

# A survey of the health of British missionaries

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**SUMMARY.** *The results of medical examinations carried out on 212 missionary personnel from one missionary society returning on leave to the UK are presented. The great majority of missionaries worked in developing countries. They served in 27 countries altogether and for a total of 488 person years.*

*The commonest illnesses reported overseas were malaria (87.3 per 1000 person years at risk), diarrhoea (63.5), anxiety (63.5), depression (41.0) and giardiasis (38.9). More illnesses were reported from West Africa (698 per 1000 person years at risk) than from any other region. Ten people (4.7%) were repatriated for health reasons and 10 relatives also returned as a consequence. Sixty per cent of those returning did so because of psychiatric illness.*

*The highest rates of immunization achieved were for yellow fever (100% of those travelling to affected countries), tetanus (93%), polio (85%), typhoid (71%) and tuberculosis (53%). The results of urinalysis (100% of adults), full blood counts (78% of adults) and stool tests (74% of all people) are reported.*

*The study shows that the history and psychiatric examination are an important part of the medical examination of people returning from overseas. Physical examination and urinalysis did not contribute much information, although the full blood count and absolute eosinophil count were useful tests.*

## Introduction

THERE are 7700 British people serving overseas with missionary societies.<sup>1</sup> Most of these people are living and working in developing countries, often in isolated rural locations. Little has been published about their health or that of many hundreds of volunteers with British secular organizations. This is partly because the people are under the auspices of a large number of fairly small missionary societies: the 10 largest account for about 2400 people (31%). In response to the evident need for a coordinated epidemiological study of these people<sup>2</sup> a pilot study based on a detailed health questionnaire has recently been carried out.<sup>3</sup>

Health risks of travel and overseas residence are considerable. Those associated with short-term holidaymakers have been studied in detail.<sup>4</sup> The longer-term traveller is at risk from a large number of diseases including diarrhoea, giardiasis, amoebiasis, hepatitis, trauma, typhoid, malaria, acquired immune deficiency syndrome and psychiatric illnesses.<sup>5-8</sup> Rare diseases such as lassa fever seldom strike the expatriate.<sup>9</sup> The United States peace corps has developed a computerized

epidemiological surveillance system to monitor the health of its 5500 volunteers.<sup>10</sup>

It has been suggested that there is room for improvement in the field of disease prevention and health promotion on the part of American mission boards.<sup>11</sup> British organizations have also met with criticism.<sup>12</sup>

What is the role of the general practitioner in the care of these people? The care of missionaries is usually overseen by the medical officer of their organization, who may also be a general practitioner. Furthermore, any general practitioner may be asked to write a report on suitability for overseas service, to administer a vaccination or to investigate an illness in a person recently returned from the tropics.<sup>13</sup> A variety of practitioners may be consulted both at home and overseas in connection with specific disease episodes.

This study was undertaken to quantify the health risks associated with overseas missionary service and to evaluate the usefulness of post-travel medical examinations.

## Method

All missionaries and their families are expected to submit to a medical examination when they return on leave to the United Kingdom. Data for this report were collected from the examinations of missionaries and members of their family who had spent three months or more overseas with one British missionary society during 1986-89. People not personally examined by the society's medical officer were excluded from the study, but data from them was sought and reported on separately, to discover if their exclusion caused significant bias to the main study. Some people returned to the UK twice during the study period; their second examinations were not included.

## Results

Demographic details of the 212 people examined (153 aged 20 years or over, 59 children) are given in Table 1. They had lived in 27 different countries; all had served in developing countries, except for five people who had been in Japan and two in Italy. They had spent a total of 488 person years overseas and the mean length of time overseas before the examination was 27.6 months.

