

Custom, culture and health in the tropics

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The aim of this chapter is to make workers in the tropics (and in temperate regions for that matter) aware of the importance of human behaviour in the overall health scene, but particularly as it relates to infectious disease. It is an important topic seldom covered as such in medical textbooks on tropical medicine.

Human behaviour and cultural practices can have a profound effect on the range and prevalence of diseases suffered by tropical communities and Gillett¹ has described human behaviour as “the forgotten factor in the transmission of tropical disease”. However, while behaviour can often help in understanding the epidemiology of a disease and even in making a correct diagnosis, in particular, knowledge of human behaviour is essential in the planning of disease control programmes. Thus a control programme developed against food-borne parasitic zoonoses in Southeast Asia in the 1990’s failed due to difficulties in changing the deep rooted and strong cultural habits of the local population - and this despite the fact that these cultural habits had been identified at the start of the programme².

Aspects of human behaviour which especially affect disease prevalence and transmission include: the impact of community living; food and water; sanitation and hygiene; sexual practices; traditional medical practices; agricultural practices; civil unrest and warfare, travel and migration and finally, traditional and religious practices.

4.1 Community living

Historically, the tendency for humans to settle down in a particular area and to live together in communities of varying size had a great impact on the infectious disease picture of the community as a whole. Thus the build up of the population numbers allowed the development of the critical mass necessary to maintain acute diseases such as measles within a community on a permanent basis³. This behaviour allowed easier transmission due to closer contact and also resulted in enhanced transmission of intestinal infections due to environmental contamination with faecal waste. This transition from hunter-gatherer communities to settled agricultural communities occurred some 10,000 years ago³⁻⁵ but is a process still going in a modified form today in many areas through urbanization, with a drift of people from rural areas with relatively low crowding to large overcrowded urban areas – a process which is having an impact on health in many developing countries and areas, due to urban overcrowding associated with a lack of the

financial resources necessary to provide adequate housing, health care, food and clean water.

Of course, overcrowding and overpopulation are in themselves threats to the human race and again strategies for population control through the promotion of birth control can be frustrated through ignorance, political propaganda suggesting sinister motives for the process, or religious beliefs and teachings.

4.2 Food and water

What we eat and how we prepare it is often a crucial factor in determining what infections we suffer from and how prevalent they are in a particular community. This topic has been dealt with in detail by Gillett¹ and in overviews on the parasitology of foods by Goldsmid, Speare and Bettiol⁶ and Butt, Aldridge and Sanders⁷. The magnitude of the problem of food-borne infections is illustrated by the statement of Butt, Aldridge and Sanders⁷ that more than 50 million people world-wide are infected with food-borne trematodes alone!

What we eat can even be determined by our religion - in its simplest form we can see how religious dietary restrictions relating to the eating of pork would protect Jews and Moslems from such parasites as *Taenia solium* and to some extent *Trichinella spiralis*⁸

An analysis of the data presented by Goldsmid, Speare and Bettiol⁶ to overview the sources of infection of parasitic infections is given in Table 4.1.

Table 4.1. Food sources of parasitic infections

Parasite group	Faecal contamination		Intermediate host		
	Water	Plants	Plant*	Invertebrate	Vertebrate
Protozoa	7	7	-	-	2
Trematodes	1	-	6	24	54
Cestodes	2	2	-	1	5
Nematodes	4	6	-	5	8
Pentastomids	2	2	-	-	1

* Loosely termed “intermediate host” to cover plants (eg. watercress) on which the infective stage has actively settled to ensure transmission as opposed to simple faecal contamination of salad plants.

The invertebrate intermediate hosts listed by Goldsmid, Speare and Bettiol⁶ include ingested snails, oysters, prawns, crabs and insects such as dragonfly nymphs. The vertebrate intermediate hosts are mostly fish for the trematode parasites and mammals for

the cestodes but may include frogs, tadpoles and snakes. In areas where dogs are eaten, they may become infected with *Cysticercus cellulosae* (larva of the Pork Tapeworm) and so serve to infect humans⁹. Filter-feeding molluscs used for food may often be the source of human infections including cholera, typhoid, Hepatitis A and *Vibrio parahaemolyticus* infection.

