GEOGRAPHICAL AND TEMPORAL VARIATIONS IN OUTPATIENT MORBIDITY AT U. S. NAVY OVERSEAS FACILITIES

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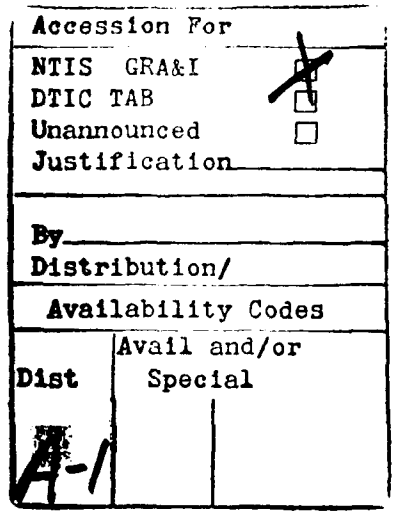

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Summary

Problem

Delineation of factors which impact on the incidence of disease and non-battle injuries is requisite to Navy medical resource planning. Previous investigations at Naval Health Research Center have examined the effect of geographical region, ship size, and combat support status on shipboard outpatient illness rates.

Objective

The present investigation seeks to assess the seasonal and geographical variations among the overseas regions at which the U.S. Navy has a presence.

Approach

Morbidity reports recorded during 1984 were compiled and examined by quarters for seven geographical regions which have Navy medical facilities. Illness rates per 1,000 per day were computed and reported with 95% confidence limits.

Results

Overall rates of illness in East Asia were higher than those in Europe. The highest outpatient rate among individual countries occurred in Bahrain. A progressive increase in illness rate was seen at duty stations from Northeast Asia to Southwest Asia (Japan-Philippines-Bahrain). The greatest seasonal variations in morbidity rates within regions were seen for Bahrain and Iceland; minor fluctuations by quarter were evident for Japan, Philippines, Diego Garcia, European continent, and the United Kingdom.

Conclusions

In general, the increases in illness rates between and within Asiatic locales corresponded to shifts in greater humidity and or rainfall. Morbidity rates in the Atlantic region evidenced minor elevations corresponding to cool or wet weather. Slight increases among several categories of illness, rather than epidemics within a single category, appeared to be responsible for the seasonal variations in overall rates. Illness rate differences between geographical areas were much greater than the minor seasonal fluctuations in rates observed within regions.

(25) HEALTH CARE, INFECTIOUS DISEASES

GEOGRAPHICAL AND TEMPORAL VARIATIONS IN OUTPATIENT MORBIDITY AT U.S. NAVY OVERSEAS FACILITIES

Recent investigations have examined the effects of various factors on U.S. Navy disease and non-battle injury (DNBI) rates. This research has indicated variations in outpatient disease rates by deployment area[1], size of vessel[2], and combat support status[3]. These studies indicated higher outpatient rates among ships deployed to the Western Pacific when compared with the Atlantic region, elevated rates among destroyers and frigates when contrasted with cruisers and carriers, and no increase in rates among ships providing combat support during the Vietnam conflict. All factors which influence DNBI rates are of interest to medical and manpower policy planners due to their potential impact on required medical resources and personnel considerations during military conflicts.

Though the aforementioned studies have focused mainly on shipboard rates of illness, rates for shore facilities around the world are of interest because they indicate the disease incidence likely to be incurred by ground troops should they be deployed to similar regions. Geographical variability in blood pressure[4] as well as higher rates of fatal circulatory system diseases and malignant tumors among Eastern European countries than those of West Europe[5] establish that regional health differences do exist.

Moreover, because geopolitical conflicts adhere to no pre-arranged schedules, any seasonal variations in illness incidence are likewise important to assess. Seasonal fluctuations have previously been observed for various enteropathogens among children worldwide[6,7,8]. Rotavirus, a common etiologic agent of diarrheal disease, was found to be prevalent in winter months in temperate zones with less well-defined seasonality in tropical areas. Likewise, seasonal influences on pertussis[9], measles[10], and the less well understood Sudden Infant Death Syndrome[11] have been evidenced. While most of the aforementioned studies have dealt with young children, there is clearly a temporal component to certain health problems, in particular communicable disorders. The U.S. Navy has personnel stationed around the

world and subject to numerous environmental, climatological, and social influences. Information concerning the combined influence of time of year and region on DNBI rates may be used to augment medical readiness in times of war.

The purpose of the present investigation is to assess the geographical and temporal variations in outpatient disease incidence at overseas facilities. Rates of illness will be examined for units from all of the overseas countries in which the U.S. Navy has a medical facility. Further, rates for the various geographical locations will be analyzed by quarters of the year to determine the existence of seasonal variations. All categories of disease will be examined with particular attention paid to the more readily transmittable categories of infective/parasitic, respiratory, and digestive disorders.

Method

The illness data analyzed is a product of the Medical Services and Outpatient Morbidity Reporting System[12]. The monthly morbidity reports, as they are commonly known, are completed by each reporting facility and maintained at the Naval Medical Data Services Center, Bethesda, Maryland. The overseas facilities filing the outpatient reports in this study included Naval clinics, branch facilities, and medical centers. The monthly morbidity reports record visits in accordance with the major disease categories within the International Classification of Diseases, Ninth Revision (ICD-9).

Shore facilities in Japan, Republic of the Philippines, Bahrain, Diego Garcia, Europe (Greece, Spain, Italy), United Kingdom, and Iceland were used in the analysis. Population serviced by each medical facility was surveyed to insure adequate size and service homogeneity; all populations selected with the exception of Bahrain exceeded one hundred in strength and all were composed of at least 80% active duty Navy personnel (with the remainder being Marines). Table 1 displays the strengths and service composition of each analyzed geographical area for the study year of 1984.

TABLE 1. STRENGTHS AND COMPOSITIONS OF OVERSEAS FACILITIES REPORTING UNITS

	AVERAGE STRENGTH	PERCENT NAVY	MANDAYS
JAPAN	4,443	91.0	1,626,172
PHILIPPINES	5,852	83.7	2,141,689
BAHRAIN	92	100.0	33,530
DIEGO GARCIA	1,679	91.5	560,799
EUROPE	9,199	93.9	3,366,881
UNITED KINGDOM	2,325	90.0	851,034
ICELAND	1,746	94.2	639,153

Outpatient visit rates are computed per 1000 strength per day. Only the initial visit for a specific illness per individual was entered into the rate calculations; revisits and follow-ups were not included in the illness totals. Ninety-five percent confidence limits were computed to indicate the degree which a rate might fluctuate. The Dunn method of adjusting the significance level for multiple comparisons[13] has been applied.

Results

Table 2 is a display of the rates of individual categories of illness for the seven overseas regions under investigation (Tables 2-10 follow text). Overall rates of illness in East Asia (Japan, Philippines) were higher than those in Europe. The highest rate among individual countries occurred in Bahrain. Figure 1 is a graphical presentation of the total outpatient rates by region. Among the various subcategories of illness, infective/parasitic diseases incidence was highest in the Philippines; respiratory, digestive, skin, and musculoskeletal disorder rates were highest in Bahrain; accidents and injuries were at their highest rate of incidence in Japan.

Figure 2 is a display of the quarterly rates for each of the seven geographical regions. Only Bahrain exhibits a seasonal trend of substantial magnitude, with rates increasing in the second quarter followed by an even larger increase in outpatient incidence during the July through September quarter. When all regions were combined, little variation was evidenced among quarterly illness rates: January-March, 12.12; April-June, 12.72; July-September, 12.18; October-December, 12.13. Illness rates by quarter for the individual regions are displayed in Tables 3 through 9.

