

SOME CONTRASTS IN MORBIDITY DISTRIBUTION

(From the College of General Practitioners Records and Statistics Unit)

IN 1960 Allen-Price¹ reported a suspected abnormally high cancer mortality in certain localities in West Devon. Particular attention was drawn to one village where water supplies have subsequently been investigated by Abbatt.² The area is highly mineralized, and preliminary studies by Warren³ have shown that abnormally high concentrations of various metals may occur in vegetables consumed both by man and animals.

The Records and Statistics Unit of the College of General Practitioners⁴ has been developing methods of morbidity recording by family doctors in order to establish patterns of morbidity. A Development Group of practitioners distributed in England and Scotland has experience of the use of 'E' Book Diagnostic Indexes and their material constituted a baseline for comparisons. It was decided to set up studies in special areas so that the morbidity pattern in each might be examined in relation to possibly influencing factors. The first special study was mounted in the Stoke-on-Trent area, the second in the Tamar Valley, including the area described by Allen-Price.

It was thought that an environmental hazard which could disturb the mortality rate from cancer, as suggested by Allen-Price, would also cause a disturbance of the pattern of morbidity, and that this could be demonstrated by the use of methods described above. The abnormal mineralization of the area constituted one observable difference and the effect of this on the intake of major, minor and trace elements by the inhabitants was to be the subject of parallel studies by others.

During the summer of 1962 diagnostic indexes were brought into use in six practices on both the Devon and Cornwall sides of the river Tamar. Records were kept by 12 practitioners. Few of these had previous experience of research work but difficulties in use of the index were soon overcome. Variations in work intensity led to some under-recording from time to time, which should be

borne in mind in interpreting collected material. An encouraging degree of conformity with the Records Unit Group was, however, quickly achieved.

The Tamar Valley group of practitioners and a Records Unit group of seven doctors used the classification of morbidity introduced by the College of General Practitioners. All spells of illness were recorded for populations of 16,000 persons in the Tamar Valley and 19,500 persons in the practices of the Development Group. Records were maintained for one year and an abstract of the analysis appears below.

The 'E' Book kept by each doctor in the two groups of recorders (Tamar Valley and Records Unit Working Party) was analysed to give the number of episodes of illness recorded against each diagnostic group in the College Classification, itself a short list of the International Classification of Disease. These numbers were broken down according to the age and sex of the patients concerned and consolidated results were obtained for each group of recorders. The raw data were then related to the known age-sex distributions of the two populations at risk to give age-sex specific rates for each diagnostic category. These rates, for each group of recorders, were applied to the 1961 age-sex structure of the population of England and Wales using the age-groups 0-4; 5-14; 45-64; 65 and over, to give a pair of rates standardized for age and sex for each diagnostic group.

Using such a detailed classification of disease, the numbers of episodes involved for many categories were small and it was necessary to make a shorter diagnostic list. An arbitrary rule was adopted that a diagnostic category would be retained only if the two rates for the category were each based upon at least 20 episodes of illness. Due regard was also paid to possible differences in labelling habits of the two groups of recorders. The low-frequency diagnoses were then grouped to give a final diagnostic short list which is given in the table in the appendix.

The standardized rates for the two groups of observers are also given in the appendix. A statistical analysis of each pair cannot be made without taking into account the inter-doctor variation about the overall rate for each group of observers. Furthermore, some of the differences between a pair of rates may be partly due to different levels of experience in using the classification. It was therefore decided to highlight the more pronounced differences between rates and the ratio of the highest to the lowest of each pair of rates was calculated. The following table includes those diagnostic categories out of the list in the appendix where the rate for one group of observers is at least half as great again as that for the other, i.e. a ratio of 1.5 or over. The table is laid out so that each main group

