

FACILITATING HEALTH AWARENESS:
EDUCATIONAL MATERIAL TO ORIENTATE NEW
VOLUNTEERS AND INTERNS TO HEALTH ISSUES
IN TANZANIA

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<p>Abstract</p> <p>Abstract</p> <p>The purpose of this project-based thesis was to provide educational material to help to contribute to increased awareness and knowledge of travelers' health issues for volunteers and staff at a non-governmental organization in Tanzania. The aim of the thesis was to provide educational material in the form of a three-part package. Firstly, a travel manual was produced outlining basic traveler health issues in Tanzania. Secondly, a PowerPoint presentation about travelers' malaria was created for staff to present to new volunteers. Thirdly, a first aid kit list was produced for travelers to access before departure.</p> <p>The rationale behind the thesis was based on personal experience and discussions with staff at the Art in Tanzania (AIT) organization, which revealed a clearer need for more comprehensive health advice for volunteers.</p> <p>This project implemented a literature search approach to gather credible, evidence-based information. Reviewing the literature resulted in using a total of 5 journal articles, 6 E-books and 10 online publications/websites to create the travel manual, malaria presentation and first aid list.</p> <p>The outcome of the project was a travel health manual for volunteers and staff to consult both pre-travel and upon arrival to Tanzania. Challenges in evaluating the usability of the manual were evident, but this could provide interesting future research and projects in order to build on this travel manual and assess more accurately travelers' perceptions of health risks in Tanzania.</p>		
<p>Keywords</p> <p>Health Education, Health Promotion, Tanzania, Literature Search, Traveler Health, Travelers' diarrhea, Travelers' malaria</p>		
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1 INTRODUCTION

People are increasingly traveling the world for a variety of reasons and travel and tourism are huge business enterprises worldwide (van Beek, 2013). Tanzania offers a variety of tourism opportunities, ranging from high-end resorts to backpacker and volunteering opportunities with NGOs (Tanzania Tourist Board, 2013a).

Travel leads to increased health risks and accidents in unfamiliar environments (Steffen et al., 2007). Travel medicine and pre-travel health advice for travelers are therefore becoming widespread concepts in preventive and public health nursing (World Health Organization, 2010). Moreover, traveler behavior and adherence to travel advice are key concepts to ensure safe travel.

Art in Tanzania (AIT) is one example of a non-governmental organization (NGO) in Tanzania where volunteers and interns participate in community-based projects (Art in Tanzania, 2013a). This thesis project will implement a literature search to collect information on traveler health to create educational material about health issues aimed at young adult travelers arriving to the AIT organization.

The proposed thesis is of interest in health sciences as education and health promotion remains one of the fundamental areas of nursing and healthcare (Lloyd et al., 2011). The rationale behind the thesis is based on personal experience and discussions with staff at Art in Tanzania which revealed a clearer need for advice and education about health issues when new volunteers arrive to Tanzania. It is hoped that the resulting health education material will both reinforce volunteers' pre-existing knowledge and improve adherence to recommended travel health behaviors.

2 TRAVELER HEALTH

2.1 Introduction to travel and tourism

Travel has long been an important part of free-time activity and tourist destinations attract millions of people per year (UNWTO, 2013a). Travel is considered beneficial for a variety of reasons, including benefiting physical and emotional health while seeking enjoyable activities or education (Travel Medicine, 2008a). Tourism and

travel has experienced global growth and diversification and it is now one of the fastest growing economic sectors in the world (UNWTO, 2013a). In fact, in 2006, it was estimated that there were 842 million recorded international tourist arrivals (Steffen et al., 2007) and this number increased to 984 million in 2011 (UNWTO, 2013a). These arrivals were mostly to developed countries and were mainly for recreation and leisure purposes (World Health Organization, 2010). However, trends are growing towards travelers from developed countries visiting developing countries and it has been reported that there are over 100 million such trips each year (Steffen et al., 2007).

Travel has been defined by the World Tourism Organization (2013b) as the activity of travelers, and a traveler is someone who moves between geographic locations for any purpose and any duration. A traveler may move by domestic, inbound or outbound travels and can be classified as a tourist, and tourism is subsequently a subset of travel. (UNWTO, 2013c)

2.2 Volunteerism and youth travels as a subset of tourism

Tourism is a diverse area of travel, and worldwide, over half of tourists travel for leisure, recreation and holidays, 27% visit friends and relatives (VFR) and 15% for business and professional reasons, while 7% travel for other purposes (Roukens, 2010). The demographic of tourists who travel for holidays and leisure has changed over the years to include younger, independent travelers with a high level of education and disposable incomes, and older travelers with high incomes and no responsibilities ('denture venturers') (Smith, 2013).

Young, educated travelers are increasingly becoming involved with a unique branch of tourism, volunteer tourism (Barbieri et al., 2012). Volunteering is a relatively new form of tourism which first developed in the 1980s and has expanded since that time to include over 1.5 million tourists per year (Smith, 2013). According to Barbieri (2012), volunteer tourism combines holiday with volunteering, with the aim to participate in community projects around the world and to provide a more sustainable and ethical alternative to traditional travel (Ackerberg and Prapasawudi, 2009; Smith, 2013).

A South African study from the City of Capetown (2013) studied the behavior of

youth tourists and backpackers, including volunteer tourists. There was found to be a distinct difference in behaviors between this subset of youth/volunteer tourists and conventional tourists or older travelers. Youth travelers, including volunteer tourists were more likely to spend money locally, be involved in more activities within local communities, stray away from expensive resorts and mix with locals more often. As such, youth travelers, and those participating in volunteer tourism, who encounter these novel destinations and activities tend to face greater risk factors to their health and safety than the older or conventional tourist (Steffen et al., 2007).

2.3 International travel and health

According to the World Health Organization (2010), international travel can be a health risk depending on the type of traveler and type of travel they encounter (Steffen et al., 2007). Health systems at many travel destinations, especially developing countries, are poor or substandard when compared with the traveler's home country (World Health Organization, 2010). The necessity of good travel medicine has arisen from the continually expanding tourism industry and increase in travels.

2.3.1 Principles of traveler health

Steffen et al. (2007) defined the main aim of traveler health as “exposure prophylaxis” i.e., minimizing exposure to health risks in the destination country. Travel health is a discipline related to travel medicine and incorporates epidemiology, health education and promotion, infectious disease studies, vaccination regimes etc. (Roukens, 2010). Travel medicine is mostly aimed at preventing and managing infectious diseases, non-infectious diseases, vaccine-preventable illnesses and sexually transmitted infections, and avoiding accidents (Roukens, 2010). Ensuring good travel health is important as being ill abroad can impact the quality of the trip, involve medical costs or, indeed, be fatal. Furthermore, returning from abroad with an infectious disease can impact the individual traveler, their family, and in some cases, the public at large (van Herck et al., 2004).

Guidance exists for each country on which precautions are recommended for what type of trip. In healthcare settings, pre-travel health advice is almost solely in travel clinics/GP surgeries in the travelers' home countries. Many travelers also seek health advice from other external sources. However, such information in the public domain can be of questionable reliability and is often via unofficial travel-health websites and guidebooks (van Herck et al., 2004).

Health advice by the World Health Organization (2010) suggests that in travel health planning, counsel for pre-travel, during-travel and post-travel that is tailored to the client should be offered. The following information may be taken into account:

- The type of trip being planned to the specific destination
- The duration of the trip
- The mode of transport used
- The sanitation and hygiene quality at the destination
- The risk of acquiring infections (including risky behaviors)
- The individual's health status, especially those with underlying health issues or chronic conditions

FIGURE 1: Considerations of the travelers' circumstances to take into account during travel health advice and counseling (WHO, 2010)

Pre-travel health advice is dependent on relative health risks. For example, a business trip, where visits are short and spent in good quality hotels or conference centers, involves fewer risks than a trip to a rural area. Also, considering travelers' activities is important in assessing the risks for travel health counselling. For example, being outdoors in the evening in a malaria-endemic country without personal protective measures (PPMs) will involve greater risks than a business trip (Steffen et al., 2007). Furthermore, location and accommodation are important to take into consideration. A traveler in a hostel outside a large city may be exposed to greater health risks and pathogens than a tourist in a luxury resort in a rural area, due to differences in quality of accommodation and services (Steffen et al., 2007).

