

Pilot Study on Geographical Pattern of Prostate Cancer in District of Columbia, 1994-2001: A Screening Effect?

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Research Questions

- Does prostate cancer incidence varies by geographical area in DC?
- Does screening effect measured as proportion of early stage (localized) prostate cancer varies by geographical area in DC?
- If both variations exist, would the screening effect variation explain geographical prostate cancer incidence variation observed in DC?

Data collection:

- All prostate cancer cases (ICD-O-2 code C619) diagnosed during 1994-2001 (8 years) were collected from DC Cancer Registry.

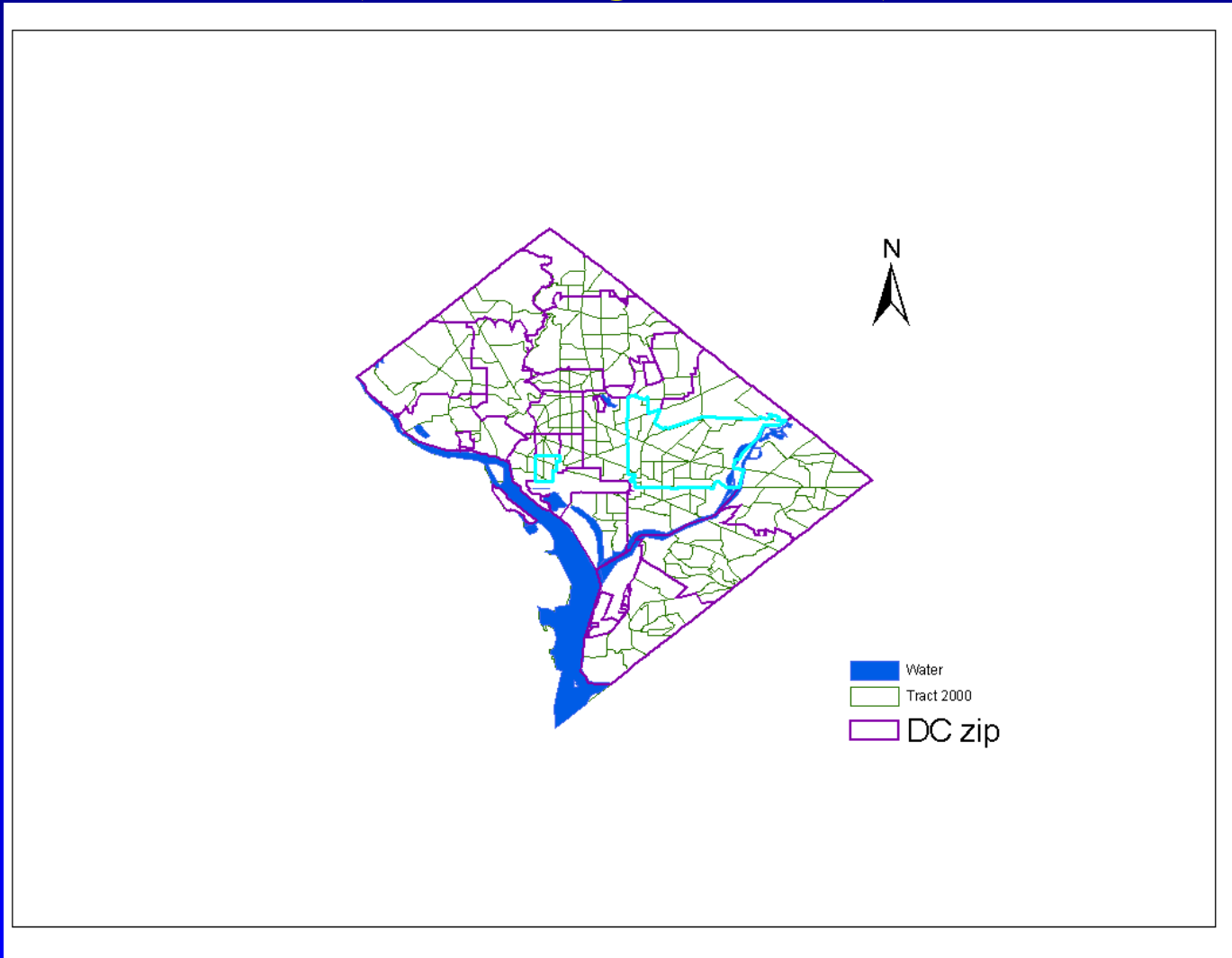
Geo-coding to Census Tract

- 1) TIGER database: census tract
- 2) U.S. Postal Service 5 digit ZIP+4 catalog

Result of geo-coding

- 25 cases could not be geo-coded
- Among geo-coded 4729 cases :
 - 80.2% - street segment exact address match;
 - 0.5% - matched to a single street segment
 - 0.4% - matched to 5-digit ZIP+4's
 - 16.9% - matched to the 5-digit ZIP
 - 1.2% - matched to the 3-digit ZIP
 - 0.5% matched to more than one street segment

Census Tract and 5-digit Zip Code (Washington, DC)



Random assignment of census tract

- For 16.9% - matched to the 5-digit ZIP and 1.2% - matched to the 3-digit ZIP zip code cases, random assignment was done based on the population sizes of involved census tracts in the zip code area (the census tract with bigger population will have more chance to be assigned to the case within the zip code area)

First, generate a random number between 0 and 1, then assign a census tract based on random number “ranges” of census tracts in the zip code area defined as in the following example table

• Tract	Population	Prop	Range
• 1	3600	36%	0-0.36
• 2	4400	44%	>0.36-0.8
• 3	1500	15%	>0.8-0.95
• 4	500	5%	>0.95-1
• Total	10000	100%	0-1