In some cases the actual food itself, or its mode of ingestion, is unusual. Halzoun is a condition where liver flukes (*Fasciola hepatica*) are accidentally swallowed with fresh raw liver. The flukes attach to the back of the throat causing pain and swelling, as occurs in the Lebanon¹⁰. Accidentally swallowed leeches and the pentastomid *Linguatula serrata* can also cause this condition¹⁰. It has also been recorded that pentastomiasis due to *Armillifer armillatus* was very common in the snake-eating aboriginal forest dwellers of Malaysia¹¹. Similarly, Gillett¹ records that the flukes, *Prosthodendrium* and *Phaneropsulus*, while wide-spread in their geographical distribution, only infect humans in Thailand probably due to the habit of fishermen in this part of S.E.Asia of eating intermediate host dragonfly nymphs accidentally trapped in their fishing nets.

Obviously, some of these food animals (eg. fish; beef; pork) are widely eaten and the chance of an infection being acquired from them is often determined by cooking or preservation methods. Thus anisakiasis and other helminth infections in which fish are intermediate hosts, can be associated with the eating of raw fish dishes such as sushi and green herring^{7,12}

Sometimes the deciding factor might be a minor dietary idiosyncrasy in an otherwise safe mode of food preparation. Thus a high level of toxoplasmosis was found in Bedouin arabs. It was traced to a predisposition for eating small rodents. However these were generally well cooked prior to ingestion and the answer to the puzzle was found to be that, although the rodents were cooked, the eye, considered a particular delicacy, was eaten raw¹³. Similarly, in a number of countries in Europe, outbreaks of trichinosis have been traced to people sampling or eating raw sausage meat and in some parts of the world (including the USA and the Arctic), the eating of raw or undercooked bear meat may also result in cases of the disease⁴

A good example of community ritual being associated with disease is that of the disease “pigbel” (necrotizing enteritis). In this case, outbreaks of the disease occurred amongst tribespeople in the highlands of PNG after a ritual pigfest. The reason was found to be that the usual diet of these people was low in protein and this had resulted in a reduced level of proteases in their intestines. When they gorged on freshly killed pigs at the feast, *Clostridium perfringens* type C were ingested with the pork, produced enterotoxins in the gut which were not detoxified by proteases as in people on normal diet with adequate protein. These toxins then affected the gut wall, resulting in the condition, which often had a significant mortality^{14,15}.

So too, inadequate cooking processes can fail to kill parasitic helminths and thus predispose to human infection, eg. “fessikhh” in Egypt associated with infection by the

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small intestinal fluke, *Heterophyes heterophyes* and outbreaks of trichinosis in many parts of the world due to undercooked pork and other meat products^{4,16}.

Even where cooking practices are controlled by legislation, problems may arise. Thus a situation relating to cooking temperature and infection is demonstrated by the example of Enterohaemorrhagic *Escherichia coli* 0157:H7 and hamburger cooking in the USA. Here legislation relating to cooking temperatures for commercially sold “takeaway-type” hamburgers was not adhered to, resulting in outbreaks of bloody diarrhoea and haemolytic uraemic syndrome in the USA^{17,18}.

At times the cooking utensils themselves may be the health problem. Thus in the past iron pots were in common use for cooking in Africa and this may have been the source for iron overload in the African population, resulting in the common occurrence of siderosis¹⁹. Poor hygiene in food preparation can be a source of infection eg lack of hand washing or the use of knives, which have been used to cut raw meat being used to carve the meat for serving after cooking⁶.

An extreme example of human infection being confined to one group of people is the example of Kuru, found only in the Fore tribe of PNG, and particularly amongst the females of the tribe. This was found to be due to the habit of ritual cannibalism practised by the women who ate dead relatives as a mark of respect⁸.

Infected food-handlers (often asymptomatic) may be the source of food-borne infections such as typhoid – a good example of which was Typhoid Mary in the USA who left a string of cases over the country as she went from cooking job to cooking job -in many cases in hospital kitchens²⁰!