The WHO (2010) suggests travelers are largely responsible for their own health when making the decision to travel. Furthermore, travelers should be knowledgeable about recognizing risks to their health and seeking health care in a timely manner (at least 4 weeks before travel). They are also responsible for taking adequate health insurance, complying with vaccinations and other medication regimes and taking health precautions to avoid transmitting diseases. It is also highly recommended to carry a medical kit containing specific supplies (see CDC, 2013b; Steffen et al., 2007) with knowledge how to use it. Moreover, travelers are also responsible for reporting illnesses upon their return, respecting the host population, avoiding unprotected sexual contact, maintaining responsible behavior and having the ability to manage underlying chronic health problems. These responsibilities of the traveler may be addressed in travel health education (CDC, 2013b).

2.3.2 Illness during travel

Health problems in travelers are frequent and the proportions of those becoming ill whilst abroad and upon their return vary considerably in the literature, from 40% (Rack et al., 2005), 65% (Travel Medicine, 2008a) to over 75% (Steffen et al., 2007). Minor health issues, including illnesses that were self-treated or self-medicated were reported by 22-64% of travelers (Roukens, 2007). These health problems are mostly mild, self-limited illnesses and less than 1% of these require a hospital stay whilst abroad (Travel Medicine, 2008a). The risk per trip is greatest for first-time travelers due to their lack of experience and the fact that experienced travelers know better how to diminish risks (Steffen et al., 2007; Roukens, 2010).

The GeoSentinel study (Leder et al., 2013) investigated the main reasons for illness in returning travelers. This included data from over 42,000 ill-returning travelers between 2007 and 2011 in 24 countries. It showed that returning travelers were most likely to be ill when returning from Asia and Sub-Saharan Africa (Figure 2).

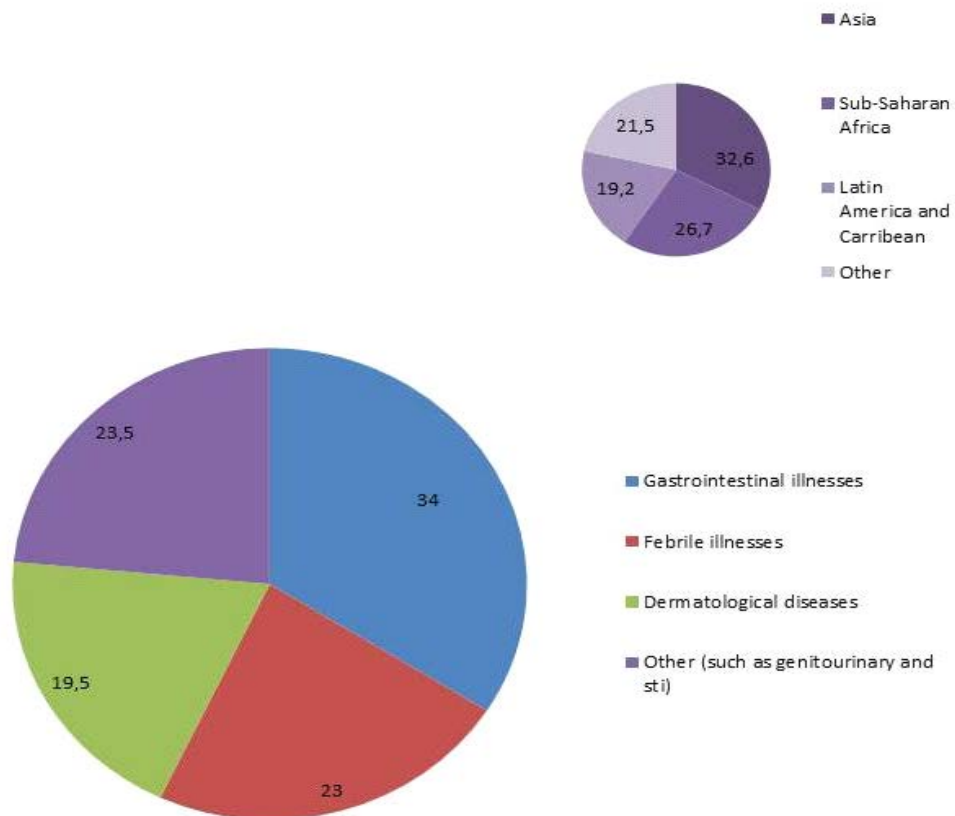


FIGURE 2: The proportion (%) of ill-returning travelers returning from abroad according to region and illness (Data from Leder et al., 2013)

Figure 2 also shows that, of those that did get ill, in all regions, gastrointestinal disorders were most prominent, followed by febrile and dermatological diseases and to a lesser extent, respiratory diseases and genitourinary diseases. This finding was in line with previous studies (Steffen et al., 2007; World Health Organization, 2010). Despite large scale studies such as the GeoSentinel study, it is still impossible to accurately predict the chances of travelers becoming ill in developing countries. This is due to huge variety of factors that affect travelers' health, including their age, genetics, and country of origin, their destination and duration, season of travel, pre-travel vaccination and travel behavior.

2.3.3 Morbidity and mortality in travels

The vast majority of travelers do not experience severe health problems whilst traveling (World Health Organization, 2010). As shown previously, the chances of

getting a minor, self-limited illness while abroad are quite high, while the chances of fatality are actually relatively small.

A Dutch study showed that mortality among tourists is mostly due to cardiovascular events (mostly limited to elderly and aging tourists) and accidents, with a smaller proportion of deaths attributable to infectious diseases (Groenheide et al., 2010). The elderly are more likely to have chronic health conditions and suffer more frequent and severe infections than younger travelers, believed to be due to the diminished function of the immune system in the elderly and their diminished response to vaccines (Roukens, 2010; Alon et al., 2010). Despite this postulation, studies show that while elderly travelers may experience a higher risk of mortality due to chronic health problems, they are more compliant with health advice, and as such, experience less preventable, minor health issues (Alon et al., 2010; World Health Organization, 2010). When comparing youth travelers and elderly travelers, youth travelers have a higher mortality and morbidity risk due to infection and accident, rather than issues related to underlying health (Travel Medicine, 2008a; Alon et al., 2010). Fatal injuries are mostly due to motor vehicle accidents and drowning (Travel Medicine, 2008a). It has been shown that the number of accidental deaths in 15-44 year olds is higher by a factor of 2-3 compared with rates in the same age group in their home country (Travel Medicine, 2008a). This “excess mortality” abroad among the young is thus largely due to accidents. The causes of death in young travelers abroad can be, in part, explained by increased risk-taking behaviors (Alon et al., 2010).

2.4 Health Issues for travelers in Tanzania

Tanzania is located in Sub-Saharan Africa within East Africa (see Figure 3). It is within a tropical region; with grasslands and forest in the cooler north and hotter humid coastal regions in the east (Dar es Salaam is located on the East coast). There are a large amount of diseases and health issues that have been recorded in Tanzania which cause significant mortality and morbidity to the host population (World Health Organization, 2010). However, many of the diseases that occur in this region are localized, confined to rural areas and are not likely to affect healthy, vaccinated travelers. Health problems that do affect travelers may be similar to the native

population, including infectious tropical diseases. Alternatively, they can be novel risk factors, associated with the climate of the region or the effects of heat, altitude and the environment, known as non-infectious health issues.