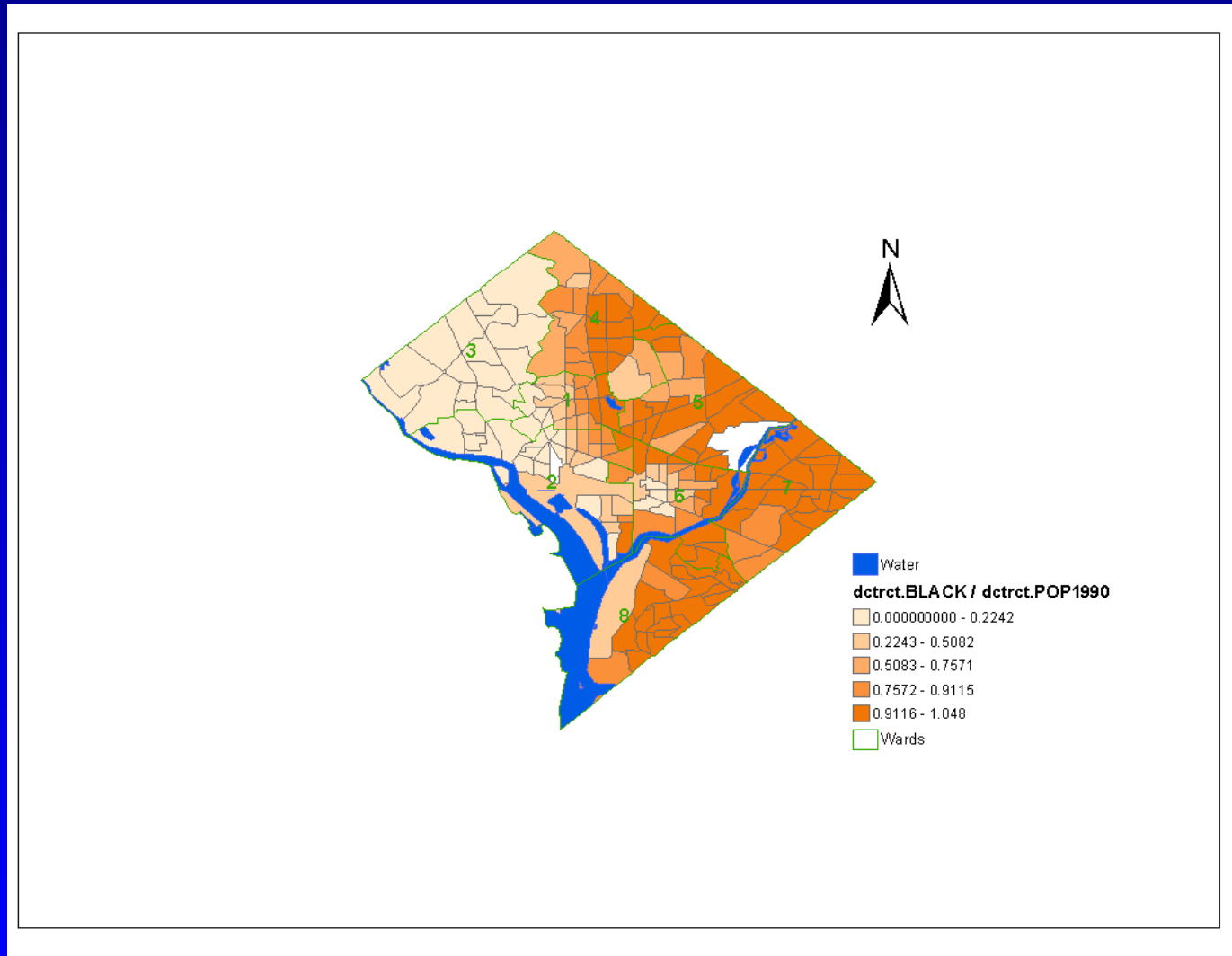
Head-banging Method for Smoothing

- “Head-banging” software (Hansen, v. 3.0 2003) was downloaded from NCI website and installed. (<http://srab.cancer.gov/headbang/>)
- The theory and application detail were described in previous studies:
 - Mungiole M, Pickle LW, Simonson KH. Application of a weighted head-banging algorithm to Mortality data maps. *Statistics in Medicine* 18: 3201-3209, 1999
 - Pickle LW and Su Y. Within-State geographic patterns of health insurance coverage and health risk factors in the United States. *Am J Prev Med* 22(2): 75-83, 2002

