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Hodgkin lymphoma incidence in ethnic enclaves in California

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Abstract

Hodgkin lymphoma (HL) incidence varies with migration and nativity, suggesting an influence of acculturation on risk. In population-based California data including 1,483 Hispanic and 348 Asian/Pacific Islander (API) HL cases, we examined HL rates in residential neighborhoods classified by ethnic enclave status (measuring degree of acculturation) and socioeconomic status (SES). Rates were inversely associated with enclave intensity, although associations varied by gender and race. In females, the enclave effect was stronger in low-SES settings, but rates were higher in less-ethnic/high-SES than more-ethnic/low-SES neighborhoods--diminishing enclave intensity affected rates more than higher SES. In Hispanics, associations were modest, and only females experienced SES modification of rates; in APIs, the enclave effect was much stronger. Thus, acculturation measured by residence in ethnic enclaves affects HL rates independently of neighborhood SES but in complex patterns. Living in less-ethnic neighborhoods may increase HL rates by facilitating social isolation and other gender-specific exposures implicated in risk.

Keywords

Hodgkin lymphoma; ethnic enclave; acculturation; epidemiology; immigration

INTRODUCTION

Hodgkin lymphoma (HL) is a B-cell malignancy whose etiology is influenced by socio-environmental conditions, as evidenced by age-specific secular trends in incidence levels [1-3], variation in rates with socioeconomic status (SES) [4-6], and changes over time in risk factors implicating social isolation and timing of key viral infections [7-10]. HL rates also rise after migration from lower- to higher-affluence countries [11,12], and vary by nativity [3,4,13,14], which may offer novel insights into mechanisms underlying HL incidence variation. In particular, the higher HL rates in US-born than foreign-born Hispanics and Asians/Pacific Islanders (APIs), and lower HL rates among US-born Hispanics and APIs

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than whites [13,14], suggest a role for post-immigration characteristics such as acculturation, the adoption of behaviors and practices of the host country.

One measure of acculturation among migrants is residence in an ethnic enclave, a neighborhood that maintains native cultural mores and is culturally and/or ethnically distinct compared with surrounding areas. For US Hispanics and APIs, living in an ethnic enclave has been shown to enhance social and economic engagement for recent immigrants, as well as to reinforce native customs [15,16]. As residence in ethnic enclaves relates to nativity and affects health behaviors [16,17] and illness [18,19], including numerous cancers [13, 20-26], it also may influence HL incidence.

A first examination of HL rates across neighborhood ethnic enclave status in a small group of APIs in California found lower rates among women, but not men, in neighborhoods of greater ethnic enclave intensity and higher SES [13]. However, the association of ethnic enclave residence with HL incidence has never before been studied in US Hispanics, nor in APIs in the detail appropriate to HL epidemiologic heterogeneity [27]. Therefore, we compared HL rates overall and by selected histologic subtype across ethnic enclave levels by age group, gender, and neighborhood SES in California Hispanics and APIs, populations with sizable immigrant subgroups but differing HL incidence patterns [4,5].

MATERIALS AND METHODS

Patient Data

We identified all California residents newly diagnosed during the years 1988-1992 and 1998-2002 with primary classical HL (International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3), morphology codes 9650-9655, 9663-9667) reported to the California Cancer Registry (CCR), which comprises four National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) registries [28]. We chose these time periods because of the availability of census small-area-level population characteristics for calculating rates by neighborhood ethnic enclave and SES (determined only for decennial census years), and combined data from the two pericensal periods to maximize statistical power for stratified analyses, having found no significant incidence rate differences between the two periods for HL overall, or by gender, age, SES, enclave, or histologic subtype (data not shown). For all cases, we obtained registry data (routinely abstracted from the medical record) on patient age, gender, race/ethnicity, residential address, birthplace (imputed [29] for the 24.3% of Hispanics and 27.9% of APIs with birthplace missing), and tumor histologic subtype at diagnosis. Classification of race and ethnicity (obtained also from death certificates) was enhanced using surname algorithms [30,31]. Because of the unusual epidemiologic profile and elevated incidence of HIV-related HL during the study period [32], we excluded 83 Hispanic (5.4%) and two API (0.6%) cases designated as HIV-positive by registry and/or death-certificate data [33]. These exclusions left 1,463 Hispanic HL cases and 348 API HL cases (74 Chinese, 20 Japanese, 112 Filipinos, 28 Vietnamese, 43 Asian Indians, and 71 others) for analysis (including 220 APIs from our previous study [13]).

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Neighborhood Ethnic Enclave and SES

We previously determined neighborhood ethnic enclave status for California cancer patients for the two pericensal periods using the census block group or census tract to which each patient's residential address at diagnosis had been geocoded [34]. The enclave indices were based on Census 2000 long form variables selected via principal components analysis. For Hispanics, these variables were the percentages of: foreign-born residents, recent immigrants, households that are linguistically isolated, Spanish-language-speaking households that are linguistically isolated, all language speakers with limited English proficiency, Spanish language speakers with limited English proficiency, and Hispanic residents. For APIs, the index was based on the percentages of: recent immigrants, API-language-speaking households that are linguistically isolated, API language speakers with limited English proficiency, and API residents. The indices (which explained 67.7% and 63.4% of the variability in the Hispanic and API data, respectively) were classified into quintiles based on their distributions across all California census tracts in the two census periods. To increase sample sizes within exposure categories, enclave quintiles were grouped into three categories of intensity, designated as more ethnic (highest quintile, 5), intermediate (second highest quintile, 4) and less ethnic (lowest three quintiles, 1-3). Each patient was assigned the appropriate ethnic enclave index of his/her neighborhood at diagnosis.

To assign neighborhood SES (hereafter called SES), we used census-tract-level indices that incorporated 1990 and 2000 census data on tract-level education, income, occupation, and housing costs [35]. For these census years, we categorized the respective indices into tertiles based on the distribution of the composite SES indices across all California census tracts (5,858 in 1990, 7,049 in 2000) and assigned each patient the SES tertile of his/her census tract at diagnosis. For sample size reasons, we also dichotomized SES as low (lowest tertile) or high (higher two tertiles). The 0.3% of cases from census tracts where SES values could not be computed were assigned SES values based on a randomly selected census tract within their county of residence, and enclave values were then assigned accordingly.

Population Data

For denominators of ethnic enclave-specific incidence rates, we used 1990 and 2000 US Census population estimates by age group, race/ethnicity, and gender at the census-tract level, assuming the estimates to be constant within the five years surrounding each census.

Incidence Rates and Rate Ratios

We computed average annual age-adjusted (standardized to the 2000 US standard million population) HL incidence rates per 100,000 population and 95% confidence intervals (CIs) for the period 1988-1992/1998-2002. As overall rates may obscure effect modification by age and gender, we further calculated rates by gender; for the age ranges 0-14, 15-39, 40-54 and ≥ 55 years (hereafter called “children,” “adolescents/young adults (AYAs),” “middle-aged adults,” and “older adults”), which demarcate groups with distinct HL incidence rates and risk factors [36]; and for Hispanics also by 10-year age group. We present these data for classical HL overall and its two most common histologic subtypes, nodular sclerosis (NS) (ICD-O-3 codes 9663-9667) and mixed cellularity (MC) (code 9652); the numbers of

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Hispanic and API cases, respectively, diagnosed with the other histologic subtypes were 50 and 9 for lymphocyte rich (code 9653-9655), 38 and 5 for lymphocyte depletion (code 9651), and 168 and 49 for classical HL not otherwise specified (code 9650). For APIs, rates are not presented by gender for NS or MC because of sample size constraints. To compare pairs of incidence rates, we calculated incidence rate ratios (IRRs) and 95% CIs, considering as significant any differences between two rates for which 95% CIs around the IRR did not include 1. IRRs are presented for comparisons of rates in less-ethnic to more-ethnic enclaves, i.e., more vs. less acculturation.