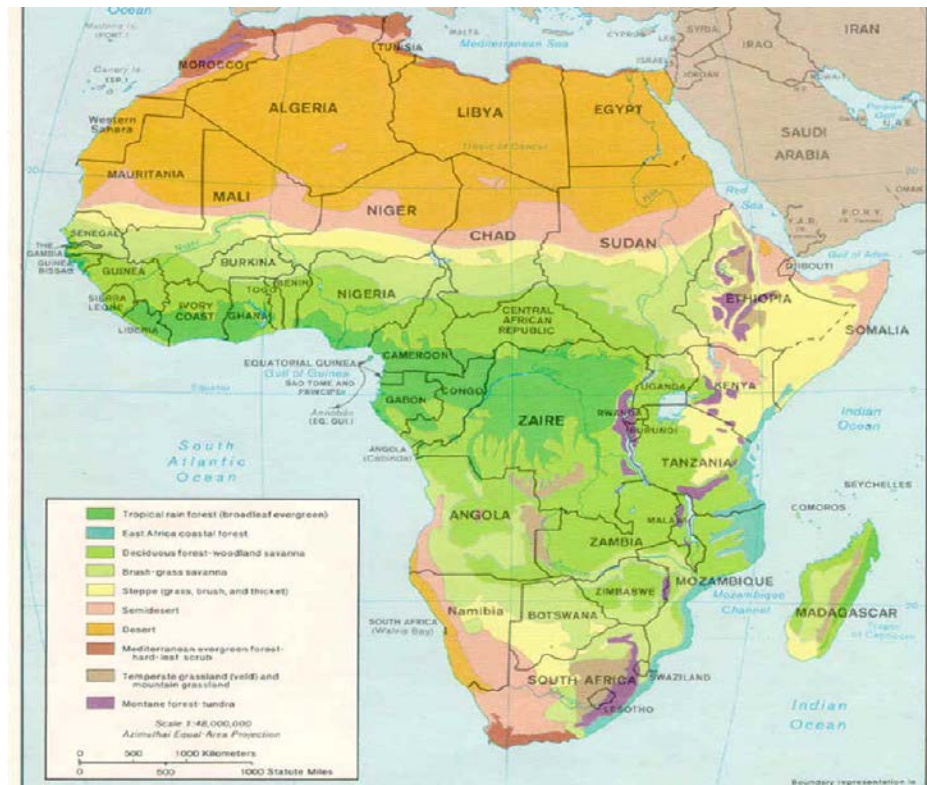


FIGURE 3: Map of Africa showing climatic variations. Tanzania is shown in Sub-Saharan East Africa and Dar es Salaam is located on the East coast. Source: Furman and Guertin (2013).

Travel medicine generally distinguishes between infections and non-infectious risks. Non-infectious risks broadly include environmental and accidental risks, whereas infectious risks are considered infections or diseases of viral, bacterial or parasitic origin. (Steffen et al., 2007)

Travel advice to Tanzania follows that of general pre-travel advice, regardless of the destination, and is based on principles of avoiding unnecessary risk factors (as shown in Table 1). These risk factors include activities related to food and drink, ensuring measures against insect bites, avoiding unprotected sexual encounters, ensuring safety in cars and when in the water and avoiding sun overexposure.

FOOD	Boil it, peel it, cook it or forget it
FLUIDS	Avoid tap water, drink plenty
FLIES	Measures against mosquito bites and other insect bites
FLIRTS	No unprotected sex, avoid casual sex, use condoms
SAFE CARS	Wear safety belt where possible, avoid night driving, where possible
SWIMMING	Avoid excessive alcohol consumption when swimming. Swim in designated areas
SUN	Don't get burned, use SPF and protection, avoid midday sun
STRESS	Get rest, don't overload your program!

TABLE 1: General travel health advice (Steffen et al., 2007)

Non-infectious health risks

Non-infectious health risks include environmental risk factors such as heat, altitude (limited to the Kilimanjaro region in the north), humidity and rainfall. Accidents, personal safety issues, dermatological (rashes, sunburn and insect bites) and respiratory conditions are also components of non-infectious health risks. These are all of concern in Tanzania due to the fact that the weather is hot and sunny, with temperatures ranging from mid-twenties to mid-thirties most of the year round, especially in the coastal regions (see Figure 2) with two rainy seasons per year (Tanzania Tourist Board, 2013b). Furthermore, pollution in cities, and dust from roads in rural areas can lead to upper respiratory tract problems and eye infections (Steffen et al., 2007).

Infectious health risks

Heat, humidity, and overcrowding promote the spread of infectious agents and their vectors within large cities and crowded places (Steffen et al., 2007). Despite this, infections claim a lower toll on travelers compared with the amount of tropical diseases present in Tanzania. This is because serious infectious diseases are effectively prevented by vaccinations (vaccine-preventable illnesses).

Vaccine-preventable diseases

Health advice recommends certain vaccinations according to the vaccine schedules of the travelers' home country. These vaccinations are recommended for all people by the World Health Organization and are usually vaccinations from childhood and boosters from early adult life (World Health Organization, 2013a). Universal vaccines include diphtheria, tetanus, measles mumps rubella, polio and hepatitis b. These vaccinations should be up to date when travelling to any travel destination (Arguin and Tan, 2013).

Many important infectious diseases can be spread through contaminated food and drink. Cholera, giardiasis, hepatitis A and E, Salmonella and typhoid fever and others have been reported in East Africa (WHO, 2010). Vaccinations specifically recommended for travel to Tanzania include Hepatitis A (one of the most common vaccine-preventable infections), typhoid, meningococcal meningitis and tuberculosis. Rabies (if at risk of handling animals) or cholera vaccinations (if the traveler plans to include relief work or medical work for prolonged periods of time) are recommended to risk groups. Yellow fever vaccine is also recommended by some countries, especially if traveling to the island of Zanzibar (World Health Organization, 2010, CDC, 2013b)

Non-vaccine preventable diseases

There are a multitude of other infections and diseases that are considerable risks to the traveler in Tanzania, ranging from common afflictions such as traveler's diarrhea to serious illnesses such as malaria (WHO, 2010). Despite malaria being not so common in travelers compared to the local population, it is a significant risk due to the travelers' non-immune status. Among travelers, malaria is considered both as the most common cause of infectious disease death and a common cause of febrile illness among returning travelers (Siikamäki et al., 2011, 2013; Freedman et al., 2006). As with general public health advice, sexually transmitted infections are also encountered in Tanzania, with HIV/AIDS being prevalent in the local population (CDC, 2013b).

2.5 Health Behavior in travelers

Many of the non-vaccine preventable infectious diseases and indeed non-infectious diseases can be effectively prevented or the risk can be reduced by adhering to pre-travel health advice. It has been shown that risky behaviors can increase the risk of becoming ill when traveling, and indeed lead to an increased risk of mortality (Rack et al., 2005). Traveler behavior is an important concept to understand in order to be able to effectively educate travelers and understand how health advice can be effective.

Most travelers seek some pre-travel advice regarding their destination, but a lower number receive pre-travel health advice (van Herck et al., 2004). Moreover, research suggests that those who do receive pre-travel advice do not always follow health advice during their travels (Farquharson et al., 2004). In the case of this thesis project, it is suggested that the AIT volunteers' knowledge of medication adherence and other preventive, prophylactic strategies and behaviors is adequate, and increasing their knowledge and awareness by utilizing travel health education during the stay, will improve adherence to responsible health behaviors. Pre-travel advice can be dismissed by travelers, after the consultation or during travel due to forgetting or not believing information (Farquharson, 2004; Bauer, 2005). Furthermore, from a travelers' perspective, previous traveler's experiences are seen as more credible than that of a medical practitioner, as the experienced traveler has first-hand encounters of the destination country (Bauer, 2005). Bauer (2005) further suggested that these 'experienced' individuals tend to have poor knowledge; poor recollection or poor interest in their travel experiences so spreading knowledge from traveler to traveler does not provide comprehensive, impartial information.

Safe sexual behavior is an example of travelers failing to adhere to health advice. Reports vary as to the proportion of tourists and travelers who put themselves at risk of unprotected sex. Bhatta et al. (2009) reported that 11% of long-term volunteers had placed themselves at risk of HIV and STIs by unprotected sex (45%), split condoms (30%) and other reasons. Furthermore, such studies found that the majority of casual sex encounters were with a partner from the host country and a smaller percentage

with fellow tourists or volunteers (Croughs et al., 2008; Bhatta et al., 2009).

Unplanned or unforeseen sexual encounters raised the risk of unprotected sex and additional reasons were found to be due to monotony, loneliness, sense of freedom and alcohol or drug use, which tends to limit inhibitions (Bhatta et al., 2009).