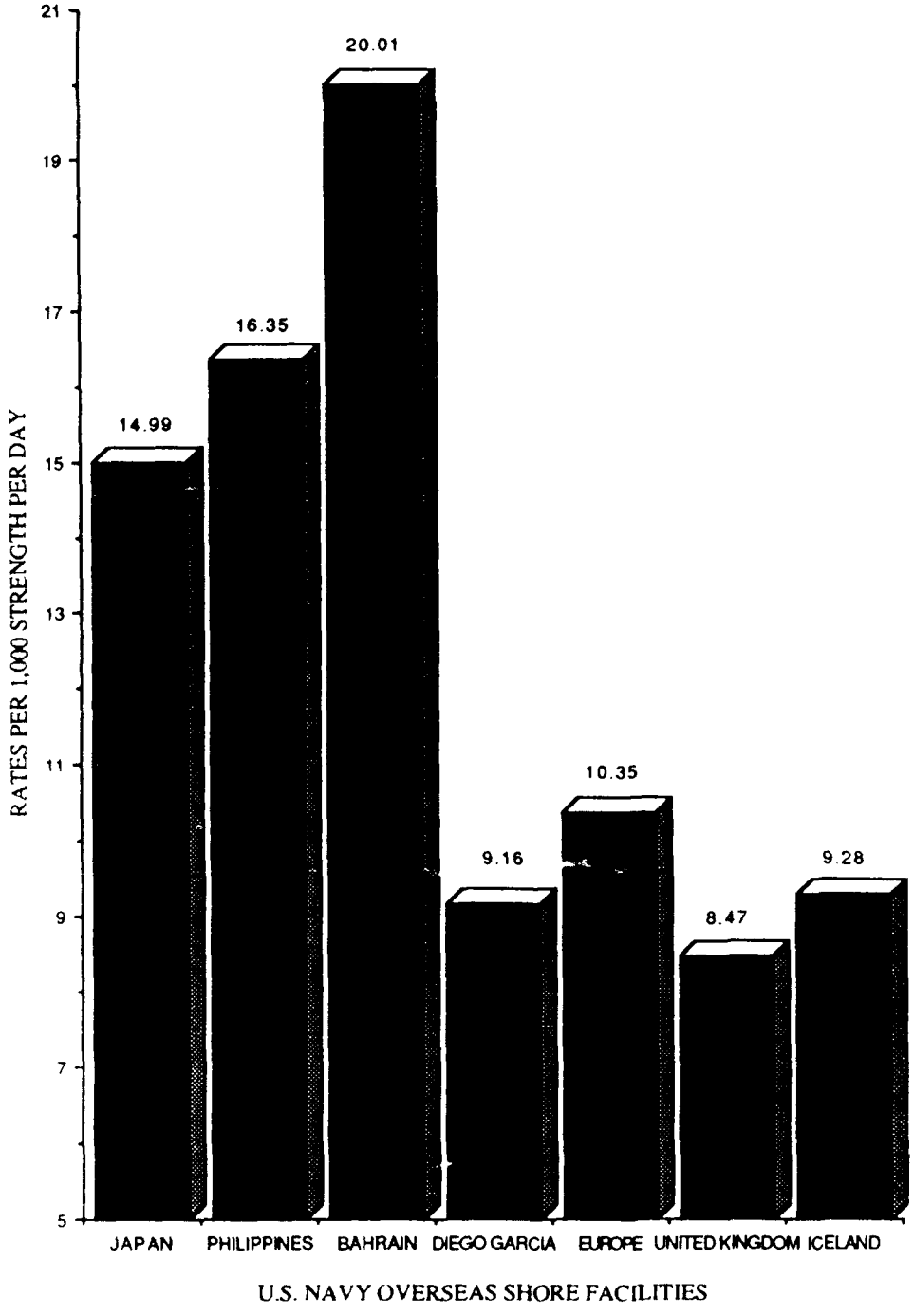

Fig. 1. Rates of Outpatient Illness at U.S. Navy Overseas Shore Facilities

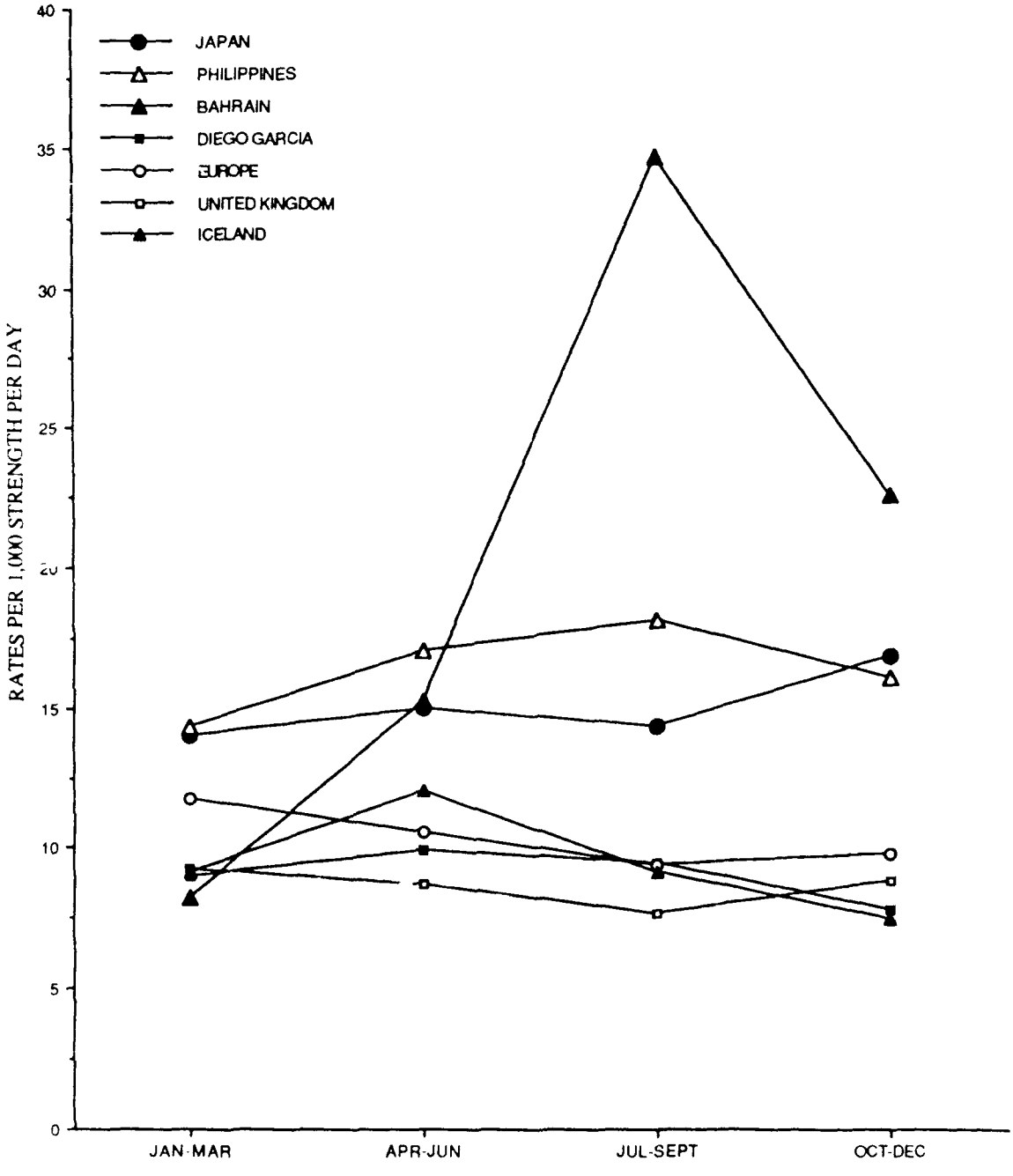

Fig. 2. Outpatient Illness rates by quarter: U.S. Navy Overseas Shore Facilities, 1984.

JAPAN

Table 3 indicates minor fluctuations in the overall illness rates among the first three quarters in Japan. However, a small but statistically significant increase in the overall illness rate is seen in the fourth quarter. Individual categories of disease that were significantly higher in the final quarter were musculoskeletal disorders, and symptoms and ill-defined diseases.

Republic of the Philippines

Table 4 is a display of the quarterly illness rates in the Philippines and shows that the first three month period had a significantly lower overall morbidity rate than the last three quarters. The highest outpatient rates were evidenced between April and September with the third quarter being the highest. Among individual disease categories, infective and parasitic disorders were significantly higher in the third quarter than in the first two quarters while the rate of genitourinary disorders was significantly higher in the third quarter when compared with the other three time periods.

Bahrain

Among all geographical regions, the greatest variations in illness rates by quarter were in Bahrain. Table 5 shows that the lowest quarterly rate was for January - March and differed significantly from the final two quarters. The quarter spanning July through September was by far the highest and was significantly greater than the first two quarters. It should be noted that the Bahrain facility services a particularly small duty station (average strength = 92) and therefore, relatively small changes in illness frequencies result in rather wide fluctuations in the morbidity rates.

