Racial Differences in Hospitalization Rates Among Navy Enlisted Men

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DIFFERENCES IN ILLNESS INCIDENCE rates among racial groups typically have been attributed to the social environment, socioeconomic status, lifestyle, or unique diet of a specified racial group. For example, epidemiologists have reported that higher rates of infectious diseases, hypertension, drug-related conditions, alcoholism, and trauma among blacks tend to be associated with socioeconomic deprivation (1-6). In his discussion of factors related to mortality and morbidity rates, Mechanic (2) suggested that because the nonwhite population in the United States is largely of low socioeconomic status, the racial difference in rates is "a distinction in socioeconomic level." He noted, furthermore, that affluence also contributes to the health status of various ethnic groups. In support of this view, Hockstim and associates (7) concluded that blacks and whites living in poverty areas are very similar in health status and that high income blacks and whites also have comparable health status.

Lifestyle, too, has been reported as related to morbidity rates of different groups. Stahl and associates (8)suggested that the incidence of obesity and cardiovascular diseases among Jewish and Italian groups can be explained in part by family interaction and dominance patterns centered around the dinner table. In their study of health status among various racial groups,

Tearsheet requests to Ms. Anne Hoiberg, Head, Health Care Systems Branch, Naval Health Research Center, P.O. Box 85122, San Diego, Calif. 92138. Breslow and Klein (9) found that Japanese-Americans experience superior health status, whites and Chinese-Americans occupy an intermediate position, and blacks have the poorest health. In explaining these differences, the authors could find little support for biological factors and suggested that the underlying sociological factors, reflecting family or community life, might be responsible for differences in health status among ethnic groups.

Mechanic (2) observed that when a large portion of the population reaches the level of satisfactory subsistence, it will be difficult to explain differences in health status as a function of gross socioeconomic factors. In the Navy, the enlisted man enjoys a satisfactory standard of living, one that includes the provision of adequate food, shelter, and medical and dental care. Further, lifestyle variations and differences in diet, particularly for men assigned to sea duty or training programs, are less pronounced than those in civilian communities. The socioeconomic status of Navy personnel also shows less variability than is evidenced among civilians in that most enlistees are of middle or lower income levels. The very disadvantaged, according to Thomas (10), may have difficulty meeting enlistment requirements whereas people from higher socioeconomic backgrounds tend to be interested in other career opportunities. Hence, the effects on health status of a causal factor such as socioeconomic status may be controlled by personnel selection and the uniformities of Navy life.

We examined the similarities and differences in hospitalization rates among men in five racial groups serving in the Navy during a 3-year period and evaluated the differences in terms of sociological and occupational factors. Racial groups were compared on the variables

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Table 1. Hospitalization rates for Navy enlisted men, by major disease categories, selected diagnoses, and racial groups, 1973-75¹

Diagnostic categories (ICDA-8 rubrics)	White	Black	Malaysian	American Indian	Asian- American
Accidents, poisonings, and violence	209	202	70	182	105
All fractures	68	44	16	37	25
Strains, sprains, dislocations	43	52	12	46	34
Concussions	18	14	7	28	15
Injuries, wounds, contusions	52	59	24	43	22
All burns	5	5	4	0	0
Mental disorders	156	210	25	262	52
Schizophrenia	12	37	5	3	9
Neuroses	15	14	4	6	6
Personality disorders	34	41	2	40	6
Transient situational disturbance	16	22	4	12	12
Alcoholism	47	46	4	154	15
Drug-related conditions	17	26	1	28	0
Diseases of the respiratory system	155	155	57	52	102
Acute upper respiratory infection	26	29	5	0	6
All pneumonias	50	40	10	15	15
Bronchitis	12	12	2	0	18
Hypertrophy of tonsils and adenoids	13	24	9	12	12
Diseases of the digestive system	103	132	61	71	83
All ulcers	6	12	9	3	6
Appendicitis	17	14	10	6	25
All hernias	37	45	14	28	25
Diseases of the musculoskeletal system and connec-					
tive tissue	88	110	31	62	31
Internal derangement of joint	19	24	5	18	3
Displacement of intervertebral disc	10	7	6	0	3
Vertebrogenic pain syndrome	13	16	3	6	0
Other diseases of joint	14	17	3	18	0
Synovitis, bursitis, tenosynovitis	10	13	6	6	12
Infective and parasitic diseases	77	87	65	71	83
Diarrheal disease	13	10	6	25	18
Pulmonary tuberculosis	1	2	8	0	6
Other respiratory tuberculosis	1	1	0	0	3
Rubella	.8	3	8	3	22
Infectious mononucleosis	11	3	1	6	0
All venereal disease	4	17_	1	3	3
Sarcoidosis	T	7	0	0	Ø

of age, General Classification Test (mental aptitude), occupational specialty, pay grade, and years of service.

