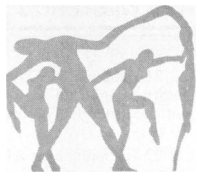

Women and Medicine

Occupational Mortality of California Women, 1979-1981

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A review of California's mortality data for 1979 through 1981, encompassing 61,561 female and 111,877 male deaths, shows differential female mortality risks by labor force status and by occupation. High patterns of risk were found for women in a number of occupations, including waitresses, licensed vocational nurses and health aides, cosmetologists, telephone operators, housekeepers and janitors, and launderers and dry cleaners. Patterns of mortality risk were similar for each race within these occupational groups. The mortality risks for women were generally higher than those for men. The association of mortality with certain occupations does not necessarily imply a causal relationship but is certainly a signal that further research is required and that physicians need to consider work-related factors in evaluating the health of women.

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Recent increases in the female work force have raised important questions about the health effects of this societal change. The percentage of women in the US and California labor force increased by a third between 1960 and 1980, rising from 38% to 52%.[1] By 1987, 56% of women in the United States were in the work force.[2] The comparable figures for women with children younger than 6 years and for women with children aged 6 to 17 years were 57% and 72%, respectively.[3] These demographic changes in the work force have resulted in increased exposure of women to potential occupational hazards.

Studies investigating the health of working women were practically nonexistent until this decade. Earlier studies of occupation and mortality, including the 1959-1961 California study and the 1969-1971 Washington State study, were limited to white men.[4-8] The relatively few studies currently available on women's occupational health offer seemingly contradictory and fragmented data and emphasize the lack of information about the impact of specific occupations on women's health.[9-16]

Current data indicate strong associations between a woman's work and her physical health.[17-22] While a "safer" nature of women's work has been presumed, it has not been shown.[13,23] Indeed, occupational health risks vary greatly among women, as they do among men. Unfortunately, most studies that compare health risks among women by occupation or industry have looked only at a limited number of occupations, or at one occupation in comparison to a control group. Few studies have compared occupational mortality by race and between sexes.[8,11,23-27]

The California Occupational Mortality Study, 1979 to 1981 (COMS), provides the first extensive data base of mortality information for California women, as well as for men, by race and detailed occupation and industry categories.[28] This COMS data base enables female mortality and comparable mortality data for men to be analyzed by various occupation, industry, and cause-of-death groupings.

Methods and Materials

The methodology of the California Occupational Mortality Study has been reported in detail elsewhere.[28] In brief, COMS information was obtained from two sources. First, California death certificates for all decedents, ages 16 to 64 years, were the source of age, sex, race—white, black, Asian—usual occupation, usual industry, and cause of death data. The occupation and industry items on 173,438 death records (61,561 women; 111,877 men) were coded for the COMS, using the same procedures employed by the US Bureau of the Census. The cause of death was coded according to the International Classification of Diseases, Ninth Revision.[29] The second data source was estimates of California's working population by age, sex, race, occupation, and industry generated by the US Bureau of the Census from the 20% sample of the 1980 California census.

Census-based standardized mortality ratios (SMRs) and 95% confidence interval estimates were calculated as shown in Table 1. SMRs by occupation were age-adjusted and presented by race. Industry SMRs were age- and race-adjusted. SMRs with interval estimates ranging entirely above 100 were defined as indicating a significantly increased risk of death compared with the standard population subset and are referred to as "highs" in this article. A comparable standard determined significant "lows." Significant SMRs were limited to those with at least 6 deaths by cause and with at least 51 deaths for the occupation or industry group. SMRs with interval estimates ranging 90 or above were defined as elevated or "marginal" for this study.

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ABBREVIATIONS USED IN TEXT

COMS = California Occupational Mortality Study
LVN = licensed vocational nurse
SMR = standardized mortality ratio

Results

The COMS data show notable differences in the risk of premature mortality by occupation for California women. In Figure 1, SMRs are presented for women by race in six summary occupational groups. High SMRs were found for both white and black female service occupations and for operators, fabricators, and laborers. For Asian women, only the SMR for managerial and professional specialties was high.

Service occupations, which include traditional female occupations, were associated with the largest number of female deaths, the highest SMRs for all causes of death, and the largest number of high SMRs for the leading causes of death. Between 1972 and 1980, more than 29% of California job growth was in the service area, while service jobs accounted for more than 41% of all job growth between 1980 and 1987.* This trend is projected to continue.[30,31]

Occupational mortality by race for six service occupations—waitresses, licensed vocational nurses and health aides, cosmetologists, telephone operators, housekeepers and janitors, and launderers and dry cleaners—are presented here. Likewise, male and female mortality comparisons for selected service occupations and related industries are discussed.