Diego Garcia

Outpatient morbidity rates by quarter for Diego Garcia are shown in Table 6 and indicate very little variation in illness rate over the course of the year. The lowest overall rate (7.793) was evidenced for the final quarter while the highest rate (9.902) was seen in the time period from April to June. These two quarterly rates yielded a significant difference but were the only time periods that such a difference was seen. Lower rates

within the subcategories of infective and parasitic disorders and respiratory diseases were evident in the October to December time period and were partially responsible for the decrease in the overall morbidity rate in the final quarter.

European Continent

Though the quarterly rates in Europe ranged from a high of 11.774 per 1,000 per day to a low of 9.418, Table 7 indicates that the overall illness rates in the first two quarters were significantly higher than in the second half of the year. The overall morbidity rate was highest in the first quarter and this time frame had significantly higher rates of behavioral disorders, respiratory system diseases, and symptoms and ill-defined conditions when compared with the other three quarters.

United Kingdom

Like the European continent, the United Kingdom showed but minor fluctuations in the quarterly rates (7.666 - 9.270) as seen in Table 8. Though relatively minor, the rate difference between the first and third quarters was significant with the July to September quarter being the lowest of the year. The only subcategory of disease that was significantly lower in the third quarter when compared with the first quarter was respiratory system disorders.

Iceland

There was considerable variability in overall morbidity rates across quarters in Iceland as indicated in Table 9. The overall rate for the second quarter (April to June) was the highest among quarters and differed significantly from the other three. Further, the rate for the last quarter (October - December) was significantly lower than the first three time periods. None of the specific categories of illness in the April - June time period were significantly higher than all other quarters; likewise, no category of disease in the fourth quarter was significantly lower when compared with all other quarters.

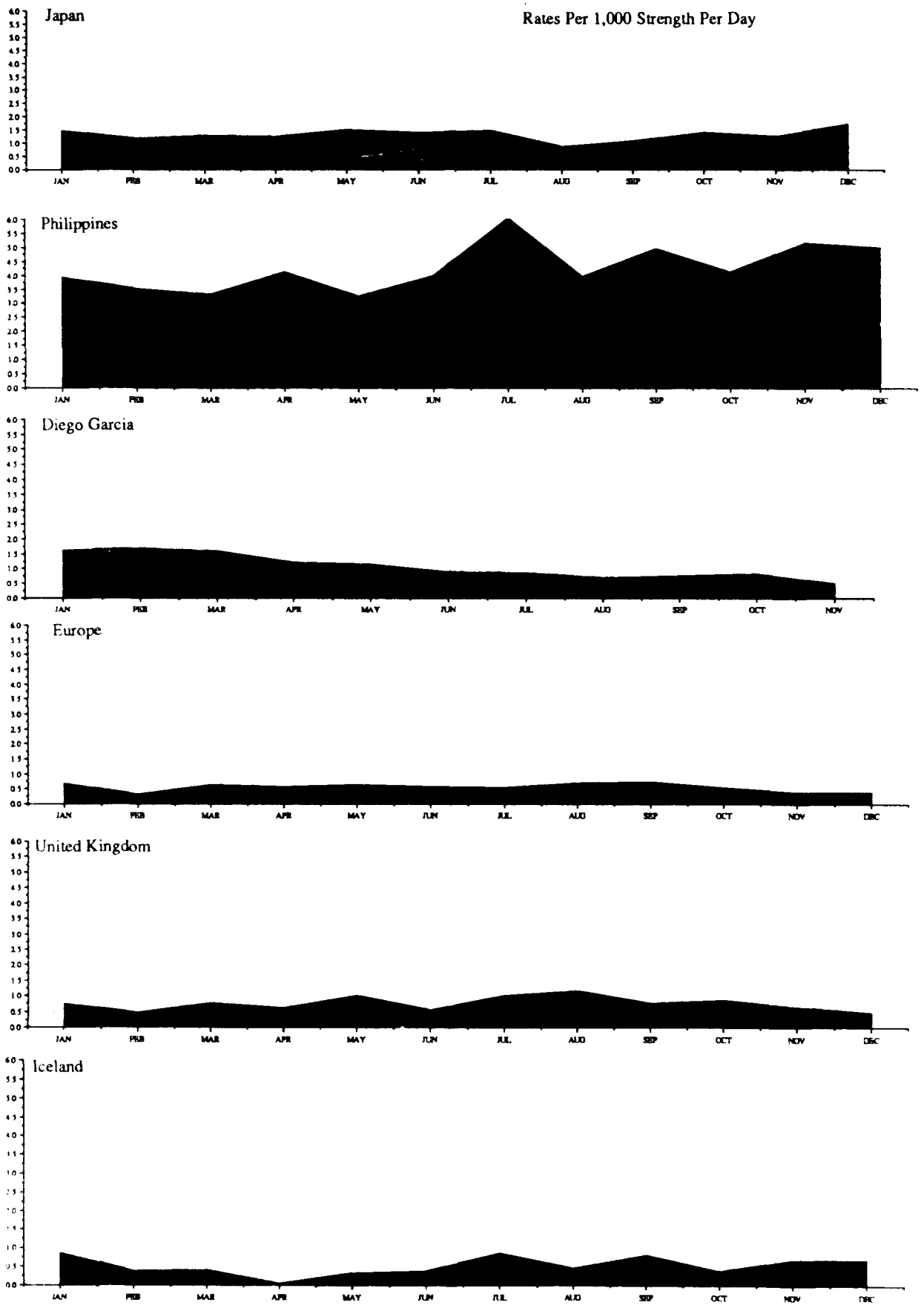

Fig. 3. Outpatient Rates of Infective/Parasitic Disorders by Month at U.S. Navy Shore Facilities.

