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Stage of Diagnosis of Breast Cancer and Socioeconomic Status in a Universal Healthcare System: A Population-based study in Emilia-Romagna, Italy

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Introduction

- Breast Cancer Epidemiology
 - 1.3 million women diagnosed/year worldwide
 - 465,000 deaths/year worldwide
 - 2008 age-adjusted incidence and mortality rates
 - United States: 76.0 and 14.7 per 100,000
 - Italy: 86.3 and 16.1 per 100,000
 - United Kingdom: 87.9 and 18.6 per 100,000

Socioeconomic Status (SES)

- One's social standing in terms of income, education, and occupation-often closely interconnected
- Lower SES-associated with poorer health outcomes, higher morbidity and mortality

Previous Studies

- Clegg and colleagues (2009)
- Impact of SES on cancer incidence and stage at diagnosis
- 26844 cancer patients from 1973-2001 in the US
- Lower income associated with increased risk of late-stage breast cancer
 - OR=2.30 for lowest income bracket
 - Lower SES associated with later stages at diagnosis across all cancers

Previous Studies

- Yu (2009)
- Surveillance, Epidemiology, and End Results (SEER) database
- 112,543 women from 1998-2002
- Composite measure of SES used-number of years of education, federal poverty line
- Inverse association found between SES and risk of dying from breast cancer
- Women living in lowest SES areas had highest percent of advanced stage disease

A Possible Explanation

- Partly explained by lack of access to health insurance and preventive services
 - US has 50.7 (16.7%) million uninsured
- Not present in universal healthcare systems

Italian Healthcare System

- Universal healthcare system
- Servizio Sanitario Nazionale (SSN)
- Ranked 2nd by WHO behind France
 - US ranked 37
- Administered through local healthcare authorities
- Healthcare provided to all Italian citizens

Study Objectives

- Describe the population of women with breast cancer in Emilia-Romagna, Italy
- Explore relationship between SES and stage of diagnosis of breast cancer in a universal healthcare system

Materials and Methods

- Approved by TJU IRB
- Collaboration
 - Regional Cancer Care Commission of the Regione Emilia-Romagna (RER)
 - Agenzia Sanitaria e Sociale Regionale
 - Center for Research in Medical Education and Health Care at Jefferson Medical College

Materials and Methods

- Study population-women with incident breast cancer from 2002-2003 in Emilia-Romagna, Italy
 - Women identified from 2002-2003 regional cancer registries (n=6,545)
 - Cancer stage based on the AJCC'S TNM classification
 - SES data available for 3,992 of these women
 - Datasets merged using unique anonymous identifier
 - 61% match rate

Materials and Methods

- Exclusion criteria
 - Stage 0 cancers
 - Lymphoma/sarcoma
 - Tumors identified within previous 2 years
- Women with no cancer stage removed from final analysis (n=3,478)

Socioeconomic Data Matched to Analytic File, 2002-2003

	# without SES data	# with SES data
TOTAL	2,553	3,992
Year		
2002	1272 (49.8%)	2029 (50.8%)
2003	1281 (50.2%)	1963 (49.2%)
Age Group		
20-49	636 (24.9%)	727 (18.2%)
50-69	1131 (44.3%)	1856 (46.5%)
70+	786 (30.8%)	1409 (35.3%)
Stage		
I	1077 (42.2%)	1597 (40.0%)
II	846 (33.1%)	1340 (33.6%)
III	248 (9.7%)	416 (10.4%)
IV	71 (2.8%)	125 (3.1%)
NS	311 (12.2%)	514 (12.9%)

Materials and Methods

- Age
 - 20-49
 - 50-69 (Screening window in 2002-2003)
 - 70+
- Index of deprivation
 - Composite measure with indicators of educational level, occupation, housing status (rents or owns), household density, and type of family
 - Score of 0, 1, 2+
- Descriptive statistics for all variables of interest
- Multivariable logistic regression to determine association between SES variables and late stage III/IV breast cancer

