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Parasitic Disease in the US Navy

Laurence D. Mueller, PhD¹, Frank C. Garland, PhD²

¹Work conducted at the Naval Health Research Center San Diego, California; Permanent Address: Department of Ecology and Evolutionary Biology, University of California, Irvine, California

²Naval Health Research Center San Diego, California, and Department of Community and Family Medicine, School of Medicine, University of California, San Diego, La Jolla, California.

Computerized inpatient medical records for enlisted Naval personnel from 1975-1983 were searched for first hospitalizations due to any of 33 parasitic diseases. Average annual age-adjusted incidence rates were calculated per 100,000 person-years and were found to range from 0.0 (viral encephalitis, louse-borne typhus, trypanosomiasis, schistosomiasis) to 2.7 for acariasis. Overall, seamen (SIR = 1.5, $p < 0.05$) and hospital corpsmen (SIR = 2.6, $p < 0.05$) were at increased risk for hospitalization for parasitic diseases. Blacks showed lower rates of acariasis ($p < 0.05$) than Caucasians or other racial groups, but higher rates of trichomoniasis ($p < 0.05$). Hospitalizations for amebiasis, malaria, cestode parasites, and intestinal helminths were more frequent among non-caucasian, non-black Navy personnel. Cultural dietary practices among some ethnic groups, such as Filipinos, may place them at higher risk for certain parasitic diseases. There were three outbreaks of malaria identified aboard ship. These were presumed to be due to the crews of these ships coming in contact with infectious mosquitoes more or less simultaneously.

Despite the many advances in the control and treatment of parasitic diseases in recent times, these diseases are among the greatest cause of morbidity in the world. Estimated cases worldwide for malaria is 220 million (1), filariasis 90.2 million (2), and amebiasis 480 million (3). A survey of incidence of intestinal helminths in Kenya showed little change over the period 1917-1983 despite repeated efforts at control (4). In most cases, the estimates of incidence and prevalence of parasitic diseases are poor (1). In addition, the prevalence of infected individuals may not be a good indicator of the intensity of infection for some types of parasites (5). Consequently, these numbers are only a very rough indication of the magnitude of the severity of these

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diseases.

We report here incidence rates among enlisted Navy personnel of parasitic diseases from 1975 to 1983. This population differs from the general population of the United States since many Naval personnel travel to areas of the world where parasitic diseases are endemic. However, hospitalization records of these personnel allow for a good estimation of incidence rates of hospitalized parasitic diseases in the Navy population and a picture of the extent and relative frequencies of parasitic diseases serious enough to require hospitalization.

Methods

This study used computerized historical inpatient medical and career history files maintained by the Naval Health Research Center. These files provided all hospitalizations, medical board, and physical evaluation board findings for all Navy enlisted personnel serving on active duty since 1 January 1965 and 31 December 1983. Inpatient information was provided by the Naval Medical Data Services Center in Bethesda, Maryland. Career history information, provided by the Navy Military Personnel Command, was used to determine demographic characteristics and occupation.

The files were searched for first hospitalizations for any one of 33 parasitic diseases (6). Incidence rates were calculated using first hospitalizations and total person-years at risk. Incidence rates were extremely low for all diseases examined; and, consequently, 95 percent confidence intervals were calculated using the Poisson distribution (7,8,9).

Sex ratios were calculated for diseases which affected both sexes, and simultaneous confidence intervals were constructed by the methods of Gold and Goodman (10-11). For seven diseases, only one sex was affected. For these cases the exact binomial probability of observing such a result by chance alone was computed, based on the sex distribution of the entire Navy. The critical probability was determined by the Bonferroni inequality (12). Since the sex ratio of Navy personnel is male biased, it is extremely difficult to detect male biased diseases and relatively easy to detect female biased disease. For instance, it would take a sample of 80 affected males and 0 affected females to satisfy the test criteria described above or a sample of 2 females and 0 males.