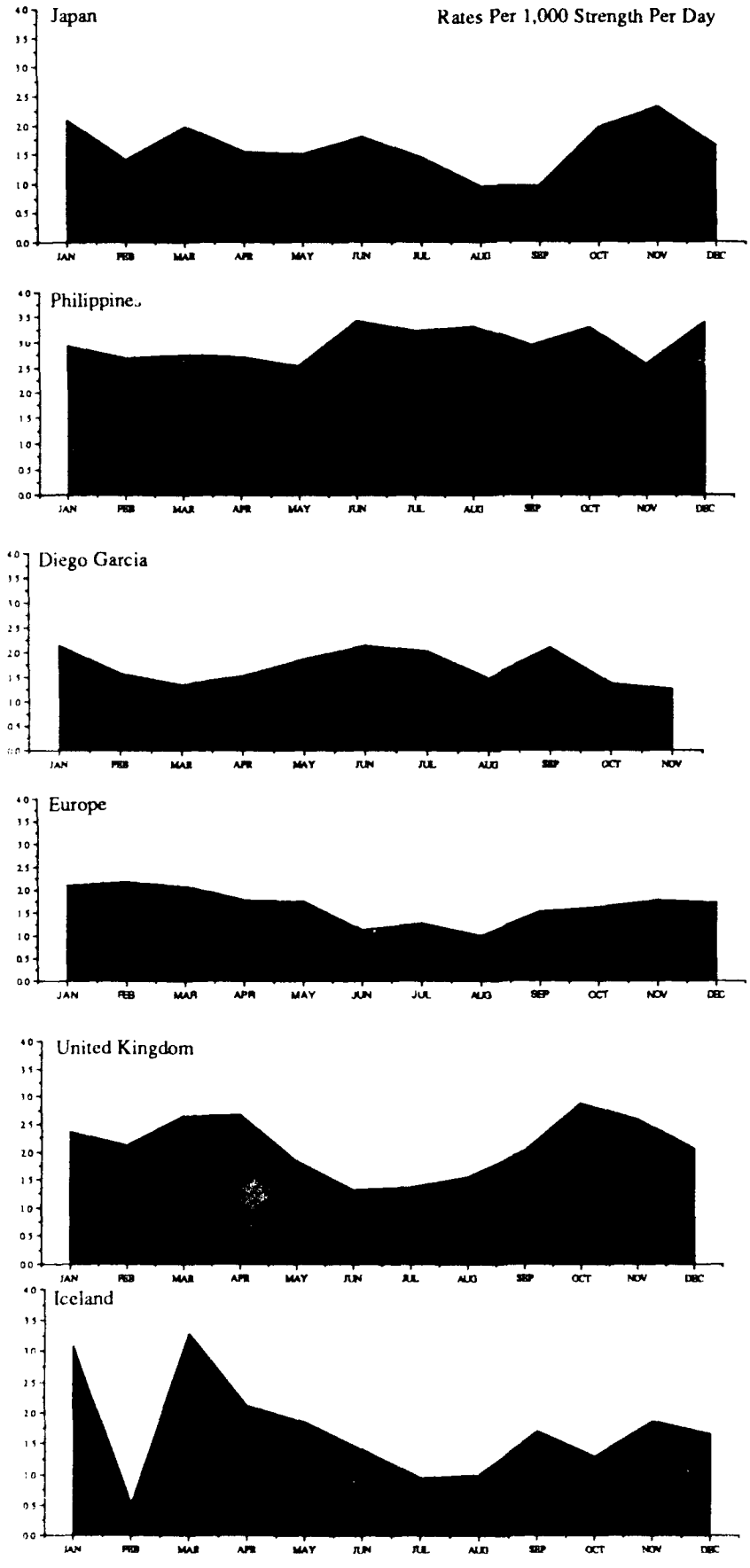

Fig. 4. Outpatient Rates of Respiratory Disorders by Month at U.S. Navy Shore Facilities.

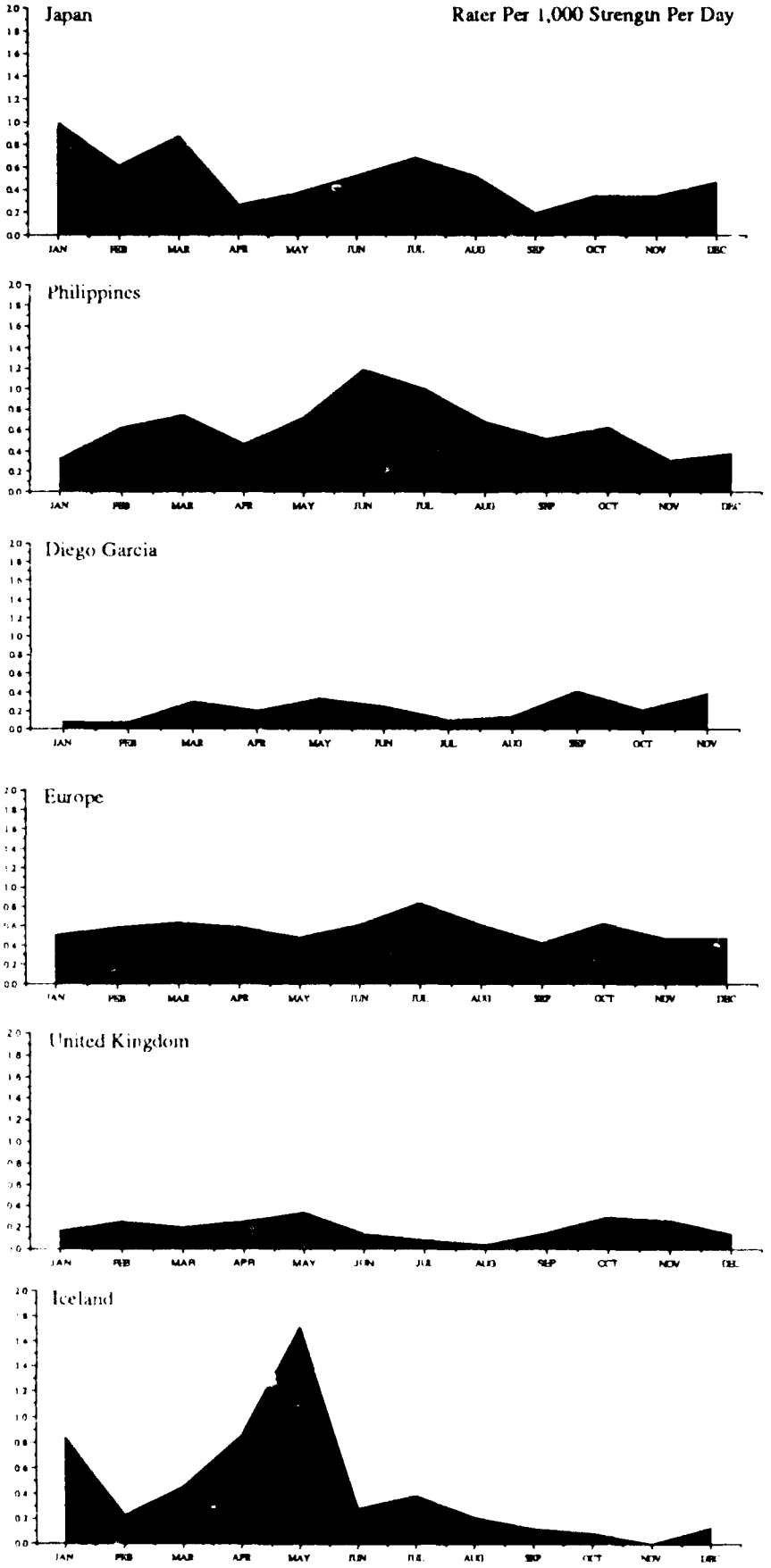

Fig. 5. Outpatient Rates of Digestive Disorders by Month at U.S. Navy Shore Facilities.

Figure 3 is a graphical presentation of the infective and parasitic rates by month for each region except Bahrain, which has been omitted due to its artifactual fluctuations. It is quite clear that the highest incidence was in the East Asia regions and that the area of greatest variability was the Philippines. Figure 4 presents the monthly rates of respiratory disorders for the same regions. There are much larger month to month fluctuations among respiratory disorders than seen with infective diseases, and though generally stable, the Philippines region has the highest incidence. A trend which was evidenced among all three Atlantic regions was a decrease in respiratory rates during June, July, and August. Figure 5 is a display of the monthly rates of digestive disorders for the overseas shore stations. Fluctuations in digestive rates do not appear to be systematic with the possible exception of increases during May, June, and July in Japan and the Philippines.

Figure 6 is a bar chart indicating the rates of disease categories across all the investigated shore facilities. Respiratory diseases had the highest rate among all categories followed by infectious/parasitic disorders and skin diseases. Rank orderings of the prevalence of individual disease categories among the geographical regions are displayed in Table 10. Although each region had its own unique distribution of disease predominance, several of the sixteen disorder categories were consistently responsible for higher proportions of the outpatient visits across areas. These categories included: respiratory disorders, which was the foremost or second most prevalent disorder within all regions except Japan where it ranked fourth; skin and subcutaneous diseases which ranked second or third in all areas except Europe (5th) and Iceland (6th), and accidents which was one of the top three categories of outpatient visits in all regions except Bahrain and the Philippines where it ranked eighth and ninth.

Discussion

Overall outpatient morbidity in this study adhered to a previously documented illness trend[1] which indicated a higher rate of illness among duty stations in Asia when compared with Europe. A progressive increase in illness rate was seen at duty stations from Northeast to Southwest Asia (Japan - Philippines - Bahrain). These morbidity differences may be tied to climatological shifts occurring among these regions.

