

Estimation of average treatment effects of having a usual source of care on Pap test use by race/ethnicity: A population-based study

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Presenter Disclosures

Tzy-Chyi Yu, MHA, PhD

- (1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

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Learning Objectives

- Describe nearest-neighbor matching estimators for average treatment effects proposed by Abadie and Imbens (2002).
- Identify various average treatment effects of having a usual source of care on Pap test use across races/ethnicities.
- Explain matching techniques to control selection biases.

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Summary of results

- Results from the matching estimators indicate
 - Having a usual source of care statistically significantly increased the probability of Pap test use for White, Black, and Hispanic respondents at the 0.001 significance level.
 - Having a usual source of care did not significantly increase the probability of Pap test use among Asian respondents.

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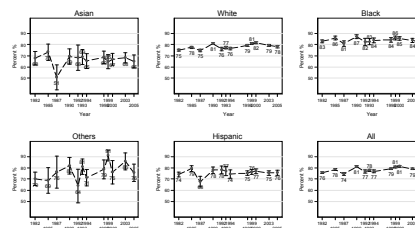
Roadmap

- Background
- Study objective
- Method
- Nearest-neighbor matching
- Results
- Discussion and Conclusion
- Summary

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Background

Figure 1. Percent of U.S. women ages 18 years and older who had a Pap test within the preceding 3 years, by race and ethnicity, 1982-2005.



Yu et al. Persistent Disparities in Pap Test Use: Assessments and Predictions for Asian Women in the U.S., 1982-2010. Journal of Immigrant and Minority Health [accepted 2009]. DOI: 10.1007/s10903-009-9255-6 NHRMS115118

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Background (cont.)

- Although plentiful studies have documented disparities in Pap test use across races/ethnicities, little is known about how the mechanism of race/ethnicity contributes to this disparity.
- The relationship between having a usual source of care and preventive service usage has also been documented (Blewett et al 2008).

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Study objective

- To evaluate the impact of having a usual source of care on Pap test use by race/ethnicity.
 - The average treatment effects of having a usual source of care, as a potential mechanism, on Pap test use by race/ethnicity.

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Method

- Study design:** cross-sectional.
- Data sources:** 2000, 2003, and 2005 the National Health Interview Survey (NHIS).
- The outcome variable:** Pap test use in the last three years.
- The variable of interest:** Having a usual source of care
 - considered endogenous or confounded by subject characteristics in this analysis.

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Method (cont.)

- Average treatment effect (ATT)

For individual i : $Y_i(1) - Y_i(0)$

For population: $\tau^{POP} = E\{Y(1) - Y(0)\}$

For sample: $\tau^{sample} = \frac{1}{N} \sum_{i=1}^N \{Y_i(1) - Y_i(0)\}$

- Challenge: need to obtain the counterfactual outcome, which cannot be actually observed, for each observation.

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Nearest-neighbor matching

- Abadie and Imbens (2002)
- nnmatch- in Stata
 - Nearest-neighbor matching estimator for average treatment effect
 - Features:
 - Bias-corrected matching estimators
 - Matching with replacement → Lowers the bias but increase the variance.

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Nearest-neighbor matching (cont.)

- Table 1: A matching estimator with seven observations, $m = 1$ (Abadie et al. 2004)

i	Wi	Xi	Yi	J1(i)	Yi(0)	Yi(1)	KM(i)
1	0	2	7		7		
2	0	4	8		8		
3	0	5	6		6		
4	1	3	9			9	
5	1	2	8			8	
6	1	3	6			6	
7	1	1	5			5	

Wi: group; Xi: covariant; Yi: outcome; Yi(0): outcome when treatment = 0; Yi(1): outcome when treatment = 1

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Nearest-neighbor matching (cont.)

- Table 1: A matching estimator with seven observations, $m = 1$ (Abadie et al. 2004)

i	W_i	X_i	Y_i	$J1(i)$	$Y_i(0)$	$Y_i(1)$	$KM(i)$
1	0	2	7	{5}	7	8	
2	0	4	8		8		
3	0	5	6		6		
4	1	3	9			9	
5	1	2	8			8	
6	1	3	6			6	
7	1	1	5			5	

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Nearest-neighbor matching (cont.)