Leading Causes of Death for Labor Force Women in California

The rank and percent of deaths by selected leading causes of premature death for California women in the labor force—also referred to here as "working women"—and those not in the labor force, aged 16 to 64 years, for 1979 to 1981 are summarized in Table 2. Breast cancer was the leading cause of death for working women in California during the study period, and ischemic heart disease was second. The latter was the leading cause for black women in the labor force. Lung cancer was the third leading cause of premature death for women both in and out of the labor force. Cancer of the digestive organs was the leading cause for Asian working women and fourth for all women.

*Calculated from current California wage and salary employment data from the California Employment Development Department.

Motor vehicle traffic accidents was the fifth leading cause of death for working women. Cirrhosis, which was the fifth cause of death for non-labor force women, was eighth for California working women. Suicide, the ninth leading cause of death for working women, was the eleventh cause for non-labor force decedents. Homicide was the third leading cause of death for black working women (Table 2).

High Mortality Risk Among Women in Service Occupations

Among white labor force women, as shown in Table 3, waitresses had the greatest age-adjusted risk of mortality with an "all causes of death" SMR of 247; this is 2½ times

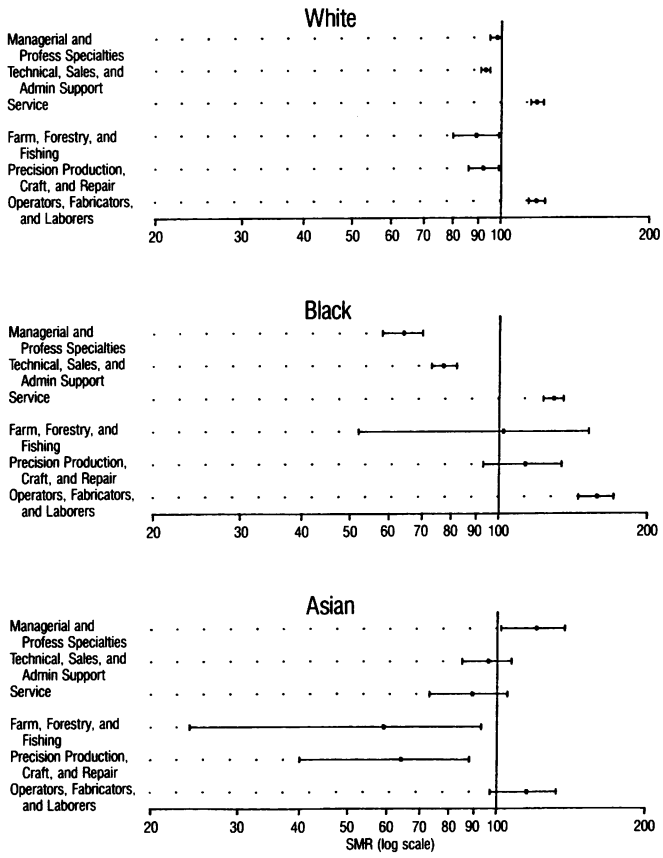

Figure 1.—The graphs show female standardized mortality ratios (SMRs) by race and six summary occupational groups—US Department of Commerce's index—for California, 1979 to 1981 (from State of California, Department of Health Services, Health Data and Statistics Branch, Occupational Mortality Study File).

TABLE 1.—*Computation of Standardized Mortality Ratio, Age-Adjusted by Race, for Ischemic Heart Disease in Female Health Aides, California, 1979-1981**†*

			Ischemic Heart Disease		
Race	Age, years	Population of Female Health Aides	Death Rate (3 years/100,000) for All White Women in This Study	Expected Deaths (3 years) for Female Health Aides	Observed Deaths (3 years) for Female Health Aides
		(1)	(2)	(3)=(1)×(2)	(4)
White . . .	16-44	85,122	5.59	4.76	14
	45-54	18,607	94.40	17.56	30
	55-59	8,282	299.20	24.78	49
	60-64	5,698	790.19	45.02	92
White Total	16-64			92.12	185

*From California Occupational Mortality 1979-1981.[28]
†White standardized mortality ratio = $(185/92.12)^{½} \times 100 = 201$; standard error = $100 \times 185/(92.12 \times 92.12) = 15$.

the expected mortality risk. Three other white female occupational groups had more than 1½ times the expected risk of death: telephone operators, licensed vocational nurses (LVNs) and health aides, and cosmetologists.