TABLE

<i>Diagnostic categories with ratios (of standardized rates) equal to or greater than 1.5</i>		<i>Tamar Valley</i>		
		<i>1.5-1.9</i>	<i>2.0 and over</i>	
1 Infective and parasitic diseases 2 Neoplasms 3 Allergic, endocrine system, metabolic and nutritional diseases 4 Diseases of blood and blood-forming organs 6 Diseases of nervous system and sense organs 7 Diseases of the circulatory system	<i>Records unit</i>			
	<i>2.0 and over</i>	<i>1.5-1.9</i>		
	087 Chickenpox	088 Herpes zoster All other	056 Whooping cough	131 Dermatophytosis
		210 Benign neoplasm -229	140 Malignant neoplasm	
		240 Hay fever All other	260+ Diabetes and glycosuria	
		391 Otitis media -392	330 Vascular lesions -334	292 Other diseases -296
		396 Other diseases of ear and mastoid process. Signs and symptoms	353 Epilepsy	Other diseases of NS and sense organs except epilepsy and migraine 340-45, 350-52, 355-57
	461 Haemorrhoids	421 Chronic endocarditis -422 and other myocardial degeneration	420 Other arterio-sclerotic heart disease. Signs and symptoms	
		430 Benign hypertension -444		
		450 General arterio-sclerosis		
		463 All phlebitis and thrombophlebitis -464		

<p>8 Diseases of the respiratory system</p>	<p>Signs and symptoms</p>	<p>470 Acute nasopharyngitis 490 Pneumonia -493</p>		<p>510 Hypertrophy of tonsils and adenoids</p>
<p>9 Diseases of the digestive system</p>	<p>530 Diseases of teeth and supporting structures 573.0 Constipation 045 Dysentery and diarrhoea and/or vomiting 785-786 635 Menopausal symptoms</p>	<p>590 Nephritis and nephrosis and other diseases of the urinary system except 605</p>	<p>550 Appendicitis -553</p>	<p>580 Diseases of liver, gall bladder and pancreas</p>
<p>10. Diseases of the genito-urinary system</p>	<p>696 Infectious warts</p>	<p>634 Disorders of menstruation Signs and symptoms</p>	<p>697 Other local infections of skin, etc. 715 Chronic ulcer of skin</p>	
<p>12 Diseases of the skin and cellular tissue</p>		<p>690 Boil and carbuncle 708 Pruritis and related conditions 714 Diseases of sweat glands and sebaceous glands Signs and symptoms</p>		
<p>13 Diseases of the bones and organs of movement</p>	<p>Back pain alone</p>	<p>363+Sciatica and lumbago Signs and symptoms</p>		<p>734 Cartilage damage -735 to knee and spine</p>
<p>14 Congenital malformations</p>				<p>750 Congenital malformations</p>
<p>16 Symptoms, senility and ill-defined conditions</p>	<p>All other signs and symptoms</p>			

of the disease classification is considered in turn and the relevant diseases within each group are listed, together with their I.C.D. code numbers. Distinction is made between ratios in the range 1.5 to 1.9 inclusive, and those of 2 and over.

The Tamar Valley recorders give higher results for several chronic disease categories, e.g. diabetes and glycosuria, diseases of the CNS, cardiovascular diseases and diseases of liver, gall bladder and pancreas. The rates for malignant neoplasms, urinary diseases and congenital malformations are higher in the Tamar Valley group. Speculations arise as to the possible existence of environmental influences which, acting over long periods, might account for these findings.

The higher rates recorded by the Records Unit Working Party for certain diseases of the respiratory system may reflect the fact that several of these practices are in industrial areas; the same reason may account for the higher rates for certain skin diseases and for diseases of the ear and mastoid process. On the other hand, the fact that more patients consulted doctors in the Records Unit Working Party with menopausal symptoms, disorders of menstruation, back pain, sciatica and lumbago may partly reflect differences in the threshold of patients in the two population groups. Those in industrial areas are apt to consult doctors for relatively trivial conditions.