Water contaminated with human or animal faeces may be the source of many human enteric infections such as Hepatitis A, poliomyelitis (including vaccine derived strains from recently immunized babies), cholera, typhoid, paratyphoid, enterotoxigenic *Escherichia coli*, *Campylobacter* infection, amoebiasis, giardiasis and cryptosporidiosis – in the latter three protozoan infections, often despite water chlorination^{6,21}. In fact, contaminated water is often a source of major epidemic outbreaks of enteric infection.

This contamination may be the result of simple run off into a stream used for drinking water often affecting a “downstream” village or due to well contamination through the building of pit toilets too close to the well, as in an outbreak of amoebiasis recorded by Goldsmid⁸ from Zimbabwe. Here the well from which the drinking water was drawn was surrounded by five toilet soakaways from which faecal material contaminated the well water! A similar outbreak of amoebiasis was well documented in a top class hotel in the USA due to toilet water leaking into a tank from which cold drinking water was drawn. The fascinating thing about this latter outbreak is that the temperature of the cold tank water was ideal for maintenance of cyst viability!!²²

Water contact through swimming, bathing, washing and rafting way lead to exposure to leptospirosis and schistosomiasis. These diseases are proving of particular importance in

travellers to endemic regions and schistosomiasis is being increasingly diagnosed in returned travellers worldwide.

4.3 Sanitation and Hygiene

The association between poor sanitation and hygiene and the transmission of infection is indisputable and as far back as 1946, Stoll²³ pointed out that six out of seven human helminth infections could be prevented if humans could be isolated from their own waste products – the seventh being preventable by isolating humans from insect and snail vectors. The role of sanitation and hygiene is closely linked particularly to water contamination, as a source of infection for humans. Lack of hygiene and sanitation generally results from a lack of available water or poor planning within a community and is often linked to poverty. However, even when good sanitation is available and when good hygiene is promoted, bad habits may persist resulting in continuing high levels of infectious disease. Examples of this are the use of human faeces as fertilizer, resulting in high levels of ascariasis and trichuriasis as is documented for many countries where human faeces has traditionally been used to fertilise vegetable gardens²⁴. It is interesting to note, however, that Cairncross²⁵ commented that there is more to hygiene and sanitation than merely owning or having access to a latrine – it must be used! In similar vein, Mwosu²⁶ has stated that “the role of sanitation in reducing infections is well known.... but the possibility of altering human behaviour to minimise contact with infecting agents and thereby reduce infection has been received with some cynicism” and Cairncross²⁵ complained that although there was an abundance of information on latrine hardware, there was a lack of information on the behavioural aspects of sanitation – a point further emphasized by Nelson⁴ who observed that in the past, with a few notable exceptions, there had been no planned scientific studies on human defaecatory habits or on the behavioural aspects of sanitation.

The problem is often that unsuitable toilets are frequently constructed. Thus in many remote areas, a well designed pit latrine, as discussed by Morgan^{27,28} in Zimbabwe, might function better than a flush toilet that blocks up due to lack of maintenance as shown in Figure 4.1.



Figure 4.1. Blocked flush toilet in Zimbabwe
(Photograph courtesy of Dr V de V Clark)

What about the role of the toilet seat in disease transmission? It is often claimed that this piece of furniture is a health hazard and that toilets with no seats are safer! In a study on the gonococcus and the toilet seat, Gilbaugh and Fuchs²⁹ concluded that while the gonococcus could survive for several hours on dried purulent discharges on a toilet seat, and while this suggests a nonsexual mode of transmission, actual scientific evidence of this happening is lacking and the possibility might be influenced by such things as the intervals between the last cleaning.

One bizarre example of human sanitary custom resulting in high levels of infection in a community is that relating to the Turkana tribe of Kenya. These people showed a very high level of hydatidosis. This was traced to the fact that, because of a desperate shortage of water, they had trained their dogs to act as “dog-nurses” and to lick clean the faces of their children, a process which transferred the eggs of the tapeworm to the faces and mouths of the children. In a neighbouring tribe, the Suk, this method of child care was not used and hydatidosis was rare^{1,4}. Similarly, in the Lebanon, high levels of hydatid were recorded in Christian families who lived in close contact with dogs as opposed to contrast to low levels of hydatidosis in Moslems who are forbidden by religious law to have dogs inside the house⁴.

