

Care and Survival of Mexican American Women with Node Negative Breast Cancer: Historical Cohort Evidence of Health Insurance and Barrio Advantages

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Abstract

We hypothesized 3-way ethnicity by barrio by health insurance interactions such that the advantages of having adequate health insurance were greatest among Mexican American (MA) women who lived in barrios. Barrios were neighborhoods with relatively high concentrations of MAs (60 % or more). Data were analyzed for 194 MA and 2,846 non-Hispanic white women diagnosed with, very treatable, node negative breast cancer in California between 1996 and 2000 and followed until 2011. Significant interactions were observed such that the protective effects of Medicare or private health insurance on radiation therapy access and long term survival were largest for MA women who resided in MA barrios, neighborhoods that also tended to be extremely poor. These paradoxical findings are consistent with the theory that more facilitative social and economic capital available to MA women in barrios enables them to better absorb the indirect and direct, but uncovered, costs of breast cancer care.

Keywords

Mexican American; Barrio advantage; Hispanic paradox; Breast cancer; Health insurance

Introduction

Censuses estimate that Hispanics will account for nearly a third of the US population by 2050 [1–4]. Among them Mexican Americans (MA) have the lowest incomes and are the most

prevalently uninsured [5, 6]. Despite these socioeconomic vulnerabilities, numerous health advantages have been observed among them [7–9]. Such findings have come to be referred to as the Hispanic paradox [10, 11]. One theoretical explanation for this paradox among MAs is the barrio advantage [12, 13]. The theory suggests that barrios with high concentrations of first generation MAs have more social capital than other neighborhoods, that their residents, typically including many extended family members, may assist each other more with indirect health care costs such as transportation and childcare. Evidence for the existence of Hispanic or barrio advantages, however, is not unequivocal. Three methodological alternatives potentially confound this field's knowledge. First, it may be that MA immigrants are a select group, healthier than non-emigrating Mexicans. Second, more Hispanics in general and MAs, specifically, may be lost to National Death Index follow-up for any number of reasons, their more prevalent lack of a social security number being one. Third, select MAs who become very ill may choose to return home to die, thus, being lost to follow-up. Such alternative explanations, if true, would bias studies in the direction of overestimating the health of Hispanics or barrio residents.

Comparing cancer care in Canada and the US, we oversampled women in California's poorest neighborhoods [14–17]. This meant that we also oversampled MA women. Secondly, we had the opportunity to compare MA women who resided in barrios or not and non-Hispanic white (NHW) women who were diagnosed with the most treatable type of breast cancer, node negative (NN). Such disease that has not spread to regional lymph nodes generally has an excellent prognosis. This study of women with early-stage disease makes healthy immigrant, return migration and other selective mortality explanations improbable.

Health Insurance and Social Capital in High Poverty MA Barrios

Recent studies of NHW women with colon or breast cancer found that health insurance advantages were strongest in low poverty neighborhoods [18, 19]. Having adequate health insurance better facilitated access to optimum treatments and to longer survival in more affluent neighborhoods. It seemed that the effectiveness of health insurance was significantly impacted by the availability of other resources. We theorize that women in more affluent neighborhoods, where social and economic capital abounds, are better able to absorb the indirect and direct, but uncovered costs of cancer care. The foundation of this explanation is William Julius Wilson and Paul Jargowsky's research on high poverty neighborhoods [20–23]. They described neighborhoods where 30 % or more of the people are poor as particularly distressed for their lack of social and economic capital. Research has also demonstrated that high poverty neighborhoods are places of prevalent health insurance inadequacy [18, 19], however, it has not yet discriminated well between poor neighborhood enclaves of various ethnic concentrations.

Very poor neighborhoods vary greatly. Though they may lack certain economic resources, at least some high poverty neighborhoods seem to have other resources indicative of strengths and resiliencies. Of note are relatively ethnically homogeneous MA barrios [12, 13]. Though quite poor; families, friends and institutions in these neighborhoods may share quite a bit of social and economic capital with one another [24–28]. Such phenomena, if true, advance a number of health insurance and barrio advantage hypotheses. This study explores two.