It has been shown that sexual health advice before travel is useful to remind people to practice safe sex while abroad (Croughs et al., 2008). When studied, less than 40% of travelers had discussed sexual health during pre-travel health advice with a medical professional and it was noted that those who did receive pre-travel sexual health advice, those who read STI-related material or those who were well-prepared and took condoms with them were more likely to have safe sex (Croughs et al., 2008).

Despite the common pre-travel health advice that chances of developing a gastrointestinal illness will be reduced considerably by following the advice to “boil it, cook it, peel it, or forget it”, surveys of returning travelers have shown that receiving advice about food and drink safety appears to have no significant effect on reducing overall rates of diarrhea. Approximately 90% of travelers break this advice within 72 hours of arrival to the destination country due to lack of choice, or temptation to try new things (Steffen et al., 2007; Travel Medicine, 2008b).

When considering malaria prophylaxis, a cornerstone of travel health advice, Farquharson et al. (2004) found that after pre-travel counseling, 62% of people in the study reported full adherence to prophylaxis, 25% reported partial adherence and 12% reported poor adherence or non-adherence. Farquharson et al. (2004) concluded that the perceived benefits of medication, length of stay and quality of pre-travel health advice all predicted good adherence by the traveler. Another study reported that travelers with unrealistic risk perceptions (i.e. over- or underestimation of risks) affected adherence to malaria chemoprophylaxis, with 25% of travelers visiting high-risk areas underestimating the risks of malaria and half of travelers going to a no-risk destination were overestimating the risks (van Herck et al., 2004). It is considered that travelers and other clients' behavior is based on the perceived susceptibility to an illness (the severity, benefits from prevention etc.), and disadvantages of the

preventive action, (cost, adverse reactions, or discomfort). Such perceptions and beliefs can be influenced during health counseling.

Health Belief Model

In health care, several models have described clients' actions, perceptions and beliefs. One model that is often used in travel medicine, the Health Belief Model (HBM), helps to explain the nature of an individual's preventive health actions and behaviors (Champion and Skinner, 2002). The Health Belief Model (HBM) emphasizes the clients' own perceptions on how to behave to avoid illness. The HBM consists of three main elements: Firstly, how an individual perceives their own susceptibility to the disease and how severe the disease is considered to be. Second, an individual's perception of the benefits and barriers to be taken to prevent a disease, and third, the cues available to an individual to stimulate them to engage in preventive health activity (See Figure 4). The Health Belief Model has been said to place too much emphasis on abstract, conceptual beliefs, but it has some advantages in that it illustrates the importance of modes of communication and it focuses on perceptions and beliefs of the clients, and it is these perceptions that can be altered to produce a change in beliefs and behaviors. (Champion and Skinner, 2002)

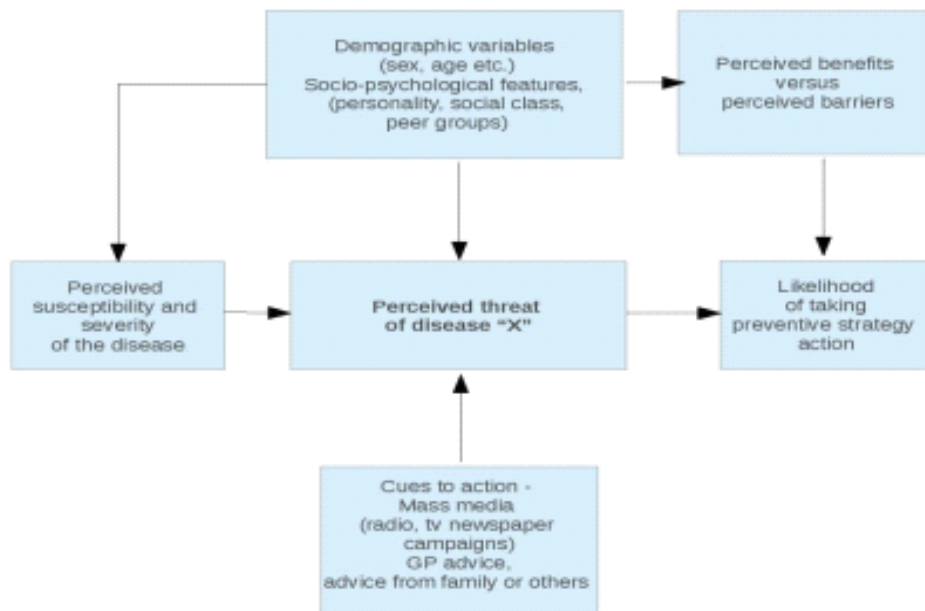


FIGURE 4: An example of applying the principles of the Health Belief Model (Champion and Skinner, 2002)

Travel advice based on the Health Belief Model needs to trigger the occurrence of three events: presence of health concerns to make the problem relevant, the belief that the problem is a threat, and finally, belief that some action can reduce this threat. In the case of travelers' diarrhea, the client must be of the opinion that there is a health concern. Then, the client must believe that this is a problem (in terms of lost time and activities, discomfort, danger of symptoms) and finally, believe that some actions (such as avoiding risky foods and poor preparation methods) can reduce these risks. Behavior is further based on the client's own abilities and intentions, and social expectancies. For example, people may be influenced by how others in their social circle behave. (Champion and Skinner, 2002.)

3 AIMS AND PURPOSE

The main aim of the thesis was primarily to provide a Word document for volunteers about common health issues for travelers in Tanzania (to be made available on the AIT website). Secondly, the project aimed to provide team leaders with a PowerPoint presentation about malaria for orientation days and volunteers' arrival. Finally, printed and online versions of a first aid kit list were to be produced for the Art in Tanzania accommodation houses, volunteers and schools/orphanages collaborating with Art in Tanzania. The aforementioned aims were achieved by implementing a literature search to collect relevant material from specific resources.

The main purpose of the project was to provide usable educational material to help to contribute to increased awareness and knowledge of health issues for both AIT staff and volunteers. In order to achieve the aforementioned aims, the following questions were considered:

- What are the main health issues that affect travelers in Tanzania?
- What are the main concepts of creating health promotion and educational material which can be used to create effective, usable health material?
- What information is suitable to enhance volunteers' knowledge of health issues in order to promote adherence to health advice?

4 METHODS AND IMPLEMENTATION

4.1 Health promotion and education

In the case of the current thesis project, health promotion and education was aimed at a specific group of young travelers and volunteers arriving to Tanzania. Providing travel health education for a traveler in another country, without the close client-nurse communication and relationship that is available in pre-travel health advice, is challenging and as such, it is difficult to assess the perceptions of the clients i.e. volunteers, when counseling health behaviors. Therefore, health promotion and education material aimed at the AIT volunteers (Users) should be based on effective written health communication.

The main aim of health promotion and education is to raise the health status of individuals, communities and groups. The World Health Organization (2013a) states that health promotion is "the process of enabling people to increase control over, and to improve, their health" and major determinants of health are social, economic and environmental factors. Health communication focuses on specific health-related transactions and factors that influence these transactions (Northouse and Northouse, 1998). Transactions can be verbal, non- verbal, oral or written, personal or impersonal and issue-oriented or relationship-oriented (Northouse and Northouse, 1998). In the case of this thesis project, communication will most likely be impersonal, written and issue-oriented communication, where information will be disseminated from Stakeholders (AIT) to the Users (volunteers and interns).

There are several challenges associated with delivering health promotion and education in the aforementioned impersonal, unidirectional way to a group such as volunteers at Art in Tanzania (Users). It is impossible to assess or reflect the Users' personal and individual experiences face to face, access information or specifically counsel the group. However, the aim is to provide empowerment by educating clients to find the goals to which they aspire. Providing education for clients is not about forcing them how to think or behave, but provide the tools with which they can change their behaviors (Tschidin, 1995).