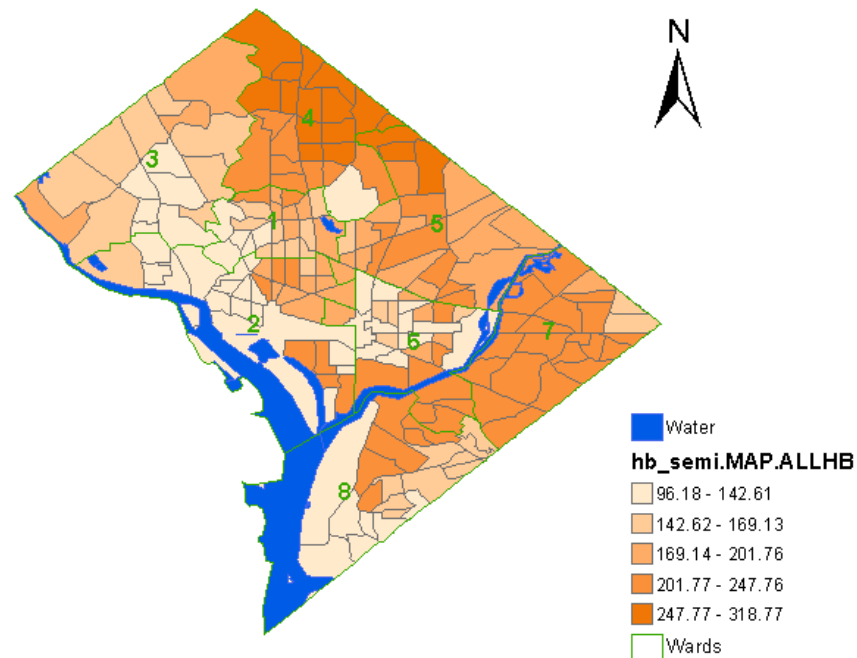
Description of the Head-bang Method

- For each census tract, 10 nearest neighboring census tracts comprised its “smoothing window”. The medians of the higher and lower 50% of the neighbors were calculated (the "high median" and the "low median"), weighted by census tract population. If the observed center census tract value was between the high and low medians, or its population is much greater than its neighbors, its value is not changed. Otherwise, if the center is less than (greater than) the low (high) median, its value is changed to equal the low (high) median.