Advantages of Barrio Residence and Adequate Health Insurance among MA Women

Adequate health insurance, defined as private or Medicare, has accounted for much of the difference on breast cancer screening between MA and other women [19, 29–33]. Less is known about treatment and survival. Hypotheses that health insurance–cancer care relationships are affected by poverty; specifically, that health insurance is less effective in high poverty neighborhoods have found support among NHWs [18, 19]. Here we hypothesize affects in the opposite direction among MA barrio residents. We paradoxically hypothesize 3-way interactions of ethnicity by barrio by health insurance on breast cancer treatment and survival. Specifically: (1) Health insurance will be more effective in facilitating access of MA women who live in barrios (versus MA non-barrio residents or NHW women) to indicated treatment. (2) The same combined barrio-health insurance advantage among MA women will be observed for survival.

Methods

The sampling frame was the California cancer registry [34]. Data was obtained for 194 MA and 2,846 NHW women diagnosed with NN breast cancer between 1996 and 2000 and followed until 2011. 151 of the MA women were identified by medical records, the remainder by a validated algorithm [35]. Participants were randomly selected from these census tract-based strata: one-third high poverty neighborhoods (30% poor) and two-thirds from less poor neighborhoods [36]. Primary health insurers were uninsured, Medicaid, Medicare or private. MA barrios were neighborhoods where 60% or more of the residents were MA [12, 36]. Other barrio criteria were explored (33–75%), but the 60% criterion had the most predictive validity.

Cancer care variables were abstracted from hospital and physician reports [37]. These were receipt of surgery, type surgery, receipt of adjuvant radiation therapy (RT), chemotherapy and hormone therapy, and survival time. These variables had less than 2% missing data. Descriptive profiles are displayed in Table 1. The MA women, nine of every ten of whom were first generation immigrants, were more likely to live in high poverty barrios of large cities. They were also more likely to be inadequately insured (uninsured or Medicaid-insured). They were nearly a decade younger, on average, than the NHW women. And their tumors were more likely to be poorly differentiated (41.4 versus 26.5%, data not shown). These socio-demographic and biological differences were accounted for in analyses.

Logistic and Cox regression models tested hypotheses about the interacting effects of ethnicity, barrios and health insurance on breast cancer treatments and the most predictive outcome, 8-year survival [38, 39]. Point estimates (odds ratios [OR] or hazard ratios [HR]) and 95% confidence intervals (CIs) were estimated. Modest missing data was imputed. All models minimally accounted for poverty, age and tumor grade. Other tumor characteristics such as size and hormone receptor statuses did not enter any models. Treatment and survival rates aided the interpretation of interactions. Rates per 100 were directly adjusted for age and tumor grade using this study's sample as the standard and reported as percentages. Then standardized rate ratios (RRs) were used for comparisons with 95% CIs derived from the χ^2 test. This analysis could detect rate differences of 10% for overall analyses with 80% power at a significance level of 5% [40, 41]. Subsample analyses were more exploratory.

This study was cleared by the University of Windsor's research ethics board. Other details were reported [18, 19, 42].