When considering project planning within health education, specifically within travel health, there is a huge range of material for travel health advice, and this material is of varying quality, ranging from books, travel books, blogs, websites and advice from health professionals. Therefore, there has to be certain criteria to fulfill (see Section 4.3). Selecting and producing health promotion resources can be demanding as information needs to be regularly updated or some information may be misleading or inappropriate for the target group.

Health promotion and communication can occur at different levels using different means and media. This involves for example, mass communication at national or international level health programs, health promotion campaigns or public health planning. These can be in the forms of presentations, speeches, public addresses. Furthermore, as technology has evolved, the medium of communication has also evolved to incorporate more interactive, internet-based communication which tends to appeal to younger clients. (Ewles and Simnett, 2004)

In this project, written communication was aimed at people for whom English may not be a first language (I.e. from other parts of Europe). As such, it was especially important to ensure simple words, phrasing and technical terms were kept to a basic level. Language was plain and accurate and points were expressed in words, tables and pictures, where appropriate. Furthermore, technical terms were explained plainly to avoid overloading the customer with unnecessary, or too theoretical, information (Roukens, 2010).

In order to produce effective resources, the material presented should be brief and to the point. Key objectives should be firmly in mind to present to the group and there should be no irrelevant material. The style of the language and the style of presentation (colors, fonts, sizing of pictures and writing etc.) should also be considered.

There are challenges related to travel health consultation including ensuring the correct balance between the content of the advice, the way it is conveyed and the effect it has on the recipient (Bauer, 2005). Studies have shown that only a limited

amount of information can be absorbed during health consultations. It has been estimated that patients are able to recall about 50% of the advice after 5 minutes and remember the only first third of the information at best (Bauer, 2005).

The target group of clients (Users) will be an international group of similarly- aged young adults from Europe, U.S and Canada. While there may be similarities regarding culture, there may be certain multicultural consideration to take into account, and different behaviors, such as attitude to alcohol, drugs or sexual health (Huff and Kline, 1999). These cultural factors may increase the already challenging task of creating and delivering education for travel health in an appropriate way which is acceptable and understandable for all.

4.2 Stakeholders and Users

Art in Tanzania (Stakeholders) is a non-governmental organization (NGO) registered in Tanzania, Zanzibar, Finland and Ethiopia and is an example of one of the many NGOs in Tanzania. It was started in 2001 to support local artists and since then, the organization has grown and currently supports more than 300 volunteering and internship placements in Tanzania alone. Volunteers and interns participate in community development projects in education, adult education, social work, medical and health placements, social media, arts and music, sports coaching and HIV/AIDS awareness (Art in Tanzania, 2013b).

Volunteers and interns (Users) at Art in Tanzania arrive from all parts of the world, mostly Europe and U.S/Canada, and placements are available in Dar es Salaam (East coast), Moshi, Karatu, Maasai land, Serengeti (North) and Zanzibar. (Art in Tanzania, 2013a, 2013b). Approximately 1000 volunteers and interns work with Art in Tanzania annually and there are about 100 staying in the country at any one time (Art in Tanzania, 2013a).

The majority of the volunteers and interns live and work in the Dar es Salaam volunteer house, with their stay ranging in time from several days to approximately 6 months. When volunteers and interns arrive to the volunteers' accommodation site in Tanzania, team leaders are responsible for volunteers' acclimatization and well-being

during their stay, especially during the first orientation and introductory days. This includes educating new volunteers about common health problems, safety issues and travelling in the Bahari Beach area. There is a need for more up to date health education as the accommodation house can hold up to 50 volunteers at one time and dispersing information to large groups during orientation days is challenging.

4.3 Literature search and search criteria

To gather information for this thesis project, a literature search was implemented. This method does not fall into the category of a systematic literature review, but the basic principles of utilizing evidence-based guidelines and critical thinking were used to ensure that the literature and searched material was trustworthy.

A literature search is considered as a means of searching the literature for some studies or information (O'Gorman et al., 2013). A literature search is considered as a less robust methodology than a systematic literature review; however, it is a viable process for searching for larger amounts of information, such as creating this type of project, provided certain limitations are included to ensure reliability of the searched literature (O'Gorman et al., 2013). It must be noted that limitations of a literature search can potentially include author biases by cherry-picking data therefore resulting in misleading conclusions (Aveyard, 2010).

However, in an information-based project such as this thesis, it is essential to collect information from trustworthy sources (Bell, 2006; Hofstee, 2006). This was achieved by searching within reliable resources of information, which included data and documentation from the World Health Organization, World Bank, Evidence-Based Medicine (EBM) Guidelines and international, journal articles with full-access titles from international, peer-reviewed journals from databases such as EBSCO and PubMed from JAMK's Nelli-Portal. Furthermore, books and e-book resources from Ebrary services, and other web publications were also considered. This method of searching for credible and reliable information ensured that the literature search method did not risk author biases.

Inclusion/exclusion criteria

Inclusion and exclusion principles were used when searching for information, and these are reported in as listed in Table 2. Search statements included key words considered fundamental to building the travel manual and presentations. The language of choice was limited to English for ease of understanding and communication. Furthermore, the type of literature was limited to international journals and peer-reviewed articles (excluding literature reviews) as these sources are considered trustworthy and credible. Moreover, full-text articles enabled the author and readers to access the information freely via the Nelli Portal at JAMK.

Inclusion criteria	Exclusion Criteria
<p>Inclusion keywords: 'travel medicine' traveler health', 'traveler diarrhea, 'traveler malaria', 'traveler behavior'</p> <p>Language: English</p> <p>Types of literature: International peer-reviewed journal articles (available as full-text) from PubMed or EBSCO searches via JAMK's Nelli Portal, or Ebrary resources and online publications</p>	<p>Exclusion keywords: 'Pandemic Influenza'</p> <p>Time: Journal articles over 10 years old</p> <p>Type of literature: Literature reviews</p>

TABLE 2: Inclusion and exclusion principles for the implemented literature search

The exclusion principles were chosen to limit information and ensure the literature collected was up to date (Journal articles greater than 10 years old were excluded). Pandemic influenzas were popular in the travel health literature but were deemed beyond the scope of this thesis project and were therefore excluded from the search.

When searching the literature, detailed evaluation of the information was done to assess the relevance of the material to the topics and objectives of the thesis. As a result of the literature search, the following resources were selected by the author and were considered to fulfil the criteria and be relevant to the project. The following table includes the resources that found from the search (Table 3) and in what part of the project they were used. The table can also be viewed in greater detail in

Appendix 1. In total, 5 journal articles, 6 e-books and 10 online publications/websites were used.

Author and Reference	Type of literature	Use in the thesis project*	Findings and information used
Alon et al. (2010)	Journal article Source: PubMed	1,2	Differences between youth and elderly travelers
Arguin and Tan (2013)	Website	2	Travelers' malaria
Bhatta et al. (2009)	Journal Article Source: PubMed	1,2	Studying the health of long-term volunteers
deBruyn et al. (2000)	Journal article Source: PubMed	1	Evidence for the benefits of antibiotic treatment for travelers' diarrhea over a placebo.
Center of Disease Control and Prevention (2013a)	Website	1,2	Sexual health Food and drink behavior
Center of Disease Control and Prevention (2013b)	Website	1,2	General travel health advice
EBM Guidelines (2013)	Online Database Source: Nelli Portal, Terveysportti Database	1	Travelers' Diarrhea
Ericsson et al. (2007)	E-book. Source: Ebrary	1	Travelers' Diarrhea
Freedman et al. (2006)	Journal article Source: PubMed	1	Mild, self-limited illnesses such as diarrhea, respiratory infections, and skin disorders are common in travelers
Leder et al. (2013)	Journal article Source: PubMed	1,2	Describe typical diseases in returned travelers
Roukens (2010)	E-Book Source: Ebrary	1,2	General travel health and advice Infectious health issues (malaria, HIV, TD)

