

DAHL: Demographic Assessment for Health Literacy

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Source

“The Demographic Assessment for Health Literacy (DAHL): A New Tool for Estimating Associations between Health Literacy and Outcomes in National Surveys”

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Journal of General Internal Medicine, Oct. 2008

Introduction

- Not a substitute for validated in-person instruments
- For use in population level analyses
- Limited health literacy associated with poor health status, health outcomes and healthcare utilization
 - Representativeness to general population is unknown – small surveys
 - In-person health literacy instrument is time-consuming and costly
- Similar to Miller et al (2007) Res. Social Admn. Pharm.

Motivation - 1

- “Health literacy” is intimately connected with socioeconomic environment and demographics
 - age, educational achievement – key causal factors
 - sex and race/ethnicity – key mediating factors
- Recognize complexity of individual health literacy, but....
- At population level, few socio-demographic factors may drive a majority of the variation in health literacy
- Derived measure allows easy quantification of relative impact on health status of these socio-demographic factors

Motivation - 2

- Potential Gains – derived health literacy measure applicable to nationally representative survey data
 - National Health Interview Survey (NHIS), CDC
 - Medical Expenditure Panel Survey (MEPS), AHRQ
 - Medicare Current Beneficiary Survey (MCBS), CMS
- Examine relationship with health outcomes and healthcare utilization
 - rare events (heart attacks, cancers, CABG, etc)

Objectives

- to impute limited health literacy from socio-demographic indicators
- to estimate the association of imputed limited health literacy with indicators of health status, and compare findings with those from using a measured indicator of limited health literacy (S-TOFHLA)

Methods I – Deriving DAHL - Data

- *Prudential Medicare survey*
- *Includes S-TOFHLA-based health literacy score*
- *Largest of health surveys with a validated in-person health literacy measure*
 - *N ~ 3,000*
 - *representative of civilian population age 65+*
 - *sample frame: all new enrollees to the Medicare HMO plans of Prudential Healthcare in four locations (Cleveland, OH; Houston, TX; South Florida; Tampa, FL) between Dec 1996 and August 1997*
 - *excluded those a) not living in community, b) with severe cognitive impairment, and c) who were not comfortable speaking either in English or Spanish*
 - *effective response rate 41%*

Methods II – Deriving DAHL - Scores

- Estimate linear relationship between S-TOFLHA score and socio-demographic indicators
 - age
 - highest educational achievement (years of schooling)
 - sex
 - race/ethnicity
- Regression coefficients used as scoring weights for obtaining the DAHL
- Concordance between the DAHL and S-TOFHLA
 - Discrimination (AUROC)

Methods III — DAHL for National Survey Data

- None has a validated measure of health literacy
- National Health Interview Survey, 1997 (CDC)
 - included those 65 or older
 - N~7,000
- Health and Retirement Study, 1992-present (NIA / Univ. of Michigan)
 - Longitudinal
 - included 65 or older in 1997
 - N~10,000

Methods IV — Association with health status

- External validation by comparing association of limited literacy with health status
- Dichotomous health status indicators (self-reported)
 - general health (poor or fair)
 - hypertension
 - diabetes
 - difficulty with Activities with Daily Living (ADL)
- Logistic regression of health status indicators estimated as a function of indicator of limited literacy (S-TOFLA / DAHL)
- Compare association with limited literacy from different survey data
 - Prudential Medicare survey, 1997
 - National Health Interview Survey, 1997
 - Health and Retirement Study, 1997

Results: Table 1a – Study Populations

	Prudential 1997 (N=2,824)	NHIS-Elderly 1997 (N=6,819)
Female, %	58	62
Age, %		
65-69	37	27
70-74	28	27
75-79	19	22
80-84	11	15
85+	5	10
Race/Ethnicity, %		
Black	11	8
White	76	86
Hispanic	12	4
Other	1	2
Years of schooling completed, %		
0-8	17	19
9-11	18	18
12 or GED	34	32
>12	30	31