Results

Table 1: Demographic Variables and Cancer Stage at Diagnosis 2002-2003

	AJCC I	AJCC II	AJCC III	AJCC IV	Total
Total	1,597 (45.9%)	1,340 (38.5%)	416 (12.0%)	125 (3.6%)	3,478 (100.0%)
Age					
20-49 years	303 (45.5%)	276 (41.4%)	65 (9.8%)	22 (3.3%)	666 (100.0%)
50-69 years	929 (52.7%)	626 (35.5%)	167 (9.5%)	42 (2.4%)	1,764 (100.0%)
70+ years	365 (34.8%)	438 (41.8%)	184 (17.6%)	61 (5.8%)	1,048 (100.0%)
Marital Status					
Single	122 (43.3%)	104 (36.9%)	44 (15.6%)	12 (4.3%)	282 (100.0%)
Married	1,098 (48.8%)	862 (38.2%)	232 (10.3%)	60 (2.7%)	2,252 (100.0%)
Separated / Divorced	97 (53.0%)	62 (33.4%)	15 (8.2%)	9 (4.9%)	183 (100.0%)
Widowed	280 (36.8%)	312 (41.0%)	125 (16.4%)	44 (5.8%)	761 (100.0%)

Table 2: Socioeconomic Variables and Cancer Stage at Diagnosis 2002-2003

	AJCC I	AJCC II	AJCC III	AJCC IV	Total
Total	1,597 (45.9%)	1,340 (38.5%)	416 (12.0%)	125 (3.6%)	3,478 (100.0%)
Index of Deprivation					
Zero	564 (51.4%)	393 (35.8%)	112 (10.2%)	29 (2.6%)	1,098 (100.0%)
One	783 (44.8%)	692 (39.6%)	205 (11.7%)	68 (3.9%)	1,748 (100.0%)
Two +	249 (39.5%)	255 (40.4%)	99 (15.7%)	28 (4.4%)	631 (100.0%)
Education					
Low	169 (38.1%)	198 (44.7%)	60 (13.5%)	16 (3.6%)	443 (100.0%)
Medium	1,132 (45.7%)	954 (38.5%)	292 (11.8%)	97 (3.9%)	2,475 (100.0%)
High	296 (52.9%)	188 (33.6%)	64 (11.4%)	12 (2.1%)	560 (100.0%)

Occupation	AJCC I	AJCC II	AJCC III	AJCC IV	Total
Business Professional/Manager	265 (50.2%)	201 (38.1%)	47 (8.9%)	15 (2.8%)	528 (100.0%)
Office Worker/Small Business Owner/Self-employed	472 (48.8%)	367 (38.0%)	106 (11.0%)	22 (2.3%)	967 (100.0%)
Blue Collar Worker	218 (44.0%)	196 (39.6%)	58 (11.7%)	23 (4.6%)	495 (100.0%)
Retired/On Leave/In Military	584 (43.9%)	510 (38.3%)	181 (13.6%)	55 (4.1%)	1,330 (100.0%)
Unemployed/Student/Housewife	58 (36.7%)	66 (41.8%)	24 (15.2%)	10 (6.3%)	158 (100.0%)

Family Size	AJCC I	AJCC II	AJCC III	AJCC IV	Total
1 Individual	259 (39.9%)	256 (39.4%)	97 (14.9%)	37 (5.7%)	649 (100.0%)
2-4 Individuals	1,238 (47.7%)	1,003 (38.6%)	279 (10.7%)	78 (3.0%)	2,598 (100.0%)
5 + Individuals	100 (43.3%)	81 (35.1%)	40 (17.3%)	10 (4.3%)	231 (100.0%)
<hr/>					
Family Type					
Two-Parent Family	1,280 (47.2%)	1,042 (38.4%)	306 (11.3%)	83 (3.1%)	2,711 (100.0%)
Single-Parent Family	61 (48.4%)	44 (34.9%)	16 (12.7%)	5 (4.0%)	126 (100.0%)
Single	256 (39.9%)	254 (39.6%)	94 (14.7%)	37 (5.8%)	641 (100.0%)