Schalgenauf-Lawlor (2007)	E-book Source: Ebrary	2	Travelers' malaria
Steffen et al. (2007)	E-Book. Source: Ebrary	1,2,3	General travel health and advice
Travel Medicine (2008a)	Website	1,2	General travel health advice and information.
Travel Medicine (2008b)	Website	1	Travelers' diarrhea
UNAIDS (2013)	Website	1	Sexual health (HIV)
United Republic of Tanzania Ministry of Health and Social Welfare (2005)	Online publication	2	Travelers' Malaria and malaria in Tanzania
World Health Organization (2000)	E-book. Source: Ebrary	2	Malaria - Diagnosis
World Health Organization (2010)	E-book. Source Ebrary	1,2,3	General travel health advice
World Health Organization. (2013a)	Website	2	Global malaria and parasite lifecycle
World Health Organization. (2013b)	Online Publication	1	Accidents in Tanzania

TABLE 3: Literature search results and use of resources in the health education material for travelers. (*1 denotes use in the travel manual, 2 denotes use in the travelers' malaria presentation, 3 denotes use in the first aid kit list)

5 PRODUCT

The product is broadly separated into three components. The first component was a Word document for the AIT website describing general issues in travel health (See Appendix 2). This included infectious and non-infectious health problems and conditions associated with health issues specifically for travelers. The second component, a PowerPoint presentation, focused on presenting more detailed information about travelers' malaria (See Appendix 3). The final component included a first aid kit list for volunteers (See Appendix 4). The first aid list may be edited to be delivered to other establishments collaborating with AIT (such as schools and orphanages). The following information was collected from the literature search and was used to create the products.

Travel manual for general health issues

Climate

For travelers going to developing countries such as Tanzania, the environment plays an important role in travels. Often, the climate differs substantially from the traveler's home country and changes in climate can directly or indirectly lead to diseases and other health problems (Steffen et al., 2007). Such changes in climate (high temperature and humidity) can lead to dehydration. Current health advice both from the World Health Organization (2010) and the Center of Disease Control (2013a) highlight the importance of drinking fluids regularly, increasing salt intake marginally (unless contraindicated by a health condition) and limiting alcohol consumption. Ensuring adequate fluid intake is especially important for vulnerable groups such as children and the elderly.

Air pollution can also be problematic in many large cities, such as Dar-es-Salaam (Tanzania), and dust from unpaved roads and arid areas may increase the risk of developing upper respiratory tract infections. (Steffen et al., 2007). Exposure to hot dusty air may increase the risk of eye infections (Roukens, 2010) and it is therefore recommended to avoid or limit the use of contact lenses, for instance, to reduce irritation to the eyes and reduce the risk of eye infections (World Health Organization, 2010).

Dermatological conditions

It has been well-documented that long-term UV overexposure from sunlight can increase the risk of some skin cancers and accelerate skin aging, and short-term overexposure can result in sunburn, particularly at high altitudes, especially for light skinned people. UV overexposure can also lead to long-term damage of the eyes, resulting in conditions such as keratitis. (World Health Organization, 2010) Travel health advice recommends that travelers should avoid sun exposure in the middle of day, wear covering clothing, use UV sunglasses, a sunhat, high SPF sunscreen, and take precautions against exposure while swimming or on water (Steffen et al., 2007; World Health Organization, 2010).

It is worth noting that skin irritation (prickly heat) and fungal infections can be exacerbated by hot weather (WHO 2010). Exposure to sunlight can also result in solar urticaria (hives) with itching and redness. Furthermore, insect bites, allergic reactions and skin abscesses are common causes of dermatological problems and have been regularly reported by travelers in Sub-Saharan Africa (CDC, 2013b).

Adverse skin reactions from interactions between drugs and sunlight have been documented (Steffen et al., 2007). These reactions can be photosensitive or phototoxic. Photosensitive medication can include certain antimicrobials, oral contraceptives and some prophylactic malaria medication. Phototoxic reactions arise from products and substances that are applied topically to the body, such as perfumes and oils. Bergamot and citrus oils have been particularly noted as phototoxic by The World Health Organization (2010).

In order to avoid skin irritation and dermatological problems, it is suggested to take regular showers and wear loose clothing. More importantly, it is essential to avoid insect bites, especially mosquitoes, not only to avoid itching and dermatological problems, but also to avoid malaria and other insect-borne diseases. Furthermore, it is important to check if medications and products have photosensitive or phototoxic side effects, and if the traveler has had previous reactions, exposure to sun should be avoided or other more suitable medication may be prescribed during pre-travel advice. (World Health Organization, 2010)

Accident

It has been reported that accidental death accounts for 16% of all deaths due to injuries among US travelers (Travel Medicine, 2008a). As specified previously, the largest cause of accidental death is due to road traffic accidents, especially in the case of young adult travelers (Steffen et al., 2007). In Tanzania, road traffic accidents are numerous, and in 2010, for example, there were almost 3600 fatalities on the roads (World Health Organization, 2010b). This is in part due to the high number of vehicles in the cities, relaxed enforcement of both drink driving laws and seat belt-wearing (especially for passengers), and a lack of helmet laws for motorcyclists and bicyclists. Furthermore, there are many 2- and 3-wheel motorized vehicles

(motorcycles and bajajis) acting as taxi services, which account for nearly 20 % of fatalities in Tanzania (World Health Organization, 2010b).

In Tanzania, it is recommended that travelers do not drive in the cities, especially at night, due to the risks of drink-driving and the poor condition of roads. This also extends to the use of 2- and 3-wheel motorized vehicles at night, due to the vehicles' state of disrepair (U.S. Bureau of Consular Affairs, 2013). Bicycling is considered especially hazardous in and around large cities, such as Dar es Salaam, due to the lack of helmets and lack of safe routes for cyclists (World Health Organization, 2010b). Other smaller risk factors for accidental deaths include drowning at sea or swimming pools, especially for children (Steffen et al., 2007). Fatalities due to animal attacks are extremely rare and an uncommon cause of death among travelers. For example, Steffen et al. (2007) reported only three known cases of foreign tourists being killed by wild mammals in South Africa (when individuals left their car to approach the animals).

Travelers' diarrhea

Traveler's diarrhea (TD) is the most common affliction for travelers and tourists around the world, and this includes Tanzania and the East African region (Freedman et al., 2006; Alon et al., 2010; Leder et al., 2013). Despite the fact that much research has been conducted to understand the pathogenesis of travelers' diarrhea, circumstances in many developing countries, such as hygiene conditions or infrastructural issues have not improved. Consequently, it is still a significant illness for the majority of travelers who become ill (Freedman et al., 2006; Leder et al., 2013).

The most predictive factors for both recurrent and acute cases of travelers' diarrhea include the place of origin of the traveler, their chosen destination and the length of time travelers spend in a foreign country (Du Pont et al., 2007). Erikson et al. (2007) equated travelers' susceptibility to diarrhea as resembling that of the children of the host country, and indeed, areas with high local child diarrhea cases frequently have a high risk of traveler's diarrhea, and Tanzania is no exception.

Epidemiology

Bhatta et al. (2009) showed that in a study of long-term volunteers, 80 % experienced travelers' diarrhea and it was the most prevalent health problem for that group of travelers. Diarrhea is generally seen within the first one to two weeks of a stay in abroad, generally lasts between 2 and 5 days and is usually self-limiting (EBM Guidelines, 2013). In Africa as a whole, the attack rate of traveler diarrhea was estimated to be between 30-50 % during a one week stay and rose to 60% during a 2 week stay (Erikson et al., 2007). However, over 90% of cases resolved themselves within one week i.e. self-limiting (Travel Medicine, 2008b).

Travelers' diarrhea (TD) is caused by bacterial (80% of cases), viral (5% of cases) or parasitic (10% of cases) organisms (EBM Guidelines, 2013). Bacterial origin TD can affect one or many people from a group who consumed contaminated or improperly prepared food (Erikson et al., 2007). The most common bacteria causing travelers' diarrhea are *E. coli* such as ETEC (Enterotoxigenic *Escherichia coli*), *Campylobacter*, *Salmonella* and *Yersinia* (EBM Guidelines, 2013). Symptoms depend on the type of bacteria that caused the episode of TD. All types of TD cause diarrhea, but other symptoms may include abdominal cramps, abdominal pain, bloody stools, loss of appetite, nausea and vomiting (EBM guidelines, 2013).