All analyses used SEER*Stat software [37], The study had the oversight of the institutional review board at the Cancer Prevention Institute of California.

RESULTS

Hispanics

The overall HL incidence rate (2.03 per 100,000 Hispanics) was 35% higher for those residing in less-ethnic relative to more-ethnic enclaves, but significantly higher only for females (Table 1). AYA and middle-aged adults of both genders had higher rates for less-ethnic neighborhoods (Table 2), but among females, the rate elevation occurred over a broader young-adult age range than among males (Figures 1a and 1b). With stratification by SES, enclave-specific rates varied significantly only among low-SES females overall. For AYAs, Figures 2a and b show that rates were higher in less-ethnic than more-ethnic enclaves at both SES levels, although more clearly in low-SES neighborhoods. Similar elevation of rates in less- than more-ethnic enclaves also occurred at both SES levels for NS (IRRs for AYAs: low SES, 1.60 (1.07-2.33); high SES, 1.55 (1.01-2.46)) and for MC.

Across joint enclave-SES groups (Table 2, bottom rows), female rates for HL overall were lowest in the more-ethnic/low-SES neighborhoods, 70% higher in the more-ethnic/high-SES neighborhoods (IRR: 1.70 (1.10-2.56)), and elevated to a similar degree in less-ethnic enclaves regardless of SES (IRRs: less ethnic/low SES, 1.62 (1.03-2.45); less ethnic/high SES 1.79 (1.43-2.24)). For males, rates did not differ across the joint categories, although an effect of higher SES was suggested within more-ethnic enclaves. For NS overall, rates were higher in less-ethnic/high-SES than more-ethnic/low-SES neighborhoods for both genders. For MC, the effects on rates of enclave intensity and of higher SES within more-ethnic enclaves were stronger and noted only in females.

Asians/Pacific Islanders

The overall HL incidence rate per 100,000 APIs was 1.01. Rates for less-ethnic enclaves were nearly double those of more-ethnic enclaves overall (Table 3), reflecting elevation among AYAs and older adults. Per Table 4, these patterns were stronger for females than males for all ages combined, and for AYAs and particularly older adults. This inverse association between ethnic enclave and HL incidence was more marked in low-SES than high-SES females, while detected only in high-SES males. For NS, rates similarly were higher in less-ethnic than more-ethnic neighborhoods but limited to females overall (Table 3), and suggestively among AYAs (IRRs: females, 1.39 (0.78-2.41); males, 1.00

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(0.48-1.94)). For MC, the inverse association was somewhat stronger than for NS and seen among both males and females.

The joint effect of enclave and SES on overall HL rates in APIs differed notably by gender. For females, rates were lowest in more-ethnic/low-SES neighborhoods and five- to six-fold higher with lessening enclave intensity, with a limited additional effect of SES. For males, the only rate differences occurred within more-ethnic neighborhoods, with higher SES linked to lower HL rates. For both NS and MC, rates were higher for less-ethnic than more-ethnic enclaves (Table 3); the data did not support gender-specific rates for these subtypes.

DISCUSSION

This first study of HL incidence and neighborhood ethnic enclave level, a measure of acculturation, in California Hispanics and APIs found that rates were higher in less-ethnic than more-ethnic enclaves in both populations. This inverse association was stronger in females than males, present in both young and older adults, and more marked in low-SES settings in females. Rates in females were highest in less-ethnic/high-SES neighborhoods, and diminishing ethnic enclave intensity appeared to affect rates more than higher SES. However, the effect of enclave on rates also differed by race/ethnicity. In Hispanics, the association of lesser enclave with higher HL rates was modest, modification by SES was limited to females, and the impact of SES within more-ethnic enclaves was of similar magnitude to that for the overall effect of less-ethnic vs. more-ethnic enclaves. In APIs, the effect of lesser enclave intensity on rates was stronger, particularly marked for MC, seen in males of higher SES, and in females progressively higher with lessening enclave intensity and increasing SES. Together, these findings suggest that acculturation as indicated by neighborhood ethnic enclave status affects HL rates independently of neighborhood SES, but in complex and race/ethnicity-varying patterns characteristic of classical HL incidence [27,38].

Our findings are consistent with prior research showing that residing in an ethnic enclave is related to risk of disease [16,19], including several cancers [13,20-26]. The direction of our observed associations was anticipated based on our previous findings regarding HL incidence by nativity [13,14], which is one component of our neighborhood enclave index. The single prior study addressing HL incidence and ethnic enclave residence, based on 220 API cases also included in the present analyses, similarly found elevated rates for females in less-ethnic and higher-SES neighborhoods [13].

Ethnic enclaves have been interpreted to affect health and disease risk through a broad range of community-level influences, including economic opportunity, social networks, health care access, diet, physical activity, reproductive behaviors, etc. [15,16,19,39-43]. Given established risk factors for HL, the observed association with ethnic enclave residence likely relates to relevant social community characteristics (e.g., education, family size [8], SES [4-6], household crowding [44]) and/or other environmental influences (e.g., smoking [45]). Indeed, in California populations, enclave levels showed strong inverse correlations among Hispanics with both neighborhood SES (percentages of block groups in the lowest and highest SES quintiles among more-ethnic enclaves = 66.8% and 0.0%, and among less-

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ethnic neighborhoods = 3.9% and 32.6%, respectively) and population density (percentages of block groups in the highest and lowest population density quintiles among more-ethnic enclaves = 52.2% and 7.9%, and among less-ethnic neighborhoods = 8.7% and 24.7%, respectively), but only very slight associations among Asians (data not shown). Nevertheless, our observation of enclave associations with HL that are present over and above some modifications by SES, together with the suggestion that residence in lesser-ethnic enclaves was more strongly associated with elevated HL rates than higher SES, support SES-independent mechanisms by which acculturation also may affect incidence. Some mechanisms are suggested by our subgroup findings. In Hispanic women, the absence of an enclave association in high-SES neighborhoods suggests that features of more-ethnic enclaves that protect against HL may be superseded in high-SES environments by other factors related to HL risk [8,44]. For AYAs, in whom HL development is associated with early social isolation [8,44], the elevated HL rates in less-ethnic enclaves irrespective of SES suggest that more concurrent aspects of acculturation may override SES-based risks set during childhood. The higher HL rates in more-ethnic/high-SES than more-ethnic/low-SES Hispanic enclaves suggest a prevailing effect of risk established by high childhood SES.

The persistently stronger impact among women than men of living in lesser ethnic enclaves recalls gender differences in HL incidence by neighborhood SES [5] and nativity [13]. These differences may reflect women's reproductive experience together with exposures to small children, which may influence HL risk [46] and vary across ethnic enclaves [47]. Thus, for Hispanic women, the relatively high fertility among immigrants [43] could provide protection against HL, leading to the observed lower rates for women in more-ethnic enclaves. The stronger association of HL incidence with less-ethnic enclaves for API than Hispanic women also is consistent with this hypothesis, as in California, Asian women are less parous than Hispanics, irrespective of birthplace (≥3 children born to 41% of foreign-born and 17% of US-born Hispanic AYA women vs. 10% of foreign-born and 4% of US-born AYA Asian women [48]). Moreover, while API women living in less-ethnic enclaves had higher HL rates regardless of SES, the association was stronger in low-SES neighborhoods, a pattern similar to that among Hispanic women. However, among API men, the impact of lesser enclave was observed only in high-SES neighborhoods, which may reflect male-female variation in social behavior and community involvement [49]; males may be less influenced by community factors, as might result from more time spent in employment out of the residential neighborhood. For HL in high-SES males, these circumstances may combine to favor social isolation that increases risk.