Results: Table 1b – Study Populations

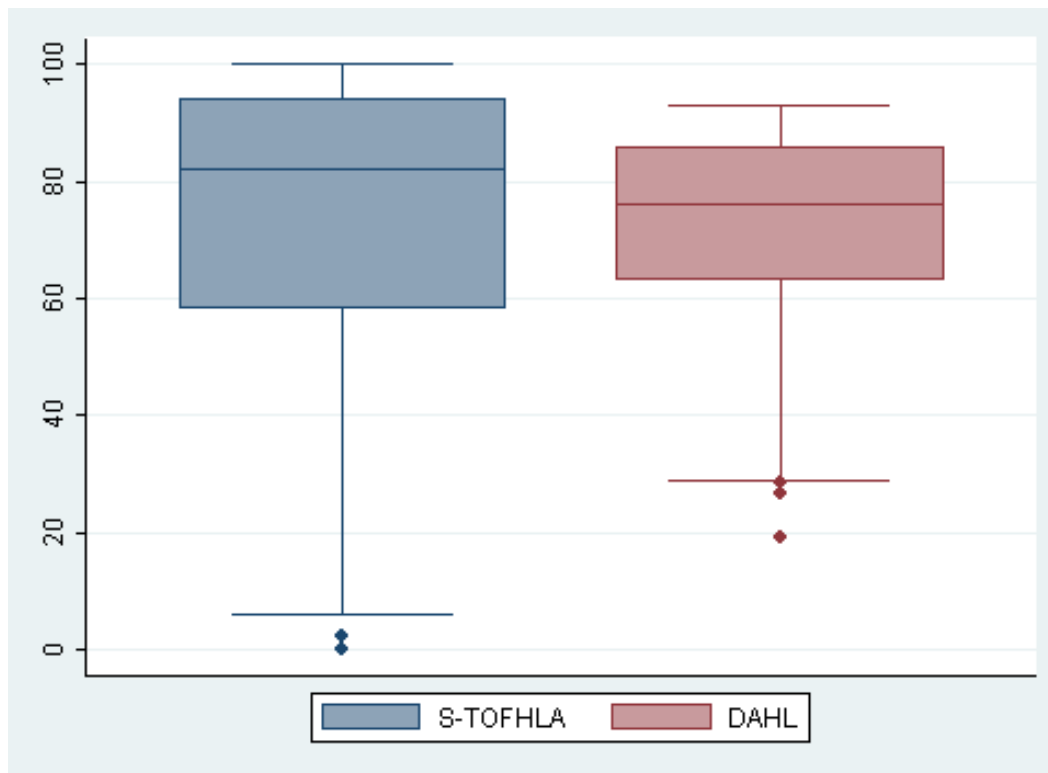
Health Status	Prudential 1997 (N=2,824)	NHIS-Elderly 1997 (N=6,819)
General health – fair or poor, %	24	26
Hypertension, %	45	52
Diabetes, %	14	13
Difficulty with ADL, %	3.3	5.3

Results: Table 2 – Deriving DAHL Prudential Medicare Survey (N=2,824)

	<u>DAHL Score</u>	<u>95% Conf. Interval</u>
Reference Group:		
White Women, age 65-69, & > 12 years of schooling	91.3	[89.3, 93.2]
Adjustments for other groups:		
Male	-1.8	[-3.5, -0.27]
Age		
70-74	-5.5	[-7.5, -3.5]
75-79	-10.9	[-13.1, -8.65]
80-84	-16.2	[-18.9, -13.4]
85+	-27.8	[-31.8, -23.9]
Years of schooling completed		
0-8	-30.2	[-32.7, -27.6]
9-11	-15.9	[-18.3, -13.6]
12 or GED	-6.2	[-8.1, -4.2]
Race/Ethnicity		
Black	-15.9	[-18.5, -13.4]
Hispanic	-6.7	[-9.4, --3.9]
Other	-8.7	[-15.8, -1.7]

Results: Comparison of S-TOFHLA & DAHL Scores

(Prudential Medicare Study; N=2,842)



AUROC = 0.81 % correctly classified = 79%

Results: Table 3 – DAHL Performance NHIS Data (N=6,819)

Association (Odds Ratio) of Inadequate literacy with self-reported health and chronic conditions

Data Source →	<i>Prudential Medicare</i>		<i>NHIS 1997</i>
Health Literacy Measure →	<i>S-TOFHLA</i>		<i>DAHL</i>
Poor/Fair General Health	1.77	1.78	1.70
Hypertension	1.08 ^a	1.15 ^a	1.07 ^a
Diabetes	1.37	1.08 ^a	1.29
Difficulty with ADL	1.91	2.57	2.47

Note: a) * denotes lack of statistical significance ($p > 0.05$)

b) NA denotes measures not available in NHIS 1997 survey.