Acknowledgements

Practitioners contributing to the study were: Drs D. L. Crombie, T. S. Eimerl, C. M. Green, Marjory C. Hogg, A. J. Pearce, L. A. Pike and R. J. F. H. Pinsent, members of the Records Unit Group. The Tamar Valley Group included Drs Sheila B. Canning, W. C. Canning, J. H. Caverhill, C. R. Cheadle, T. M. Davie, T. D. Gillies, G. E. Sharp, F. H. Staines, C. M. Sutherland, Mary Sutherland, P. A. Watt and A. G. Winfield. Statistical analysis was undertaken by Dr K. W. Cross and the Records and Statistics Unit of the College in Birmingham.

REFERENCES

1. Allen-Price, E. D. *Lancet*, 1960, **1**, 1235.
2. Abbatt, J. D., Lakey, J. R. A., Mathias, D. J. *Lancet*, 1960, **2**, 1272.
3. Warren, H. V., *The Geographical Journal*. 1964, **130**, 525.
4. The Records and Statistical Unit. *J. Coll. gen. Practit*, 1963, **6**, 195.

APPENDIX

SHORT LIST OF DIAGNOSES WITH STANDARDIZED EPISODE RATES PER THOUSAND POPULATION AT RISK

ICD		Tamar Valley		Records Unit	
		Rate	No. of Episodes	Rate	No. of Episodes
1.	Infective and Parasitic Diseases				
056	Whooping cough	3.5	49	1.9	39
085	Measles	6.2	87	9.2	182
087	Chicken pox	3.1	44	7.4	139
088	Herpes zoster	1.7	33	3.1	65
089	Mumps	4.5	68	3.5	68
130.1	Oxyuriasis	1.5	21	1.3	25

<i>ICD</i>		<i>Tamar Valley</i>		<i>Records Unit</i>	
		<i>Rate</i>	<i>No. of Episodes</i>	<i>Rate</i>	<i>No. of Episodes</i>
1. Infective and Parasitic Diseases					
131	Dermatophytosis	2.3	36	1.1	22
	All other infective and parasitic diseases except 045-048, dysentery, but including 788.8, pyrexia of unknown origin, 763, ac. bronchiolitis	10.7	160	16.8	333
2. Neoplasms					
140-207	Malignant neoplasms	5.5	116	3.9	71
210-229	Benign neoplasms	1.6	28	2.3	47
3. Allergic, Endocrine System, Metabolic and Nutritional Diseases					
240	Hay fever	2.8	43	5.0	103
241	Asthma	6.9	111	4.7	95
250-254	Diseases of thyroid gland	3.0	56	2.6	54
260-289.2	Diabetes mellitus and renal glycosuria	4.6	93	2.6	52
287	Obesity	7.2	118	9.1	183
	All other allergic and metabolic disease and signs and symptoms except 242-244, Allergic dermatoses	2.9	50	5.5	108
4. Diseases of the Blood and Blood-forming Organs					
290	Pernicious anaemia	1.5	37	1.2	24
291	Hypochromic anaemias	7.2	141	7.3	153
292-296	Other diseases and signs and symptoms of blood and blood-forming organs	1.5	28	0.6	13
5. Mental, Psychoneurotic and Personality Disorders					
300-303	Schizophrenic disorders and paranoid states	1.4	24	1.1	22
301-302	Manic-depressive reaction and involuntional melancholia	1.6	32	2.0	40
310-318	Psychoneurotic disorders	35.2	610	47.7	958
320-326 and 306-309	Other psychoses and disorders of character, including signs and symptoms	4.9	90	5.5	116
6. Diseases of the Nervous System and Sense Organs					
330-334	Vascular lesions affecting C.N.S.	2.8	67	1.6	32
340-345 } 350-352 } 355-357 }	Inflammatory diseases of C.N.S. and other diseases of C.N.S. except epilepsy and migraine	2.1	37	1.0	21
353	Epilepsy	3.2	52	1.9	38
354	Migraine	3.0	53	4.0	82