The common findings for Hispanics and APIs suggest consistency in the effects of acculturation and related aspects of the social environment on HL incidence, at least under conditions common to these study populations. In 2001, California Hispanics and Asians both comprised large proportions of recent immigrants (46% of Hispanics and 66% of Asians were foreign-born; approximately one-third of both groups had resided in the US for fewer than 10 years) [48]. These populations had achieved similar levels of some acculturation indicators (55% of Hispanics and 50% of Asians spoke English and one other language [48]). On the other hand, differences between the two study populations in study findings may relate to other sociodemographic differences. Hispanics reported less education and more poverty than APIs among both the foreign-born (84% vs. 34%

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completing high school or less; 42% vs. 16% living at or below the federal poverty level), and the US-born (57% vs. 29% completing high school or less; 28% vs. 9% living at or below the federal poverty level) [48]. Hispanics also had evidence of being less acculturated than Asians (e.g., 49% vs. 27% reporting not speaking English well [48]). Thus, the stronger effects of acculturation among APIs (and, for API females, irrespective of SES) we noted may imply that acculturation has more of an effect on HL development in populations lacking the prior protections against HL correlated with lower SES (e.g., larger family size in childhood [44,50] and, in females, more exposure to children in childhood and adulthood [46]). However, Hispanics and APIs also have well-described and persistent HL incidence rate variation [3-5], suggesting that other underlying differences may come into play with enclave associations.

Nativity likely influences our findings [13,14]. The lack of census-tract-level population data by nativity precluded our incorporating nativity into this analysis. Nevertheless, the decreasing percentages across enclaves of Hispanic HL cases who were foreign-born (more-ethnic (41%), intermediate (35%), less-ethnic (28%)) are consistent with a contribution of US birthplace to the higher HL rates in less-ethnic enclaves. The smaller proportion of foreign-born Hispanics in more-ethnic enclaves of low SES (45%) than high SES (59%) might predict higher HL rates for more-ethnic/low-SES neighborhoods. However, our findings show the opposite, perhaps because foreign-born Hispanics in more-ethnic/high-SES neighborhoods may have experienced childhood social isolation prior to immigration, thereby increasing HL risk. Among APIs, nativity seems less likely to affect our findings, as the percentage foreign-born varied less across more-ethnic, intermediate, and less-ethnic enclaves (62%, 53%, and 58%, respectively) than in Hispanic HL cases.

As immigration patterns, existence of ethnic enclaves, and acculturation processes change over time, the impact of ethnic enclave residence on HL incidence rates may evolve. The smaller proportions of foreign-born Hispanics (39%) and APIs (59%) in California in 2011-12 than 2001, and higher education levels in both groups (high school or less completed by 76% and 28% of the foreign-born, and 48% and 24% of the US-born), would predict higher HL rates in both groups going forward [48]. However, persistent socioeconomic disparities between Hispanics and APIs suggest that racial/ethnic differences in HL rates will continue.

Our study is subject to some limitations. Our enclave index did not capture all aspects of acculturation, may not have included those most influential for HL etiology, and cannot account for the effect of duration in an enclave [15]. The index reflects residence at HL diagnosis, and some etiologically exposures occur long before diagnosis [8,36]; however, other HL risk factors occur closer to disease onset [51], and some tumor promoters could act late in the carcinogenic process. Without individual-level information, we could not partition the respective effects of individual- and neighborhood-level acculturation and SES on HL incidence [16,47]. We lacked information on tumor Epstein-Barr virus (EBV) status, which defines etiologically distinct forms of HL [52] and modifies risk related to both nativity and SES [14,53]. While the more pronounced findings in females and in young adults are consistent with a stronger effect in EBV-negative HL, the somewhat larger IRRs for MC HL (mostly EBV-positive [53,54]) than NS HL (mostly EBV-negative [53,54]) suggest the

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opposite. The numbers of HL cases were sparse in some strata. Small sample sizes mandated calculating rates for all APIs combined, limiting the precision of our findings across Asian ethnic groups [55]. The numerous associations tested may have yielded some statistically significant associations by chance.

Nevertheless, our study offers the strength of a broad evaluation of the effect of ethnic enclave residence on HL rates by including two racial/ethnic groups with differing HL incidence and sociodemographic characteristics. Our large case series allowed us to address HL heterogeneity by calculating HL enclave-specific rates simultaneously by age group, gender, and selected histologic subtype separately for Hispanics and APIs; the larger group of APIs cases assembled here permitted more detailed, stratified enclave rates for this race group than were possible previously [13]. The high-quality population-based data of our data source [56] ensured reliable conclusions generalizable to similar populations, relative ethnic homogeneity of the Hispanic population for more precise study findings [57], and race/ethnicity and nativity enhanced [30,31,58] to reduce misclassification [59]. Our ethnic enclave indices, based on race/ethnicity-specific measures, captured acculturation appropriate to the study populations [16].

Conclusion

In two California racial/ethnic populations with large proportions of recent immigrants, HL rates varied by ethnic enclave, a neighborhood measure of acculturation. The higher HL rates in less-ethnic neighborhoods support an influence on HL risk of community-level sociodemographic characteristics that change following immigration and acculturation to a westernized lifestyle. Limited rate modification by SES, and elevation of rates in less-ethnic/high-SES compared to more-ethnic/low-SES neighborhoods, suggest that acculturation affects HL incidence independently of neighborhood SES. Less-ethnic and/or high-SES neighborhoods may increase HL risk by facilitating protected social interactions, especially early in life, that are associated with increases in HL risk. The stronger impact of acculturation on HL rates for females than males is consistent with a role of reproductive experience and exposures to young children on HL occurrence, and/or with gender differences in social and behavioral interactions with enclave environments. Differences in findings between Hispanics and APIs may reflect differing socioeconomic, demographic, and cultural profiles of immigrants in these groups, and changes in these profiles over time may alter acculturation-based variation in HL rates. Nevertheless, the results of this ecologic study justify further investigation of genetic, hormonal, and behavioral factors, that interact with environmental influences associated with HL occurrence in groups defined by patient race/ethnicity and tumor EBV tumor-cell status. Although such studies require large samples with sufficient racial/ethnic diversity, they might be contemplated in data pooled across extant case-control and cohort studies within the International Lymphoma Epidemiology Consortium (InterLymph) [45].

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Ellen T. Chang is employed by Exponent, Inc., a for-profit corporation that provides engineering and scientific consulting services to private and government organizations. As part of her employment for Exponent, Dr. Chang has been a consultant on the epidemiology of HL.

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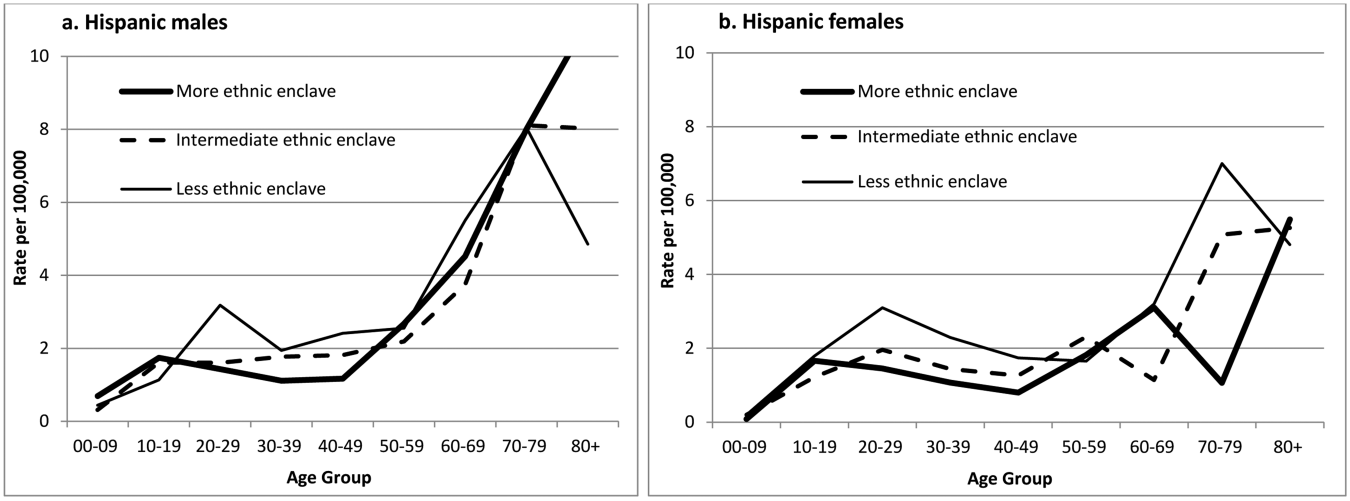

Figure 1.