Black female launderers and dry cleaners showed a risk of mortality more than three times expected, and black waitresses and cosmetologists had a risk of death about twice that expected. Black female housekeepers and janitors had high mortality, while the mortality risk for white women in this occupational group was about 30% lower than expected (Table 3). An insufficient number of deaths precluded calculating SMRs for Asians in these occupations.

White LVNs and health aides showed high SMRs for 14 of the 15 leading causes of death examined (Figure 2). Both white and black women in this occupational group were at the greatest risk of death from suicide, with SMRs of 245 and 259, respectively. For white women, this SMR is the highest suicide rate found among any of the female occupational groups analyzed. This group showed the only high SMR for suicide among black women (Table 3).

White waitresses during 1979-1981 were at the greatest risk of fatal respiratory tract disease (SMR=430) as shown in Figure 2. Black waitresses showed more than five times the expected risk of death from cirrhosis (Table 3).

The SMRs for all causes of death for white and black female cosmetologists were 168 and 195, respectively. Other accidents, cirrhosis, and ischemic heart disease presented the greatest risks for cosmetologists (Table 3).

The COMS data show a dramatic difference in the mortality risk for black and white female housekeepers and janitors (Table 3). Blacks showed an all-cause SMR of 138, while whites had a significantly low SMR (69) for all causes and no high SMRs. The greatest risk of death for black female housekeepers and janitors was homicide (SMR=171), as presented in Figure 2. Also, this figure shows several extraordinarily high SMRs for black female launderers and dry cleaners, including cirrhosis (SMR=626).

Female and Male SMRs for Selected Occupations and Industries

Female and male SMRs for all causes of death differ for several of the service occupations, as shown in Table 4. Generally, the SMRs for women were higher than those for men in similar age-adjusted, race, and occupation groups. For instance, for white female and male LVNs and health aides, the respective high SMRs for all causes of death of 168 and 132 were found. Black women in these occupations also showed a high SMR, while the SMR for black men was only marginally high.

TABLE 2.—*Selected Leading Causes of Death for Women Aged 16 to 64 by Labor Force Status and Race, California, 1979-1981**

	Breast Cancer		Ischemic Heart Disease		Lung Cancer		Cancer Digestive Organs		Motor Vehicle Traffic Accidents		Cirrhosis		Suicide		Homicide	
	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent	Rank	Percent
All Women	2	9.3	1	11.0	3	7.4	4	6.7	5	5.6	7	5.1	11	4.1	12	2.5
Non-Labor Force	2	8.4	1	12.1	3	6.3	4	6.4	9	4.6	5	5.6	11	3.7	12	2.0
Labor Force	1	10.1	2	10.1	3	8.3	4	7.0	5	6.5	8	4.6	9	4.4	12	2.9
White	1	10.6	2	10.1	3	8.8	5	6.8	4	6.9	8	4.8	9	4.7	12	2.3
Black	2	6.8	1	11.1	7	5.8	6	6.5	13	3.4	9	4.0	13	1.8	3	6.7
Asian	3	9.5	7	5.4	9	3.7	1	13.7	4	8.1	12	1.7	6	7.4	8	4.2

*From State of California, Department of Health Services, Health Data and Statistics Branch, Occupational Mortality Study File, 1979-1981.

TABLE 3.—*Standardized Mortality Ratios (SMRs) by Leading Causes of Death for Selected Occupations of Women Aged 16 to 64, by Race, California, 1979-1981*†*