Age-specific incidence rates were calculated for all para-



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Table 1
Incidence of parasitic disease in U.S. Navy, 1975-1983

Disease (ICD-9 CM code)	Number of cases	Average annual incidence rate per 100,000 person-years (N=4,199,630 person-years)	95% Confidence limits
Acariasis (133)	112	2.7	(2.2, 3.2)
Trichomoniasis (131)	106	2.5	(2.1, 3.1)
Other Protozoal (007)*	80	1.9	(1.5, 2.4)
Amebiasis (006)	78	1.9	(1.5, 2.3)
Malaria (084)	52	1.2	(0.9, 1.6)
Other infestation (134)†	47	1.1	(0.8, 1.5)
Toxoplasmosis (130)	30	0.7	(0.5, 1.0)
Other intestinal helminthiasis (127)‡	29	0.7	(0.5, 1.0)
Pediculosis (132)	17	0.4	(0.3, 0.7)
Tick rickettsia (082)	12	0.3	(0.2, 0.5)
Other cestode (123)§	12	0.3	(0.2, 0.5)
Other typhus (081)¶	11	0.3	(0.2, 0.5)
Other rickettsia (083)**	9	0.2	(0.1, 0.4)
Echinococcosis (122)	8	0.2	(0.1, 0.4)
Dengue (061)	5	0.1	(0.0, 0.3)
Other arthropod disease (088)††	4	0.1	(0.0, 0.2)
Ancylostomiasis (126)	4	0.1	(0.0, 0.2)
Trichinosis (124)	3	0.1	(0.0, 0.2)
Other unspecified helminthiasis (128)	3	0.1	(0.0, 0.2)
Leishmaniasis (085)	3	0.1	(0.0, 0.2)
Relapsing fever (087)	3	0.1	(0.0, 0.2)
Filarial infection (125)	2	0.1	(0.0, 0.2)
Mosquito encephalitis (062)	2	0.1	(0.0, 0.2)
Hemorrhagic fever (065)	2	0.1	(0.0, 0.2)
Tick encephalitis (063)	1	0.0	(0.0, 0.1)
Yellow Fever (060)	1	0.0	(0.0, 0.1)
Other trematode (121)‡‡	1	0.0	(0.0, 0.1)
Viral encephalitis (064)	0	0.0	(0.0, 0.0)
Other arthropod-borne viral disease (066)§§	0	0.0	(0.0, 0.0)
Louse-borne typhus (080)	0	0.0	(0.0, 0.0)
Trypanosomiasis (086)	0	0.0	(0.0, 0.0)
Schistosomiasis (120)	0	0.0	(0.0, 0.0)
Intestinal parasitism unspecified (129)	0	0.0	(0.0, 0.0)
Total	637	15.2	(14.0, 16.4)

* Balantidiasis, giardiasis, coccidiosis, other and unspecified.

† Myiasis, phthirus, other arthropod, hirudiniasis, other and unspecified.

‡ Ascariasis, strongyloidiasis, trichuriasis, enterobiasis, other nematodes, mixed helminthiasis, helminthiasis unspecified.

§ Taenia solium, cysticercosis, taenia saginata, taeniasis, diphyllbothriasis, sparganosis, hymenolepiasis, other and unspecified.

¶ Endemic flea-borne, Brill's disease, mite-borne, unspecified.

** Rickettsial pox, Q-fever, Wolhynian fever, other, unspecified.

†† Bartonellosis, other, unspecified.

‡‡ Opisthorchiasis, clonorchiasis, paragonimiasis, fascioliasis, fasciolopsiasis, metagonimiasis, heterophyiasis, other, unspecified.

§§ Phlebotomus fever, tick-borne fever, Venezuelan equine fever, other mosquito borne fever, other unspecified.

sitic diseases combined. Because incidence rates varied with age, rates for occupations were age-adjusted. Standardized incidence ratios (SIRs) and 95% Poisson confidence intervals were calculated for each of 60 occupations. Since this test was carried out on a large number of occupations significant results may be expected to appear at the five percent error level due to chance alone. Based on the Bonferroni inequality, 99.8 percent confidence intervals were calculated for those occupations in which the 95 percent Poisson confidence interval did not include 1.0 (12,13).