Age-specific incidence rates of Hodgkin lymphoma, by gender and neighborhood ethnic enclave tertile, Hispanics, California, 1988-92/1998-02

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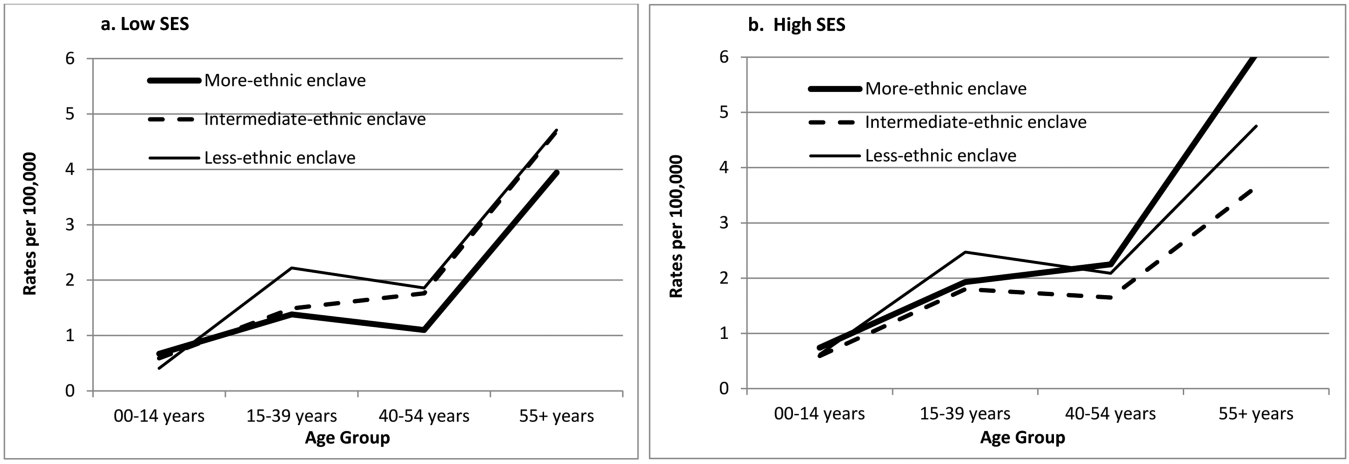

Figure 2.

Age-specific incidence rates of Hodgkin lymphoma by neighborhood SES and ethnic enclave tertile, Hispanics, California, 1988-1992/1998-2002

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Table 1

Age-adjusted incidence rates*, incidence rate ratios (IRRs), and 95% confidence intervals (CIs), of classical Hodgkin lymphoma and selected histologic subtypes, by ethnic enclave tertile, Hispanics, California, 1988-1992/1998-2002

Characteristics	Hispanic Enclave§	All classical Hodgkin lymphoma			Nodular sclerosis			Mixed cellularity		
		N = 1463			N = 877			N = 330		
		N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)
ALL COMBINED										
	More ethnic	603	1.81 (1.63-2.00)	1.00 (reference)	356	0.89 (0.77-1.02)	1.00 (reference)	148	0.55 (0.45-0.67)	1.00 (reference)
	Intermediate	344	1.96 (1.71-2.23)	1.08 (0.91-1.28)	192	0.90 (0.75-1.06)	1.01 (0.80-1.26)	83	0.55 (0.42-0.71)	1.01 (0.72-1.40)
	Less ethnic	516	2.45 (2.21-2.71)	**1.35 (1.17-1.56)**	329	1.29 (1.14-1.46)	**1.46 (1.21-1.76)**	99	0.61 (0.48-0.76)	1.11 (0.82-1.51)
SEX										
Male	More ethnic	354	2.35 (2.02-2.71)	1.00 (reference)	181	0.93 (0.75-1.15)	1.00 (reference)	109	0.86 (0.66-1.11)	1.00 (reference)
	Intermediate	190	2.30 (1.89-2.76)	0.98 (0.77-1.24)	92	0.93 (0.69-1.24)	1.00 (0.69-1.43)	53	0.71 (0.49-0.99)	0.82 (0.52-1.27)
	Less ethnic	268	2.63 (2.26-3.04)	1.12 (0.91-1.38)	159	1.23 (1.02-1.47)	1.31 (0.99-1.75)	63	0.82 (0.60-1.10)	0.95 (0.63-1.42)
Female	More ethnic	249	1.40 (1.21-1.62)	1.00 (reference)	175	0.87 (0.72-1.04)	1.00 (reference)	39	0.30 (0.20-0.42)	1.00 (reference)
	Intermediate	154	1.69 (1.40-2.03)	1.20 (0.94-1.53)	100	0.90 (0.71-1.12)	1.03 (0.77-1.39)	30	0.42 (0.27-0.61)	1.39 (0.79-2.42)
	Less ethnic	248	2.30 (1.99-2.64)	**1.64 (1.33-2.02)**	170	1.36 (1.15-1.61)	**1.57 (1.22-2.01)**	36	0.44 (0.30-0.62)	1.46 (0.86-2.46)
AGE GROUP AT DIAGNOSIS										
00-14 years	More ethnic	92	0.68 (0.55-0.83)	1.00 (reference)	62	0.47 (0.36-0.60)	1.00 (reference)	24	0.17 (0.11-0.25)	1.00 (reference)
	Intermediate	40	0.59 (0.42-0.81)	0.87 (0.58-1.28)	25	0.38 (0.24-0.55)	0.81 (0.49-1.30)	12	0.17 (0.09-0.30)	1.03 (0.47-2.14)
	Less ethnic	40	0.58 (0.41-0.79)	0.85 (0.57-1.25)	28	0.41 (0.27-0.59)	0.87 (0.54-1.39)	8	0.12 (0.05-0.23)	0.69 (0.27-1.58)
15-39 years	More ethnic	310	1.44 (1.28-1.61)	1.00 (reference)	220	1.01 (0.88-1.15)	1.00 (reference)	51	0.24 (0.18-0.32)	1.00 (reference)
	Intermediate	179	1.67 (1.43-1.94)	1.16 (0.96-1.41)	125	1.17 (0.97-1.40)	1.16 (0.92-1.46)	29	0.27 (0.18-0.39)	1.13 (0.69-1.84)
	Less ethnic	287	2.43 (2.16-2.73)	**1.69 (1.43-2.00)**	223	1.89 (1.65-2.16)	**1.88 (1.55-2.28)**	28	0.24 (0.16-0.35)	1.02 (0.61-1.66)
40-54 years	More ethnic	66	1.22 (0.94-1.55)	1.00 (reference)	28	0.52 (0.34-0.75)	1.00 (reference)	19	0.34 (0.21-0.54)	1.00 (reference)
	Intermediate	53	1.70 (1.27-2.22)	1.39 (0.95-2.04)	21	0.65 (0.40-1.00)	1.26 (0.68-2.32)	18	0.62 (0.37-0.98)	1.80 (0.89-3.64)
	Less ethnic	80	2.06 (1.63-2.56)	**1.69 (1.20-2.38)**	45	1.12 (0.82-1.51)	**2.18 (1.32-3.65)**	24	0.64 (0.41-0.95)	1.85 (0.97-3.60)
55+ years	More ethnic	135	4.17 (3.46-4.98)	1.00 (reference)	46	1.49 (1.07-2.02)	1.00 (reference)	54	1.66 (1.22-2.19)	1.00 (reference)
	Intermediate	72	4.08 (3.15-5.19)	0.98 (0.71-1.33)	21	1.21 (0.73-1.89)	0.81 (0.45-1.43)	24	1.33 (0.84-2.02)	0.81 (0.46-1.36)