	Occupations									
	White‡					Black‡				
Cause of Death by Rank	Waitress	LVNs, Aides	Cosmetologists	Housekpr, Janitor	Telephone Operator	Waitress	LVNs, Aides	Cosmetologists	Housekpr, Janitor	Launderer, Dry Clean
All Causes	247	168	168	69	171	220	135	195	138	309
1 Breast cancer	130m	124	156	31	175	...	...	...	...	...
2 Ischemic heart disease	256	201	141m	...	156	...	146	259	128	352
3 Lung cancer	368	138	188	45	191	...	...	271m	...	383
4 Cancer of digestive organs	133m	138	163	57	178	...	...	253m	129m	296
5 Motor vehicle accidents	235	188	...	...	158m	...	...	...	...	...
6 Genital cancer	191	139	182	71	...	...	...	...	...	404
7 Cerebrovascular disease	218	163	193	...	...	...	156	...	...	...
8 Cirrhosis	423	165	212	...	191	507	159m	...	165	626
9 Suicide	220	245	...	...	192	...	259	...	...	...
10 Other heart disease	314	141	192	72	...	...	...	...	148	...
11 Respiratory tract disease	430	155	...	48	234	...	...	...	148m	...
12 Other accidents	225	209	257	...	222	...	174	...	...	...
14§ Homicide	360	161	201m	...	...	...	164	...	171	...
15 Hypertensive disease	...	244	...	...	...	...	165	...	166	328
Total Number of Deaths	1,392	1,470	482	598	427	65	549	100	687	140

*From State of California, Department of Health Services, Health Data and Statistics Branch, Occupational Mortality Study File, 1979-1981.
†SMRs were standardized for age. An "m" beside a number indicates elevated but "marginal" for this study.
‡The number of Asian deaths in these occupations did not meet the minimal size of more than 50.
§There were no high SMRs for the 13th cause of death, leukemia and other lymphatic cancers.

TABLE 4.—*Standardized Mortality Ratios (SMRs) for All Causes of Death for Selected Service Occupations by Sex and Race, California, 1979-1981*†*

Occupation	Race‡	Women SMR	Women Number	Men SMR	Men Number
LVNs and health aides	White	168	1,470	132	260
	Black	135	549	110m	119
Health technicians	White	122	264	...	152
	Black	...	34	...	31
Other health professionals	White	120	138	73	152
	Black	...	34	...	15
Housekeepers and janitors	White	69	598	87	2,253
	Black	138	687	92	937
Cosmetologists and barbers	White	168	482	110m	330
	Black	195	100	146	58
Launderers and dry cleaners	White	114m	130	...	119
	Black	309	140	177	96

LVNs=licensed vocational nurses

*From State of California, Department of Health Services, Health Data and Statistics Branch, Occupational Mortality Study File, 1979-1981.

†An "m" beside a number indicates elevated but "marginal" for this study.

‡There was one low SMR (66) for Asian male housekeepers and janitors. There were no high SMRs for Asians.

High all-cause SMRs were found for both black women and men employed as cosmetologists and barbers and as launderers and dry cleaners. In each of these occupational groups, however, the relative mortality risk for women was greater than that for men.

Age- and race-adjusted SMRs for women and men in seven industries are presented in Table 5. In each of these industries, the relative risk of death compared with the expected risk was greater for women than for men.

Discussion

Current studies indicate that women in the labor force are healthier than non-labor force women.[8,11,19,26,32] Work has a strong and positive effect on women's health, apparently separate from the "healthy worker" effect.[23,26] Recent evidence shows that, next to age, occupation is the key determinant of health for women.[17] The COMS data further show the importance of occupation in determining women's health and contribute additional evidence to support the hypothesis that women have significant variations in the risk of mortality by occupation, as well as by age and race.