Several features make the Navy population appropriate for such a study: (a) naval medical facilities keep accurate inpatient records that are stored centrally, (b)numbers of admissions are large enough to permit comparisons among racial groups, and (c) Navy enlistees are more homogeneous with regard to socioeconomic status, diet, and living conditions than their civilian counterparts.

Methods

Participants. Hospitalization records, obtained from the Navy Medical Data Services Center in Bethesda, Md., were edited and compiled into individual medical histories for research purposes at the Naval Health Research Center in San Diego. All Navy enlisted men who were hospitalized in naval medical facilities throughout the world from 1973 through 1975 were included in this study. The sample was divided into five racial groups (white, black, Asian-American, American Indian, and Malaysian) based on information routinely included in hospitalization records. The average annual Navy enlisted male population was approximately 464,000 during the 3 years. Of this number, approximately 87 percent were white, 8 percent black, 4.5 percent Malaysian (Filipino), and the remaining 0.5 percent Asian-Americans (Japanese and Chinese) and American Indians.

Malaysian (Filipino) sailors differ from the other

Table 1.-Continued

Diagnostic categories (ICDA-8 rubrics)	White	Black	Malaysian	American Indian	Asian- American
Diseases of the skin and subcutaneous tissue	80	58	26	43	31
Other cellulitis and abscess	40	26	12	25	22
Pilonidal cyst	18	8	1	3	0
Diseases of the genitourinary system	53	192	36	49	62
Calculus of kidney and ureter	90	4	13	3	9
Redundant prepuce and phimosis	14	130	4	37	34
Other diseases of male genital organs	14	31	8	9	6
Symptoms and ill-defined conditions Symptoms referable to cardiovascular and lymphatic	48	68	28	28	37
system	5	10	2	3	3
Diseases of the circulatory system	36	51	39	18	56
Essential benign hypertension	5	15	10	0	9
Acute myocardial infarction	2	1	2	3	0
Chronic ischemic heart disease	4	3	4	0	9
Phlebitis and thrombophlebitis	2	3	1	3	6
Hemorrhoids	8	12	10	0	6
Supplementary classifications	30	67	9	15	12
Medical and surgical aftercare	23	60	2	6	9
Diseases of the nervous system and sense organs	32	28	27	28	12
Other diseases of peripheral nerves, except autonomic	4	2	3	6	3
Otitis media without mention of mastoiditis	4	1	2	0	3
Neoplasms	16	16	12	12	3
Congenital anomalies	14	17	5	18	6
Endocrine, nutritional, metabolic diseases	9	14	16	12	6
Diabetes mellitus	4	9	8	12	3
Diseases of the blood and blood-forming organs	3	8	2	0	0
Hereditary hemolytic anemias	0	4	0	0	0
Average male enlisted population (1973–75)	403,292	37,003	21,226	1,083	1,079

¹ Hospitalization rates are numbers of admissions per 10,000 population per year.

groups in that the enlistees are foreign born and enter the Navy under a special contract between the Philippine and U.S. Governments. This contract stipulates that no more than 2,000 Filipinos may enlist in the U.S. Navy per year; the number of applicants greatly exceeds the number of enlistees, making possible a high degree of selectivity.

Procedure. From computerized hospitalization files, the variables of race, diagnosis, age, General Classification Test score, occupational specialty, pay grade, and years of service were extracted for all male enlistees hospitalized from 1973 through 1975. The primary diagnosis for each patient was based upon the "International Classification of Diseases Adapted for Use in the United

States, 8th Revision." In this classification, several thousand specific diagnoses are grouped into 18 major categories, and 16 of these categories were included in this study. Two categories—complications of pregnancy, childbirth, and the puerperium and certain causes of perinatal morbidity and mortality—were not relevant to this study.