Results: Table 3b – DAHL Performance HRS Data (N=10,310)

Association (Odds Ratio) of Inadequate literacy with self-reported health and chronic conditions

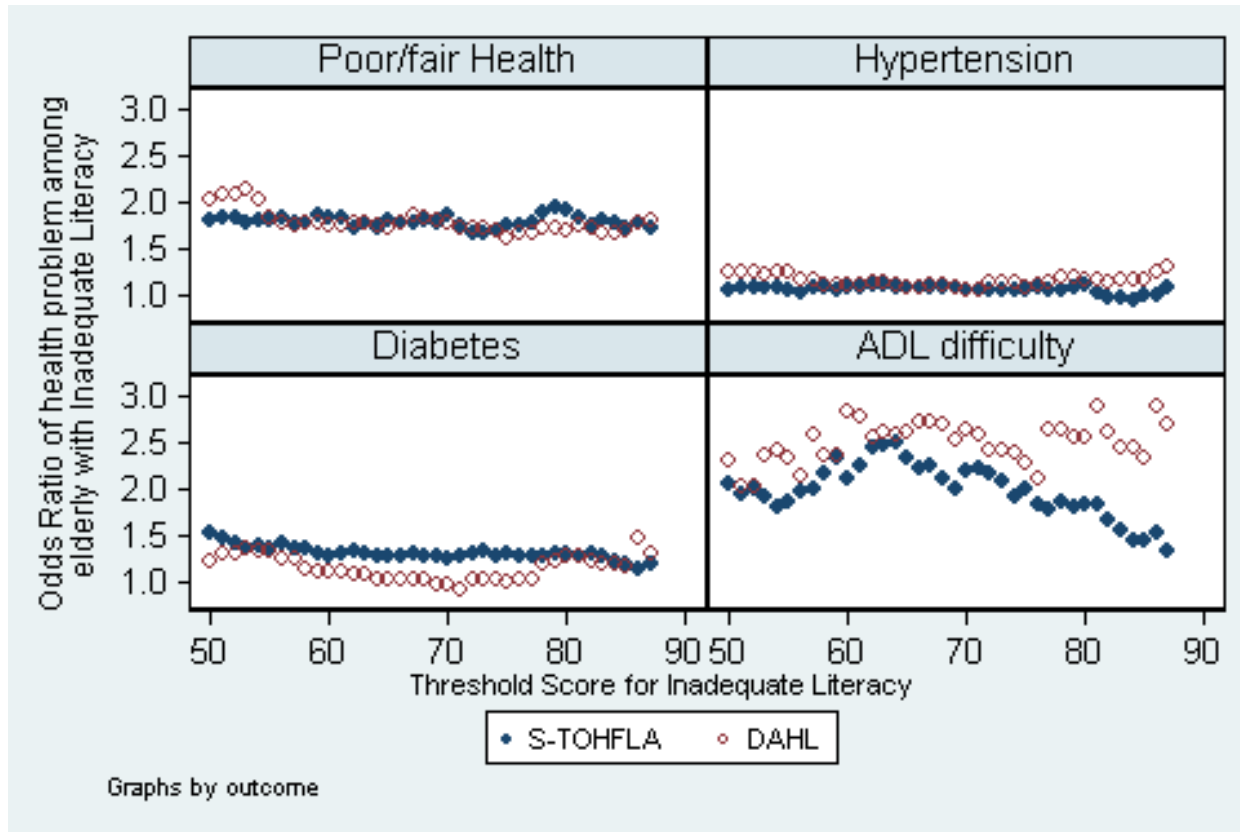
Data Source →	<i>Prudential Medicare</i>		<i>HRS 1997</i>
Health Literacy Measure →	<i>S-TOFHLA</i>	<i>DAHL</i>	
Poor/Fair General Health	1.77	1.78	1.92
Hypertension	1.08 ^a	1.15 ^a	1.19
Diabetes	1.37	1.08 ^a	1.30
Difficulty with ADL	1.91	2.57	1.94

Note: a) * denotes lack of statistical significance ($p > 0.05$).