Results

3-Way Ethnicity by Barrio by Health Insurance Interactions

Long Term Survival—Survival findings are displayed in Table 2. As hypothesized, a 3-way ethnicity by barrio by primary health insurer interaction was observed (HR = 1.85). This finding, along with the, respective, significant (HR = 1.95) and null 2-way barrio by primary insurer interactions detected in separate MA and NHW regression models indicated that the advantaging effect of being insured privately or by Medicare differs by barrio status for MA women, but not for NHW women. A main advantaging effect of health insurance adequacy as well as main disadvantaging effects of being MA and living in a high poverty neighborhood was observed, but a main effect of barrio residence was not. The significant 2-way ethnicity by poverty interaction (HR = 0.32), however, suggested that barrio or near barrio residence is probably advantageous for many MA women with treatable breast cancer. While NHW women who lived in high poverty neighborhoods experienced an expected survival disadvantage (HR = 1.71), a paradoxical advantage was observed among MA women who lived in similarly poor neighborhoods (HR = 0.56). And even though barrio, *per se*, did not enter models, the intimacy of the relationship between poverty and MA ethnicity suggested a barrio advantage. In fact, MA people were in the majority (median = 58 %) in the high poverty neighborhoods where the MA women lived. MA representation was much lower in the high poverty neighborhoods where the NHW women lived (median = 35 %).

Adjuvant RT Therapy—Findings related to RT access are displayed in Table 3. It is typically indicated after surgery for the vast majority of women with NN breast cancer. All except 27 of the participants received some type of surgical intervention that did not differ significantly by ethnicity, poverty, barrio residence or primary insurer. Mirroring the survival finding and as hypothesized, a 3-way ethnicity by barrio neighborhood by primary health insurer interaction was observed on RT receipt (OR = 0.02). In this instance though there were not main or 2-way interaction effects of ethnicity so separate MA and NHW regressions were not run. As interpretation of the 3-way interaction point-estimates are not intuitive, they are practically depicted in Table 4.

Depiction of 3-way Interactions—The adjusted NHW 8-year survival rate (74.9 %) was significantly higher than that of MAs (66.3 %, RR = 1.13, 95 % CI 1.03, 1.24, data not shown). The survival advantage of being adequately insured among NHW women was significant, though relatively modest (RR = 1.09) and unaffected by barrio residence. And while there was not a significant protective effect of health insurance among MA non-barrio residents, those who lived in barrios seemed to enjoy a very large survival advantage (RR = 1.67). MA women with NN breast cancer who lived in barrios and were adequately insured were nearly 70 % more likely to survive for eight years than were their uninsured or Medicaid-insured counterparts. In fact, their survival rate (72.0 %) did not differ significantly from that of adequately insured NHWs (75.6 %). The 3-way ethnicity-barrio-health insurance interaction on RT is depicted for those who first received breast conserving

surgery. Adjuvant RT is most indicated for them. The treatment pattern essentially mirrored the survival pattern. The apparently very large combined effect of health insurance adequacy and barrio residence among MA women may be a dual effect of profound disadvantage among the inadequately insured (less than half received indicated RT) and relative advantage among the adequately insured. In fact, the highest RT treatment rate was for adequately insured MA barrio residents (86.7 %), a treatment rate that did not differ significantly from that of similarly insured NHWs (83.5 %). Finally, it should be noted that the very modest RT refusal rate (3.2 %) did not differ between study groups.

Addendum

We explored 3-way interactions that involved ethnicity on other treatments (e.g., chemotherapy or hormone therapy), but found none. We did uncover two interesting ethnic differences though. The MA women were about twice as likely as NHW women to have waited two months or more to receive initial surgical intervention (8.2 % vs. 4.5 %, RR = 1.82, 95 % CI 1.12, 2.96). And among the women whose initial surgery was a mastectomy, MAs were only about a third as likely as NHWs to receive breast reconstruction surgery (BRS, 5.0 % vs. 17.3 %, RR = 0.29, 95 % CI 0.13, 0.62). Those who had private health insurance were much less likely to so wait and much more likely to receive BRS than were the uninsured or publicly insured. When this factor was accounted for both of the previously apparent ethnic effects were null.