After the number of hospitalizations by diagnosis and racial group were tabulated, annual hospitalization rates in terms of numbers of admissions per 10,000 men were computed for major diagnostic categories and selected specific diagnoses. Such computations were achieved by multiplying the frequency of hospitalizations for each diagnostic category or disorder by 10,000 and dividing that result by the average number of men within a racial

Table 2. Means and standard deviations for selected variables for hospitalized Navy enlisted men, by racial groups, 1973-75

Variable	White		Black		Malaysian		American Indian		Asian- American	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	23.68	6.74	23.27	6.24	30.84	8.05	24.53	6.72	24.85	7.34
Years of service	4.51	6.23	3.81	5.88	8.97	7.01	4.91	6.10	4.62	6.19
Pay grade	3.48	1.95	3.05	1.71	4.34	1.80	3.39	1.17	3.39	1.89
General Classification Test score	54.19	9.13	44.82	9.01	41.18	8.12	49.70	9.37	48.18	10.24

subgroup. The average number of enlisted personnel on active duty during the 3-year period was determined from the "Navy and Marine Corps Personnel Statistics." Percentage distributions by race were obtained from the Naval Military Personnel Command, Navy Human Resources Management Support System, and they were used as the basis for estimating the number in each of the five racial groups. Frequency distributions for specified intervals of age and years of service by race were unavailable, precluding the computations of rates and subsequent comparisons across groups on these variables. Hospital admissions for the 3 years numbered 134,024 for whites, 15,695 for blacks, 221 for Asian-Americans, 200 for American Indians, and 3,239 for Malaysians.

Results

Comparisons of total hospitalization rates among racial groups. Total hospitalization rates were computed for each of the five racial groups. As shown in the chart,

Total hospitalization rates by racial group for enlisted Navy men hospitalized during 1973–75 (rates per 10,000 per year)



the overall annual hospitalization rates per 10,000 men were blacks, 1,413; whites, 1,109; American Indians, 923; Asian-Americans, 683; and Malaysians, 508.

Hospitalization rates by racial group for major disease categories and selected diagnoses are presented in table 1. The 16 major disease categories are listed in order of magnitude of incidence rates for the total enlisted male population.

Accidents, poisonings, and violence. The highest hospitalization rate for all Navy enlisted men was for the category of accidents, poisonings, and violence. Whites and blacks had the highest rates for this category, followed by American Indians. The rate for Asian-Americans was about one-half the rate for whites and blacks; the rate for Malaysians was the lowest of all groups.

Mental disorders. The second highest hospitalization rate for all men was for mental disorders. Greater variability among racial groups was noted for this category than for any other. American Indians and blacks had relatively high rates of mental disorders whereas Malaysians and Asian-Americans had low rates. Alcoholism accounted for the majority of hospitalizations among American Indians.

Diseases of the respiratory system. This category constituted 11 percent of all hospitalizations for Navy enlisted men. Respiratory diseases occurred with greatest frequency among whites and blacks, particularly acute upper respiratory infections and pneumonias.

Diseases of the digestive system. Blacks had the highest hospitalization rate (132) for this diagnostic category, in contrast to the relatively low rate (61) for Malaysians. Hernias represented the most common condition.

Diseases of the musculoskeletal system. Blacks tended to be hospitalized more often for musculoskeletal prob-

lems than the other groups; however, differences in rates between whites and blacks' for selected diagnoses were relatively small. Malaysians and Asian-Americans had few musculoskeletal problems that resulted in hospitalization.

Infective and parasitic diseases. Overall rates for this category generally were quite similar among racial groups. The highest rate for venereal disease was observed among blacks; Asian-Americans had the highest rate for rubella. Whites were hospitalized more frequently than others for infectious mononucleosis.

Diseases of the skin and subcutaneous tissue. Whites were hospitalized more often for these conditions than other groups. This difference could be largely attributed to cellulitis and pilonidal cyst.

Diseases of the genitourinary system. Hospitalization rates for this category ranged from a high of 192 for blacks to 36 for Malaysians. The much higher rate for blacks was attributed primarily to a high incidence of redundant prepuce and phimosis. Rates were quite comparable among the other four groups.

Diseases of the circulatory system. The rate of circulatory disease was relatively high among Asian-Americans and blacks and low among American Indians, although the differences were not large. Blacks, however, had the highest hospitalization rate for hypertension. Other categories. Rates for other diseases were too low for meaningful comparisons among racial groups. The Asian-American group consistently had the lowest hospitalization rates for the less common major disease categories, including neoplasms, diseases of the nervous system and sense organs, and endocrine, nutritional, and metabolic disorders. Under diseases of the blood and blood-forming organs, blacks had a rate of 4 per 10,000 for hereditary hemolytic anemias, a diagnostic category that includes sickle cell trait and other hemoglobinopathies.