Sensitivity: Figure 1

Sensitivity to Inadequacy Cut-off, Prudential Medicare Data

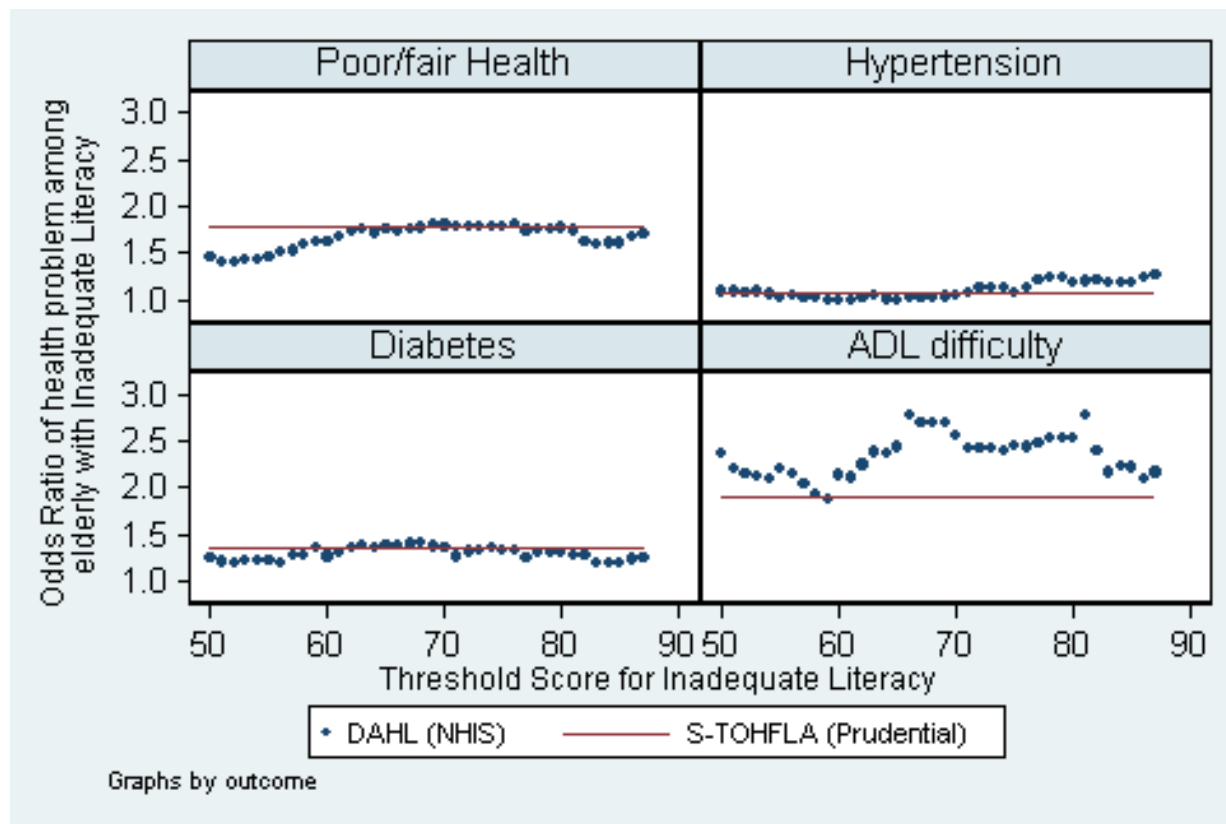
Association of self-reported health with inadequate literacy based on S-TOHFLA and DAHL – Prudential Medicare Study (N=2,824)



Sensitivity: Figure 2

Sensitivity to Inadequacy Cut-off, NHIS Data

Association of self-reported health with inadequate literacy based on DAHL – NHIS elderly (N=6,819)



Discussion

- Results support using DAHL as a proxy for identifying subgroups with limited literacy in nationally representative surveys
 - it is NOT designed for individual assessment of health literacy
 - it is NOT designed for health literacy assessment of any non-representative cohort of patients
- The four determinants of DAHL seem to capture the important variation in health literacy so far as its impact on health status is concerned
- No natural threshold for limited literacy – robust association between measured limited literacy and health status – leads to robustness to errors in DAHL

Limitations

- S-TOFHLA as gold standard
- Limited to self-report outcomes
- Prudential Medicare Study not nationally representative sample
- Limited to the elderly



Thank you