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Characteristics	Hispanic Enclave[§]	All classical Hodgkin lymphoma			Nodular sclerosis			Mixed cellularity		
		N = 1463			N = 877			N = 330		
		N	Rate[*] (95% CI)	IRR (95% CI)	N	Rate[*] (95% CI)	IRR (95% CI)	N	Rate[*] (95% CI)	IRR (95% CI)
	Less ethnic	109	4.75 (3.87-5.77)	1.14 (0.87-1.49)	33	1.37 (0.93-1.94)	0.92 (0.56-1.50)	39	1.69 (1.18-2.34)	1.02 (0.64-1.60)
NEIGHBORHOOD SES										
Low	More ethnic	523	1.72 (1.53-1.91)	1.00 (reference)	314	0.87 (0.75-1.00)	1.00 (reference)	123	0.49 (0.39-0.61)	1.00 (reference)
	Intermediate	145	2.04 (1.64-2.50)	1.19 (0.93-1.50)	75	0.84 (0.62-1.12)	0.97 (0.70-1.34)	40	0.66 (0.43-0.95)	1.35 (0.84-2.09)
	Less ethnic	80	2.29 (1.71-2.99)	1.33 (0.98-1.78)	50	1.14 (0.79-1.60)	1.31 (0.88-1.91)	17	0.62 (0.33-1.06)	1.27 (0.65-2.28)
High	More ethnic	80	2.62 (1.98-3.41)	1.00 (reference)	42	1.09 (0.73-1.57)	1.00 (reference)	25	1.07 (0.63-1.66)	1.00 (reference)
	Intermediate	199	1.90 (1.60-2.25)	0.73 (0.53-1.01)	117	0.93 (0.74-1.16)	0.86 (0.55-1.36)	43	0.48 (0.33-0.67)	0.45 (0.25-0.84)
	Less ethnic	436	2.48 (2.22-2.76)	0.94 (0.71-1.28)	279	1.32 (1.16-1.51)	1.22 (0.82-1.86)	82	0.61 (0.47-0.77)	0.57 (0.34-1.02)
ENCLAVE*SES[‡]										
More Ethnic/Low SES		523	1.72 (1.53-1.91)	1.00 (reference)	314	0.87 (0.75-1.00)	1.00 (reference)	123	0.49 (0.39-0.61)	1.00 (reference)
More Ethnic/High SES		80	2.62 (1.98-3.41)	**1.53 (1.13-2.03)**	42	1.09 (0.73-1.57)	1.26 (0.82-1.87)	25	1.07 (0.63-1.66)	**2.19 (1.24-3.62)**
Intermediate/Low SES		145	2.04 (1.64-2.50)	1.19 (0.93-1.50)	75	0.84 (0.62-1.12)	0.97 (0.70-1.34)	40	0.66 (0.43-0.95)	1.35 (0.84-2.09)
Intermediate/High SES		199	1.90 (1.60-2.25)	1.11 (0.90-1.36)	117	0.93 (0.74-1.16)	1.08 (0.82-1.41)	43	0.48 (0.33-0.67)	0.98 (0.64-1.49)
Less Ethnic/Low SES		80	2.29 (1.71-2.99)	1.33 (0.98-1.78)	50	1.14 (0.79-1.60)	1.31 (0.88-1.91)	17	0.62 (0.33-1.06)	1.27 (0.65-2.28)
Less Ethnic/High SES		436	2.48 (2.22-2.76)	**1.44 (1.24-1.69)**	279	1.32 (1.16-1.51)	**1.53 (1.25-1.87)**	82	0.61 (0.47-0.77)	1.25 (0.89-1.74)

--Per confidentiality regulations of the California Cancer Registry, case counts and rates based on fewer than 5 cases are suppressed, and statistics are not computed.

Bolding denotes statistical significance.

[*]Per 100,000 person-years and standardized to the 2000 U.S. standard population

[§]More ethnic (Enclave Quintile 5); Intermediate (Enclave Quintile 4); Less ethnic (Enclave Quintile 1-3)

[‡]Low SES comprises the lowest SES tertile; high SES comprises the middle and highest SES tertiles.

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Table 2

Age-adjusted incidence rates*, incidence rate ratios (IRRs), and 95% confidence intervals (CIs), of classical Hodgkin lymphoma and selected histologic subtypes, by ethnic enclave tertile, Hispanics, California, 1988-92/1998-02