Comparisons of personnel and occupational variables by race. Significant differences (F ratios) were obtained for all four personnel variables; the racial groups differed in age, years of service, pay grade, and mental aptitude (General Classification Test scores). Means and standard deviations are presented in table 2. Results of post hoc comparative analyses (Scheffé t tests) indicated that Malaysians differed significantly from the other groups in age, years of service, and pay grade. Blacks had the lowest mean age, whereas differences in years of service and pay grade were nonsignificant among blacks, American Indians, and Asian-Americans. On the measure of mental aptitude, whites scored significantly higher than the other groups, particularly when compared with blacks and Malaysians.

Table 3 shows percentage distributions by occupational assignments and racial groups for the total Navy enlisted and hospitalized populations. The highest per-

Table 3.	Percentage	distributions	for total	Navy	enlistees	and	hospitalized	enlistees,	by	occupational	and	racial	groups
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Occupational group			Total enliste	es 1			Hospitalized enlistees ²					
	White	Black	Malaysian	American Indian	Asian- American	White	Black	Malaysian	American Indian	Asian- American		
 Deck	7.0	5.8	1.2	5.4	4.8	5.7	5.1	1.9	5.8	4.2		
Ordnance	4.5	2.2	0.3	3.3	4.6	3.2	1.7	0.4	1.7	3.3		
Electronics	4.7	1.1	0.4	2.0	8.5	2.6	0.7	0.3	2.4	1.9		
Precision equipment Administrative and clerical (includes	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0		
culinary work)	15.5	16.7	61.2	11.5	18.5	10.3	13.2	50.2	14.7	19.8		
Engineering and hull	21.4	15.7	13.3	22.4	16.3	19.6	13.3	13.1	18.2	13.7		
Construction	3.1	1.3	1.8	3.7	3.2	2.6	1.4	1.5	1.7	2.4		
Aviation	23.5	22.8	9.9	21.9	20.7	19.2	19.1	9.8	20.2	13.2		
Medical	5.1	4.6	2.6	5.5	8.2	7.1	5.9	4.6	8.6	9.9		
Dental Miscellaneous (includes	0.8	1.3	0.7	0.9	1.0	0.6	0.7	0.9	0.0	0.5		
unskilled)	14.1	28.4	8.5	23.3	13.9	28.9	38.8	17.2	26.7	31.1		
Total percentage	99.9	99.9	99.9	99.9	100.0	99.9	99.9	99.9	100.0	100.0		
= • • • • • • • • • • • • • • • • • • •	410,144	39,905	22,414	1,332	939	134,024	15,695	3,239	300	221		

¹ Includes all active duty Navy personnel as of June 30, 1974.

² 1973–75.

centages of hospitalizations were observed for the miscellaneous category, which consisted primarily of unskilled jobs, across all racial groups except Malaysians. Specifically, the most notable differences in percentages of hospitalized personnel were the large proportion of Malaysians assigned to culinary work and the high percentage of blacks in miscellaneous occupations. For the engineering and hull occupational group, whites and American Indians had the highest percentages of hospitalizations. An examination of percentage distributions of occupational assignments for the total Navy enlisted population showed similar distinctions—Malaysians were overrepresented in the culinary work, blacks in miscellaneous jobs, and whites and American Indians in engineering and hull work.

Discussion

The comparisons showed that of the five groups, blacks had the highest hospitalization rates and Malaysians the lowest. The greatest differences in rates among the groups were seen for the categories of mental disorders; diseases of the genitourinary system; and accidents, poisonings, and violence. Possible explanations for differences in the rates include an occupational factor; the variables of age, years of service, pay grade, and General Classification Test scores; and the factor of selection of enlistees.