To assess whether different racial groups are at increased risk of a particular parasitic disease, standardized incidence ratios were computed for whites, blacks and all other racial groups combined.

Results

Table 1 is noteworthy for identifying those diseases which do not occur or occur rarely as it is useful for identifying those which are most frequent. Two common parasitic diseases in the third world, schistosomiasis and trypanosomiasis were unobserved in Navy personnel during this nine-year period (Table 1). The most common disease, scabies or acarasis, is still relatively rare occurring in only 3 individuals per 100,000 person-years.

There were no significant trends with age and parasitic disease infection. The rates were significantly lower, however, in the 35-44 year age ranges as compared to the 17-24 year age ranges (table 2).

The frequency of white, black and other racial groups affected show deviations from the expected for six diseases (Table 3). Amebiasis, malaria, and "other" cestode diseases which includes pork and beef tapeworms were significantly higher in personnel who were neither white nor black. Protozoal diseases other than amebiasis were higher in "others" than in whites, but not significantly higher than in blacks. Blacks

had a significant excess of trichomoniasis.

Two diseases, trichomoniasis and echinococcosis, show significantly higher incidence rates among females (sex ratios are shown in Appendix Table 1). All 8 cases of echinococcosis which occurred in the Navy occurred in females, and 82 of 106 cases (77 percent) of cases of trichomoniasis occurred in females. Because trichomoniasis affects the uro-genital tract, the higher incidence among females may be a function of the expression of this parasite in the two sexes which in turn leads to different incidence of hospitalization. Explanations for the exclusive occurrence of echinococcosis among females are not so easily developed.

One vector of echinococcosis, *Echinococcus multilocularis*, is harbored in the fox-vole predator-prey community in Northern latitudes of the United States (14). The duty station of the eight females infected with echinococcosis were not predominantly in the Northern U.S. and only three subjects enlisted in states along the northern border.

Only three job categories showed frequencies of parasitic disease which were higher than expected (Table 4). Seamen were 50 percent more likely to come down with a parasitic disease compared to other Navy personnel while hospital corpsmen experienced rates 150 percent greater. Sonar technicians also show statistically significant higher incidence of parasitic disease than expected even though the SIR was based on only three cases. Further study of these cases would be prudent to verify that this increased incidence was not due to some lack of independence between these three cases.

The heterogeneity of these parasitic diseases is evident in the frequency with which each parasitic disease is detected on the first diagnosis (Table 5). For instance, almost all individuals affected with malaria or amebiasis are admitted to the hospital with a diagnosis of these diseases. In contrast, individuals with trichomoniasis are as likely to be first hospitalized with an admitting diagnosis of a mental disorder as

Table 2
Average annual age-specific incidence rates for all parasitic disease in the U.S. Navy, 1975-1983

Age (in years)	Number of cases	Incidence rate per 100,000 person-years	95% Confidence limits
17 - 19	126	17.8	(14.9, 21.2)
20 - 24	292	16.1	(14.3, 18.0)
25 - 29	11	15.0	(12.5, 18.1)
30 - 34	67	14.9	(11.7, 18.9)
35 - 39	32	9.4	(6.6, 13.2)
40 - 44	7	6.6	(3.2, 13.7)
45 - 49	2	7.7	(0.94, 28.0)
50 - 61	1	13.2	(0.33, 74.0)
Total	637	15.2	(14.0, 16.4)

Table 3
Standardized incidence ratios (SIR) for parasitic diseases by racial group, U.S. Navy, 1975-1983