According to Wingard, the variable mortality risks by

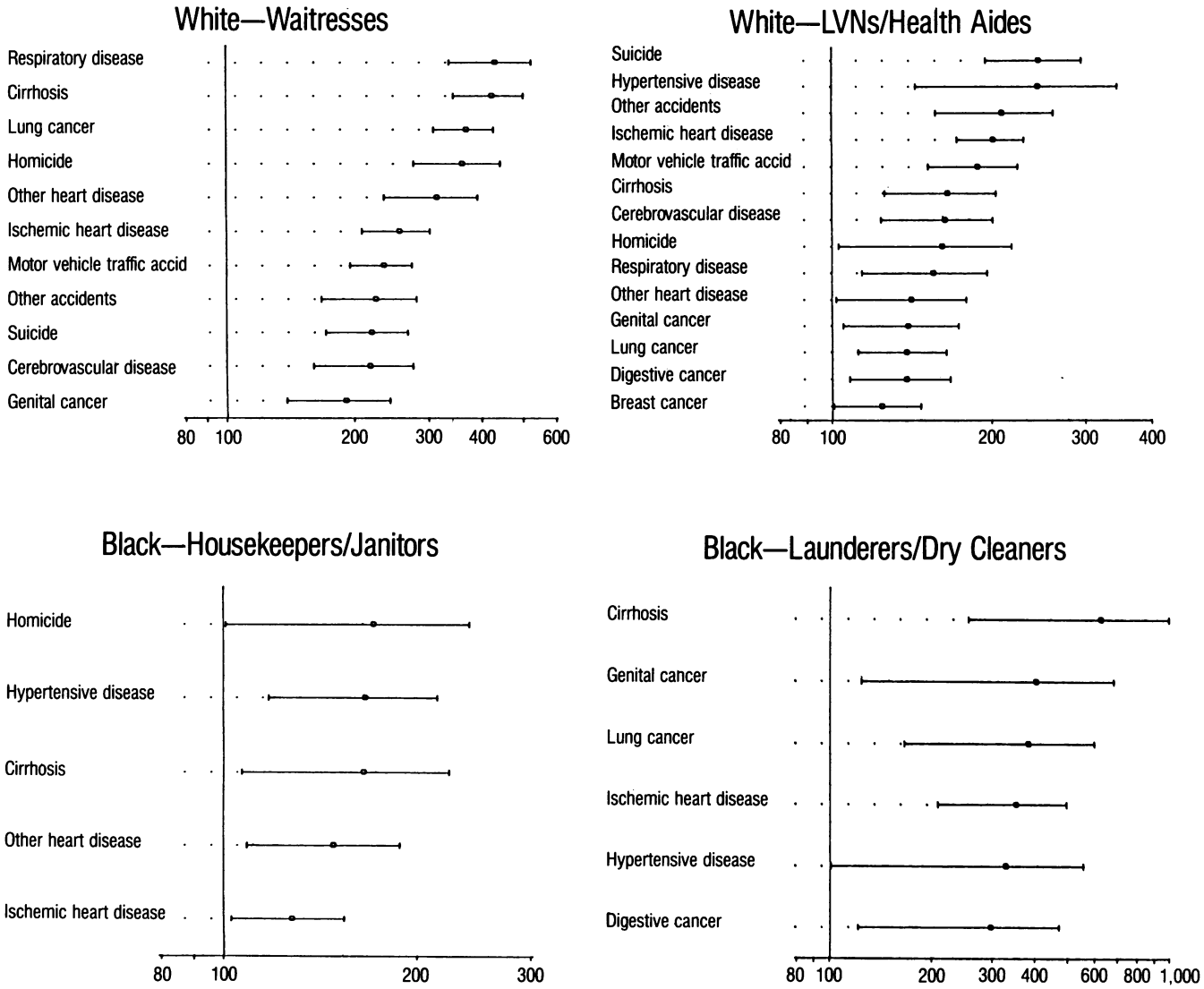

Figure 2.—The graphs show the standardized mortality ratios for women by race for the leading causes of death of selected occupations, California, 1979 to 1981. LVNs = licensed vocational nurses

TABLE 5.—*Standardized Mortality Ratios (SMRs) by Selected Industries for Women and Men, California, 1979-1981**†*

Industry	Women		Men	
	SMR	Number	SMR	Number
Communications‡	123	636	71	959
Eating and drinking	173	2,285	122	3,201
Laundry and dry cleaning	163	385	105m	415
Barber and beauty shops	163	579	108m	377
Hospitals	88	2,316	71	1,248
Nursing and personal care	232	804	147	184
Other health services§	118	1,166	62	881

*From State of California, Department of Health Services, Health Data and Statistics Branch, Occupational Mortality Study File, 1979-1981.

†An "m" beside a number indicates elevated but "marginal" for this study.

‡The communications industry includes radio and television broadcasting, telephone, telegraphic, and miscellaneous communications services.

§The "Other health services" industry includes medical offices, laboratories, clinics, and miscellaneous health centers, services, and associations.

occupation depend on work exposures and on life-style, biologic, and social factors.[14] A number of authors outline similar occupational factors.[9,18,23,30,33] Most studies of women's occupational health have focused on life-style, stresses, socioeconomic factors, and women's social roles as caretaker for children and older parents.[14,34,35]

Work-related exposures that affect women's health include poorly designed and maintained equipment, extreme temperatures, job-related driving, violence at the work site, side-stream smoke, toxic chemicals, microbial agents, shift hours, occupationally associated life-style behaviors such as smoking and drinking patterns, and other work-related stresses.[9,16,17,31,34,36,37]

