The Effect of Income on Health Choices: Physical Activity and Alcohol Use

Xiaowen Hu, University of Kentucky

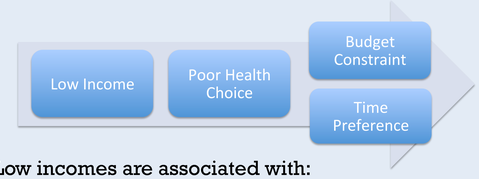
C. Jill Stowe, University of Kentucky

Selected Poster prepared for presentation at the Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013.

The Effect of Income on Health Choices: Physical Activity and Alcohol Use

Xiaowen Hu, C. Jill Stowe
Department of Agricultural Economics, University of Kentucky

MOTIVATION



- Low incomes are associated with:
  - Lower consumption: vegetables, fruits (costly)
  - Higher consumption: cigarettes, alcohol (costly)
  - Less participation: physical activity (non-costly)
- Time preference: consumers who discount the future more tend to select immediate pleasure and care less about future health. (Becker et al. (1988))
  - Probability of starting smoking decreases as income increases, whereas the rate of quitting increases. (Binkley (2010))
  - Lower income is associated with higher odds of alcoholism. (Cerdá et al. (2011))
  - Low income and physical activity deficiency occur concurrently. (Chang et al. (2008))

RESEARCH QUESTION

- Through the lens of time preference,
  - Investigate the relation between household income level and individual consumption choice of alcohol.
  - Investigate the relation between household income level and individual physical activity participation choice.

METHODS

$$V = \sum_{t=0}^{T} \beta^t(I_t)U_t(C_t), \qquad U = U_0(c_0, x_0) + \beta(I_0)f(x_0)U_1(g(I_0))$$

$$D = [U_0(c_0, x_0) + \beta(I_0)f(x_0)U_1(g(I_0))] - [U_0(c_0, x_0') + \beta(I_0)f(x_0')U_1(g(I_0))]$$

$$= [U_0(c_0, x_0) - U_0(c_0, x_0')] + \beta(I_0)U_1(g(I_0))[f(x_0) - f(x_0')]$$

$$= D_0 + D_1$$

Utility difference in the first period

Utility difference in the second period

I: income level; U: utility, $U'(x)>0$, $U'(g(I))>0$;
β: discount factor, $\beta'(I)>0$;
c: consumption of ordinary good;
x: consumption of good that contains health consequence, $x>x'$;
$g(I)$: expected income in next period, $g'(I)>0$;
$f(x)$: utility variation function, $f(0)=1$.

	x is costly, contributes to current utility but hurts health and future utility (alcohol).	x is non-costly, benefits health and future utility without negative effects (physical activity).
$f(x)$	Reduction function, $f'(x)<0$	Accumulation function, $f'(x)>0$
Low Income	$D>0$, consume x.	D increases with I. Higher incomes consume more x.
High Income	$D<0$, not consume x.	

- Empirically estimated by two Multinomial Logit models and a Binary Logit model.
- Data from 2001-2010 Behavioral Risk Factor Surveillance System (BRFSS).
- Dependent variables:
  - Model 1: frequency of regular alcohol consumption
  - Model 2: frequency of excessive alcohol consumption
    - 0 - "none"; 4 - "up to twice per week";
    - 1 - "once per month"; 5 - "up to every other day";
    - 2 - "twice per month"; 6 - "up to every day"
    - 3 - "up to once per week";
  - Model 3: physical activity participation
    - 0 - No; 1 - Yes.

RESULTS & DISCUSSION

Table 1. Multinomial Logit Estimation Results for Drinking Frequency (N=1,719,271)

Drinking Frequency	*0*	*1*	*2*	*4*	*5*	*6*
Income1: <$10,000	0.631***	0.100***	0.012	-0.005	-0.016	-0.082***
Income2: $10,000-$14,999	0.432***	0.102***	0.056***	-0.010	0.006	-0.073***
Income3: $15,000-$19,999	0.269***	0.051***	0.043***	-0.016	-0.010	-0.032**
Income5: $25,000-$34,999	-0.151***	-0.052***	0.006	0.022*	0.046***	0.025**
Income6: $35,000-$49,999	-0.444***	-0.135***	-0.020	0.071***	0.110***	0.105***
Income7: $50,000-$74,999	-0.787***	-0.238***	-0.045***	0.121***	0.173***	0.171***
Income8: >$75,000	-1.421***	-0.488***	-0.170***	0.239***	0.357***	0.358***

Table 2. Multinomial Logit Estimation Results for Binge Drinking Frequency (N=1,376,525)