## Health problems

Table 2 shows the commonest new diagnoses by region made overseas or during the medical examination and not the result of subsequent investigations. Trivial and self-limiting diagnoses were omitted, as were pre-existing ones. The 'miscellaneous infections' included three cases of dengue fever, three of pneumonia, two each of schistosomiasis (urinary), tick bite fever and typhoid, and one each of pericarditis, orchitis, cough (cause not found) and fever of unknown origin. The eight operations carried out overseas comprised three excisions of breast lumps, two hernia repairs and an appendicectomy, a prostatectomy and a hysterectomy. All 12 deliveries were normal; one was complicated by a post-partum haemorrhage. There were two other pregnant women — one returned to the UK for delivery during leave and one had a spontaneous abortion and needed an evacuation of retained products of conception. Of 14 non-infective medical conditions there were five cases of chest pain and two of anaemia. There was only one new malignancy, a skin basal cell carcinoma. There were two cases of bites from rabid animals, one head injury involving loss of consciousness and one long

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**Table 1.** Demographic details of the study population.

	Number (%) of people (n = 212)	
<b>Sex</b>		
Male	100	(47)
Female	112	(53)
<b>Age (years)</b>		
0-4	24	(11)
5-19	35	(17)
20-39	74	(35)
40-59	56	(26)
60+	23	(11)
<b>Marital status (for 20+ year olds, n = 153)</b>		
Single (men)	18	(12)
Single (women)	27	(18)
Married	103	(67)
Widowed/divorced	5	(3)
<b>Occupation (for 20+ year olds, n = 153)</b>		
Minister of religion	39	(26)
Teacher	36	(24)
Non-working spouse	32	(21)
Health worker	22	(14)
Other	24	(16)
<b>Region of travel</b>		
Asia	52	(25)
West Africa	43	(20)
Rest of Africa	58	(27)
Elsewhere	59	(28)
<b>Location</b>		
Urban	71	(33)
Rural	141	(67)
<b>Duration of stay (months)</b>		
0-12	21	(10)
13-24	75	(35)
25-36	101	(48)
37+	15	(7)

n = total number of people.

bone fracture. There were two other psychiatric illnesses, namely one acute psychosis and one hypomania.

During the four year study period 10 people (4.7% of study population) were repatriated owing to illness (Table 3), with a further 10 members of their families also returning to the UK. Of these 10, six (60%) returned because of a psychiatric problem.

Residence in West Africa was a considerable risk factor for repatriation (relative risk = 3.9, 95% confidence interval 1.2 to 13.0).

#### Immunization status

From medical records and personal recollections the immunization status of the people was ascertained (Table 4). Excluding those under one year old, all 40 people who travelled to countries where yellow fever was endemic had up to date vaccination.

#### Weight

Each person was observed for weight change during their time overseas. The weight of 138 adults was recorded, of whom 66 (48%) had gained weight (mean gain of 8.0 pounds); these included 23 who had gained 10 pounds or more. Sixty three adults (46%) had lost weight (mean loss 9.1 pounds). Twenty six people lost 10 pounds or more: 10 in West Africa, seven in the rest of Africa, five in Asia and four elsewhere. There were no differences in age, sex or duration of service overseas between weight gainers and losers. At the time of examination, seven people admitted to severe weight loss at some time overseas; three of these had lost 10 pounds or more when weighed.

#### Urine and stool tests

The urine of all 153 adults was tested for glucose and protein. None were positive for glucose. Four people (3%) had proteinuria. Of these, two had hypertension, one also had haematuria, and one had recently been treated for urinary schistosomiasis. All four were investigated but no other pathology was found.

Seventy four per cent of people (157 out of 212) had stool tests for pathogenic organisms and parasites. Thirteen people had cysts of the following: giardia (seven), entamoeba histolytica (four), trichuris (three) and ascaris (one). Two people had two types of cysts.