Enteric viruses are a second cause of TD and are increasingly recognized as important in some cases of travelers' diarrhea (Erikson et al., 2007). Main symptoms include watery diarrhea and vomiting. Other symptoms include headache, fever, chills, and abdominal pain. Symptoms usually appear within 12 to 48 hours after exposure to a virus and typically lasts for 1 to 3 days, although some symptoms last longer (EBM Guidelines, 2013). A third cause of travelers' diarrhea is parasitic infection, such as *Giardia*. These are common causes of diarrhea in travelers, but they can also be highly infectious. The potential pathways or transmission include fecal, oral, waterborne and foodborne routes. Parasitic infections such as *Giardia* (protozoan parasites) result in symptoms such as prolonged diarrhea, fatigue, abdominal cramps, bloating, malodorous stool, flatulence, weight loss, with less common fever and vomiting (EBM Guidelines, 2013).

Diagnosis

In developing countries where medical facilities are basic, it may be difficult to diagnose the cause of travelers' diarrhea due to lack of diagnostic tools. However, fortunately, most cases of diarrhea are self-limiting and treatment is similar for viral, bacterial, and parasitic traveler diarrhea.

Treatment

Currently, antibiotics are prescribed only for treatment of severe diarrhea either in the destination country or during pre-travel health advice as an option for self-treatment (Travel Medicine, 2008b). A Cochrane Review showed benefits of antibiotic treatment for severe travelers' diarrhea as a higher proportion of subjects were cured within 72 hours and the severity of the illness was reduced when compared with a placebo (de Bruyn et al., 2000). Despite antibiotics as a treatment option for severe TD, increasing worldwide antibiotic resistance means currently, antibiotic prophylaxis (prevention of TD using antibiotics) for TD is recommended only for a very small group of at-risk travelers (EBM Guidelines, 2013).

Anti-motility medications such as Loperamide and other medications (such as Peptobismol) ameliorate symptoms and are recommended for treatment of moderate TD (Erikson et al., 2007; Travel Medicine, 2008b). However, it is important to note that Loperamide and other anti-motility/antidiarrheal are not recommended for those with fever and/or bloody stools (EBM Guidelines, 2013; Travel Medicine, 2008b). In cases of severe, prolonged diarrhea, health care should always be consulted as IV fluids and antibiotic treatment may be needed to replace lost fluids in order to improve dehydration and reduce symptoms. Travelers with bloody stool or prolonged fever, severe vomiting or abdominal pain should seek medical attention as these symptoms may be signs of more serious illnesses (CDC, 2006).

Self-treatment

Self-treatment for less severe diarrhea includes replacing lost fluids with oral rehydration salts (ORS) in sufficient volume to recover urine output. Sports drinks, fruit juices, non-diet soft drinks and other fluids high in 'simple' sugars, should be avoided as the proportion of carbohydrates is too large and sodium (and other

electrolyte) balance is too low. Conversely, water alone is too low in carbohydrates and electrolytes. Therefore, supplementing small, regular meals with water (and ORS), soups, crackers and complex carbohydrates should improve absorption of glucose and electrolytes in the intestine, although this does not reduce stool volume. It is also recommended to avoid alcohol and dairy/milk products during the acute phases of diarrhea. (Travel Medicine, 2008b.)

Hand hygiene

It has been reported that transmission of acute gastrointestinal illnesses is almost exclusively caused by bacteria on the hands (Travel Medicine, 2008b). These bacteria are easy to remove from the hands by hand-washing and it is recommended to wash hands for at least thirty seconds, which reduces the number of bacteria, parasites and viruses acquired through human contact and contaminated surfaces by up to 95% (Travel Medicine, 2008b). Antiseptic wipes and hand sanitizer gels containing more than 60% alcohol are easy to carry in locations where hand washing may not be possible. Hand washing and hand sanitizer gels have also been shown to reduce the spread of colds and respiratory illness (CDC, 2013b).

Food and drink behavior

Despite challenges of avoiding suspect foods and drinks, it is still recommended to avoid dietary indiscretions, where possible, as the chances of illness may be reduced. Furthermore, it is important to note the added benefit of following careful eating and drinking habits in the prevention of diseases other than travelers' diarrhea. Hepatitis A or E, typhoid fever and other parasitic infections have been reported in Tanzania and can be effectively reduced by following the aforementioned advice be up to date with vaccination regimes (CDC, 2013a).

Sexual health

Sexual health is an important factor within travel medicine and all health promotion strategies (Ewles and Simnett, 2004). Tourists, especially young and single travelers, long-term volunteers, military personnel and those visiting friends and relatives (VFR) are more likely to be exposed to STI's or be involved in unprotected sex than short-stay businessmen or tourists.

Little information is available on travelers' deaths that occur after return as a consequence of STIs acquired many years after human immunodeficiency virus (HIV) infection or accidents during the stay abroad. Several years ago, it was estimated that 6 in 100,000 travelers ultimately died of AIDS, owing to HIV transmission mostly through unprotected, casual sex during a stay in a developing country (Roukens, 2010). Roukens (2010) also reported that for example, in European countries, such as Switzerland, 10% of HIV infections were acquired abroad; and in the United Kingdom, the risk of acquiring HIV was considered 300 times higher while abroad, compared with staying home.

The prevalence of HIV/AIDS is 5.1% in Tanzania, which is considered high prevalence from a global perspective (UNAIDS, 2013). As such, it is recommended that protection against sexually transmitted diseases follows that of sexual health advice in most parts of the world. The CDC (2013a) recommends that condoms should always be used as protection, (and should be used correctly), casual sex should be limited if abstinence is not a personal choice and travelers be vaccinated against hepatitis B. Furthermore, injecting drugs or sharing needles that can break the skin (including tattoos, piercings or acupuncture) should be avoided. Other medical or dental equipment, for instance, should be disinfected or sanitized. Finally, alcohol consumption should be limited as people take more risks when intoxicated, and this is not only limited to sexual behavior. (CDC, 2013a). If the traveler experiences risky sexual behavior, testing for sexually transmitted infections is recommended at the earliest opportunity.

Travelers' Malaria presentation

Malaria is a major international public health problem causing 219 million cases of malaria and approximately 660,000 deaths in 2010 alone (WHO, 2013). Although the global mortality rates for malaria have fallen by more than 25% since 2000 and by 33% in the African Region alone, according to the World Health Organization (2013), it still remains a significant cause of mortality and morbidity in malaria-endemic countries. Although both the number of cases and number of deaths among

populations where malaria is endemic has been decreasing, the number of malaria cases among travelers has shown a steadily increasing trend (Schalgenhauf-Lawlor, 2007).

Malaria transmission occurs in large areas of Africa, Central and South America, parts of the Caribbean, Asia (including South Asia, Southeast Asia, and the Middle East), Eastern Europe, and the South Pacific (Arguin and Tan, 2013). Tanzania is defined as a malaria-endemic country by the World Health Organization (2010a). Moreover, malaria is a significant economic burden and is the most common health problem and number one cause of morbidity and mortality in the Tanzanian population, especially among vulnerable groups, such as pregnant women and children under 5 years old (United Republic of Tanzania Ministry of Health and Social Welfare, 2005; WHO, 2010). The United Republic of Tanzania Ministry of Health and Social Welfare (2005) classifies travelers as a vulnerable group within the recommendations of treatment for malaria in Tanzania, which demonstrates the importance of the disease to travelers in Tanzania.

Sub-Saharan Africa is the most common destination for travelers who acquired fatal cases of malaria (Schalgenhauf-Lawlor, 2007). However, malaria is less common in travelers than in the host population and case fatality rates are low, mostly due to chemoprophylaxis and personal preventive methods (PPMs). For examples, fatalities of European travelers visiting a malarious country average at 1.1% (range 0-3.6%), and the risk of travelers acquiring malaria ranges hugely both around the world and within a specific country from 0.05-0.01% in Central America, 2.4% in West Africa 8% in the Solomon Islands. (Schalgenhauf-Lawlor, 2007).

