.

³Politzer, R., Yoon, J., Shi, L., Hughes, R., Regan, J., and Gaston, M. (2001) "Inequality in America: The Contribution of Health Centers in Reducing and Eliminating Disparities in Access to Care." *Medical Care Research and Review* 58.2. Pg. 234-48.

⁴Satcher, D., and Higginbotham, E. (2008) "The Public Health Approach to Eliminating Disparities in Health." *American Journal of Public Health* 98.3. Pg. 400-03. =

⁵Marmot, M. (2005) "Social Determinants of Health Inequalities." *The Lancet* 365.9464. Pg.1099-104.

⁶DeVoe, J., Baez, A., Angier, H., Krois, L., Edlund, C., and Carney, P. (2007) "Insurance + Access ≠ Health Care: Typology of Barriers to Health Care Access for Low-Income Families." *The Annals of Family Medicine* 5.6. Pg. 511-18.

⁷Betancourt, J. (2003) "Defining Cultural Competence: A Practical Framework for Addressing Racial/Ethnic Disparities in Health and Health Care." *Public Health Reports* 118.4. Pg. 293-302.

⁸Division of Health Interview Statistics. (2016) "Survey Description." *2015 National Health Interview Survey (NHIS) Public Use Data Release*. Centers for Disease Control and Prevention. ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2015/srvydesc.pdf. (Date Accessed 06/02/2017).

Table 1. Response frequencies to select demographic and socioeconomic questions: 2015

National Health Interview Survey

Variables	Frequency
Sex	
Male	0.4405
Female	0.5595
Age	
18-40 years	0.3367
41-59 years	0.3114
60+ years	0.3519
Race	
White	0.7382
Black	0.1378
Other	0.1240
Region	
Northeast	0.1681
Midwest	0.2158
South	0.3361
West	0.2799
Highest Level of Education	
Less than High School Diploma	0.1215
Diploma or GED	0.2390
Some College	0.1972
Bachelor's Degree or Higher	0.4424
Marital Status	
Not Married	0.4474
Married	0.2202
Other (i.e. divorced, etc.)	0.3324
Citizenship Status	
Citizen	0.9397
Not Citizen	0.0603
Employment Status	
Employed	0.5760
Not Employed	0.4241

Smoker Status (current)	
Smoker	0.1507
Non-Smoker	0.8493
Alcohol Consumer Status (current)	
Consumer	0.3602
Non-Consumer	0.6398
Is individual worried about paying medical bills if he/she gets sick/injured?	
Yes	0.4159
No	0.5841
Family Size	
0-4 member	0.9214
5+ members	0.0786
Family Income	
\$0-\$34,999	0.3746
\$35,000-\$74,999	0.2989
\$75,000-\$99,999	0.1137
\$100,000+	0.2128
Does the individual (or his/her family) benefit from food stamps?	
Yes	0.1449
No	0.8551
Insurance Status	
Not Insured	0.0527
Insured	0.9473

Note. Response frequencies are given as proportions, not as percentages. Data from the 2015 National Health Interview Survey were restricted to adults 18 years and older who self-reported their answers to the fifteen selected questions.

Table 2. Significance in Variable Influence on Individuals' Decisions *Not* to Obtain Medical Care: 2015 NHIS

Variables	χ^2	p-value
Sex		
Male	25.29	<0.001
Female		
Age		
18-40 years	59.33	<0.001
41-59 years		
60+ years		
Race		
White	45.68	<0.001
Black		
Other		
Region		
Northeast	16.65	<0.001
Midwest		
South		
West		
Highest Level of Education		
Less than High School Diploma	81.48	<0.001
Diploma or GED		
Some College		
Bachelor's Degree or Higher		
Marital Status		
Not Married	188.05	<0.001
Married		
Other (i.e. divorced, etc.)		
Citizenship Status		
Citizen	1.38	0.241
Not Citizen		
Employment Status		
Employed	14.23	<0.001
Not Employed		

Smoker Status (current)		
Smoker	218.31	<0.001
Non-Smoker		
Alcohol Consumer Status (current)		
Consumer	3.92	0.048
Non-Consumer		
Is individual worried about paying medical bills if he/she gets sick/injured?		
Yes	920.30	<0.001
No		
Family Size		
0-4 member	7.65	0.006
5+ members		
Family Income		
\$0-\$34,999	523.30	<0.001
\$35,000-\$74,999		
\$75,000-\$99,999		
\$100,000+		
Does the individual (or his/her family) benefit from food stamps?		
Yes	207.78	<0.001
No		
Insurance Status		
Not Insured	1139.30	<0.001
Insured		

Note. χ^2 = Chi-Squared Test result. A Pearson χ^2 Test was conducted in order to observe the association between each variable and the outcome of an individual to not obtain medical care regardless of potential need for it. An $\alpha=0.05$ level of significance was used to evaluate the relative statistical significance of each variable.

Table 3. Logistic Regression Model of Significant Demographic and Socioeconomic Variables:
2015 NHIS

Variables	OR (95% CI)
Sex	
Male	1.00
Female	1.11 (0.99, 1.25)
Age	
18-40 years	1.00
41-59 years	1.46 (1.26, 1.68)
60+ years	0.98 (0.82, 1.17)
Race	
White	1.00
Black	1.15 (0.99, 1.33)
Other	0.72 (0.59, 0.87)
Marital Status	
Not Married	1.00
Married	1.26 (1.07, 1.50)
Other (i.e. divorced, etc.)	1.48 (1.28, 1.71)
Employment Status	
Employed	1.00
Not Employed	1.18 (1.03, 1.35)
Smoker Status (current)	
Smoker	1.00
Non-Smoker	0.63 (0.55, 0.72)
Is individual worried about paying medical bills if he/she gets sick/injured?	
Yes	1.00
No	0.20 (0.17, 0.23)
Family Income	
\$0-\$34,999	1.00
\$35,000-\$74,999	0.67 (0.58, 0.77)
\$75,000-\$99,999	0.33 (0.25, 0.43)
\$100,000+	0.22 (0.17, 0.30)
Does the individual (or his/her family) benefit from food stamps?	
Yes	1.00

No	0.89 (0.77, 1.03)
Insurance Status	
Not Insured	1.00
Insured	0.20 (0.17, 0.23)

Note. OR = odds ratio; CI = confidence interval. Select variables that showed significance in the Pearson χ^2 Test were included in this logistic regression model.