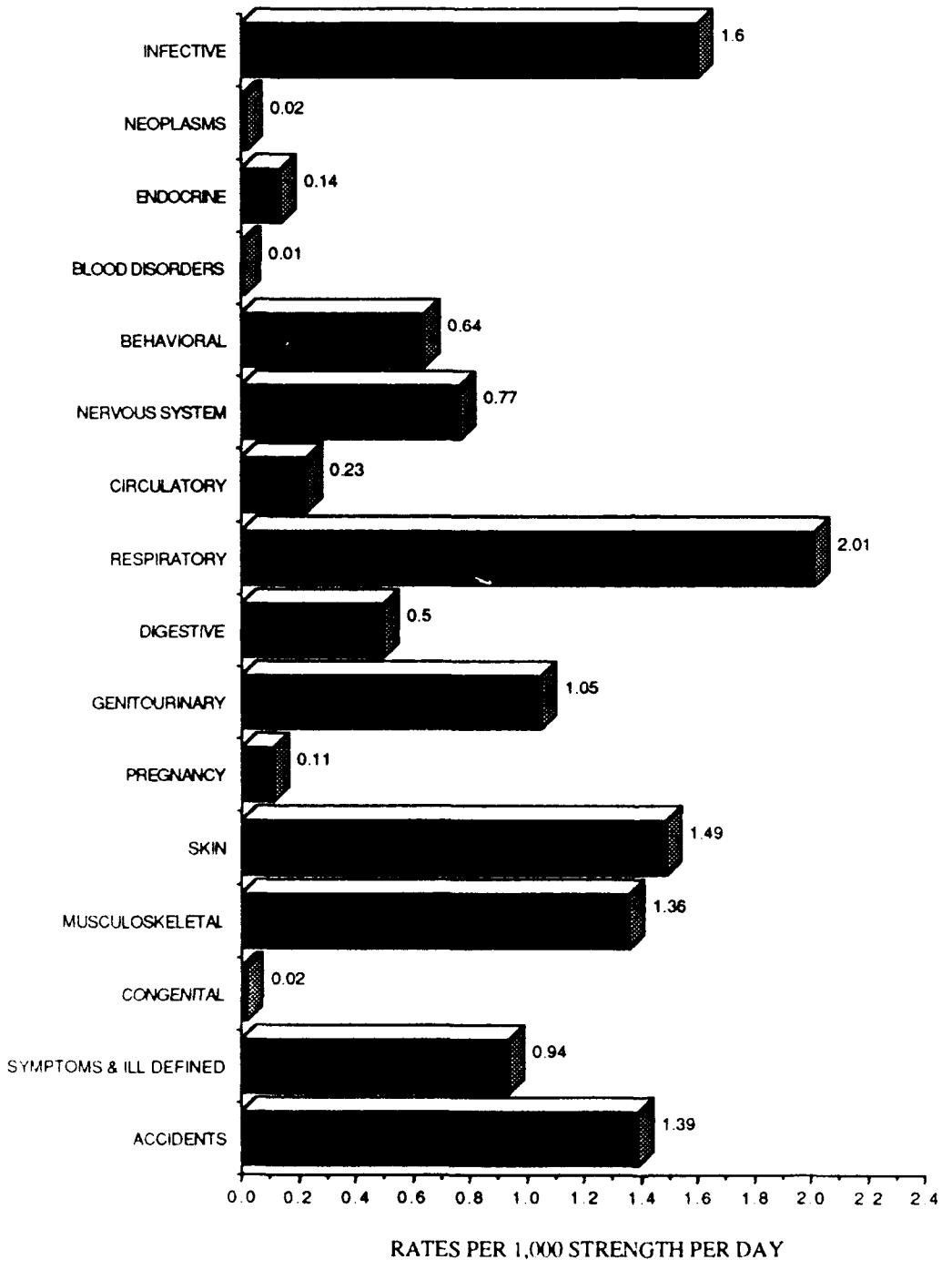

Fig. 6. Outpatient Illness Rates by Disease Category Across Overseas Shore Facilities.

Japan is characterized as having a humid continental climate with temperatures ranging from subtropical to cool; the summers are warm and wet and the winters are dry and cool. The moderate nature of this climate is reflected in its stable illness rates with a slight increase in morbidity seen in the fourth quarter. A slight but nonsignificant increase in respiratory rate was seen in this final quarter along with a significant increase in the rather nebulous category of symptoms and ill-defined. The Philippines has a wet equatorial climate with the heaviest rainfall between June and November. The highest illness rates in the Philippines occurred in the quarters corresponding to April through September. Both infective disorders and genitourinary disease rates were significantly higher between July and September than in other quarters. Bahrain has a tropical dry climate which is typically hot and humid from April through October and temperate from November through March; the highest illness rate was witnessed in the July - September quarter and was quadruple that seen between January and March. Categories of illness rates that increased substantially in the July-September quarter included infective, respiratory, and digestive disorders.

In general, it appears that the increases in illness rates between Asiatic locales as well as the intra-regional increases corresponded to shifts in greater humidity and or rainfall. It is quite likely that it is not the weather per se that is responsible for increases in communicable diseases but rather that warm moist mediums which accompany this type of weather are more conducive to the growth of various bacteria and viruses. An additional factor possibly contributing to higher rates is the greater likelihood of spending time indoors in this weather thereby facilitating disease transmission.

Duty stations in the Atlantic region yielded illness rates which were substantially lower than those of the Pacific and Persian Gulf regions. The duty stations comprised by the European continent region included Spain (Rota), Italy (Naples, Sigonella), and Greece (Nea Makri, Souda Bay). These areas generally have a Mediterranean climate consisting of mild, wet winters and hot, dry summers; illness rates were lowest during the July through September quarters and then increased with a peak in the January through March quarter. The United Kingdom facilities were located in Thurso,

Brawdy, Edzell, and London; the climate is temperate and equable with winters typically cool and moist, and summers mild and moist. The U.K. illness rates fluctuated little, but were at their lowest in the July to September period and then rose through the January - March quarter. Iceland has damp, cool summers and relatively mild but extremely windy winters; the highest illness rates were seen between April and June and the lowest rates were in the October through December quarter. Morbidity rates in the Atlantic region, though generally quite stable, evidenced minor elevations corresponding to periods of cool, wet weather. The only consistent trend in communicable illnesses seen throughout the region was that of lower rates of respiratory diseases during the summer months.

No single illness category contributed to the fluctuations in rates seen across all duty stations. In the Philippines infectious disorders and genitourinary diseases were highest in the peak periods of humidity. In Europe, higher rates of respiratory disorders, and behavioral problems were witnessed during the first quarter of the year and may be attributed to weather conditions forcing more time spent in indoor closed environments. Generally, when the overall illness rates rose in a region for a time period it was the result of slight increases within several disease categories rather than an epidemic within a single disease category. Those regions which had the highest outpatient rates, specifically those in Asia, were most prone to fluctuations in illness incidence. Outpatient rates at the treatment facilities were generally low and stable in all but the Bahrain facility, which had rates based on a small number of personnel, and therefore, were subject to greater variability.

Medical planners are most concerned with those illnesses incurred in wartime which require hospitalization. In times of combat, however, due to the scarcity of beds some personnel that in peacetime would be treated on an outpatient basis and sent to their quarters will require evacuation to a rear echelon facility[14]. The present findings, though based on peacetime data, indicate the minimal effects of time of year on outpatient illness rates which would be evident during times of conflict in these regions. The effect of region on illness rates at these shore facilities was much greater and more consistent than the observed seasonal influences on health.

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TABLE 2. OUTPATIENT MORBIDITY RATES AT U.S. NAVAL OVERSEAS FACILITIES; 1984