Table 3: Logistic model predicting Stage III/IV breast cancer

	OR	95% Confidence Int.	
Age group (reference - age 50-69)			
Age 20-49	1.11	0.85	1.46
Age 70+*	2.02	1.61	2.53
Marital status (reference – Married)			
Single*	1.55	1.12	2.14
Separated / divorced	1.04	0.66	1.63
Widowed*	1.34	1.05	1.70
Index of deprivation (reference – 1)			
0	0.97	0.77	1.23
2+*	1.45	1.14	1.84

p<0.05

Table 4: Logistic model predicting Stage III/IV breast cancer with SES Variables

Odds Ratio Estimates			
Effect	Point Estimate	95% <u>Wald</u> Confidence Limits	
		Age Group (Reference - Age 50-69)	
20-49	1.12	0.84	1.50
70+ *	2.03	1.59	2.58
Marital Status (Reference - Married)			
Single*	1.67	1.17	2.38
Separated / Divorced	1.13	0.69	1.85
Widowed*	1.49	1.10	2.02
Education Level (Reference - Medium)			
High	0.99	0.75	1.32
Low	0.83	0.63	1.10
Occupation (Reference - Office Worker/Self-employed)			
Blue Collar Worker	1.24	0.91	1.69
Business Professional/ Manager	0.83	0.59	1.16
Retired/On Leave/In Military	1.15	0.86	1.52
Unemployed/Student/ Housewife	1.25	0.76	2.04
Family Size (Reference - 2-4 Individuals)			
1 Individual	1.65	0.40	7.13
5 + Individuals*	1.94	1.37	2.76
Family Type (Reference - Two-Parent Family)			
Single-Parent Family	1.11	0.65	1.91
Single	0.52	0.12	2.22

p<0.05

Discussion

- Variables associated with late stage breast cancer
 - Over the age of 70
 - Single
 - Widowed
 - Index of deprivation score 2+
 - Family Size of 5+

Age

- 2002-2003-screening window of 50-69
 - Jan 1, 2010-window widened to 45-74
 - 8-14 million euro/year investment
- Future investigators looking at effect of age with new screening window

Marital Status

- Findings consistent with other research
- Previous studies
 - Osborne and colleagues (2005)
 - Unmarried women more likely to be diagnosed with stage II-IV breast cancer versus stage I (OR=1.17)
 - Ali and Rajan (2008)
 - Unmarried women had highest association with late stage breast cancer (OR=3.31)
- Reduced social networks and social support

Index of Deprivation

- Consistent with other studies
 - Adams and Forman (2004)
 - SES and progression of breast cancer at diagnosis in Yorkshire, England
 - 12,793 women from 1998-2000
 - SES-Townsend Deprivation Score divided into fifths
 - Women from more deprived areas-more advanced disease at diagnosis than those from less deprived areas

Family Size

- 5 or more-possible that demanding household makes for personal neglect
- Outreach program
 - Target population of mothers in large households
 - Emphasize importance of regular mammography screening

Other Possible Reasons for Link

- Mammography
 - Lack of knowledge
 - Adherence rates
 - Emilia-Romagna-72.4%
 - Italy-59.9%
- Access to care
 - Shortage in medical technology
 - US-Twice as many MRI machines/million people, 25% more CT scanners
 - Avg. wait time for mammography-70 days
 - Best-equipped hospitals in northern Italy have even longer wait times
 - Draw patients from poorer southern regions
- Future researchers should examine these variables for associations with SES

Limitations

- 61% match rate between datasets
 - 64.2% of the women 70+ years of age matched
 - 53.3% of women aged 20-49
 - Possibly skewed this data towards an older population
- Index of deprivation
 - May not be reliable indicator
 - Limited information on calculation
 - Education level, occupation, family type-not significant
- No data on household income
 - 65% of population married