4.4 Sexual practices

Sexually Transmitted Infections (STI's) are widespread and common worldwide. Thus for 1990, The Travel Medicine Advisor³⁰ cited the WHO as giving the annual occurrences of the commoner STI's shown in Table 4.2:

Table 4.2. Annual global occurrence of STI's for 1990

Disease	Total
Trichomoniasis	120 million
Genital <i>Chlamydia</i>	50 million
Genital warts	30 million
Gonorrhoea	25 million
Syphilis	3.5 million
Chancroid	2 million
HIV	1 million

While acknowledging that these figures are 13 years old, we must accept that they are underestimates at best and that they have probably increased in the intervening years.

The poverty of many developing countries and the financial rewards in the richer countries has led to high levels of prostitution – a situation, which promotes the spread of

STI's. Thus Palmer³¹ has commented that poor education in women results in high unemployment levels amongst this group which in turn forces them to resort to prostitution for economic survival – and often, dangerously, to accept unprotected sex with their clients!

Sexually transmitted infections are often present at high levels of prevalence in populations where promiscuity is common. This may also mean that many such people suffer from multiple infections. So too, sexual habits (i.e. the type of sexual intercourse) may also have a marked effect of the STI picture. Thus the more sexual partners a person has, the more likelihood of STI and the greater chance of acquiring more than one type of infection. Such STI's can include gonorrhoea, *Chlamydia trachomatis* D-K, lymphogranuloma venereum, syphilis, granuloma inguinale, trichomoniasis, crab lice genital herpes, genital warts, HIV, and Hepatitis B. Certain essentially nonvenereal infections such as scabies may also be commonly encountered in these people. Infection with any one of these may well be a marker for infection with one or more of the others.

The opportunities for such STI's (or drug resistant variants) to spread is illustrated by a study quoted by Ross³² in which, during the course of one voyage, 80 American sailors had sex with 615 women at 112 ports in 45 different countries! Similarly the claim by Black³³ that some gay men might have a history of having in excess of 1000 sexual partners (called “tomcatting” by Brass and Gold³⁴) suggests a similar opportunity for transmission of STI's. This fact plus the fact that oral-anal sex was commonly practiced in this group, resulted in the recognition that many gay men suffered from excessive numbers of infections due to enteric organisms (*Entamoeba histolytica/dispar*; *Giardia*; *Shigella* etc) – a condition labelled as “Gay Bowel Syndrome.” Anal sex has also been associated with increased transmissibility of the HIV virus as opposed to vaginal sex and interesting studies from Africa have suggested that circumcision in males may lead to lower levels of acquisition of HIV³⁵, perhaps because the foreskin has higher numbers of Langerhans Cells and thus being particularly susceptible to viral entry.

4.5 Traditional medical practice

Traditional medical practices are widely used in developing countries and the practitioner of scientific medicine may come into conflict with such practices; may work side by side with traditional healers or may ignore them. However, traditional medical practices do impact on the medical system in many countries/areas, particularly amongst remote rural populations. Western medicine has certainly benefited from traditional medicine, for example, the use of foxglove, quinine, emetine, artemisinin etc. Practices such as acupuncture too, owe their origins to traditional medical practice. Thus we should not dismiss such traditional knowledge out of hand. We need to look at traditional medical practices and examine those showing promise for possible inclusion in modern medical practice after careful scientific assessment.

However, traditional medical practice can create medical problems and where they create adverse health problems they need to be eliminated. The most obvious is where patients consult a traditional healer without successful cure (eg for malaria or malignancy). They

then come to hospital in such an advanced stage of the disease process that often a disease eminently curable in its early stages, is beyond medical help by the time they arrive for consultation.

Figure 4.2 illustrates a patient in Zimbabwe with hepatomegaly due to chronic schistosomiasis and who has obviously consulted a traditional healer (Nganga) as can be seen from the scarification marks over the enlarged liver/spleen. Traditional African medicine has no cure for this parasitic infection and the patient eventually presented for delayed treatment at hospital.