ICD		Tamar Valley		Records Unit	
		Rate	No. of Episodes	Rate	No. of Episodes
6. Diseases of the Nervous System and Sense Organs					
360-369 except 363	Diseases of nerves and peripheral ganglia except sciatica	3.3	61	4.4	88
370-371	Conjunctivitis, ophthalmia and blepharitis	11.2	185	15.0	304
372-389 except 380	Other diseases and conditions of the eye except refractive errors	7.9	140	10.2	205
390	Otitis externa	4.6	75	5.6	110
391-392	Otitis media	12.2	170	23.2	447
396	Other diseases of ear and mastoid process including wax in the ear	9.5	176	17.6	338
393-398	Mastoiditis except those diseases included in 396	3.7	65	5.6	109
195	Signs and symptoms of C.N.S.	2.9	56	5.3	108

7. Diseases of the Circulatory System					
420.1	Heart disease specified as involving coronary arteries	2.3	47	2.2	40
420	Other arteriosclerotic heart disease	4.6	111	1.4	29
434.1	Congestive heart failure	3.6	82	2.5	50
434.2	Left ventricular failure	0.9	22	1.3	27
400-416	Chronic rheumatic heart disease	5.6	124	3.3	65
421-422	Chronic endocarditis and other myocardial degeneration				
430-434	Other diseases of heart except those above				
440 and 444	Benign hypertension	10.8	233	6.2	124
450	General arteriosclerosis	1.9	45	1.0	21
453.2	Chilblains	2.5	43	1.8	37
453 except 453.2 and 454-456	Peripheral vascular disease except chilblains and other arterial disease	1.6	33	1.2	22
460	Varicose veins of lower extremities	6.0	110	5.3	107
461	Haemorrhoids	2.7	51	5.0	95
463-464	All phlebitis and thrombophlebitis	2.9	53	1.6	32
441-447 except 444	Hypertensive disease except benign	1.7	35	1.2	24
451-452	Aneurysm and embolism	3.0	67	7.0	138
465-468	Signs and symptoms of diseases of circulatory system				

<i>ICD</i>		<i>Tamar Valley</i>		<i>Records Unit</i>	
		<i>Rate</i>	<i>No. of Episodes</i>	<i>Rate</i>	<i>No. of Episodes</i>
8. Diseases of the Respiratory Tract					
470	Acute nasopharyngitis	59.9	954	114.9	2265
472, 473 and 051	Acute pharyngitis and tonsillitis and streptococcal sore throat	44.5	664	44.2	860
471 and 513	Sinusitis	6.0	100	7.8	156
474 and 516	Laryngitis and tracheitis	5.3	87	7.9	159
480-483	Influenza	5.2	96	3.6	72
490-493	Pneumonia	3.3	60	5.6	113
500, 502 and 526	Bronchitis and bronchiectasis	26.2	473	33.9	650
510	Hypertrophy of tonsils and adenoids	3.2	47	1.5	27
	Other diseases of respiratory system	7.3	118	2.0	38
	Signs and symptoms of respiratory system disease	14.1	229	35.2	704

9. Diseases of the Digestive System					
530-535	Diseases of teeth and supporting structures	3.4	52	8.7	172
536-539	Other diseases of buccal cavity and oesophagus	3.5	59	2.5	50
540-541	Ulcers of stomach and duodenum	3.4	61	2.4	47
	Peptic ulcer unspecified	2.2	38	2.1	40
542-545	Other disease and disorders of stomach and gastric function	10.4	186	15.6	305
550-553	Appendicitis	3.1	48	1.9	40
560, 560.1 and 561, 561.1	Femoral and inguinal hernia	3.2	61	2.7	49
560.2-.5 and 561.2 to 561.5	Hernia of abdominal cavity	1.7	37	1.7	33
570-578	Other diseases of intestines and peritoneum	2.2	40	1.9	38
580-587	Diseases of liver, gall bladder and pancreas	2.5	49	1.2	25
573	Constipation	2.0	39	4.4	87
785.5	Colic	1.8	25	1.7	35
045-048 and 785.6	Dysentery and diarrhoea and/or vomiting	15.5	261	33.9	677
	All other signs and symptoms of diseases of the digestive system	9.7	156	10.9	213