Conclusions

- Association between SES and stage of diagnosis of breast cancer still present in a universal healthcare system
- Severity of gradient-less than competitive systems
 - Only true SES variable-index of deprivation
 - Education level, occupation type not significant

References

- ACS :: How is breast cancer staged? Retrieved 4/12/2010, 2010, from http://www.cancer.org/docroot/CRI/content/CRI_2_4_3X_How_is_breast_cancer_staged_5.asp
- Adams, J., White, M., & Forman, D. (2004). Are there socioeconomic gradients in stage and grade of breast cancer at diagnosis? cross sectional analysis of UK cancer registry data *BMJ (Clinical Research Ed.)*, 329(7458), 142. doi:10.1136/bmj.38114.679387.AE
- Ali, R., Mathew, A., & Rajan, B. (2008). Effects of socio-economic and demographic factors in delayed reporting and late-stage presentation among patients with breast cancer in a major cancer hospital in south india *Asian Pacific Journal of Cancer Prevention : APJCP*, 9(4), 703-707.
- The american college of surgeons commission on cancer: National quality forum endorsed commission on cancer measures for quality of cancer care for breast and colorectal cancers Retrieved 4/16/2010, 2010, from <http://www.facs.org/cancer/qualitymeasures.html>
- Amorim, V. M., Barros, M. B., Cesar, C. L., Carandina, L., & Goldbaum, M. (2008). Factors associated with lack of mammograms and clinical breast examination by women: A population-based study in campinas, sao paulo state, brazil [Fatores associados a nao realizacao da mamografia e do exame clinico das mamas: um estudo de base populacional em Campinas, Sao Paulo, Brasil] *Cadernos De Saude Publica / Ministerio Da Saude, Fundacao Oswaldo Cruz, Escola Nacional De Saude Publica*, 24(11), 2623-2632.
- Baquet, C. R., & Commiskey, P. (2000). Socioeconomic factors and breast carcinoma in multicultural women *Cancer*, 88(5 Suppl), 1256-1264.
- Barbone, F., Filiberti, R., Franceschi, S., Talamini, R., Conti, E., Montella, M., et al. (1996). Socioeconomic status, migration and the risk of breast cancer in italy *International Journal of Epidemiology*, 25(3), 479-487.
- Breast cancer prevention screening, mammogram, diet and exercise on *MedicineNet.com* Retrieved 4/14/2010, 2010, from http://www.medicinenet.com/breast_cancer_prevention/page2.htm#to
- Breast cancer: Statistics on incidence, survival, and screening | breast health resource center | imaginis the women's health resource Retrieved 4/19/2010, 2010, from <http://www.imaginis.com/breast-health/breast-cancer-statistics-on-incidence-survival-and-screening-2>
- CDC - breast cancer - mammography Retrieved 3/30/2010, 2010, from <http://www.cdc.gov/cancer/breast/statistics/screening.htm>
- CDC - breast cancer rates by race and ethnicity Retrieved 3/30/2010, 2010, from <http://www.cdc.gov/cancer/breast/statistics/race.htm>