Disease	No. of cases	Race		
		White	Black	Other
		SIR (95% C.I.)	SIR (95% C.I.)	SIR (95% C.I.)
Amebiasis	78	0.9 (0.7, 1.2)	1.2 (0.6, 2.2)	13.0 (6.0,28.0)*
Other protozoal disease	80	0.9 (0.7, 1.1)	1.7 (1.0, 2.8)	6.3 (1.3,18.0)*
Dengue	5	1.1 (0.4, 2.7)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Mosquito encephalitis	2	1.1 (0.1, 4.0)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Hemorrhagic fever	2	0.6 (0.0, 3.0)	4.6 (0.1,25.0)	0.0 (0.0, 0.0)
Other typhus	11	0.9 (0.9, 1.8)	0.8 (0.0, 4.6)	14.0 (0.4,80.0)
Tick rickettsia	12	1.1 (0.6, 1.9)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Other rickettsia	9	1.0 (0.5, 2.0)	0.0 (0.0, 0.0)	20.0 (0.5,110.0)
Malaria	52	0.9 (0.7, 1.2)	0.5 (0.1, 1.5)	23.0 (11.0,47.0)*
Leishmaniasis	3	1.1 (0.2, 3.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Relapsing fever	3	0.7 (0.1, 2.7)	3.0 (0.1, 1.7)	0.0 (0.0, 0.0)
Other arthropod-borne viral disease	4	0.9 (0.2, 2.5)	2.3 (0.1,13.0)	0.0 (0.0, 0.0)
Echinococcosis	8	1.1 (0.6, 2.2)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Other cestode	12	0.7 (0.4, 1.4)	0.0 (0.0, 0.0)	57.0 (16.0,150.0)*
Trichinosis	3	0.7 (0.1, 2.7)	0.3 (0.0, 1.7)	0.0 (0.0, 0.0)
Filarial infection	2	0.6 (0.0, 2.7)	4.6 (0.1,25.0)	0.0 (0.0, 0.0)
Ancylostomiasis	4	0.9 (0.2, 2.5)	2.3 (0.1,13.0)	0.0 (0.0, 0.0)
Other intestinal helminthiasis	29	0.6 (0.4, 1.0)	0.9 (0.2, 8.8)	59.0 (32.0,108.0)*
Other unspecified helminthiasis	3	0.7 (0.1, 2.7)	3.0 (0.1,17.0)	0.0 (0.0, 0.0)
Toxoplasmosis	30	1.0 (0.7, 1.5)	0.6 (0.1, 2.2)	0.0 (0.0, 0.0)
Trichomoniasis	106	0.8 (0.6, 1.0)	2.8 (2.0, 4.0)	0.0 (0.0, 0.0)
Pediculosis	17	1.0 (0.6, 1.7)	1.1 (0.1, 3.8)	0.0 (0.0, 0.0)
Acariasis	112	1.1 (0.9, 1.3)	0.3 (0.1, 0.9)*	4.5 (0.9,13.0)
Other infestations	47	0.8 (0.6, 1.2)	2.2 (1.2, 3.9)	1.0 (0.0, 5.6)
Other trematode	1	0.9 (0.03, 6.3)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Tick encephalitis	1	0.9 (0.03, 6.3)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Yellow fever	1	0.9 (0.03, 6.3)	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)
Total	637	0.9 (0.8, 1.0)	1.3 (1.1, 1.6)	9.5 (6.8, 13)*

* Significantly different from the total Navy at the $p < 0.05$ level.

they are for trichomoniasis.

Several outbreaks of disease were observed. All occurred on ships and involved malaria. In 1976, seven men on the aircraft carrier Enterprise came down with malaria in a seven-day period. In 1980, seven men on the Constellation came down with malaria in a five-day period and an eighth was stricken 12 days later.

Average hospital stays varied from 4.0 days for the category other intestinal parasites to 33.0 days for leishmaniasis (Appendix Table 1). Number of cases of parasitic disease varied from 52 in 1979 to 105 in 1976 (Appendix Table 2).

Discussion

The most noteworthy result of this study is the quantita-

ative documentation of very low incidence rates of these parasitic diseases in the Navy compared to incidence rates in populations in many other parts of the world. For instance, no cases of trypanosomiasis were observed in the Navy after four million person-years of observation although one form of trypanosomiasis, Chagas disease, occurs in perhaps 10 percent of the population at risk in South America (15). Clyde (16) reports worldwide incidence rates of malaria between 0.2 percent and 20 percent while the observed first hospitalization rates in the Navy were about 0.001 percent per year. Positive serologic evidence for *Entamoeba histolytica* was found in up to 49 percent of stool samples examined in populations of various localities of South America (3) although less than 0.002 percent of Navy personnel per year were hospitalized with clinical cases of amebiasis.