A number of studies have investigated women's work-related stresses, including low pay; poor benefits; shift hours; bimodal work histories; lack of professional support; lack of job control; and limited job challenge, recognition, training, and promotional opportunities.[11,12,17,22,33,38] Research findings repeatedly point to the additional workloads and stresses women face because of their dual roles as workers and mothers/housekeepers.[14,21-23,30,39] It is estimated that married women who are employed full time work 80 hours per week (including home and family responsibilities), compared with an average of 50 hours worked by their employed spouses.[31] Researchers frequently note the multitude of stresses inherent in these dual roles and the associated symptoms of nervousness and anxiety.[15,19,22,36,39,40]

Relatively few studies have looked at the relationship between the role of parenthood, work, and health for women or men.[11,14,17,21,41] Recently, increasing attention has been focused on the negative health effects for both mothers and children of inadequate maternity-related employment benefits and the lack of quality, affordable child care.[30,42]

Socioeconomic factors such as income, education, marital status, housing, diet, and the availability of adequate support services affect health and potentially confound the relationship between women's work and health status.[43-50] The societal lack of options for adequate care of children and older parents further exacerbates the pressures on women, particularly for single working women.[17,30,51] The roles, means of coping, and motivations that are culturally learned by women affect their entry into specific occupations, ability to deal with job stresses, and promotional opportunities. These structural factors in society also confound the relationship between women's work and health.[20,21,41,44,52]

These critical, work-related factors should be taken into consideration by physicians evaluating the health of working-age women. Also, our findings suggest that it is important for physicians to investigate possible occupationally based causes for women suffering from a wide variety of common diseases and injuries. A number of examples of diseases and injuries that, based on the COMS data, may be associated with occupational exposures and stresses are outlined below.

California's waitresses are at high and not previously reported risks from ischemic heart disease, suicide, respiratory tract disease, and homicide. The high SMRs found for cirrhosis, lung cancer, motor vehicle traffic accidents, and other accidents support evidence from previous studies of waitresses.[53-55] The COMS SMRs of 507 for cirrhosis among black waitresses and 423 among white waitresses warrant additional study. Employment in an occupation involving the sale of alcohol has long been associated with an increased alcohol intake.[56] Also, according to Sterling and Weinkam, about half of white waitresses were reported to smoke, and they also were likely to have been exposed to substantial side-stream smoke.[57]

The high risk of suicide for both black and white women working as licensed vocational nurses and health aides is supported by previous studies that found high risks for nurses in England and for other health workers in the United States, including physicians.[18,55,58,59] COMS data also show, apparently for the first time, a high SMR for hypertensive disease in addition to highs for other accidents, ischemic heart disease, cerebrovascular disease, and cancer of the lung, breast, and digestive organs. The Washington State study also found elevations in the number of deaths from intestinal, uterine, and kidney cancers.[53] According to Sterling and Weinkam, more than a third of white female hospital attendants smoked and, of those, more than half smoked a pack or more per day.[57]

This large occupational group of LVNs and health aides shows several high SMRs that are fairly consistent by race, yet this has not been well studied. Mortality surveillances of this group should continue. Also, additional studies should focus on potential physical exposures, as well as job-related stresses, that may contribute to these high mortality risks.

California's cosmetologists face unexpectedly high risks of death from other accidents, cirrhosis, cancer (lung, genital, breast), and heart disease similar to those found previously in the Washington State and Roswell Park (Buffalo, New York) studies.[53,60] The COMS findings suggest additional risks for this group, including cerebrovascular disease and cancer of the digestive organs. These workers routinely have exposure to a number of chemical agents, including dyes, solvents, and methacrylates.[28] Additionally, according to Sterling and Weinkam, almost half of white female cosmetologists smoked and, of these smokers, most smoked a pack or more each day.[57]

Housekeepers and janitors show different patterns of risk for blacks (high), whites (low), and Asians (not significant). The low SMRs for various cancers among white women in this group are in agreement with the findings for female housekeepers, stewards, and janitors in Washington State. Also, the high SMR for ischemic heart disease in blacks is supported by Washington data.[53] Three SMRs for blacks suggest risks that apparently have not been reported previously for this occupation: homicide, hypertensive disease,

and cirrhosis. The reasons for the differences in risk patterns by race for this group need further investigation.

Telephone operators in California show SMRs that are about twice the mortality risk expected for respiratory tract diseases, other accidents, suicide, cirrhosis, and lung cancer. These findings, along with other highs for breast cancer, ischemic heart disease, and cancer of the digestive organs, raise a question about the possible health effects from work-related exposures, including job stress. Unfortunately, little information is available with which to compare these California data.