- Table 1: A matching estimator with seven observations, $m = 1$ (Abadie et al. 2004)

i	W_i	X_i	Y_i	$J1(i)$	$Y_i(0)$	$Y_i(1)$	$KM(i)$
1	0	2	7	{5}	7	8	
2	0	4	8	{4,6}	8	7 ½	
3	0	5	6	{4,6}	6	7 ½	
4	1	3	9	{1,2}	7 ½	9	
5	1	2	8			8	
6	1	3	6			6	
7	1	1	5			5	

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Nearest-neighbor matching (cont.)

- Table 1: A matching estimator with seven observations, $m = 1$ (Abadie et al. 2004)

i	W_i	X_i	Y_i	$J1(i)$	$Y_i(0)$	$Y_i(1)$	$KM(i)$
1	0	2	7	{5}	7	8	3
2	0	4	8	{4,6}	8	7 ½	1
3	0	5	6	{4,6}	6	7 ½	0
4	1	3	9	{1,2}	7 ½	9	1
5	1	2	8	{1}	7	8	1
6	1	3	6	{1,2}	7 ½	6	1
7	1	1	5	{1}	7	5	0

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Estimate ATT of usual source of care on Pap tests

- 4 matches per observation matched with
 - immigration status
 - age groups
 - marital status
 - Education
 - poverty status
 - health insurance
 - self-reported health status
 - living region
- Population Average Treatment Effect (PATE)
- Bias correction

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Results

Table 1. Descriptive statistics by race/ethnicity

Race / Ethnicity	Sample size	Pap test [§]	Having a usual source of care [§]	P-value
Asian	830	69%	86%	***
White	24,673	81%	92%	***
Black	5,642	84%	91%	***
Hispanics	6,494	76%	80%	***

[§] Weighted estimates
*** < .001

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Results (cont.)

Table 2. Average treatment effects by race/ethnicity

Race / Ethnicity	ATT	Std. Err.	z	P> z	[95% Conf. Interval]
Asian	0.09	0.06	1.41	0.159	[-.04 .22]
White	0.16	0.02	10.64	0.000	[.13 .19]
Black	0.15	0.03	5.45	0.000	[.09 .20]
Hispanics	0.13	0.02	7.17	0.000	[.10 .17]

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Discussion and conclusion

- Having a usual source of care statistically significantly increased the probability of Pap test use for White, Black, and Hispanic respondents at the 0.001 significance level, but did not increase the probability of Pap test use among Asian respondents.
- Results of this study demonstrate that a policy encouraging Asian women to have a usual source of care will not increase their Pap test use.

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Summary

- Nearest-neighbor matching techniques to control selection biases to estimate average treatment effects.
- Various average treatment effects of having a usual source of care on Pap test use across races/ethnicities.

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References

- Abadie, A., Drukker, D., Herr, J. L., & Imbens, G.W. (2004). "Implementing Matching Estimators for Average Treatment Effects in Stata." *Stata Journal*, 4(3), 290-311.
- Abadie, A., & Imbens, G. (2002). "Simple and Bias-Corrected Matching Estimators for Average Treatment Effects," Technical Working Paper T0283, NBER.
- Blewett, L., Johnson, P., Lee, B., & Scal, P. (2008). "When a usual source of care and usual provider matter: Adult prevention and screening services." *JGIM: Journal of General Internal Medicine*, 23(9), 1354-1360. Print.
- Yu, T.-C., Chou, C.-F., Johnson, P.J., & Ward, A. "Persistent Disparities in Pap Test Use: Assessments and Predictions for Asian Women in the U.S., 1982-2010." *Journal of Immigration and Minority Health*, 2009 May 5. [Epub ahead of print] DOI: 10.1007/s10903-009-9255-6 NIHMS115118.

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Thank you

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