Percentage Distribution of Black Population (DC)



Head-bang Smoothed Prostate Cancer Incidence (1994-2001, Washington DC)



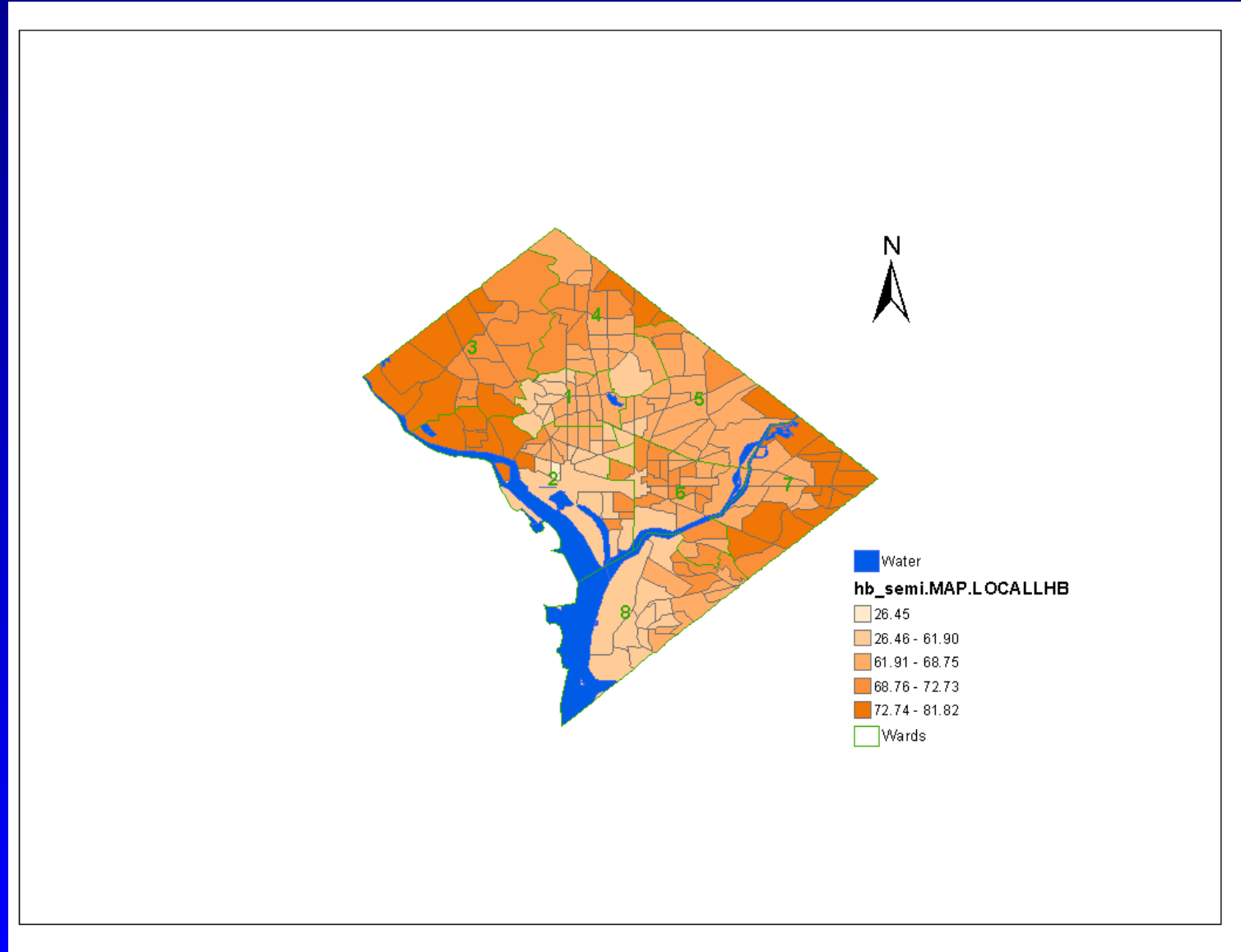
Distribution of Un-staged Prostate Cancer Cases (%) by Race and Age (1994-2001)

Age	White	Black	Other	Unknown	Total
	977	3442	128	182	4729
Age < 55	4.8	14.2	44.4	80.0	15.6
Age 55-64	8.8	8.7	34.5	68.0	11.9
Age 65-74	7.7	13.3	29.3	70.8	14.6
Age 75 +	23.5	22.9	40.8	75.0	25.7
Total	11.7	15.1	35.9	72.0	17.1

Distribution of Local Staged Prostate Cancer Cases (%) by Race and Age (1994-2001)