Table 4
Standardized incidence ratios (SIR) for various occupations for all parasitic disease in the US Navy, 1975-1983

Occupation	Number of cases	SIR	(95% C.I.)
Boatswain's Mate	14	1.2	(0.7, 2.1)
Quartermaster	5	0.9	(0.3, 2.1)
Signalman	1	0.3	(0.0, 1.4)
Operations Specialist	14	1.3	(0.8, 2.1)
Elec. Warfare Technician	1	0.4	(0.0, 2.2)
Sonar Technician	3	34.0*	(6.9, 98.0)
Ocean Systems Technician	2	1.1	(0.1, 3.8)
Torpedoman's Mate	3	0.6	(0.1, 1.6)
Gunner's Mate	8	0.8	(0.4, 1.6)
Fire Control Technician	2	5.4	(0.7, 19.0)
Mineman	1	1.3	(0.0, 7.4)
Electronics Technician	8	0.5	(0.3, 1.1)
Data Systems Technician	3	1.0	(0.2, 2.8)
Navy Counselor	2	1.9	(0.2, 6.8)
Radioman	25	1.2	(0.8, 1.7)
Yeoman	17	1.2	(0.7, 1.9)
Personnelman	4	0.4	(0.1, 1.1)
Data Processing Technician	3	0.7	(0.1, 1.9)
Storekeeper	9	0.8	(0.4, 1.4)
Disbursing Clerk	4	1.3	(0.4, 3.4)
Mess Management Specialist	24	1.2	(0.8, 1.7)
Intelligence Specialist	2	1.3	(0.2, 4.7)
Ships Serviceman	7	1.0	(0.5, 2.1)
Journalist	1	1.0	(0.0, 5.6)
Lithographer	1	1.8	(0.1, 10.0)
Illustrator Draftsman	1	2.3	(0.1, 13.0)
Seaman Recruit	131	1.5*	(1.2, 1.8)
Machinist's Mate	27	0.8	(0.5, 1.1)
Engineman	12	1.1	(0.6, 1.8)
Machinery Repairman	2	0.6	(0.1, 2.1)
Boiler Technician	17	1.1	(0.7, 1.8)
Electrician's Mate	13	0.8	(0.5, 1.3)
Interior Comm. Electrician	5	0.7	(0.2, 1.6)
Hull Maint. Technician	13	0.9	(0.5, 1.5)
Fireman Recruit	32	1.1	(0.8, 1.5)
Engineering Aide	2	4.1	(0.5, 1.5)
Construction Electrician	1	0.6	(0.0, 3.1)
Equipment Operator	1	0.3	(0.0, 1.9)
Construction Mechanic	3	1.5	(0.3, 7.5)
Builder	2	0.6	(0.1, 2.0)
Construction Recruit	1	0.9	(0.0, 4.9)
Aviation Machinist's Mate	15	1.1	(0.7, 1.9)
Aviation Electronics Tech	7	0.5	(0.3, 1.1)
Antisub. Warfare Tech	6	2.3	(1.1, 5.0)
Aviation ASW Operator	6	1.5	(0.7, 3.3)
Aviation Ordnanceman	8	1.0	(0.5, 2.0)
Aviat. Fire Control Tech.	3	0.7	(0.2, 2.1)
Air Controlman	2	0.6	(0.1, 2.2)
Aviation Boatswain's Mate	2	0.2	(0.0, 0.9)
Aviation Electrician's Mate	9	0.9	(0.5, 1.6)
Aviation Structural Mech.	12	0.6	(0.3, 1.0)
Aircrew Survival Equipman	2	0.8	(0.1, 2.8)

Table 4 (continued)
Standardized incidence ratios (SIR) for various occupations for all parasitic disease in the US Navy, 1975-1983

Occupation	Number of cases	SIR	(95% C.I.)
Aerographer's Mate	3	1.4	(0.3, 4.0)
Aviation Storekeeper	7	1.3	(0.6, 2.7)
Aviation Maint. Admin. Man	4	1.0	(0.3, 2.5)
Aviat. Sup. Eqpt. Tech.	2	0.7	(0.1, 1.7)
Photographer's Mate	3	1.1	(0.2, 3.3)
Airman	17	0.6	(0.4, 0.9)
Hospital Corpsman	79	2.6*	(2.0, 3.2)
Dentalman	8	1.7	(0.9, 3.4)
Unspecified	15	-.	(-. , -.)
Total	637	1.0	(. , .)