Discussion

Evidence was found in support of the 3-way interaction hypothesis that health insurance effects are moderated by barrio residence for MA women with NN breast cancer, but not for NHW women. First, relatively advantaged long term survival was observed among adequately insured MA barrio residents. Second, treatment access was implicated as the same pattern of combined health insurance and barrio advantages was observed for RT. Adequately insured MA barrio residents were again advantaged. In fact, having private health insurance or Medicare coverage seemed no more effective than being uninsured or Medicaid-insured among MA women who did not live in barrios. And such treatment access and survival of adequately insured MA barrio residents was on par with that of adequately insured NHW women. These findings are consistent with the theory that more facilitative social and economic capital is available to MA women in barrios. It is there that they are probably best able to absorb the indirect and direct, but uncovered, costs of breast cancer care. This study's support of the "barrio advantage" theory suggests that health insurance in concert with other, more available and facilitative resources, in MA neighborhoods probably potentiate each other.

Gateway Mexican American Neighborhoods

By oversampling women from the poorest neighborhoods in California we also oversampled recent immigrants. In fact, nearly all of the MA women in our study were first generation immigrants. The geographer Regan Mass recently studied such high immigrant Hispanic, "gateway" neighborhoods in Los Angeles [43]. She found that these were places where country of origin cultural norms are probably strongest and so social capital is strongest.

Maas' gateway neighborhood criteria (low-income and high-immigrant) were consistent with the MA barrios we studied as were the protective effects we observed. Both the general health benefits she observed and the breast cancer care advantages we observed were restricted to gateway neighborhoods. And Maas' findings of "tight knit multigenerational social networks" associated with practical economic and even health care benefits in such neighborhoods are consistent with contemporary sociological theories on ethnic immigrant enclaves [44–46]. A number of probable explanations have been suggested, ranging from more instrumental sharing of indirect (transportation and childcare) and direct (deductibles and copayments) health care costs with extended family members and friends in barrios to the greater availability of culturally sensitive neighborhood health clinics there. Such rich narrative detail could be provided by future qualitative studies.

Our findings of better breast cancer care among MA women who resided in MA barrios or gateway neighborhoods were consistent with three studies [42, 47, 48], but inconsistent with two studies that found later diagnoses in Hispanic enclaves [49, 50]. They, however, studied more ethnically diverse Hispanic women in higher income neighborhoods that included more second and third generation immigrants. Maas also studied such, more acculturated, neighborhoods and found that they did not offer the same sorts of bonding social capital or health protections as gateway neighborhoods.

Potential Limitations

The potential confounding influence of healthy immigrant and selective follow-up has been studied. Investigators have consistently concluded that these alternatives cannot fully account for observed MA mortality advantages [51–55]. Lariscy [51] found that death errors and return migration bias are most problematic for women over 70 years of age. But more than three quarters of the MA women in this study were less than 65. There are additional reasons that this study was probably not so confounded. First, its MA and NHW women had early stage breast cancer and were essentially matched on two proxies of disease virulence, age and tumor grade, through mathematical modeling. The comparison of two such similarly diseased and relatively healthy groups makes the healthy immigrant alternative explanation unlikely. Second, this study's MA women born in Mexico or in the US did not differ on survival. Third, Mexican or US nativity made no difference in findings. These caveats make return migration, so-called "salmon bias," an all but impossible alternative explanation. Finally, the observed MA and barrio advantages on breast cancer treatments, typically provided only days or weeks after diagnoses, cannot be potentially explained by return migration or other selective mortality alternatives.

We think that our central analyses of more than 3,000 women were statistically powerful. They provided rather precise estimates that may engender substantial confidence. Admittedly, certain subsample analyses, especially those related to the increasingly specific experiences of MA barrio residents who received BCS and were inadequately insured were increasingly exploratory. Also, this study's findings were admittedly most generalizable to California, where four of every ten first generation Mexican American women live [56]. We encourage researchers with access to national data to systematically replicate these analyses.

Conclusions

Health insurance matters. This study's Hispanic paradoxical findings, consistent with MA barrio advantages, suggest that place and culture also matter. This study's findings were consistent with the theory that more social and economic capital is available to MA women in barrios. It is there that they are probably best able to absorb the indirect and direct, but uncovered, costs of care.