Characteristics	Hispanic Enclave§	All classical Hodgkin lymphoma						Nodular sclerosis						Mixed cellularity					
		Male			Female			Male			Female			Male			Female		
		N = 812			N = 651			N = 432			N = 445			N = 225			N = 105		
		N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)
ALL COMBINED																			
	More ethnic	354	2.35 (2.02-2.71)	1.00 (reference)	249	1.40 (1.21-1.62)	1.00 (reference)	181	0.93 (0.75-1.15)	1.00 (reference)	175	0.87 (0.72-1.04)	1.00 (reference)	109	0.86 (0.66-1.11)	1.00 (reference)	39	0.30 (0.20-0.42)	1.00 (reference)
	Intermediate	190	2.30 (1.89-2.76)	0.98 (0.77-1.24)	154	1.69 (1.40-2.03)	1.20 (0.94-1.53)	92	0.93 (0.69-1.24)	1.00 (0.69-1.43)	100	0.90 (0.71-1.12)	1.03 (0.77-1.39)	53	0.71 (0.49-0.99)	0.82 (0.52-1.27)	30	0.42 (0.27-0.61)	1.39 (0.79-2.42)
	Less ethnic	268	2.63 (2.26-3.04)	1.12 (0.91-1.38)	248	2.30 (1.99-2.64)	**1.64 (1.33-2.02)**	159	1.23 (1.02-1.47)	1.31 (0.99-1.75)	170	1.36 (1.15-1.61)	**1.57 (1.22-2.01)**	63	0.82 (0.60-1.10)	0.95 (0.63-1.42)	36	0.44 (0.30-0.62)	1.46 (0.86-2.46)
AGE GROUP AT DIAGNOSIS																			
00-14 years	More ethnic	65	0.92 (0.71-1.17)	1.00 (reference)	27	0.43 (0.29-0.63)	1.00 (reference)	39	0.56 (0.40-0.76)	1.00 (reference)	23	0.37 (0.23-0.55)	1.00 (reference)	21	0.28 (0.18-0.44)	1.00 (reference)	--	--	--
	Intermediate	24	0.69 (0.44-1.03)	0.76 (0.45-1.22)	16	0.49 (0.28-0.79)	1.12 (0.57-2.16)	13	0.38 (0.20-0.65)	0.69 (0.34-1.31)	12	0.37 (0.19-0.64)	1.00 (0.45-2.08)	9	0.26 (0.12-0.49)	0.91 (0.36-2.07)	--	--	--
	Less ethnic	22	0.62 (0.39-0.93)	0.67 (0.39-1.11)	18	0.54 (0.32-0.85)	1.25 (0.65-2.35)	15	0.42 (0.23-0.69)	0.75 (0.39-1.40)	13	0.39 (0.21-0.67)	1.07 (0.50-2.19)	--	--	--	--	--	--
15-39 years	More ethnic	167	1.43 (1.22-1.68)	1.00 (reference)	143	1.44 (1.21-1.70)	1.00 (reference)	102	0.86 (0.70-1.04)	1.00 (reference)	118	1.19 (0.98-1.43)	1.00 (reference)	40	0.35 (0.24-0.48)	1.00 (reference)	11	0.11 (0.06-0.21)	1.00 (reference)
	Intermediate	96	1.71 (1.38-2.09)	1.19 (0.91-1.55)	83	1.63 (1.29-2.03)	1.13 (0.85-1.50)	58	1.06 (0.80-1.37)	1.23 (0.87-1.73)	67	1.30 (1.00-1.66)	1.10 (0.80-1.50)	20	0.35 (0.21-0.54)	1.00 (0.55-1.77)	9	0.19 (0.09-0.36)	1.66 (0.60-4.46)
	Less ethnic	143	2.26 (1.90-2.67)	**1.58 (1.25-1.99)**	144	2.61 (2.20-3.08)	**1.81 (1.42-2.31)**	106	1.69 (1.38-2.05)	**1.97 (1.48-2.62)**	117	2.11 (1.75-2.54)	**1.78 (1.36-2.33)**	19	0.30 (0.18-0.47)	0.87 (0.47-1.55)	9	0.18 (0.08-0.33)	1.55 (0.56-4.16)
40-54 years	More ethnic	41	1.53 (1.10-2.09)	1.00 (reference)	25	0.91 (0.59-1.34)	1.00 (reference)	15	0.54 (0.30-0.89)	1.00 (reference)	13	0.49 (0.26-0.84)	1.00 (reference)	15	0.56 (0.31-0.93)	1.00 (reference)	--	--	--
	Intermediate	30	1.91 (1.28-2.74)	1.24 (0.75-2.05)	23	1.48 (0.94-2.23)	1.63 (0.88-3.01)	11	0.67 (0.33-1.22)	1.25 (0.52-2.97)	10	0.63 (0.30-1.16)	1.27 (0.50-3.17)	10	0.69 (0.33-1.27)	1.23 (0.49-2.93)	8	0.55 (0.24-1.08)	**4.25 (1.11-19.24)**
	Less ethnic	47	2.48 (1.82-3.31)	**1.62 (1.04-2.53)**	33	1.65 (1.13-2.33)	**1.82 (1.05-3.21)**	22	1.13 (0.71-1.72)	**2.10 (1.03-4.42)**	23	1.12 (0.71-1.69)	**2.28 (1.11-4.95)**	17	0.90 (0.52-1.44)	1.59 (0.74-3.44)	7	0.39 (0.15-0.79)	2.98 (0.74-13.87)
55+ years	More ethnic	81	6.13 (4.78-7.75)	1.00 (reference)	54	2.81 (2.09-3.71)	1.00 (reference)	25	1.84 (1.14-2.81)	1.00 (reference)	21	1.23 (0.75-1.90)	1.00 (reference)	33	2.61 (1.74-3.76)	1.00 (reference)	21	1.03 (0.63-1.60)	1.00 (reference)
	Intermediate	40	5.27 (3.65-7.36)	0.86 (0.55-1.31)	32	3.21 (2.17-4.57)	1.14 (0.70-1.82)	10	1.55 (0.69-2.96)	0.84 (0.33-1.92)	11	1.04 (0.51-1.89)	0.85 (0.36-1.89)	14	1.78 (0.93-3.11)	0.68 (0.32-1.38)	10	0.99 (0.46-1.84)	0.96 (0.39-2.18)
	Less ethnic	56	5.40 (4.01-7.15)	0.88 (0.60-1.29)	53	4.21 (3.13-5.54)	1.50 (0.99-2.25)	16	1.37 (0.77-2.32)	0.74 (0.36-1.55)	17	1.33 (0.76-2.14)	1.08 (0.53-2.20)	23	2.33 (1.41-3.62)	0.89 (0.48-1.64)	16	1.23 (0.69-2.03)	1.20 (0.57-2.46)
NEIGHBORHOOD SES‡																			
Low	More ethnic	309	2.25 (1.92-2.63)	1.00 (reference)	214	1.31 (1.11-1.53)	1.00 (reference)	163	0.94 (0.74-1.17)	1.00 (reference)	151	0.83 (0.67-1.00)	1.00 (reference)	92	0.79 (0.59-1.03)	1.00 (reference)	31	0.24 (0.16-0.36)	1.00 (reference)
	Intermediate	87	2.36 (1.75-3.11)	1.05 (0.75-1.45)	58	1.73 (1.24-2.33)	1.32 (0.91-1.86)	43	1.03 (0.64-1.56)	1.09 (0.65-1.77)	32	0.71 (0.46-1.06)	0.86 (0.53-1.35)	25	0.77 (0.43-1.26)	0.97 (0.51-1.74)	15	0.55 (0.28-0.95)	**2.27 (1.04-4.64)**
	Less ethnic	42	2.49 (1.62-3.66)	1.11 (0.70-1.68)	38	2.12 (1.39-3.08)	**1.62 (1.03-2.45)**	22	0.95 (0.56-1.59)	1.01 (0.56-1.79)	28	1.30 (0.78-2.04)	1.57 (0.91-2.60)	12	0.93 (0.40-1.81)	1.18 (0.48-2.46)	5	0.35 (0.11-0.87)	1.46 (0.40-4.08)
High	More ethnic	45	3.18 (2.06-4.66)	1.00 (reference)	35	2.23 (1.48-3.22)	1.00 (reference)	18	0.87 (0.46-1.57)	1.00 (reference)	24	1.28 (0.76-2.03)	1.00 (reference)	17	1.53 (0.69-2.82)	1.00 (reference)	8	0.75 (0.31-1.47)	1.00 (reference)
	Intermediate	103	2.23 (1.71-2.87)	0.70 (0.44-1.16)	96	1.69 (1.33-2.12)	0.76 (0.49-1.22)	49	0.86 (0.56-1.25)	0.99 (0.47-2.09)	68	1.04 (0.78-1.36)	0.81 (0.47-1.47)	28	0.66 (0.40-1.03)	0.43 (0.19-1.09)	15	0.33 (0.17-0.56)	0.44 (0.17-1.24)
	Less ethnic	226	2.65 (2.25-3.10)	0.83 (0.55-1.32)	210	2.34 (2.00-2.71)	1.05 (0.70-1.62)	137	1.29 (1.05-1.57)	1.48 (0.79-2.89)	142	1.37 (1.14-1.63)	1.07 (0.65-1.86)	51	0.80 (0.56-1.10)	0.52 (0.25-1.23)	31	0.45 (0.30-0.65)	0.60 (0.27-1.56)
ENCLAVE*SES‡																			

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Characteristics	Hispanic Enclave§	All classical Hodgkin lymphoma						Nodular sclerosis						Mixed cellularity					
		Male			Female			Male			Female			Male			Female		
		N = 812			N = 651			N = 432			N = 445			N = 225			N = 105		
		N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)	N	* Rate (95% CI)	IRR (95% CI)
More Ethnic/Low SES		309	2.25 (1.92-2.63)	1.00 (reference)	214	1.31 (1.11-1.53)	1.00 (reference)	163	0.94 (0.74-1.17)	1.00 (reference)	151	0.83 (0.67-1.00)	1.00 (reference)	92	0.79 (0.59-1.03)	1.00 (reference)	31	0.24 (0.16-0.36)	1.00 (reference)
More Ethnic/High SES		45	3.18 (2.06-4.66)	1.41 (0.89-2.14)	35	2.23 (1.48-3.22)	**1.70 (1.10-2.56)**	18	0.87 (0.46-1.57)	0.93 (0.47-1.76)	24	1.28 (0.76-2.03)	1.55 (0.89-2.58)	17	1.53 (0.69-2.82)	1.94 (0.84-3.85)	8	0.75 (0.31-1.47)	**3.08 (1.18-7.02)**
Intermediate/Low SES		87	2.36 (1.75-3.11)	1.05 (0.75-1.45)	58	1.73 (1.24-2.33)	1.32 (0.91-1.86)	43	1.03 (0.64-1.56)	1.09 (0.65-1.77)	32	0.71 (0.46-1.06)	0.86 (0.53-1.35)	25	0.77 (0.43-1.26)	0.97 (0.51-1.74)	15	0.55 (0.28-0.95)	**2.27 (1.04-4.64)**
Intermediate/High SES		103	2.23 (1.71-2.87)	0.99 (0.73-1.34)	96	1.69 (1.33-2.12)	1.29 (0.97-1.72)	49	0.86 (0.56-1.25)	0.91 (0.57-1.43)	68	1.04 (0.78-1.36)	1.26 (0.89-1.78)	28	0.66 (0.40-1.03)	0.84 (0.47-1.44)	--	--	--
Less Ethnic/Low SES		42	2.49 (1.62-3.66)	1.11 (0.70-1.68)	38	2.12 (1.39-3.08)	**1.62 (1.03-2.45)**	22	0.95 (0.56-1.59)	1.01 (0.56-1.79)	28	1.30 (0.78-2.04)	1.57 (0.91-2.60)	12	0.93 (0.40-1.81)	1.18 (0.48-2.46)	--	--	--
Less Ethnic/High SES		226	2.65 (2.25-3.10)	1.18 (0.94-1.48)	210	2.34 (2.00-2.71)	**1.79 (1.43-2.24)**	137	1.29 (1.05-1.57)	**1.37 (1.01-1.87)**	142	1.37 (1.14-1.63)	**1.66 (1.26-2.17)**	51	0.80 (0.56-1.10)	1.01 (0.64-1.57)	31	0.45 (0.30-0.65)	**1.86 (1.03-3.35)**