* Significantly different from 1.0 using 99.8% confidence intervals (12).

Table 5
Admitting diagnosis and final diagnoses, six parasitic diseases, U.S. Navy, 1975-1983

Admitting diagnosis	Final Diagnosis					
	Toxo-plasmosis (N=30)	Other intestinal helminthiasis (N=127)	Amebiasis (N=78)	Acariasis (N=112)	Tricho-moniasis (N=106)	Malaria (N=52)
Toxoplasmosis	65.0	0.0	0.0	0.0	0.0	0.0
Other intestinal helminthiasis	0.0	33.0	0.0	0.0	0.0	0.0
Amebiasis	0.0	0.0	86.0	0.0	0.0	0.0
Acariasis	0.0	0.0	0.0	26.0	0.0	0.0
Trichomoniasis	0.0	0.0	0.0	0.0	13.0	0.0
Malaria	13.0	0.0	0.0	0.0	0.0	96.0
Alcoholism	0.0	0.0	0.0	14.3	3.0	0.0
Mental disorder	3.2	0.0	0.0	8.0	16.0	0.0
Venereal	0.0	0.0	0.0	2.0	0.0	0.0
Other	18.8	67.0	14.0	49.7	68.0	4.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

For many parasitic diseases, accurate incidence rates are not available for a U.S. population. Walsh (3) conjectures that there are probably >100,000 clinical cases of amebiasis in the United States yearly. This would translate into roughly 45 cases per 100,000 person-years. The observed first hospitalization rate of 1.9 per 100,000 person-years in the Navy suggests that Walsh's estimate may be high.

Six diseases show a significant excess of affected individuals in the "other" racial group. Further examination of these data show that Filipinos constitute a very large fraction

of all individuals affected with other cestode diseases (33% of the total) and other intestinal helminthiasis (37%). Included among the other intestinal helminthiasis is capillariasis, which is endemic to the Northern Philippines and is transmitted by eating raw fish (14). These observations suggest the cultural and dietary practices of certain ethnic groups in the Navy may predispose them to certain parasitic diseases.

Acariasis (scabies) showed significant heterogeneity among races (Table 3). The incidence rate indicates that blacks tend to have a lower incidence than the other racial

groups. Several reports have indicated decreased prevalence among blacks (17-19) although one study (20) showed no significant difference among recruits at Army medical centers.

In some respects the results of this study will be atypical of many other U.S. populations. The extensive travel by military personnel clearly put them at risk for diseases such as malaria. The pattern of the outbreaks of malaria tend to confirm this suspicion. Navy personnel living at close quarters may also be at greater risk for highly contagious conditions such as scabies (21,22). The very low rates of parasitic diseases in the Navy indicate measures taken to prevent these diseases are for the most part effective.

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Appendix Table 1
Sex ratio and mean hospital stay of affected individuals for parasitic diseases, U.S. Navy, 1975-1983