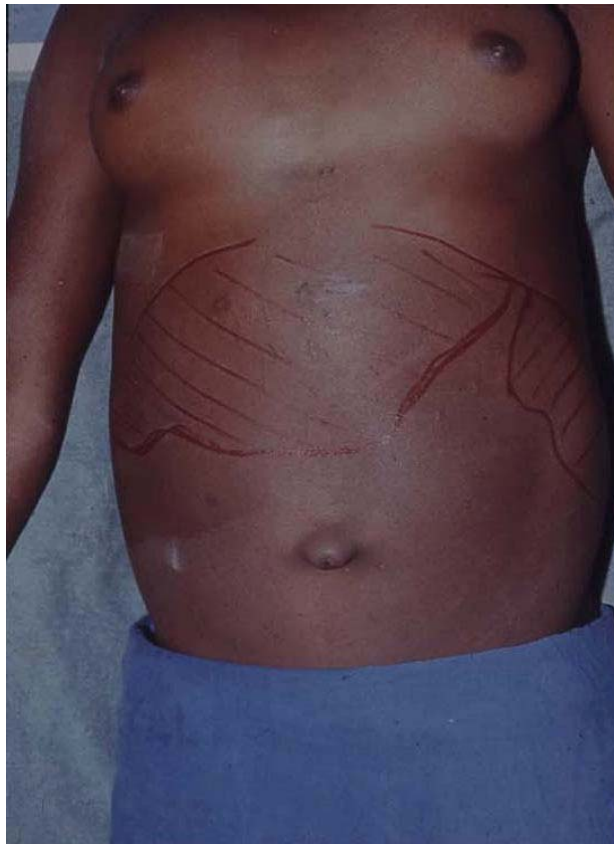


Figure 4.2. African female with bilharzial hepatosplenomegaly showing evidence of treatment by a Nganga (traditional healer) in Zimbabwe (Photograph courtesy of Prof M. Gelfand).

Scarification is common in traditional African medicine¹⁹. Scarification in itself, whether for traditional tribal reasons or for healing purposes, can be dangerous and can result in tetanus or other bacterial infection, Hepatitis B or HIV infection. The same applies to ritual circumcision and chord cutting after birth – the latter often leading to neonatal tetanus, a leading cause of death in babies in developing regions. The application of poultices made with, for example cow dung, to open wounds too, may lead to tetanus⁴.

In some cases too, the medicines used by traditional healers or in traditional remedies can be harmful or expose the patient to infection of some sort. Thus the use of snake meat as medicine can result in the development of porocephaliosis due to the snake parasite, *Armillifer armillatus*³⁶. Similarly, outbreaks of measles and pertussis in Southeast Asia have been treated with crab juice as an antipyretic. Unfortunately the crabs used were intermediate hosts for the lung fluke, *Paragonimus*, and the juice squeezed out from the crabs contained fluke metacercariae. This resulted in infection with *Paragonimus* in the children¹⁰. Another situation in which a high prevalence of paragonimiasis was recorded in West Africa was that where lung fluke infections were only found in the female members of one tribe due to the fact that they ate fresh water crabs to increase fertility³⁷. In Paris too, the high prevalence of *Toxoplasma* infection was shown to be due to the mothers of the children using juice squeezed from raw meat to feed their babies. This meat liquid contained *Toxoplasma* tissue cysts, which infected the babies⁸.

Traditional, cultural and ritual practices involving the teeth and orofacial soft tissues are especially common in the tropics. Wilson, Grappin and Miquel³⁸ have pointed out that “since time immemorial the teeth, the mouth and the face have held a seemingly intrinsic fascination for mankind.” Thus they cover in detail such practices (many of them surgical) and they discuss the reasons for such practices as they relate to decorative mutilation, the effects of tobacco habits (including the taking of snuff and chewing tobacco), the use and effects of betel and other areca-nut habits and finally the effects of food habits on the mouth and surrounding soft tissues.

The habit of taking “recreational drugs” and in particular, intravenous drug taking is dangerous, not only because of the addiction that ensues, but because of the dangers of disease transmission and often mini-epidemics through shared needles (eg Hepatitis B, Hepatitis C, HIV, malaria etc).