--Per confidentiality regulations of the California Cancer Registry, case counts and rates based on fewer than 5 cases are suppressed, and statistics are not computed.

Bolding denotes statistical significance.

*Per 100,000 person-years and standardized to the 2000 U.S. standard population

§More ethnic (Enclave Quintile 5); Intermediate (Enclave Quintile 4); Less ethnic (Enclave Quintile 1-3)

‡Low SES comprises the lowest SES tertile; high SES comprises the middle and highest SES tertiles.

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Table 3

Age-adjusted incidence rates*, incidence rate ratios (IRRs), and 95% confidence intervals (CIs), of classical Hodgkin lymphoma and selected histologic subtypes, by ethnic enclave tertile, Asians/Pacific Islanders (API), California, 1988-1992/1998-2002

Characteristics	API Enclave§	All classical Hodgkin lymphoma			Nodular sclerosis			Mixed cellularity		
		N = 348			N = 218			N = 67		
		N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)
ALL COMBINED										
	More ethnic	158	0.87 (0.73-1.02)	1.00 (reference)	106	0.55 (0.45-0.67)	1.00 (reference)	24	0.16 (0.10-0.24)	1.00 (reference)
	Intermediate	77	1.12 (0.87-1.42)	1.29 (0.95-1.74)	52	0.71 (0.52-0.95)	1.30 (0.89-1.86)	13	0.21 (0.11-0.37)	1.35 (0.62-2.85)
	Less ethnic	113	1.69 (1.37-2.05)	**1.95 (1.50-2.52)**	60	0.83 (0.62-1.08)	**1.51 (1.06-2.11)**	30	0.50 (0.33-0.73)	**3.23 (1.77-5.95)**
SEX										
Male	More ethnic	95	1.11 (0.89-1.37)	1.00 (reference)	54	0.59 (0.44-0.78)	1.00 (reference)	17	0.22 (0.13-0.36)	1.00 (reference)
	Intermediate	47	1.57 (1.13-2.14)	1.42 (0.95-2.08)	25	0.76 (0.47-1.16)	1.28 (0.73-2.17)	12	0.44 (0.22-0.78)	1.95 (0.82-4.45)
	Less ethnic	49	1.59 (1.15-2.14)	1.43 (0.97-2.09)	23	0.68 (0.41-1.05)	1.15 (0.64-1.97)	18	0.62 (0.35-1.00)	**2.75 (1.28-5.85)**
Female	More ethnic	63	0.65 (0.50-0.84)	1.00 (reference)	52	0.52 (0.39-0.68)	1.00 (reference)	7	0.09 (0.04-0.20)	1.00 (reference)
	Intermediate	30	0.75 (0.49-1.10)	1.14 (0.70-1.84)	27	0.68 (0.43-1.01)	1.30 (0.77-2.17)	--	--	--
	Less ethnic	64	1.80 (1.37-2.33)	**2.75 (1.88-4.02)**	37	0.97 (0.68-1.36)	**1.88 (1.18-2.96)**	12	0.41 (0.21-0.73)	**4.42 (1.55-14.06)**
AGE GROUP AT DIAGNOSIS										
00-14 years	More ethnic	11	0.29 (0.15-0.52)	1.00 (reference)	8	0.21 (0.09-0.42)	1.00 (reference)	--	--	--
	Intermediate	10	0.68 (0.33-1.25)	2.32 (0.88-6.00)	9	0.61 (0.28-1.16)	2.86 (0.98-8.52)	--	--	--
	Less ethnic	5	0.33 (0.11-0.76)	1.11 (0.30-3.48)	5	0.33 (0.11-0.76)	1.53 (0.40-5.31)	--	--	--
15-39 years	More ethnic	93	1.22 (0.98-1.49)	1.00 (reference)	73	0.96 (0.75-1.21)	1.00 (reference)	7	0.09 (0.04-0.19)	1.00 (reference)
	Intermediate	42	1.35 (0.97-1.83)	1.11 (0.75-1.62)	33	1.07 (0.73-1.50)	1.11 (0.71-1.70)	3	0.10 (0.02-0.28)	1.08 (0.18-4.77)
	Less ethnic	54	1.76 (1.32-2.30)	**1.45 (1.01-2.05)**	35	1.15 (0.80-1.60)	1.20 (0.78-1.82)	11	0.35 (0.17-0.62)	**3.90 (1.37-11.92)**
40-54 years	More ethnic	21	0.60 (0.37-0.92)	1.00 (reference)	13	0.38 (0.20-0.64)	1.00 (reference)	--	--	--
	Intermediate	8	0.55 (0.24-1.09)	0.91 (0.35-2.15)	--	--	--	--	--	--
	Less ethnic	16	1.03 (0.59-1.68)	1.71 (0.83-3.44)	9	0.57 (0.26-1.08)	1.51 (0.57-3.84)	--	--	--
55+ years	More ethnic	33	1.13 (0.77-1.61)	1.00 (reference)	12	0.38 (0.19-0.68)	1.00 (reference)	12	0.44 (0.22-0.78)	1.00 (reference)
	Intermediate	17	1.75 (0.99-2.86)	1.55 (0.79-2.93)	6	0.67 (0.22-1.51)	1.77 (0.49-5.25)	6	0.55 (0.20-1.24)	1.25 (0.38-3.78)