- CDC - breast cancer statistics Retrieved 3/30/2010, 2010, from <http://www.cdc.gov/cancer/breast/statistics/index.htm>
- CDC - health disparities in cancer - basic information - contributing factors Retrieved 3/30/2010, 2010, from http://www.cdc.gov/cancer/healthdisparities/basic_info/challenges.htm
- Cheng, S. H., Wang, C. J., Lin, J. L., Horng, C. F., Lu, M. C., Asch, S. M., et al. (2009). Adherence to quality indicators and survival in patients with breast cancer *Medical Care*, 47(2), 217-225. doi:10.1097/MLR.0b013e3181893c4a
- Clegg, L. X., Reichman, M. E., Miller, B. A., Hankey, B. F., Singh, G. K., Lin, Y. D., et al. (2009). Impact of socioeconomic status on cancer incidence and stage at diagnosis: Selected findings from the surveillance, epidemiology, and end results: National longitudinal mortality study *Cancer Causes & Control : CCC*, 20(4), 417-435. doi:10.1007/s10552-008-9256-0
- Cuthbertson, S. A., Goyder, E. C., & Poole, J. (2009). Inequalities in breast cancer stage at diagnosis in the trent region, and implications for the NHS breast screening programme *Journal of Public Health (Oxford, England)*, 31(3), 398-405. doi:10.1093/pubmed/rdp042
- Downing, A., Prakash, K., Gilthorpe, M. S., Mikeljevic, J. S., & Forman, D. (2007). Socioeconomic background in relation to stage at diagnosis, treatment and survival in women with breast cancer *British Journal of Cancer*, 96(5), 836-840. doi:10.1038/sj.bjc.6603622
- Elmore, J. G., Nakano, C. Y., Linden, H. M., Reisch, L. M., Ayanian, J. Z., & Larson, E. B. (2005). Racial inequities in the timing of breast cancer detection, diagnosis, and initiation of treatment *Medical Care*, 43(2), 141-148.
- Gordon, N. H. (2003). Socioeconomic factors and breast cancer in black and white americans *Cancer Metastasis Reviews*, 22(1), 55-65.
- The grass is not always greener: A look at national health care systems around the world | michael D. tanner | cato institute: Policy analysis Retrieved 12/6/2010, 2010, from http://www.cato.org/pub_display.php?pub_id=9272
- Hahn, K. M., Bondy, M. L., Selvan, M., Lund, M. J., Liff, J. M., Flagg, E. W., et al. (2007). Factors associated with advanced disease stage at diagnosis in a population-based study of patients with newly diagnosed breast cancer *American Journal of Epidemiology*, 166(9), 1035-1044. doi:10.1093/aje/kwm177
- Harper, S., Lynch, J., Meersman, S. C., Breen, N., Davis, W. W., & Reichman, M. C. (2009). Trends in area-socioeconomic and race-ethnic disparities in breast cancer incidence, stage at diagnosis, screening, mortality, and survival among women ages 50 years and over (1987-2005) *Cancer Epidemiology, Biomarkers & Prevention : A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology*, 18(1), 121-131. doi:10.1158/1055-9965.EPI-08-0679