Closer to home, we must acknowledge that modern medicine too, has created problems. The overuse and in many cases unnecessary use of antibiotics, especially in hospitals, has led to a serious antibiotic resistance problem world-wide – a process exacerbated in many developing areas through the free and widespread availability of antibiotics across the counter.

Immunization against infection is a powerful tool in the hands of modern medicine for individual protection, control or even, hopefully, eradication of infection. Unfortunately, even this strategy can be thwarted through people refusing to be immunized or not permitting their children to be immunized due to fear of side effects, misinformation as to the process, or religious beliefs.

4.6 Agricultural practices and living with animals

Humans first settled into communities about 10 000 years ago^{4,5}. This gave them security and the domestication of animals and planting of crops, which followed gave them a more stable supply of food. However, there was a downside to the process. Larger accumulations of humans resulted in crowding and consequent easier transmission of

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infectious disease and the increase in humans in a small area resulted in an increase in diseases of environmental contamination. Further, the closer association with domesticated animals led to an increase in zoonotic infections and poor farming technique (overcrowding of animals and close mixing of animal species) also led to an increase in the diseases in the flocks and herds and then to the humans themselves.

The close association of farm species and humans is particularly common in Asian countries such as China where fowls, pigs and humans may live in close proximity, allowing viral gene mixing - and it is here that many viral epidemics seem to have originated such as the various influenza strains, including bird flu and perhaps with the SARS virus being the latest in this story.

Reservoirs and therefore potential sources of human infections can at times be unusual as illustrated by tuberculosis, where reservoirs may include possums, badgers and even seals.

This poor farming technique has led to further health problems: The widespread and irresponsible use of antibiotics to enhance growth and weight-gain in food animals has exacerbated the antibiotic resistance problem amongst bacteria capable of infecting humans and the use of dangerous insecticides for the control of insect pests and disease vectors has also added to our health problems. The utilisation of animal waste in food for meat animals has led to the emergence of the prion disease Spongiform Bovine Encephalopathy (SBE or Mad cow disease)³⁹.

Additionally, the clearance of natural forest areas and expansion of farming into these areas has exposed us to the dangers of climatic change and the possibility that this might result in changing geographical ranges of diseases such as malaria. This spreading of humans into previously remote and uninhabited areas has also changed our relationships with other animals and brought us into closer contact with various wild animal species, again affecting the infectious disease picture with the emergence of new or previously unidentified zoonotic diseases³¹. In fact it is noteworthy that most of the newly emerged diseases of humans are zoonotic in origin (see Table 4.3).

The development of water storage and irrigation into previously dry areas too, while seemingly of inestimable value in the production of food and other economically valuable crops, can also bring the undesirable elements of disease spread (eg onchocerciasis, schistosomiasis and malaria) unless carefully and scientifically planned⁴. We can see this as illustrated by schistosomiasis in Egypt where palaeopathological studies have clearly shown that it has existed as an agrico-medical problem for over 5000 years⁴⁰

The use of human faeces as fertiliser for food plants has already been discussed as a source of human enteric infection transmission but the use of animal manure too, can be a source of transmission of zoonotic infections as seen in a case of *Ascaris suum* infection in a child in the UK who had been indulging in a gourmet meal of pig manure from the garden⁴¹.

Table 4.3 Some newly recognised human zoonotic infections of significance

Disease	Country of origin	Animal source
SBE	UK	Cows
Marburg	Africa	Vervet monkey?
Ebola	Africa	Chimpanzee
Lassa fever	Africa	Multimammate mouse
Bat Lyssa virus	Australia	Flying Foxes
Equine morbilliform virus	Australia	Flying foxes
Nipah virus	S.E.Asia	Flying foxes
Hanta virus etc	Americas	Rodents
HIV I/II	Africa	Monkeys
SARS virus	China	? Civet cats
Monkeypox	Africa	Monkeys; rodents
Lyme disease	USA	Rodents
<i>Campylobacter</i>	World-wide	Cattle, sheep etc
EHEC	World-wide	Cattle
Babesiosis	Europe; USA	Cattle; rodents
Dirofilariasis	Africa; Asia; USA; Australia	Various carnivores & sea lions.
Eosinophilic enteritis	Australia	Dogs
Gnathostomiasis	Asia; Africa	Carnivores; rodents; fish; frogs.
Anisakiasis	World-wide	Sea mammals/fish.
<i>Trichinella nelsoni</i>	Africa	warthog; carnivores; Scavengers.
<i>Trichinella pseudospiralis</i>	Tasmania	Marsupials
<i>Haycocknema perplexum</i>	Tasmania	Marsupials