	JAPAN		PHILIPPINES		BAHRAIN		DIEGO GARCIA		EUROPE		UNITED KINGDOM		ICELAND	
	FREQ	RATE*	FREQ	RATE	FREQ	RATE	FREQ	RATE	FREQ	RATE	FREQ	RATE	FREQ	RATE
INFECTIVE/PARASITIC	2135	**1.313**	9112	**4.255**	0046	**1.372**	0607	**1.082**	1868	**0.555**	0636	**0.747**	0340	**0.532**
NEOPLASMS	0084	**0.052**	0018	**0.008**	0002	**0.060**	0003	**0.005**	0030	**0.009**	0006	**0.007**	0001	**0.002**
ENDOCRINE	0127	**0.078**	0099	**0.046**	0001	**0.030**	0102	**0.182**	0598	**0.178**	0218	**0.256**	0123	**0.192**
BLOOD/BLOOD FORMING	0039	**0.024**	0023	**0.011**	0000	**0.000**	0001	**0.002**	0027	**0.008**	0004	**0.005**	0011	**0.017**
BEHAVIORAL	1800	**1.107**	0881	**0.411**	0026	**0.775**	0153	**0.273**	2536	**0.753**	0224	**0.263**	0273	**0.427**
NERV. SYS/SENSE ORG	2898	**1.782**	1440	**0.672**	0027	**0.805**	0293	**0.523**	1666	**0.495**	0553	**0.650**	0241	**0.377**
CIRCULATORY SYSTEM	0528	**0.325**	0589	**0.275**	0006	**0.179**	0118	**0.210**	0574	**0.170**	0194	**0.228**	0114	**0.178**
RESPIRATORY SYSTEM	2582	**1.588**	6337	**2.959**	0153	**4.563**	0957	**1.706**	5565	**1.653**	1773	**2.083**	1094	**1.712**
DIGESTIVE SYSTEM	0824	**0.507**	1324	**0.618**	0054	**1.610**	0123	**0.219**	1910	**0.567**	0162	**0.190**	0257	**0.402**
GENITOURINARY SYS	2065	**1.270**	4032	**1.883**	0043	**1.282**	0407	**0.726**	2156	**0.640**	0480	**0.564**	0543	**0.850**
PREGNANCY,CHILDBIRTH	0122	**0.075**	0041	**0.019**	0000	**0.000**	0034	**0.061**	0565	**0.168**	0213	**0.250**	0072	**0.113**
SKIN/SUBCUTANEOUS	3085	**1.897**	5306	**2.478**	0093	**2.774**	0707	**1.261**	3166	**0.940**	0865	**1.016**	0538	**0.842**
MUSCULOSKELETAL SYS	2042	**1.256**	2592	**1.210**	0122	**3.638**	0183	**0.326**	6158	**1.829**	0755	**0.887**	0670	**1.048**
CONGENITAL ANOMALIES	0004	**0.002**	0041	**0.019**	0000	**0.000**	0002	**0.004**	0071	**0.021**	0007	**0.008**	0076	**0.119**
SYMPTOMS/ILL-DEFINED	1346	**0.828**	2115	**0.988**	0056	**1.670**	0387	**0.690**	3647	**1.083**	0357	**0.420**	0747	**1.169**
ACCIDENTS	4706	**2.894**	1080	**0.504**	0042	**1.253**	1065	**1.899**	4334	**1.287**	0769	**0.904**	0836	**1.308**
TOTAL	24387	**14.997**	35030	**16.356**	0671	**20.012**	5142	**9.169**	34871	**10.357**	7216	**8.479**	5936	**9.287**

* RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 3. RATES OF OUTPATIENT MORBIDITY IN JAPAN BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	1.117	**1.310**	1.503	1.199	**1.394**	1.589	0.960	**1.125**	1.290	1.251	**1.460**	1.669
NEOPLASMS	0.034	**0.082**	0.130	0.022	**0.064**	0.106	0.015	**0.050**	0.085	0.000	**0.008**	0.023
ENDOCRINE	0.016	**0.056**	0.096	0.029	**0.074**	0.119	0.038	**0.083**	0.128	0.011	**0.100**	0.045
BLOOD/BLOOD FORMING	0.004	**0.036**	0.068	0.000	**0.022**	0.046	0.001	**0.026**	0.051	0.000	**0.011**	0.029
BEHAVIORAL	0.932	**1.110**	1.288	0.941	**1.116**	1.291	0.943	**1.106**	1.269	0.914	**1.095**	1.276
NERV. SYS/SENSE ORG	1.082	**1.272**	1.462	1.299	**1.502**	1.705	1.939	**2.168**	2.397	1.892	**2.145**	2.398
CIRCULATORY SYSTEM	0.224	**0.319**	0.414	0.152	**0.232**	0.312	0.178	**0.256**	0.334	0.394	**0.518**	0.642
RESPIRATORY SYSTEM	1.584	**1.811**	2.038	1.408	**1.618**	1.828	0.939	**1.102**	1.265	1.684	**1.924**	2.164
DIGESTIVE SYSTEM	0.663	**0.815**	0.967	0.284	**0.387**	0.490	0.349	**0.454**	0.559	0.273	**0.380**	0.487
GENITOURINARY SYS	0.994	**1.177**	1.360	1.048	**1.231**	1.414	1.096	**1.271**	1.446	1.203	**1.408**	1.613
PREGNANCY,CHILDBIRTH	0.023	**0.067**	0.111	0.043	**0.094**	0.145	0.040	**0.085**	0.130	0.012	**0.051**	0.090
SKIN/SUBCUTANEOUS	1.637	**1.868**	2.099	1.634	**1.859**	2.084	1.589	**1.797**	2.005	1.844	**2.094**	2.344
MUSCULOSKELETAL SYS	0.904	**1.079**	1.254	0.976	**1.153**	1.330	0.963	**1.128**	1.293	1.487	**1.713**	1.939
CONGENITAL ANOMALIES	0.000	**0.000**	0.000	0.000	**0.005**	0.017	0.000	**0.002**	0.009	0.000	**0.003**	0.013
SYMPTOMS/ILL-DEFINED	0.486	**0.619**	0.752	0.628	**0.773**	0.918	0.606	**0.739**	0.872	1.026	**1.217**	1.408
ACCIDENTS	2.136	**2.397**	2.658	3.170	**3.478**	3.786	2.671	**2.937**	3.203	2.437	**2.722**	3.007
TOTAL	13.386	**14.018**	14.650	14.361	**15.001**	15.641	13.740	**14.328**	14.916	16.139	**16.849**	17.559
MANDAYS		389199			406040			460294			370639	

*RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 4. RATES OF OUTPATIENT MORBIDITY IN THE REPUBLIC OF THE PHILIPPINES BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	3.333	**3.604**	3.875	3.493	**3.775**	4.057	4.602	**4.928**	5.254	4.411	**4.716**	5.021
NEOPLASMS	0.000	**0.018**	0.037	0.000	**0.015**	0.033	0.000	**0.000**	0.000	0.000	**0.000**	0.000
ENDOCRINE	0.007	**0.033**	0.059	0.058	**0.105**	0.152	0.001	**0.023**	0.045	0.003	**0.025**	0.047
BLOOD/BLOOD FORMING	0.000	**0.000**	0.000	0.000	**0.017**	0.036	0.000	**0.012**	0.028	0.000	**0.014**	0.030
BEHAVIORAL	0.233	**0.313**	0.393	0.417	**0.522**	0.627	0.355	**0.432**	0.529	0.297	**0.384**	0.471
NERV. SYS/SENSE ORG	0.626	**0.750**	0.874	0.476	**0.587**	0.698	0.556	**0.677**	0.798	0.558	**0.673**	0.788
CIRCULATORY SYSTEM	0.150	**0.216**	0.282	0.203	**0.280**	0.357	0.199	**0.276**	0.353	0.247	**0.327**	0.407
RESPIRATORY SYSTEM	2.560	**2.799**	3.038	2.626	**2.872**	3.118	2.869	**3.129**	3.389	2.795	**3.040**	3.285
DIGESTIVE SYSTEM	0.455	**0.562**	0.669	0.653	**0.781**	0.909	0.590	**0.714**	0.838	0.340	**0.432**	0.524
GENITOURINARY SYS	1.320	**1.495**	1.670	1.561	**1.753**	1.945	2.153	**2.380**	2.607	1.728	**1.923**	2.118
PREGNANCY,CHILDBIRTH	0.000	**0.020**	0.040	0.007	**0.034**	0.061	0.000	**0.021**	0.042	0.000	**0.002**	0.009
SKIN/SUBCUTANEOUS	1.765	**1.965**	2.165	2.182	**2.408**	2.634	2.631	**2.880**	3.129	2.439	**2.669**	2.899
MUSCULOSKELETAL SYS	0.921	**1.069**	1.217	1.249	**1.422**	1.595	1.138	**1.306**	1.474	0.917	**1.062**	1.207
CONGENITAL ANOMALIES	0.000	**0.009**	0.022	0.016	**0.048**	0.080	0.000	**0.016**	0.035	0.000	**0.005**	0.015
SYMPTOMS/ILL-DEFINED	1.006	**1.160**	1.314	1.458	**1.644**	1.830	0.477	**0.590**	0.703	0.465	**0.571**	0.677
ACCIDENTS	0.219	**0.297**	0.375	0.635	**0.762**	0.889	0.622	**0.749**	0.876	0.170	**0.239**	0.308
TOTAL	13.770	**14.311**	14.852	16.426	**17.026**	17.626	17.506	**18.131**	18.756	15.517	**16.081**	16.645
MANDAYS		542437			524800			513970			560482	

*RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 5. RATES OF OUTPATIENT MORBIDITY IN BAHRAIN BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	0.000	**0.000**	0.000	0.000	**0.244**	0.819	1.590	**3.865**	6.140	0.056	**1.449**	2.842
NEOPLASMS	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.121**	0.524	0.000	**0.121**	0.524
ENDOCRINE	0.000	**0.114**	0.494	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000
BLOOD/BLOOD FORMING	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000
BEHAVIORAL	0.000	**0.228**	0.765	0.000	**0.855**	1.931	0.120	**1.570**	3.020	0.000	**0.483**	1.287
NERV. SYS/SENSE ORG	0.000	**0.228**	0.765	0.000	**0.610**	1.538	0.000	**0.604**	1.503	0.254	**1.812**	3.370
CIRCULATORY SYSTEM	0.000	**0.114**	0.494	0.000	**0.122**	0.528	0.000	**0.242**	0.812	0.000	**0.242**	0.812
RESPIRATORY SYSTEM	0.582	**2.278**	3.974	0.548	**2.320**	4.092	4.417	**7.609**	10.801	3.287	**6.159**	9.031
DIGESTIVE SYSTEM	0.000	**0.228**	0.765	0.000	**1.099**	2.319	1.505	**3.744**	5.983	0.056	**1.449**	2.842
GENITOURINARY SYS	0.000	**1.253**	2.511	0.057	**1.465**	2.873	0.254	**1.812**	3.370	0.000	**0.604**	1.503
PREGNANCY,CHILDBIRTH	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000
SKIN/SUBCUTANEOUS	0.053	**1.367**	2.681	0.701	**2.564**	4.427	1.761	**4.106**	6.451	1.089	**3.140**	5.191
MUSCULOSKELETAL SYS	0.000	**0.570**	1.419	0.000	**1.343**	2.691	4.512	**7.730**	10.948	2.466	**5.072**	7.678
CONGENITAL ANOMALIES	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000
SYMPTOMS/ILL-DEFINED	0.000	**0.228**	0.765	1.102	**3.175**	5.248	0.693	**2.536**	4.379	0.000	**0.845**	1.909
ACCIDENTS	0.175	**1.594**	3.013	0.057	**1.465**	2.873	0.000	**0.725**	1.711	0.000	**1.208**	2.480
TOTAL	4.982	**8.200**	11.418	10.716	**15.262**	19.808	27.849	**34.662**	41.475	17.084	**22.584**	28.084
MANDAYS		8780			8190			8280			8280	

* RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 6. RATES OF OUTPATIENT MORBIDITY IN DIEGO GARCIA BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	1.301	**1.637**	1.973	0.806	**1.089**	1.372	0.525	**0.759**	0.993	0.383	**0.660**	0.937
NEOPLASMS	0.000	**0.019**	0.056	0.000	**0.000**	0.000	0.00	**0.000**	0.000	0.000	**0.000**	0.000
ENDOCRINE	0.122	**0.255**	0.388	0.064	**0.179**	0.294	0.017	**0.104**	0.191	0.040	**0.188**	0.336
BLOOD/BLOOD FORMING	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.010**	0.043
BEHAVIORAL	0.160	**0.305**	0.450	0.156	**0.306**	0.456	0.099	**0.227**	0.355	0.074	**0.241**	0.408
NERV. SYS/SENSE ORG	0.333	**0.523**	0.713	0.339	**0.538**	0.737	0.347	**0.545**	0.743	0.230	**0.461**	0.692
CIRCULATORY SYSTEM	0.000	**0.019**	0.056	0.101	**0.232**	0.363	0.081	**0.201**	0.321	0.060	**0.022**	0.380
RESPIRATORY SYSTEM	1.346	**1.687**	2.028	1.477	**1.846**	2.215	1.473	**1.836**	2.199	0.919	**1.309**	1.699
DIGESTIVE SYSTEM	0.048	**0.149**	0.250	0.121	**0.259**	0.397	0.086	**0.208**	0.330	0.109	**0.293**	0.477
GENITOURINARY SYS	0.515	**0.741**	0.967	0.410	**0.624**	0.838	0.531	**0.766**	1.001	0.492	**0.796**	1.100
PREGNANCY,CHILDBIRTH	0.000	**0.069**	0.138	0.000	**0.020**	0.058	0.000	**0.045**	0.102	0.010	**0.136**	0.262
SKIN/SUBCUTANEOUS	0.804	**1.077**	1.350	0.731	**1.003**	1.275	1.491	**1.856**	2.221	0.672	**1.016**	1.360
MUSCULOSKELETAL SYS	0.118	**0.249**	0.380	0.196	**0.359**	0.522	0.177	**0.331**	0.485	0.183	**0.398**	0.613
CONGENITAL ANOMALIES	0.000	**0.000**	0.000	0.000	**0.013**	0.044	0.000	**0.000**	0.000	0.000	**0.000**	0.000
SYMPTOMS/ILL-DEFINED	0.262	**0.436**	0.610	0.847	**1.136**	1.425	0.427	**0.642**	0.857	0.253	**0.492**	0.731
ACCIDENTS	1.323	**1.662**	2.001	1.887	**2.298**	2.709	1.584	**1.960**	2.336	1.144	**1.571**	1.998
TOTAL	8.214	**9.002**	9.790	9.048	**9.902**	10.756	8.654	**9.480**	10.306	6.842	**7.793**	8.744
MANDAYS	160635			150576			154122			95466		

* RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 7. RATES OF OUTPATIENT MORBIDITY ON EUROPEAN CONTINENT BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	0.444	**0.529**	0.614	0.514	**0.604**	0.694	0.562	**0.655**	0.748	0.361	**0.435**	0.509
NEOPLASMS	0.000	**0.011**	0.023	0.000	**0.012**	0.025	0.000	**0.013**	0.026	0.000	**0.000**	0.000
ENDOCRINE	0.128	**0.177**	0.226	0.073	**0.111**	0.149	0.152	**0.204**	0.256	0.164	**0.216**	0.268
BLOOD/BLOOD FORMING	0.000	**0.006**	0.015	0.000	**0.011**	0.023	0.000	**0.006**	0.015	0.000	**0.009**	0.020
BEHAVIORAL	0.987	**1.110**	1.233	0.559	**0.652**	0.745	0.574	**0.668**	0.762	0.514	**0.601**	0.688
NERV. SYS/SENSE ORG	0.478	**0.566**	0.654	0.474	**0.560**	0.646	0.403	**0.483**	0.563	0.309	**0.378**	0.447
CIRCULATORY SYSTEM	0.114	**0.161**	0.208	0.100	**0.144**	0.188	0.142	**0.192**	0.242	0.136	**0.184**	0.232
RESPIRATORY SYSTEM	1.953	**2.123**	2.293	1.408	**1.551**	1.694	1.133	**1.262**	1.391	1.546	**1.693**	1.840
DIGESTIVE SYSTEM	0.493	**0.582**	0.671	0.475	**0.561**	0.647	0.524	**0.614**	0.704	0.434	**0.515**	0.596
GENITOURINARY SYS	0.505	**0.595**	0.685	0.412	**0.493**	0.574	0.630	**0.728**	0.826	0.642	**0.739**	0.836
PREGNANCY,CHILDBIRTH	0.121	**0.169**	0.217	0.117	**0.164**	0.211	0.131	**0.179**	0.227	0.114	**0.159**	0.204
SKIN/SUBCUTANEOUS	0.894	**1.012**	1.130	0.812	**0.923**	1.034	0.841	**0.953**	1.065	0.772	**0.878**	0.984
MUSCULOSKELETAL SYS	1.838	**2.003**	2.168	2.020	**2.190**	2.360	1.301	**1.438**	1.575	1.554	**1.701**	1.848
CONGENITAL ANOMALIES	0.015	**0.038**	0.061	0.005	**0.022**	0.039	0.000	**0.006**	0.015	0.004	**0.020**	0.036
SYMPTOMS/ILL-DEFINED	1.473	**1.622**	1.771	1.008	**1.130**	1.252	0.537	**0.628**	0.719	0.867	**0.979**	1.091
ACCIDENTS	0.950	**1.071**	1.192	1.293	**1.431**	1.569	1.252	**1.387**	1.522	1.128	**1.254**	1.380
TOTAL	11.373	**11.774**	12.175	10.182	**10.556**	10.930	9.067	**9.418**	9.769	9.408	**9.760**	10.112
MANDAYS	811619			836274			847033			871955		

* RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 8. RATES OF OUTPATIENT MORBIDITY IN THE UNITED KINGDOM BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	0.465	**0.646**	0.827	0.529	**0.719**	0.909	0.746	**0.965**	1.184	0.445	**0.640**	0.835
NEOPLASMS	0.000	**0.000**	0.000	0.000	**0.014**	0.041	0.000	**0.009**	0.030	0.000	**0.005**	0.022
ENDOCRINE	0.184	**0.309**	0.434	0.093	**0.191**	0.289	0.111	**0.214**	0.317	0.182	**0.320**	0.458
BLOOD/BLOOD FORMING	0.000	**0.000**	0.000	0.000	**0.005**	0.022	0.000	**0.009**	0.030	0.000	**0.005**	0.022
BEHAVIORAL	0.239	**0.377**	0.515	0.167	**0.287**	0.407	0.091	**0.188**	0.285	0.085	**0.192**	0.299
NERV. SYS/SENSE ORG	0.438	**0.614**	0.790	0.628	**0.833**	1.038	0.338	**0.554**	0.720	0.405	**0.592**	0.779
CIRCULATORY SYSTEM	0.188	**0.314**	0.440	0.113	**0.218**	0.323	0.065	**0.152**	0.239	0.113	**0.229**	0.345
RESPIRATORY SYSTEM	2.027	**2.373**	2.719	1.631	**1.944**	2.257	1.347	**1.631**	1.915	2.067	**2.447**	2.827
DIGESTIVE SYSTEM	0.106	**0.209**	0.312	0.135	**0.246**	0.357	0.023	**0.089**	0.155	0.109	**0.224**	0.339
GENITOURINARY SYS	0.489	**0.673**	0.857	0.342	**0.501**	0.660	0.332	**0.487**	0.642	0.413	**0.602**	0.791
PREGNANCY,CHILDBIRTH	0.159	**0.277**	0.395	0.100	**0.200**	0.300	0.164	**0.282**	0.400	0.121	**0.240**	0.359
SKIN/SUBCUTANEOUS	0.909	**1.150**	1.391	0.708	**0.924**	1.140	0.802	**1.028**	1.254	0.717	**0.954**	1.191
MUSCULOSKELETAL SYS	0.651	**0.859**	1.067	0.919	**1.161**	1.403	0.581	**0.777**	0.973	0.522	**0.730**	0.938
CONGENITAL ANOMALIES	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.018**	0.048	0.000	**0.016**	0.047
SYMPTOMS/ILL-DEFINED	0.159	**0.277**	0.395	0.430	**0.605**	0.780	0.221	**0.353**	0.485	0.285	**0.448**	0.611
ACCIDENTS	0.946	**1.191**	1.436	0.632	**0.838**	1.044	0.699	**0.911**	1.123	0.440	**0.634**	0.828
TOTAL	8.586	**9.270**	9.954	8.023	**8.685**	9.347	7.050	**7.666**	8.282	8.075	**8.820**	9.565
MANDAYS	219954			219681			223836			187563		

*RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 9. OUTPATIENT RATES OF MORBIDITY IN ICELAND BY QUARTERS; 1984

	JAN - MAR			APR - JUN			JUL - SEPT			OCT - DEC		
	LOWER LIMIT	RATE*	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT	LOWER LIMIT	RATE	UPPER LIMIT
INFECTIVE/PARASITIC	0.363	**0.559**	0.755	0.112	**0.256**	0.400	0.466	**0.686**	0.906	0.395	**0.582**	0.769
NEOPLASMS	0.000	**0.006**	0.026	0.000	**0.000**	0.000	0.000	**0.000**	0.000	0.000	**0.000**	0.000
ENDOCRINE	0.052	**0.155**	0.258	0.128	**0.278**	0.428	0.139	**0.280**	0.421	0.015	**0.087**	0.159
BLOOD/BLOOD FORMING	0.000	**0.025**	0.067	0.000	**0.029**	0.077	0.000	**0.019**	0.056	0.000	**0.000**	0.000
BEHAVIORAL	0.127	**0.261**	0.395	0.227	**0.409**	0.591	0.288	**0.470**	0.652	0.367	**0.549**	0.731
NERV. SYS/SENSE ORG	0.028	**0.118**	0.208	0.361	**0.578**	0.795	0.340	**0.534**	0.728	0.182	**0.321**	0.460
CIRCULATORY SYSTEM	0.086	**0.205**	0.324	0.122	**0.270**	0.418	0.062	**0.172**	0.282	0.018	**0.092**	0.166
RESPIRATORY SYSTEM	1.859	**2.253**	2.647	1.410	**1.791**	2.172	0.937	**1.232**	1.527	1.279	**1.588**	1.897
DIGESTIVE SYSTEM	0.322	**0.509**	0.696	0.661	**0.936**	1.211	0.093	**0.216**	0.339	0.005	**0.071**	0.137
GENITOURINARY SYS	0.159	**0.304**	0.449	1.150	**1.499**	1.848	0.733	**0.998**	1.263	0.510	**0.718**	0.926
PREGNANCY,CHILDBIRTH	0.000	**0.012**	0.040	0.076	**0.205**	0.334	0.053	**0.159**	0.265	0.018	**0.092**	0.166
SKIN/SUBCUTANEOUS	0.540	**0.770**	1.000	0.887	**1.199**	1.511	0.689	**0.947**	1.205	0.367	**0.549**	0.731
MUSCULOSKELETAL SYS	0.481	**0.701**	0.921	1.286	**1.652**	2.018	0.628	**0.877**	1.126	0.798	**1.050**	1.302
CONGENITAL ANOMALIES	0.000	**0.000**	0.000	0.007	**0.095**	0.183	0.232	**0.400**	0.568	0.000	**0.000**	0.000
SYMPTOMS/ILL-DEFINED	1.499	**1.856**	2.213	0.906	**1.221**	1.536	0.514	**0.743**	0.972	0.660	**0.892**	1.124
ACCIDENTS	1.098	**1.409**	1.720	1.274	**1.638**	2.002	1.106	**1.423**	1.740	0.646	**0.876**	1.106
TOTAL	8.349	**9.142**	9.935	11.067	**12.056**	13.045	8.352	**9.155**	9.958	6.797	**7.468**	8.139
MANDAYS	1o1130			136774			157398			183851		

* RATES ARE PER 1,000 STRENGTH PER DAY

TABLE 10. RANK ORDERINGS OF MORBIDITY CATEGORIES WITHIN U.S. NAVAL OVERSEAS FACILITIES; 1984

	JAPAN	PHILIPPINES	BAHRAIN	DIEGO GARCIA	EUROPE	UNITED KINGDOM	ICELAND	MEAN
INFECTIVE/PARASITIC	5	1	6	4	9	5	7	5.3
NEOPLASMS	14	16	12	14	15	15	16	14.6
ENDOCRINE	12	12	13	12	11	10	11	11.6
BLOOD/BLOOD FORMING	15	15	15	16	16	16	15	15.4
BEHAVIORAL	8	10	10	9	6	9	8	8.6
NERV.SYS/SENSE ORG	3	7	9	7	10	6	10	7.4
CIRCULATORY SYSTEM	11	11	11	11	12	12	12	11.4
RESPIRATORY SYSTEM	4	2	1	2	2	1	1	1.8
DIGESTIVE SYSTEM	10	8	5	10	8	13	9	9.0
GENITOURINARY SYS	6	4	7	5	7	7	5	5.9
PREGNANCY,CHILDBIRTH	13	13	16	13	13	11	14	13.3
SKIN/SUBCUTANEOUS	2	3	3	3	5	2	6	3.4
MUSCULOSKELETAL SYS	7	5	2	8	1	4	4	4.4
CONGENITAL ANOMALIES	16	14	14	15	14	14	13	14.3
SYMPTOMS/ILL-DEFINED	9	6	4	6	4	8	3	5.7
ACCIDENTS	1	9	8	1	3	3	2	3.9

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12 PERSONAL AUTHOR(S)
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Differences in outpatient morbidity were found to exist between shore stations in East Asia and Europe. The facilities in Europe consistently yielded lower illness rates than those in the Pacific region. The highest rate among the seven regions investigated was seen in Bahrain. Minor fluctuations in illness incidence by quarter were evidenced for Japan and the Philippines while Bahrain showed considerable variation by time period. Increases in disease rates were quite stable across quarters for facilities in Europe and the United Kingdom. The minor elevations in morbidity rates for the European regions paralleled increases in rainfall or decreases in temperature. Outpatient rates fluctuated much more by region than they did by season within regions.

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