- Hausauer, A. K., Keegan, T. H., Chang, E. T., Glaser, S. L., Howe, H., & Clarke, C. A. (2009). Recent trends in breast cancer incidence in US white women by county-level urban/rural and poverty status *BMC Medicine*, 7, 31. doi:10.1186/1741-7015-7-31
- *ICSN data - breast cancer incidence and mortality rates* Retrieved 11/14/2010, 2010, from <http://appliedresearch.cancer.gov/icsn/breast/mortality.html>
- Katz, S. J., & Hofer, T. P. (1994). Socioeconomic disparities in preventive care persist despite universal coverage. breast and cervical cancer screening in ontario and the united states *JAMA : The Journal of the American Medical Association*, 272(7), 530-534.
- Kim, J., & Jang, S. N. (2008). Socioeconomic disparities in breast cancer screening among US women: Trends from 2000 to 2005 *Journal of Preventive Medicine and Public Health = Yebang Uihakhoe Chi*, 41(3), 186-194.
- Lagerlund, M., Bellocco, R., Karlsson, P., Tejler, G., & Lambe, M. (2005). Socio-economic factors and breast cancer survival—a population-based cohort study (sweden) *Cancer Causes & Control : CCC*, 16(4), 419-430. doi:10.1007/s10552-004-6255-7
- Lantz, P. M., Mujahid, M., Schwartz, K., Janz, N. K., Fagerlin, A., Salem, B., et al. (2006). The influence of race, ethnicity, and individual socioeconomic factors on breast cancer stage at diagnosis *American Journal of Public Health*, 96(12), 2173-2178. doi:10.2105/AJPH.2005.072132
- Li, C. I., Malone, K. E., & Daling, J. R. (2003). Differences in breast cancer stage, treatment, and survival by race and ethnicity *Archives of Internal Medicine*, 163(1), 49-56.
- MacKinnon, J. A., Duncan, R. C., Huang, Y., Lee, D. J., Fleming, L. E., Voti, L., et al. (2007). Detecting an association between socioeconomic status and late stage breast cancer using spatial analysis and area-based measures *Cancer Epidemiology, Biomarkers & Prevention : A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology*, 16(4), 756-762. doi:10.1158/1055-9965.EPI-06-0392
- Maloney, N., Koch, M., Erb, D., Schneider, H., Goffman, T., Elkins, D., et al. (2006). Impact of race on breast cancer in lower socioeconomic status women *The Breast Journal*, 12(1), 58-62. doi:10.1111/j.1075-122X.2006.00184.x
- *Mammografia, ampliato il progra - ERMES regione emilia-romagna* Retrieved 10/22/2010, 2010, from http://www.regione.emilia-romagna.it/wcm/ERMES/notizie/news/2010/gen/screening_mammografia.htm
- *Mammograms - national cancer institute* Retrieved 4/14/2010, 2010, from <http://www.cancer.gov/cancertopics/factsheet/Detection/mammograms>
- Morris, E., Haward, R. A., Gilthorpe, M. S., Craigs, C., & Forman, D. (2008). The impact of the calman-hine report on the processes and outcomes of care for yorkshire's breast cancer patients *Annals of Oncology : Official Journal of the European Society for Medical Oncology / ESMO*, 19(2), 284-291. doi:10.1093/annonc/mdm432
- Moser, K., Patnick, J., & Beral, V. (2009). Inequalities in reported use of breast and cervical screening in great britain: Analysis of cross sectional survey data *BMJ (Clinical Research Ed.)*, 338, b2025.
- *Number of uninsured americans hits record high - health - health care - msnbc.com* Retrieved 12/4/2010, 2010, from <http://www.msnbc.msn.com/id/39215770/ns/health-health-care/>
- Osborne, C., Ostir, G. V., Du, X., Peek, M. K., & Goodwin, J. S. (2005). The influence of marital status on the stage at diagnosis, treatment, and survival of older women with breast cancer *Breast Cancer Research and Treatment*, 93(1), 41-47. doi:10.1007/s10549-005-3702-4
- Sassi, F., Luft, H. S., & Guadagnoli, E. (2006). Reducing racial/ethnic disparities in female breast cancer: Screening rates and stage at diagnosis *American Journal of Public Health*, 96(12), 2165-2172. doi:10.2105/AJPH.2005.071761
- Schootman, M., Jeffe, D. B., Gillanders, W. E., & Aft, R. (2009). Racial disparities in the development of breast cancer metastases among older women: A multilevel study *Cancer*, 115(4), 731-740. doi:10.1002/cncr.24087
- *Socioeconomic status and health fact sheet* Retrieved 4/19/2010, 2010, from <http://www.apa.org/about/gr/issues/socioeconomic/ses-health.aspx>
- Vona-Davis, L., & Rose, D. P. (2009). The influence of socioeconomic disparities on breast cancer tumor biology and prognosis: A review *Journal of Women's Health* (2002), 18(6), 883-893. doi:10.1089/jwh.2008.1127
- Wells, B. L., & Horm, J. W. (1992). Stage at diagnosis in breast cancer: Race and socioeconomic factors *American Journal of Public Health*, 82(10), 1383-1385.
- *WHO | world health organization assesses the world's health systems* Retrieved 12/5/2010, 2010, from http://www.who.int/whr/2000/media_centre/press_release/en/
- Woods, S. E., Luking, R., Atkins, B., & Engel, A. (2006). Association of race and breast cancer stage *Journal of the National Medical Association*, 98(5), 683-686.
- Yu, X. Q. (2009). Socioeconomic disparities in breast cancer survival: Relation to stage at diagnosis, treatment and race *BMC Cancer*, 9, 364. doi:10.1186/1471-2407-9-364