Age	White	Black	Other	Unknown	Total
	977	3442	128	182	4729
Age < 55	85.7	65.9	33.3	20.0	68.0
Age 55-64	75.4	76.2	51.7	26.0	73.3
Age 65-74	79.2	71.7	56.1	26.2	71.2
Age 75 +	63.4	61.3	44.9	17.3	59.4
Total	74.7	69.3	49.2	23.1	68.1

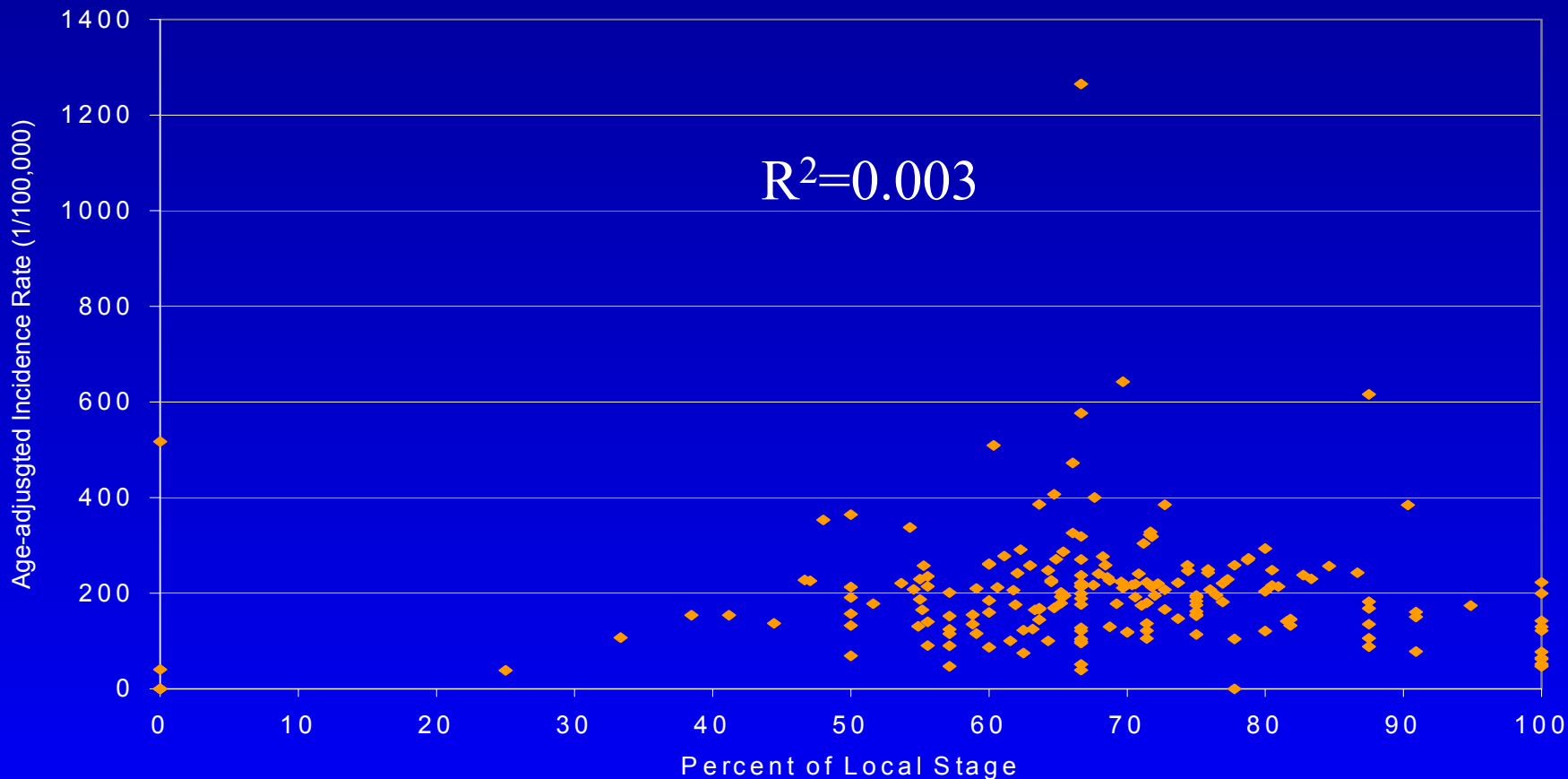
Distribution of Local Staged Prostate Cancer (%) 1994-2001, Washington DC