Of the variables associated with increased morbidity risks, occupation was one of the most important contributing factors. Other research findings, for example, indicated that hospitalization rates for naval personnel assigned to unskilled jobs were the highest of all Navy occupational groups (11); unauthorized absences also were most frequent in this job category (12). Parenthetically, unskilled jobs consisted of interim tasks performed by enlistees who had not vet been assigned to a specific Navy occupation and included the menial and boring work, such as chipping paint, scrubbing decks, cleaning produce, and running errands, typically described as maintenance or service. The present results showed that blacks had the highest overall hospitalization rate as well as the highest proportion of men performing unskilled jobs. Malaysians, on the other hand, had the lowest hospitalization rate and lowest percentage of unskilled personnel. Between these two extremes were the Asian-American, white, and American Indian groups. In general, these findings suggested that many men assigned to the unskilled category probably were dissatisfied or inexperienced in their kinds of work assignments, which could explain in part the elevated injury rates among blacks, whites, and American Indians.

Further evidence for an association between occupation and hospitalization rate was that whites, blacks, and American Indians had the highest hospitalization rates for injuries and musculoskeletal disorders, as well as the highest percentages of men assigned to the most physically demanding jobs—such as engineering and hull. In contrast, Malaysians were most likely to be assigned to jobs that required minimal physical strength and had the lowest hospitalization rates for the specified conditions. With a relatively small proportion performing physically arduous work, Asian-Americans also had a lower hospitalization rate.

To a lesser extent, age differences probably affected hospitalization rates. Other research has shown that hospitalization rates for injuries and mental disorders tended to be much higher among younger sailors than among older, experienced men (13). In the present study, blacks-who comprised the youngest age grouphad a much higher hospitalization rate than Filipino sailors who generally were older. This relationship was confounded by the fact that blacks were not only younger but also had the highest percentage assigned to unskilled jobs. Other researchers reported similar relationships between hospitalization rates and both age and skill levels (14). One limitation of our study was that multivariate analyses were not conducted across racial groups for various intervals of age and years of service. As noted earlier, frequency distributions by race-which would be needed to compute rates for subsequent comparisons-were not available for these variables.

With regard to the selection factor, the number of Filipino applicants has exceeded the enlistment quota since the beginning of the arrangement between the two Governments (15). With such a large pool from which to select enlistees, recruiters have been able to choose only those applicants in superior physical and mental condition. The effectiveness of this selection factor was reflected in part by the low hospitalization rate observed for Malaysians.

Another factor that should be considered in accounting for differences in hospitalization rates was the availability of free health care, particularly among enlistees who had medically remediable problems. For example, in a comparison of hospitalization data between whites and blacks, it was apparent that rates differed substantially for disorders requiring surgical procedures that included such elective and non-life-threatening conditions as circumcisions (redundant prepuce and phimosis), tonsillectomies, and herniotomies. These conditions alone accounted for nearly one-half of the disparity in hospitalization rates between whites and blacks.

Although total hospitalization rates differed considerably among the five racial groups studied, much of the variation was attributed to dissimilarities in selection, occupational assignments, and age and job experience. Socioeconomic background and availability of health care before service also were important factors considered in interpreting differences between blacks and whites, primarily for medical problems correctable by surgery. That is, the Navy Medical Department provided remedial treatment for many black enlistees who perhaps were unable to afford such medical care in civilian life.

The results also lent support for an association between a genetic factor and certain disorders, such as alcoholism among American Indians (16) and schizophrenia, hypertension, and hemoglobinopathies among blacks (17). This evidence, however, must be considered tentative in the present descriptive study.

In conclusion, the findings should be useful to medical care planners who must be cognizant of the variability in the health care needs among racial groups. That is, the changing racial composition of the Armed Forces has important implications for the development of future programs designed to enhance the health and well-being of all members.

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Similarities and differences in hospitalization rates among five racial groups serving in the Navy during a 3-year period (1973–75) were examined, and the differences in terms of sociological and occupational factors were evaluated. Overall annual hospitalization rates per 10,000 men were blacks, 1,413; whites, 1,109; American Indians, 923; Asian-Americans, 683; and Malaysians (Filipinos), 508.

Explanations for the low Malaysian hospitalization rate included selection of the fittest for service, age and job experience, and a low percentage of assignments to physically arduous occupations. Although blacks had the highest rates for many medical conditions, their rates for injuries, respiratory diseases, and infective disorders were comparable with those for whites. Blacks had the highest rates for several non-lifethreatening conditions that required surgical procedures; this finding suggested that the Navy Medical Department had filled a longstanding need for corrective treatment.

Although the results of this study should be useful to military medical planners responsible for the health care of all naval personnel, the authors conclude that detailed longitudinal studies are needed to establish more clearly the underlying biological and sociological factors associated with racial differences in morbidity.