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Characteristics	API Enclave§	All classical Hodgkin lymphoma			Nodular sclerosis			Mixed cellularity		
		N = 348			N = 218			N = 67		
		N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)
	Less ethnic	38	3.60 (2.51-5.01)	**3.19 (1.91-5.34)**	11	1.05 (0.50-1.93)	**2.78 (1.05-7.06)**	17	1.65 (0.94-2.67)	**3.75 (1.64-8.88)**
NEIGHBORHOOD SES										
Low	More ethnic	38	0.88 (0.62-1.21)	1.00 (reference)	19	0.42 (0.25-0.66)	1.00 (reference)	9	0.21 (0.09-0.39)	1.00 (reference)
	Intermediate	15	0.99 (0.55-1.66)	1.13 (0.57-2.14)	11	0.66 (0.33-1.21)	1.58 (0.67-3.59)	--	--	--
	Less ethnic	26	1.53 (0.98-2.26)	1.74 (1.00-2.97)	11	0.59 (0.28-1.08)	1.41 (0.58-3.20)	9	0.60 (0.27-1.13)	2.90 (0.99-8.27)
High	More ethnic	120	0.86 (0.70-1.03)	1.00 (reference)	87	0.59 (0.47-0.74)	1.00 (reference)	15	0.14 (0.07-0.24)	1.00 (reference)
	Intermediate	62	1.19 (0.89-1.56)	1.39 (0.98-1.95)	41	0.75 (0.52-1.06)	1.27 (0.82-1.91)	11	0.24 (0.12-0.44)	1.74 (0.70-4.30)
	Less ethnic	87	1.72 (1.36-2.16)	**2.02 (1.48-2.73)**	49	0.90 (0.65-1.21)	**1.51 (1.02-2.20)**	21	0.46 (0.27-0.72)	**3.29 (1.54-7.34)**
ENCLAVE*SES‡										
More Ethnic/Low SES		38	0.88 (0.62-1.21)	1.00 (reference)	19	0.42 (0.25-0.66)	1.00 (reference)	9	0.21 (0.09-0.39)	1.00 (reference)
More Ethnic/High SES		120	0.86 (0.70-1.03)	0.97 (0.67-1.46)	87	0.59 (0.47-0.74)	1.42 (0.85-2.51)	15	0.14 (0.07-0.24)	0.68 (0.26-1.79)
Intermediate/Low SES		15	0.99 (0.55-1.66)	1.13 (0.57-2.14)	11	0.66 (0.33-1.21)	1.58 (0.67-3.59)	--	--	--
Intermediate/High SES		62	1.19 (0.89-1.56)	1.36 (0.87-2.13)	41	0.75 (0.52-1.06)	1.80 (0.99-3.37)	11	0.24 (0.12-0.44)	1.17 (0.43-3.27)
Less Ethnic/Low SES		26	1.53 (0.98-2.26)	1.74 (1.00-2.97)	11	0.59 (0.28-1.08)	1.41 (0.58-3.20)	9	0.60 (0.27-1.13)	2.90 (0.99-8.27)
Less Ethnic/High SES		87	1.72 (1.36-2.16)	**1.96 (1.31-3.00)**	49	0.90 (0.65-1.21)	**2.14 (1.22-3.93)**	21	0.46 (0.27-0.72)	2.22 (0.94-5.64)

--Per confidentiality regulations of the California Cancer Registry, case counts and rates based on fewer than 5 cases are suppressed, and statistics are not computed.

Bolding denotes statistical significance.

*Per 100,000 person-years and standardized to the 2000 U.S. standard population

§More ethnic (Enclave Quintile 5); Intermediate (Enclave Quintile 4); Less ethnic (Enclave Quintile 1-3)

‡Low SES comprises the lowest SES tertile; high SES comprises the middle and highest SES tertiles.

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Table 4

Age-adjusted incidence rates* of classical Hodgkin lymphoma, incidence rate ratios (IRRs), and 95% confidence intervals (CIs), by ethnic enclave tertile and gender, Asians/Pacific Islanders, California, 1988-1992/1998-2002

Characteristics	API Enclave§	All classical Hodgkin lymphoma					
		Males			Females		
		N = 191			N = 157		
		N	Rate* (95% CI)	IRR (95% CI)	N	Rate* (95% CI)	IRR (95% CI)
ALL COMBINED							
	More ethnic	95	1.11 (0.89-1.37)	1.00 (reference)	63	0.65 (0.50-0.84)	1.00 (reference)
	Intermediate	47	1.57 (1.13-2.14)	1.42 (0.95-2.08)	30	0.75 (0.49-1.10)	1.14 (0.70-1.84)
	Less ethnic	49	1.59 (1.15-2.14)	1.43 (0.97-2.09)	64	1.80 (1.37-2.33)	**2.75 (1.88-4.02)**
AGE GROUP AT DIAGNOSIS							
00-14 years	More ethnic	6	0.31 (0.11-0.67)	1.00 (reference)	5	0.27 (0.09-0.64)	1.00 (reference)
	Intermediate	7	0.92 (0.37-1.88)	2.96 (0.85-10.65)	--	--	--
	Less ethnic	--	--	--	--	--	--
15-39 years	More ethnic	50	1.30 (0.97-1.72)	1.00 (reference)	43	1.13 (0.82-1.53)	1.00 (reference)
	Intermediate	20	1.36 (0.83-2.10)	1.04 (0.59-1.78)	22	1.36 (0.85-2.06)	1.20 (0.68-2.06)
	Less ethnic	22	1.49 (0.93-2.25)	1.14 (0.66-1.92)	32	2.06 (1.40-2.91)	**1.82 (1.11-2.95)**
40-54 years	More ethnic	16	0.97 (0.55-1.57)	1.00 (reference)	5	0.27 (0.09-0.64)	1.00 (reference)
	Intermediate	5	0.75 (0.24-1.75)	0.77 (0.22-2.21)	--	--	--
	Less ethnic	8	1.15 (0.50-2.27)	1.19 (0.44-2.95)	8	0.94 (0.40-1.85)	3.42 (0.99-13.32)
55+ years	More ethnic	23	1.74 (1.09-2.65)	1.00 (reference)	10	0.63 (0.29-1.19)	1.00 (reference)
	Intermediate	15	3.43 (1.87-5.80)	1.98 (0.93-4.06)	--	--	--
	Less ethnic	17	3.55 (2.02-5.80)	2.05 (1.00-4.10)	21	3.66 (2.22-5.70)	**5.81 (2.53-14.30)**
NEIGHBORHOOD SES‡							
Low	More ethnic	31	1.55 (1.05-2.22)	1.00 (reference)	7	0.29 (0.12-0.60)	1.00 (reference)
	Intermediate	7	0.99 (0.38-2.10)	0.64 (0.23-1.52)	8	0.99 (0.42-1.98)	**3.42 (1.06-11.26)**
	Less ethnic	12	1.54 (0.77-2.74)	0.99 (0.45-2.03)	14	1.51 (0.81-2.57)	**5.24 (1.93-15.47)**
High	More ethnic	64	0.94 (0.72-1.22)	1.00 (reference)	56	0.77 (0.58-1.02)	1.00 (reference)
	Intermediate	40	1.78 (1.23-2.50)	**1.89 (1.19-2.94)**	22	0.71 (0.43-1.12)	0.92 (0.51-1.60)
	Less ethnic	37	1.56 (1.08-2.20)	**1.65 (1.04-2.58)**	50	1.89 (1.37-2.54)	**2.45 (1.60-3.74)**
ENCLAVE*SES‡							
More Ethnic/Low SES		31	1.55 (1.05-2.22)	1.00 (reference)	7	0.29 (0.12-0.60)	1.00 (reference)
More Ethnic/High SES		64	0.94 (0.72-1.22)	**0.61 (0.39-0.98)**	56	0.77 (0.58-1.02)	**2.67 (1.19-7.00)**
Intermediate/Low SES		7	0.99 (0.38-2.10)	0.64 (0.23-1.52)	8	0.99 (0.42-1.98)	**3.42 (1.06-11.26)**
Intermediate/High SES		40	1.78 (1.23-2.50)	1.15 (0.68-1.95)	22	0.71 (0.43-1.12)	2.47 (0.98-7.00)
Less Ethnic/Low SES		12	1.54 (0.77-2.74)	0.99 (0.45-2.03)	14	1.51 (0.81-2.57)	**5.24 (1.93-15.47)**
Less Ethnic/High SES		37	1.56 (1.08-2.20)	1.01 (0.59-1.71)	50	1.89 (1.37-2.54)	**6.55 (2.89-17.25)**

Per confidentiality requirements of the California Cancer Registry, case counts based on fewer than 4 cases are suppressed, and statistics are not computed

Bolding denotes statistical significance.

[*] Per 100,000 person-year and standardized to the 2000 U.S. standard population

[§] More ethnic (Enclave Quintile 5); Intermediate (Enclave Quintile 4); Less ethnic (Enclave Quintile 1-3)

[‡] Low SES comprises the lowest SES tertile; high SES comprises the middle and highest SES tertiles.

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