<i>ICD</i>		<i>Tamar Valley Rate</i>	<i>No. of Episodes</i>	<i>Records Rate</i>	<i>Unit No. of Episodes</i>
10. Diseases of the Genito-urinary System					
605	Cystitis	8.0	136	10.0	212
590-594	Nephritis and nephrosis and				
600-609 ex-	other diseases of urinary sy-				
cept 605	stem except cystitis	5.8	96	3.8	79
610-617	Diseases of male genital organs	7.2	64	5.4	48
631	Uterovaginal prolapse	3.7	34	2.9	31
634	Disorders of menstruation	11.9	93	22.4	252
635	Menopausal symptoms	4.8	45	14.8	149
620-626, 630, 633 636, 637	Diseases of breast, ovary, Fallopian tube and para- metrium and other diseases of the uterus and female genital organs	11.9	95	14.6	163
	Signs and symptoms of diseases of the genito-urinary system	2.5	45	4.0	80
11. Deliveries and Complications of Pregnancy, Childbirth and the Puerperium					
		48.4	367	31.2	292
12. Diseases of the Skin and Cellular Tissue					
690	Boil and carbuncle	8.9	140	15.3	297
691	Cellulitis of finger and toe	3.5	62	5.1	99
692-693	Other cellulitis and abscess	3.9	67	5.7	113
694	Acute lymphadenitis	2.1	32	1.7	33
695	Impetigo	3.6	52	4.0	76
696	Infectious warts	2.8	42	5.9	111
697-698	Other local infections of skin and subcutaneous tissue	7.2	113	4.0	78
242-244 and 700-703	Allergic dermatoses and all other dermatitis	21.8	357	30.1	604
706	Psoriasis and similar dis- orders	2.3	42	2.6	51
708	Pruritis and related condi- tions	2.3	40	4.5	91
712-713	Diseases of nail, hair and hair follicles	2.1	35	2.8	56
714	Diseases of sweat and seba- ceous glands	2.3	40	3.9	78
715	Chronic ulcer of skin	3.1	64	1.6	35
704, 707, 709-711, 716	Other diseases of the skin and cellular tissue	4.6	79	5.0	101
	Signs and symptoms of skin and cellular tissue disease	4.4	65	7.1	143
13. Diseases of the Bones and Organs of Movement					
722	Rheumatoid arthritis and allied conditions	3.2	59	2.5	51
723	Osteo-arthritis and allied conditions	13.3	289	9.2	186

<i>ICD</i>		<i>Tamar Valley</i>		<i>Records Unit</i>	
		<i>Rate</i>	<i>No. of Episodes</i>	<i>Rate</i>	<i>No. of Episodes</i>
13. Diseases of the Bones and Organs of Movement					
363 and 726.0, 720, 721, 724, 725, 726.1, 726.2, 726.3 and 727	Other forms of fibrositis, arthritis and rheumatism	19.4	346	26.0	508
734-735	Cartilage damage to knee and spine	7.4	119	3.0	56
730-733, 736-738, 740, 743-749	Derangement of knee and foot, etc.	7.1	123	5.2	104
741-742	Bursitis, tenosynovitis	4.0	67	5.4	106
	Back pain alone	2.8	47	6.7	132
	All other signs and symp- toms of diseases of bone and organs of movement	2.9	52	4.9	96
14. Congenital Malformations					
750-759	All congenital malforma- tions	2.4	35	1.1	23
15. Certain Diseases of Early Infancy					
		1.5	20	0.7	14
16. Symptoms, Senility and Ill-defined Conditions					
304, 305 and 794	Senility	3.2	78	3.4	74
	All other symptoms and ill- defined conditions, not in- cluded under a specific heading	2.2	34	5.8	112
17. Accidents, Poisonings and Violence					
		68.1	1,106	78.7	1,519
		POPULATIONS			
		16,000		19,500	