#### Blood tests

Of the 153 adults 120 (78.4%) had a full blood count performed. Four women were anaemic (defined as haemoglobin level <115 g l<sup>-1</sup>), with haemoglobin levels of 108, 111 and 112 g l<sup>-1</sup> (probably owing to menstrual blood loss), and one of 111 g l<sup>-1</sup> (probably dietary). Two men were anaemic (defined as

**Table 2.** Commonest diagnoses by region.

Diagnoses	Number of diagnoses					Incidence per 1000 PYAR
	West Africa (PYAR = 68.8)	Rest of Africa (PYAR = 153.8)	Asia (PYAR = 121.4)	Elsewhere (PYAR = 141.6)	All regions (PYAR = 488.3)	
Malaria	24	8	—	—	32	87.3 <sup>a</sup>
Diarrhoea	8	10	8	5	31	63.5
Anxiety	4	8	10	9	31	63.5
Depression	2	5	6	7	20	41.0
Giardiasis	—	3	15	1	19	38.9
Miscellaneous infections	1	5	5	5	16	32.8
Birth of child	2	4	1	5	12	24.6
Severe lassitude	3	1	3	3	10	20.5
Dysentery	1	4	3	—	8	16.4
Surgical operation	2	3	—	3	8	16.4
Severe weight loss	1	3	1	2	7	14.3
Hepatitis A	—	2	2	—	4	8.2

<sup>a</sup> Calculated for persons in malarial countries only. PYAR = person years at risk.

**Table 3.** Details of people repatriated prematurely on health grounds.

Age (years)	Sex	Region of visit	Diagnoses	Outcome
3	M	West Africa	Pulmonary hypertension	Stayed in UK
25	F	West Africa	Typhoid	Returned overseas
25	M	West Africa	Hypomania	Stayed in UK
26	F	West Africa	Depression	Stayed in UK
26	M	West Africa	Acute psychosis	Stayed in UK
38	M	Caribbean	Depression/anxiety/weight loss	Stayed in UK
45	F	Asia	Depression/anxiety	Stayed in UK
55	M	Southern Africa	Episodes of loss of consciousness	Returned overseas
60	M	Pacific	Extreme lassitude	Stayed in UK
65	M	Pacific	Anxiety/weight loss	Stayed in UK

**Table 4.** Immunization status on return by age groups.

	Number (%) of people	
	Aged 0-4 years (n = 24)	All ages (n = 212)
Cholera vaccine	0 (0)	9 (4)
Diphtheria vaccine	24 (100)	59 (28)
Gamma globulin injection	1 (4)	39 (18)
Hepatitis B vaccine	0 (0)	14 (7)
Measles vaccine	16 (67)	
Poliomyelitis vaccine	24 (100)	181 (85)
Tetanus vaccine	24 (100)	197 (93)
BCG vaccine (or positive skin test)	20 (83)	113 (53)
Rabies vaccine	4 (17)	35 (17)
Typhoid vaccine	1 (4)	151 (71)

haemoglobin level  $<130 \text{ g l}^{-1}$ ), with haemoglobin levels of 122 and  $129 \text{ g l}^{-1}$  (ages 76 and 55 years respectively) but no cause was found.

Two adults were found to have a leucopaenia (total white cell count  $<4 \times 10^9 \text{ l}^{-1}$ ): a 27 year old male (white cell count 3.2) who was on anticonvulsants which may have been the cause, and a 49 year old female (white cell count 3.6) for whom no cause was found.

Three adults had a leucocytosis (total white cell count  $>11 \times 10^9 \text{ l}^{-1}$ ): a 37 year old woman who had a grossly raised total count caused by a new diagnosis of chronic lymphatic leukaemia, a 55 year old female, white cell count 12.3, cause not found, and a 59 year old man, white cell count 14.0, who had recently developed rheumatoid arthritis.

Ten adults (6.5%) had a raised eosinophil count ( $>0.4 \times 10^9 \text{ l}^{-1}$ ) ranging from 0.5 to  $1.9 \times 10^9 \text{ l}^{-1}$ . One was atopic and one had cysts of ascaris and trichuris, and in eight no cause was found. Further tests were requested on some of these people but they were unfortunately lost to follow up.