Binge Drinking Frequency	*0*	*1*	*2*	*4*	*5*	*6*
Income1: <$10,000	-0.075***	-0.007***	-0.045	0.061***	0.070	0.181***
Income2: $10,000-$14,999	-0.061***	-0.035	-0.032***	0.033***	0.080***	0.048
Income3: $15,000-$19,999	0.018	0.030	0.012	0.043	0.060***	0.118**
Income5: $25,000-$34,999	0.014**	-0.005	-0.033	0.003	0.037	-0.055*
Income6: $35,000-$49,999	-0.003	-0.003	-0.033	0.034	0.096***	-0.073**
Income7: $50,000-$74,999	-0.035	-0.009	-0.040	0.044	0.053	-0.161***
Income8: >$75,000	-0.074***	0.019	0.003	0.099***	0.078***	-0.313***

Table 3. Binary Logit Estimation Results for Physical Activity Participation (N=2,713,996)

Physical Activity Participation	*1*
Income1: <$10,000	-0.14***
income2: $10,000-$14,999	-0.12***
income3: $15,000-$19,999	-0.08***
income5: $25,000-$34,999	0.12***
income6: $35,000-$49,999	0.27***
income7: $50,000-$74,999	0.45***
income8: >$75,000	0.73***

- Moderate amount, health benefit; higher social status, more social activities.
- The consumption of a good in harmful amounts for a low income person tends to be greater.
- Low incomes are less likely to invest in healthy, non-costly goods.

✓ *(Category 3 is the base outcome category.*
✓ **, **, *** denotes significance at the 10%, 5%, 1% level.)*

Table 4. Results from Other Explanatory Variables

Variable	*Drinking*	*Binge drinking*	*Physical Activity*
Educational Attainment	+	-	+
Marital Status (Unmarried)	+	+	-
Gender (Male)	+	+	+
Children Presence	-	-	-
Self-Reported Physical Health	+	N/S	+
Self-Reported Mental Health	N/S	-	+
Age	U-shaped	U-shaped	-

- Low income individuals discount expected future utility and hence diminish the cost of reduced longevity.

CONCLUSION

- Household income level is important because it affects not only current budget but also future expectation of consumption.
- The latter one becomes dominant as income increases.

To control binge drinking, promote physical activity participation, improve population health, reduce the crimes caused by alcoholism -> ***Investment in education or other policies to increase income for the poor.***

REFERENCES

- Becker, G. S., M. Grossman, and K. Murphy. 1994. "An Empirical Analysis of Cigarette Addiction." American Economic Review, 84: 396–417.
- Becker, G. S., and C. Mulligan. 1997. "The Endogenous Determination of Time Preferences". Quarterly Journal of Economics, 112: 729–758.
- Becker, G. S., and K. M. Murphy. 1988. "A Theory of Rational Addiction". Journal of Political Economy, 96: 675–700.
- Binkley, J. 2010. "Low Income and Poor Health Choices: The Example of Smoking". American Journal of Agricultural Economics, 92: 972–984.
- Cerdá, M. , Johnson-Lawrence, V. D. , and Galea, S. 2011. "Lifetime Income Patterns and Alcohol Consumption: Investigating the Association between Long- and Short-term Income Trajectories and Drinking". Social Science & Medicine, 73: 1178–1185.
- Droomers, M. , Schrijvers, C. T. M. , Stronks, K. , Mheen, D. , and Mackenbach, J. P. 1999. "Educational Differences in Excessive Alcohol Consumption: The Role of Psychosocial and Material Stressors". Preventive Medicine, 29: 1-10.
- Ettner, S. J. 1996. "New Evidence on the Relation between Income and Health". Journal of Health Economics, 15: 67-85.
- Herd, D. 1990. "Subgroup Differences in Drinking Patterns among Black and White Men: Results from a National Survey". Journal of Studies on Alcohol and Drugs, 51: 221-232.
- Keough, K.A., Zimbardo, P.G., and Boyd, J.N. 1999. "Who's Smoking, Drinking, and Using Drugs? Time Perspective as a Predictor of Substance Use". Basic and Applied Social Psychology, 21: 149-164.
- Park, J., R. Holcomb, K. Raper, and O. Capps. 1996. "A Demand System Analysis of Food Commodities by U.S. Households Segmented by Income." American Journal of Agricultural Economics, 78: 290-300.
- Scharff, R. L., and Viscusi, W. K. 2011. "Heterogeneous Rates of Time Preference and the Decision to Smoke". Economic Inquiry, 49: 959-972.
- Stephens, T., Jacobs, D. R., and White C. C. 1985. "A Descriptive Epidemiology of Leisure-Time Physical Activity". Public Heath Reports, 100(2): 147–158.
- Stewart, H., N. Blisard, and D. Joliffe. 2003. "Do Income Constraints Inhibit Spending on Fruits and Vegetables among Low-income Consumers?" Journal of Agricultural and Resource Economics, 28: 465–480.
- Wilsnack, R.W., Vogeltanz, N.D., Wilsnack. S.C., and Harris, T.R. 2000. "Gender Differences in Alcohol Consumption and Adverse Drinking Consequences: Cross-cultural Patterns". Addiction, 95: 251-265.

Contact author: Xiaowen Hu, PhD student
Email: *xiaowen.hu@uky.edu*