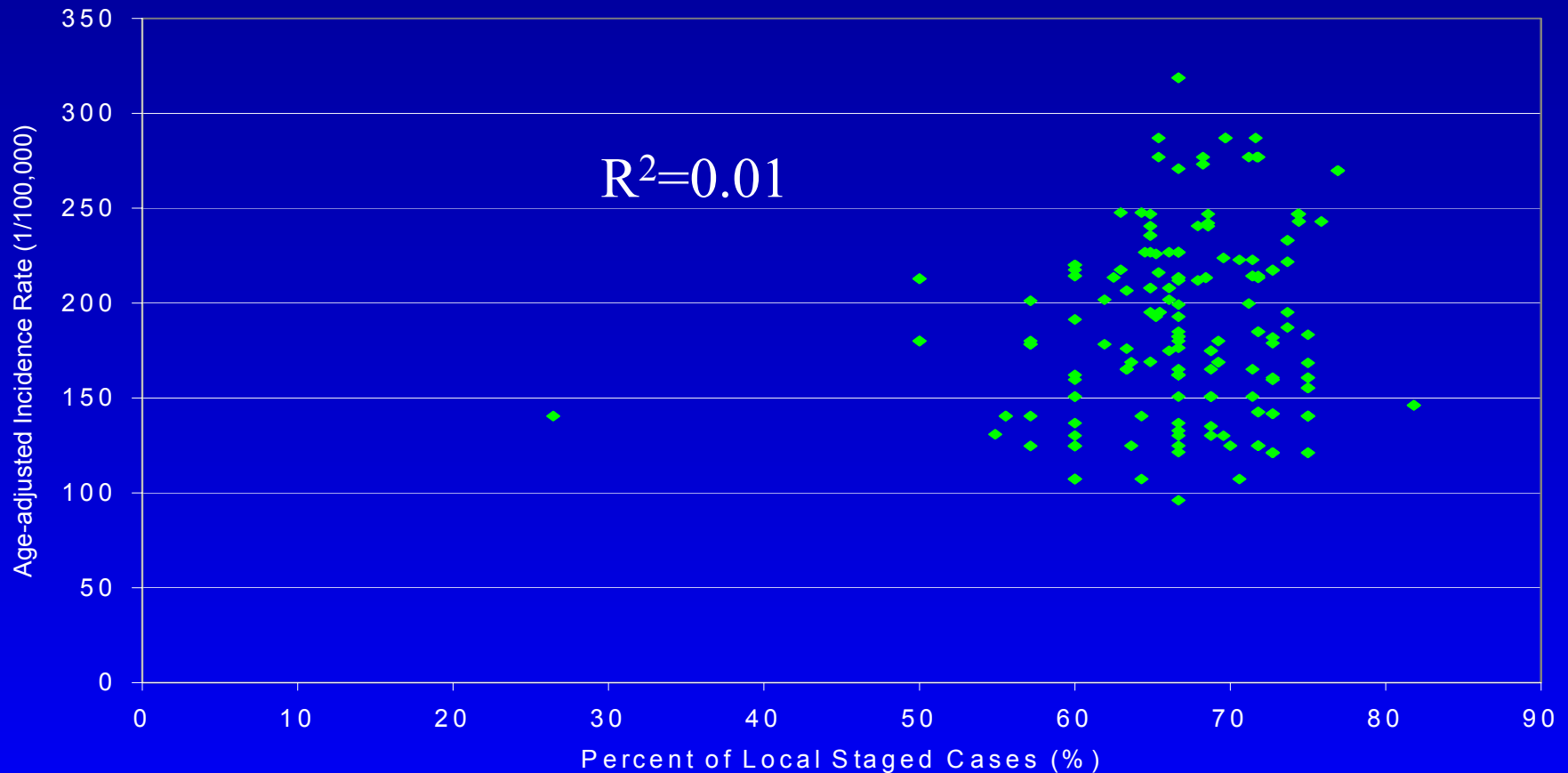
Logistic Regression Result for Local Staged Diagnosis