### Excluded patients

Among nine people who were excluded because they were not examined by the author, there was one death (a 67 year old who was reported to have died of a malignancy in India). One 59 year old man was repatriated from India, together with his healthy wife, with an exacerbation of a pre-existing condition, paroxysmal nocturnal haemoglobinuria. He travelled directly to his British base on arrival and so was not seen. Finally six people flew directly to their Irish homes and had routine medical examinations with local doctors there. One had recovered from encephalitis several months previously, and one had an eosinophilia of  $0.88 \times 10^9 \text{ l}^{-1}$ .

### Discussion

The disappointing overall rates of immunization may be due in part to under-reporting in the notes; many immunizations were carried out during the busy pre-travel period by the missionaries' own general practitioners and these may not all have been reported at the health examination, although considerable effort was made to obtain this information. A closer liaison between the missionary society and general practitioners would have been beneficial for this study and indeed desirable for the preparation of these and future volunteers for overseas work. As this study is of missionaries returning on leave, these figures reflect an immunization policy of the mid-1980s. This has been considerably modernized, particularly with respect to hepatitis B and rabies vaccines which are now widely offered.

The evidence for disease suffered overseas was mainly obtained from the patients' memories; only in a minority of cases was there corroborating medical evidence. This inevitably introduces a potentially serious methodological error. Nevertheless, the great majority of the missionaries were intelligent professionals who were motivated to maintain good health and it is likely that self-reporting was reliable. Illnesses such as malaria and hepatitis were memorable events and likely to be recorded accurately, but less serious ones were likely to be under-reported. Minor illnesses such as upper respiratory tract and skin infections were not recorded.

Unlike short-term travellers whose commonest illness is diarrhoea,<sup>4</sup> the missionaries reported malaria most often, as reported in detail elsewhere.<sup>14</sup> It is likely that the low incidence of 63.5 episodes per 1000 person years at risk of diarrhoea and 41.0 of giardiasis are due to under-reporting. Members of the peace corps serving in Central America suffered 444 and 107 cases per 1000 person years respectively.<sup>10</sup>

The low incidence of all types of hepatitis of 8.2 per 1000 person years at risk is similar to the level reported for the peace corps (7.0 per 1000 person years). Missionaries have been encouraged to receive regular human normal immunoglobulin injections before travel and while overseas.

Apart from malaria, diarrhoea and giardiasis, the commonest serious problem was psychiatric illness, with a total incidence of nearly 110 episodes per 1000 person years. The missionaries were carefully screened by one of the authors (RP) and a clinical psychologist before acceptance for overseas work. This high psychiatric morbidity probably reflects the major stresses experienced overseas, both social and work related.<sup>8</sup> While serious psychiatric illnesses accounted for only 51 out of 198 (26%) of the commonest diagnoses, they accounted for six out of 10 (60%) of the premature repatriations for medical reasons. This probably reflects a lack of appropriate psychiatric facilities in many countries, as well as the relief from stress that can be achieved by repatriation.

In this study West Africa appears to have the highest overall incidence of illness, in terms of the number of incidents per person years at risk, the number of people reporting extreme weight loss and the number of repatriations. Although much of the excess morbidity in this region is attributed to malaria,<sup>14</sup> higher rates of repatriation and weight loss were also associated with residence in West Africa.

How valuable is the 'furlough' medical? This study shows that taking a history, including a brief psychiatric examination, is extremely useful. The importance of psychiatric illness may well be underestimated by doctors unfamiliar with examining people returned from overseas. The physical examination rarely contributed a new diagnosis. Urinalysis is regarded as essential by many physicians although the results did not contribute a great deal to the present study. The full blood count and the absolute eosinophil count were useful tests, particularly in detecting anaemia and suggesting the search for parasites. The lack of results of further investigation of eosinophilia partly reflects the difficulty in caring for people who are staying at several places while in the UK for a relatively short time before returning overseas.

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