In Tasmania in the 1960's there was recorded the highest prevalence of human hydatid in English-speaking world and one of the contributing factors for this was the habit of feeding sheep offal to the sheep dogs (Figure 4.3)⁴².

Keeping animals as pets (i.e. companion animals) also exposes humans to the risk of zoonotic infections and more exotic pets such as snakes and skinks may result in human salmonellosis from more exotic serotypes of the genus.

4.7 Natural disasters, civil unrest and warfare

Natural disasters such as earthquakes and floods can result in overcrowding in refugee camps, contamination of water supplies, shortage of food and collapse of public health

disease controls programmes and infrastructure resulting in devastating outbreaks of infectious diseases such as typhoid, cholera, malaria and many more.



Figure 4.3. Feeding offal to dogs (Photograph courtesy of Tasmanian Hydatids Eradication Council)

There is little we can do to prevent such natural disasters, but the human preoccupation with violence, revolution and warfare is just as significant and directly due to our own behaviour! Hand in hand with civil unrest and frank warfare comes a deterioration in population health. The effects of war have been overviewed by Zinsser⁴³ and Goldsmid⁴⁴ who emphasized that in terms of military personnel, the casualties or even mortality, of disease often far exceed those of military action. The disease picture of soldiers serving overseas can also affect the health profile in their home country such as malaria in the USA during the Viet Nam War⁴. The effects of war on the civilian inhabitants is also often devastating due to increased spread and decreased public health operations as evidenced by the high levels of epidemic typhus and cholera in Eastern Europe during the First World War. Then too, invading armies carry disease with them and may unintentionally, or intentionally introduce new diseases into a country^{43,45,46}. Terrorists too, have climbed onto the biological warfare bandwagon and the dangers of intoxications due to botulinum toxin and infection with anthrax have been accepted as very real threats. So to, terrorist threats have soured our wonderful ideals for the global eradication of such diseases as smallpox and poliomyelitis and made people begin to question the wisdom of total eradication of infections such as these and as alluded to by Pearn⁴⁷ in his audit of success and failure in the global eradication of disease.

4.8 Migration and travel

Humans travel! They travel for sport, they travel for pleasure, they migrate for many reasons and they move within and between countries for belligerent purposes. With modern progress, travel has become easier and the world has become smaller – the global village concept. Over thirty years ago, Toffler⁴⁸ wrote: “we are witnessing an historic decline in the significance of place to human life. We are breeding a new race of nomads and few suspect quite how massive, widespread and significant their migrations are”. One of the significant effects alluded to, is undoubtedly that of the spread of disease, locally, nationally and internationally⁴⁹.

Thus evidence of travel is important in taking a history from a patient and this may relate only to that patient’s personal medical problem or may pose a threat of further spread or disease introduction to a nonendemic region. So too, larger population movements may have a profound influence on the health situation in a country and may certainly affect health statistics. Thus in global terms Bloom and Small⁵⁰ have stated that even today tuberculosis “remains a more frequent cause of death than any other infectious agent” and that it, with HIV “is responsible for the death of about a third of all patients with AIDS in Africa.” Many countries have seen an increase in the detection of cases of tuberculosis largely due to imported cases in migrants entering the country – often associated with the spread of HIV. These cases then pose a threat to the countries in which TB has declined over the years and thus have a low level of herd immunity to *Mycobacterium tuberculosis*. Unfortunately, many countries in which TB has declined have lost their clinical awareness of the disease and so diagnosis may be delayed, resulting in a string of secondary cases.