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Table 1

Socio-demographic sample descriptions

Variable	Mexican American ^a		Non-Hispanic white	
	Sample percentage		Sample percentage	
<i>Places</i>				
Large urban	83	42.8	780	27.4
Smaller urban	55	28.4	1,038	36.5
Rural	56	28.9	1,028	36.1
<i>Neighborhood poverty prevalence (%)</i>				
<30	72	37.1	2,222	78.1
30 ^b	122	62.9	624	21.9
<i>Neighborhood Mexican American prevalence (%)</i>				
<60 ^c	119	61.3	2,733	96.0
60 ^c	75	38.7	113	4.0
<i>Primary insurer</i>				
Uninsured	36	18.6	224	7.9
Medicaid	46	23.7	77	2.7
Medicare	41	21.1	932	32.7
Private	71	36.6	1,613	56.7
<i>Age at diagnosis (years)</i>				
25–44	52	26.8	258	9.1
45–54	43	22.2	535	18.8
55–64	53	27.3	607	21.3
65	46	23.7	1,446	50.8
<i>M</i> = 54.8, <i>SD</i> = 14.0 <i>M</i> = 64.0, <i>SD</i> = 13.7				

All between ethnic group comparisons were significant at $p < .05$: χ^2 tests or *F* ratio

^aMost (86 %) were first generation immigrants born in Mexico. Nativity (born in Mexico or the US) did not differ significantly between barrio and non-barrio residents

^bThe prevalence of poverty in the high poverty neighborhoods where the samples of MA (37 %) and NHW (35 %) women lived were similar, as were their typical annual household incomes; respectively \$23,275 and \$23,825

^cOverall, 8 of every 10 barrios, but only 2 of every 10 non-barrios were high poverty neighborhoods (30 % poor)

Table 2

Cox regression significant main effects and interactions of ethnicity, neighborhood poverty, barrio neighborhood and primary insurer on overall 8-year survival (N = 3,040)

Predictor variables (baseline comparison)	Hazard ratio	95 % CI
<i>Main effects</i>		
Ethnicity (Non-Hispanic white)		
Mexican American	3.43	1.86, 6.33
Neighborhood poverty (low poverty)		
High poverty (30 % poor)	1.71	1.45, 2.03
Primary health insurer (uninsured or Medicaid)		
Private or Medicare	0.76	0.59, 0.98
<i>Interaction effects</i>		
Ethnicity by neighborhood poverty	0.32	0.16, 0.62
Ethnicity by primary health insurer	0.39	0.19, 0.80
Ethnicity by barrio neighborhood by primary insurer	1.85	1.01, 3.38

Separate models for Mexican American and non-Hispanic white women

	Mexican America (n = 194)	Non-Hispanic white (n = 2,846)
	HR (95 % CI)	HR (95 % CI)
Neighborhood poverty	0.56 (0.30, 1.06)	1.71 (1.43, 2.04)
Primary health insurer	0.29 (0.13, 0.65)	0.76 (0.59, 0.98)
Barrio by primary insurer	1.95 (1.08, 3.51)	1.02 (0.71, 1.46)

The pattern and significance of overall and cancer-specific survival analyses were nearly identical

Table 3

Logistic regression significant main effects and interactions of ethnicity, neighborhood poverty, barrio neighborhood and primary insurer on receipt of adjuvant radiation therapy ($N = 3,013$)

Predictor variables (baseline comparison)	Odds ratio	95 % CI
Main effects		
Neighborhood poverty (low poverty)		
High poverty (30 % poor)	0.65	0.50, 0.83
Primary health insurer (uninsured or Medicaid)		
Private or Medicare	3.17	2.03, 4.95
Interaction effect		
Ethnicity by barrio neighborhood by primary insurer	0.02	0.00, 0.22

All effects were additionally adjusted for type of surgery: breast conserving surgery or mastectomy