		OR	95% CI	
Race	White vs. Other	2.8	1.9	4.1
Race	Black vs. Other	2.2	1.5	3.2
Age	55-64 vs. <55	1.3	1.0	1.7
Age	65-74 vs. <55	1.2	0.9	1.5
Age	>75 vs. <55	0.7	0.5	0.9
WARD	2 vs. 1	1.1	0.8	1.5
WARD	3 vs. 1	1.4	1.0	1.9
WARD	4 vs. 1	1.4	1.1	1.8
WARD	5 vs. 1	1.3	1.0	1.7
WARD	6 vs. 1	1.2	0.9	1.6
WARD	7 vs. 1	1.4	1.1	1.9
WARD	8 vs. 1	1.0	0.7	1.4

No correlation was found between percent of local staged cases and age-adjusted incidence rate at census tract level (without head-bang smoothing)



No correlation was found between percent of local staged cases and age-adjusted incidence rate at census tract level-Head-bang smoothed data



Findings

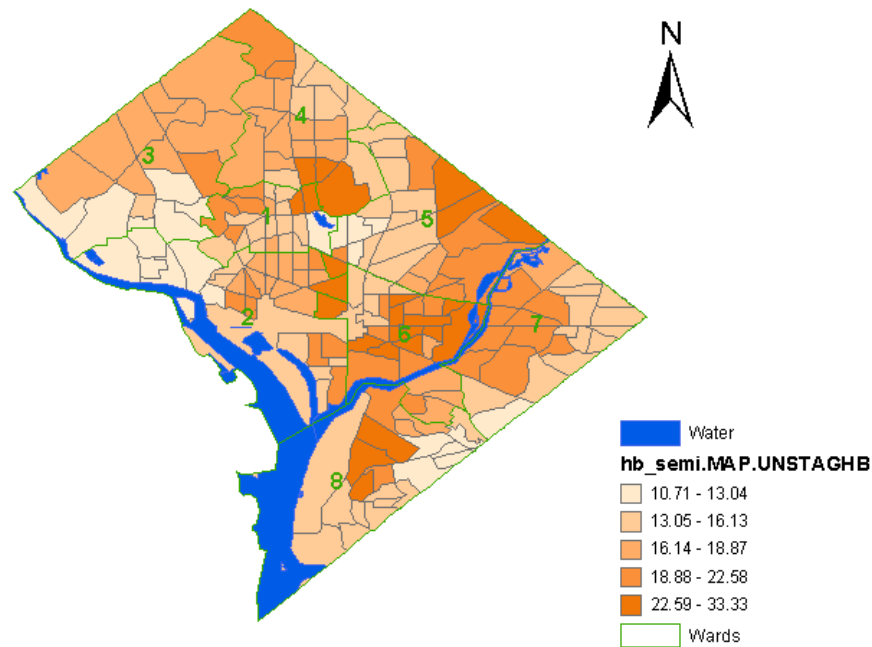
- High proportion of early stage diagnosis was observed in census tracts in Ward 3, 4 and 7 in DC.
- Incidence rate varied by census tract with possible cluster in Ward 4 along MD border.
- This incidence variation could not be explained by screening effect (high proportion of early stage diagnosis).

Secondary Findings

- The likelihood of being diagnosed at early stage: highest in white, second in black, and lowest in other races
- The likelihood of being diagnosed at early stage: highest for age 55-64, decreased with age.
- The likelihood of un-staging: high in other races and high in age group 75+

Thank you!

Percentage Distribution of Un-staged Diagnosis (Prostate Cancer, 1994-2001, Washington DC)



Logistic Regression Result for Un-staged Diagnosis

		OR	95% CI	
Race	Black vs. White	1.3	1.0	1.8
Race	Other vs. White	3.9	2.5	6.0
Age	55-64 vs. <55	0.7	0.5	1.0
Age	65-74 vs. <55	1.0	0.7	1.4
Age	>75 vs. <55	2.2	1.5	3.1
WARD	2 vs. 1	1.0	0.7	1.4
WARD	3 vs. 1	0.9	0.6	1.4
WARD	4 vs. 1	0.9	0.6	1.2
WARD	5 vs. 1	0.7	0.5	1.0
WARD	6 vs. 1	1.0	0.7	1.4
WARD	7 vs. 1	0.9	0.6	1.2
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