Although no significant high or low SMRs were found for white or Asian female launderers or dry cleaners, black women in this occupational group had three to six times the expected risks of mortality from cirrhosis, genital and lung cancer, ischemic heart disease, hypertensive disease, and cancer of the digestive organs. Studies in Missouri, Wisconsin, Rhode Island, and England found elevated risks for genital and lung cancer, cirrhosis, hypertension, and ischemic heart disease among similar workers.[55,61-63] The COMS high for cancer of the digestive organs appears to be new data that should be further studied.

Conclusion

This study presents new data about mortality of women in California according to occupational groupings. Additional studies are needed to investigate a number of factors potentially related to the high mortality risks for women in certain occupations. This is especially so for confounding variables such as smoking, the use of alcohol, and socioeconomic status; toxic chemical and other hazardous substance exposures; the duration and levels of employment for women in traditional and nontraditional jobs; employment-related stress; marital status and responsibilities for children and older parents; health care access and use by employed women; and the impact of protective variables such as positive health behaviors and strong social support.

Though the mortality patterns of all causes of death in this study generally were similar for women and men by race and occupation, the specific risks shown for women were often different from those for men. Further research needs to focus on these differences to provide a more adequate information base from which more effective prevention strategies and health maintenance regimens could be designed for women. At present, women's health promotion and disease intervention programs, as well as health practices prescribed for women by physicians, often are modifications of models that were originally developed for men. To be more effective, however, such programs and practices may need to be specifically developed for women, targeting particular occupational and industry groups.

Further, to more reliably assess possible occupational health risks in California for subpopulations and of less frequently occurring diseases, death record-based occupational mortality patterns should be examined regularly. High-risk findings should be further investigated through case-control studies and targeted field investigations to determine critical occupational exposures for women.

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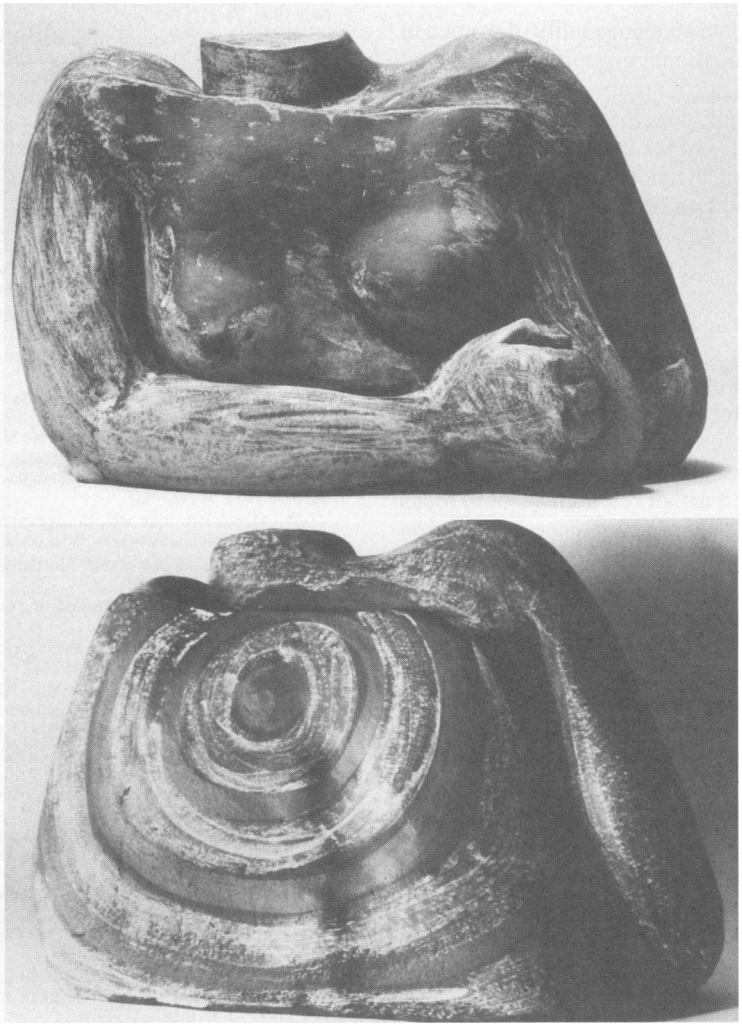

Woman Trying to Make a Point

Medium: Fired Clay

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