Disease	No. of cases		Per Cent male	Mean hospital stay in days
	Male	Female		
Amebiasis	76	2	96	10.0
Other Protozoal	78	2	98	9.7
Dengue	5	0	100	5.0
Mosquito encephalitis	2	0	100	17.0
Tick encephalitis	1	0	100	10.0
Hemorrhagic fever	1	1	50	4.0
Other typhus	10	1	91	9.0
Tick rickettsia	11	1	92	9.8
Other rickettsia	9	0	100	13.0
Malaria	52	0	100	7.0
Leishmaniasis	3	0	100	33.0
Relapsing fever	3	0	100	24.0
Other arthropod-borne viral disease	3	1	75	4.3
Other trematode	1	0	100	13.0
Echinococcosis	0	8	0*	8.4
Other cestode	12	0	100	12.0
Trichinosis	3	0	100	6.3
Filarial infection	2	0	100	25.0
Ancylostomiasis	4	0	100	4.0
Other intestinal helminth	22	7	77	14.0
Other unspecified helminth	2	1	6	5.0
Toxoplasmosis	30	0	10	16.0
Trichomoniasis	24	82	22*	9.0
Pediculosis	17	0	100	9.2
Acariasis	106	6	95	14.0
Other infestation	43	4	92	13.0
Yellow fever	1	0	100	..

* Percent males significantly different from Navy average of 0.94. Type I error rate for all 27 tests simultaneously set at < 0.05.

Appendix Table 2
Number of parasitic disease hospitalizations by year

Disease	Year									
	75	76	77	78	79	80	81	82	83	Total
Amebiasis	8	7	8	4	13	21	5	7	10	83
Other Protozoal	7	23	7	6	6	7	9	10	8	83
Dengue	0	0	0	2	0	2	1	0	0	5
Mosquito										
encephalitis	0	0	1	0	1	0	0	0	0	2
Tick encephalitis	0	0	1	0	0	0	0	0	0	1
Hemorrhagic fever	0	0	0	0	0	0	1	1	0	2
Other typhus	0	1	4	2	2	2	0	0	0	11
Tick rickettsia	0	3	3	2	3	1	0	0	0	12
Other rickettsia	0	0	2	1	0	3	0	1	3	10
Malaria	6	9	2	6	2	8	10	8	2	53
Leishmaniasis	1	0	0	2	1	0	0	0	0	4
Relapsing fever	1	0	0	0	1	0	0	0	1	3
Other arthropod-borne										
viral disease	0	2	0	1	0	0	0	0	1	4
Other trematode	0	1	0	0	0	0	0	0	0	1
Echinococcosis	0	0	1	1	1	0	2	2	1	8
Other cestode	7	3	0	1	0	0	1	0	0	12
Trichinosis	1	0	0	1	0	1	0	0	0	3
Filarial infection	1	1	0	0	0	0	0	0	2	4
Arcylostomiasis	2	0	0	0	1	1	0	0	0	4
Other intestinal										
helminth	9	2	3	3	1	4	5	3	0	30
Other unspecified										
helminth	0	0	0	2	0	1	0	0	0	3
Toxoplasmosis	5	4	1	2	3	2	7	3	4	31
Trichomoniasis	16	11	11	8	5	13	17	17	9	107
Pediculosis	2	3	2	3	2	3	1	0	1	17
Acariasis	17	25	26	8	6	10	8	5	7	112
Other infestation	3	10	4	6	4	4	4	6	6	47
Total	86	105	76	61	52	83	71	63	55	652*

* Includes some cases with more than one hospitalization.

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) Computerized inpatient medical records for enlisted Naval personnel from 1975-1983 were searched for first hospitalizations due to any of 33 parasitic diseases. Average annual age-adjusted incidence rates were calculated per 100,000 person-years and were found to range from 0.0 (viral encephalitis, louse-borne typhus, trypanosomiasis, schistosomiasis) to 2.7 for acariasis. Overall, seamen (SIR = 1.5, $p < 0.05$) and hospital corpsmen (SIR = 2.6, $p < 0.05$) were at increased risk for hospitalization for parasitic diseases. Blacks showed lower rates of acariasis ($p < 0.05$) than Caucasians or other racial groups, but higher rates of trichomoniasis ($p < 0.05$). Hospitalizations for amebiasis, malaria, cestode parasites, and intestinal helminths were more frequent among non-caucasian, non-black Navy personnel. Cultural dietary practices among some ethnic groups, such as Filipinos, may place them at higher risk for certain parasitic diseases. There were three outbreaks of malaria identified aboard ship. These were presumed to be due to the crews of these ships coming in contact with infectious mosquitoes more or less simultaneously.					
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