Malaria too can travel with migrants and refugees⁵¹ to pose diagnostic, therapeutic and, in sensitive areas with *Anopheles* vectors of their own, introduction or reintroduction problems. Goldsmid⁸ quotes the example of Sri Lanka in the 1960’s when it was hailed as a model for malaria eradication. Then over a two-year period between 1967 and 1968, good rains coupled with unusual population movements, resulted in the diagnosis of over 2 million cases.

Similarly, of course, vectors may travel and be introduced into new areas in cars, aircraft and items of trade (eg. tyres). This in turn may set the scene for disease introduction or reintroduction to an area or country (eg. malaria; schistosomiasis).

4.9 Traditional and religious practices

Religious and traditional practices can have both positive and negative effects on health. They can have a marked influence on disease patterns through medical (eg. public health) and social directives (eg. sexual conduct), body piercing and marking (eg. tattoos). Thus body piercing, religious circumcision, tattooing and other surgical procedures relating to religion or tribal custom, may be associated with tetanus, wound infection and septicaemia, infection with Hepatitis B, Hepatitis C and HIV. In the public health sphere, religious restrictions relating to diet abound in the Talmud of the Jews; the Old Testament of the Christians and the Koran of the Moslems (eg. prohibition on the eating of pork or

“animals that dieth of themselves”) and the burying of human faeces etc^{4,7} and which have been covered in the relevant earlier sections.

The refusal of some religious sects such as the Mormons to accept blood transfusions due to biblical restrictions on the “eating of blood” can be infuriatingly frustrating for the physician treating a critically ill patient but, on the upside, such patients, if they do survive, are not exposed to transfusion-related infections! Some Christian sects go even further and put their trust in divine intervention through faith healing rather than in scientific medicine. They may refuse all medical help including immunisation – a refusal which can be dangerous for them and their children and put at risk those children who, for immunological or other health reasons, cannot be immunised.

4.10 Conclusions

When studying a disease, health professionals need to have a good knowledge of the disease and its aetiological agents if it is an infectious disease. They must understand the virulence factors of microbial pathogens, the clinical responses of the host and the host’s immunological response.

Infectious disease has always been a major component in the study of tropical medicine and the potential for world spread has meant that concern is worldwide. With the emergence and re-emergence of a range of infectious diseases, mostly of zoonotic origin^{52,53}, and possibly associated with changing ecological relationships between humans and wild, companion and domestic animal species, combined with the threat of climatic change, the problem is very real. In an article titled “Preventing tomorrow’s epidemics”, Palmer³¹ makes it clear that “we need to take a broader view of the causal chain of infectious diseases.” He cites the classic triad in this causal chain as host, agent and environment. He subdivides the environment into “physical and natural, the built environment, the political and economic environment, the social environment (demographics and lifestyle) and the therapeutic environment.” He goes on to say that “physical and natural factors include climatic change, predicted increase in altitude, latitude and seasonal range of important vectors of infectious disease” He further points to the continuing threat of epidemics due to the emergence of many new zoonotic infections, continuing disruption due to civil unrest and warfare, increase in international trade and travel. Hidden amongst these important epidemic risk factors, is that of human behaviour. The importance of this must not be overlooked or overwhelmed by the others or we risk once more relegating it to “the forgotten factor in the transmission of tropical disease” as discussed by Gillett¹.

The link to travel medicine is also there, and in 1973, Nelson⁴ warned: “Every year we see more and more tourists searching for the sun and adventure.....unaware that very little progress has been made in the control of parasitic and other infectious diseases in the areas they are visiting.” In this sense, Tropical Medicine is the concern of us all, whether we live in the tropics or the temperate regions; whether we live in the developed or the developing world – our behaviour ensures this. It determines why we travel; where we travel and what we do when we are there. In this sense the behaviour of the residents

of the tropical and developing regions interacts with the behaviour of the short term or long-term visitors and migrants. It makes knowledge of behaviour mandatory for health practitioners – not just knowledge of major population cultural and other behavioural characteristics, but often of minor behavioural idiosyncrasies, which might have a major effect on disease prevalence, transmission, treatment and control.

4.11 References

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