Epidemiology and life cycle

Malaria is caused by species of the protozoan parasite, Plasmodium, of which 4 are important to humans; *P.falciparum* (which is not only one of the most common parasites but also causes the most serious symptoms and the most fatalities), *P.vivax* (one of the most common parasites), *P.ovale* and *P.malariae* (WHO, 2013). These protozoans are passed from a mosquito of the Anopheles species (a malaria 'vector') to a human during a blood meal.

When a female mosquito feeds on a human, it may inject between several and 200 sporozoites (infective stages of the parasite life cycle) from the salivary gland of the mosquito into the bloodstream of the human host. Sporozoites enter the liver cells (hepatocytes), replicate and develop, which gives rise to thousands of infective merozoites within 5.5- 7 days. The merozoites rupture from the liver and infect red blood cells and the parasites growing in the red blood cells infect new red blood cells. The completion of this blood cycle corresponds to fever. There can be several broods of parasite in the bloodstream which can lead to subtertian or quotidian fever (fever that rises and falls regularly over a 24 hour period). Some of the species of the parasite remain dormant in the body and are responsible for relapses in malaria.

Most parasite species then develop into sexual forms which can be transmitted from the blood of a human back to a mosquito when another mosquito takes a blood meal from a human. These stages are transported to the stomach of the mosquito and the life cycle continues within the mosquito. New life stages of the parasite migrate to the salivary gland of the mosquito to infect another human. The salivary glands of mosquitoes can contain up to 60-70000 parasite stages, but only a few are injected into a person at each time. It is estimated that at least half of bites from an infected *Anopheles* mosquito will result in a blood infection and clinical attack in non-immune subjects. (Schalgenahauf-Lawlor, 2007)

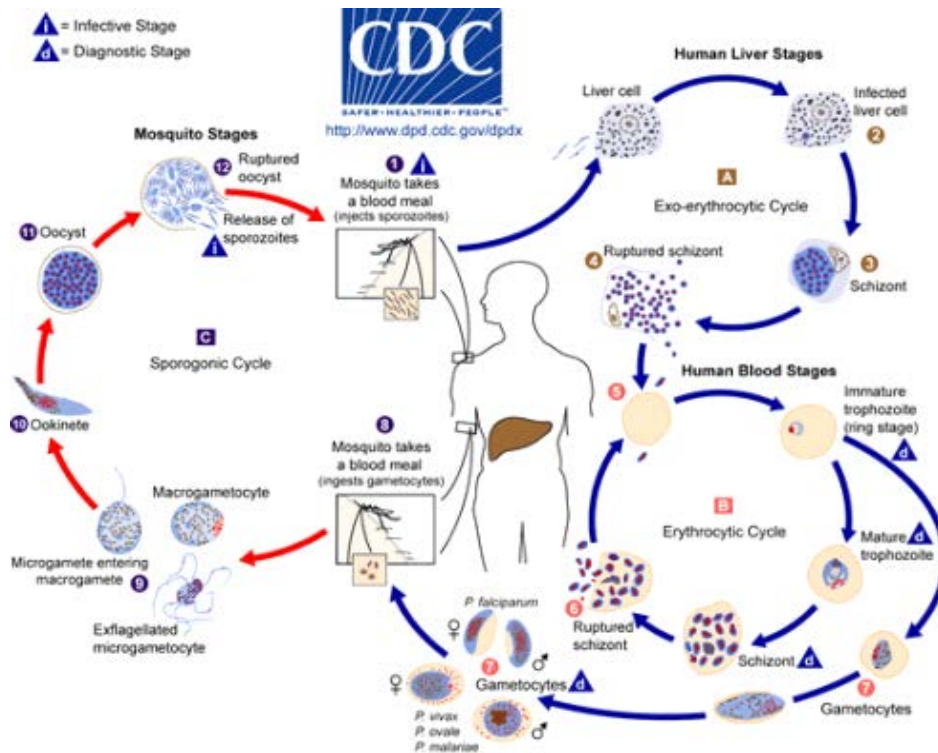


FIGURE 5: Illustration of the malaria parasite lifecycle. From CDC (2013b). Cycle A represents human liver stage where parasites multiply in the liver cells. Cycle B represents the erythrocyte stage where parasites multiply in the blood. Cycle C represents the stages in the mosquito vector. 'd' represents the stages at which malaria can be diagnosed (i.e. erythrocyte stage). 'I' represents the infective stage.

Transmission

Intensity of transmission depends on several factors related to the parasite, the vector, the human host, and the environment. *Anopheles* mosquitoes tend to breed in shallow, fresh water and all of the important vector (mosquito) species bite at night, between dawn and dusk (WHO, 2013). Therefore, transmission is more intense in areas where these conditions are present. Transmission is also more intense in places where the mosquito species has a longer lifespan as the parasite has time to complete its lifecycle. Furthermore, in certain areas of the world, the mosquito prefers to bite humans rather than animals, which increases the chance of infecting a human host. For example African vector species have a long lifespan and strong human-biting habit which may explain why more than 90% of the world's malaria deaths are in Africa. (WHO, 2013)

Transmission further depends on the climate, which may affect the number and survival of mosquitoes, temperature, humidity and rainfall. In many places, transmission occurs according to the seasons and peak according to rainy seasons. Finally, human immunity is another important factor. Partial immunity is developed over years of exposure, and while it never provides complete protection against malaria, it does reduce the risk that the infection will cause severe disease. Most malaria deaths in Africa occur in young children, whereas in areas with less transmission and low immunity, all age groups are at risk. The lack of immunity among many travelers means that they are especially susceptible to malaria transmission.

As stated previously, *Plasmodium falciparum* is the most clinically significant of the 4 species of malaria parasite for humans. It is especially significant in tropical and subtropical regions of Africa and Asia, however, in Sub-Saharan Africa it is responsible for almost all recorded malaria cases (Schalgenahauf-Lawlor, 2007; WHO, 2013). *Falciparum* takes 7-27 days for clinical signs to occur (incubation period) and if a patient lacks immunity, infection can develop quickly and acutely.

Symptoms

According to (Schalgenahauf-Lawlor, 2007), the main histories of malaria can be separated into complicated and uncomplicated malaria. Symptoms of uncomplicated malaria include fever in the majority of patients followed by chills, pain such as headaches and muscle aches. Furthermore, nausea and vomiting may be present in some adult patients, but is more common in children (see Table 4).

Uncomplicated malaria	Complicated malaria
Fever (97 % of cases),	Impaired Consciousness, coma, Hypoglycemia
Chills (78 %),	Generalized seizures
Headache (74 %),	Hemoglobinuria Acute Renal Failure
Sweats (64 %)	Severe anemia and jaundice,
Myalgia (34 %)	Acute Respiratory Distress Syndrome (ARDS)
Nausea and vomiting (27% each), with vomiting being more frequent in children.	Hypotension, Circulatory collapse
	Parasitemia >5 %

TABLE 4: Symptoms of complicated and uncomplicated malaria. (Summarized from Schalgenahauf-Lawlor, 2007)

Risk factors for progression of symptoms may include delayed treatment, inadequate treatment, high parasite burden, or lack of acquired immunity. (Schalgenahauf-Lawlor, 2007). If uncomplicated malaria worsens, and symptoms become more severe, complicated malaria may be diagnosed. Symptoms of complicated malaria may include impaired consciousness and circulatory collapse, leading to coma (see Table 2). Severe symptoms, especially coma, may be diagnosed as cerebral malaria and is the least desirable outcome. It is defined as a coma that is not attributable to any other cause in a patient infected with *P.falciparum*. It is a life threatening complication that has been reported in up to 80% of fatal cases of malaria (Schalgenahauf-Lawlor, 2000).

Diagnosis

It is challenging to diagnose malaria early as initial symptoms resemble those of influenza or other viral infections. On the other hand, diagnosing the presence of the malaria parasite is reasonably straightforward and cheap for many healthcare facilities (World Health Organization, 2000). The specificity of diagnostic tests, however, is dependent on the facilities available at the health care center or hospital. Larger health centers and hospitals have more resources whereas small, local, health centers in developing countries such as Tanzania only have the resources for testing for the

presence of the parasite in the blood but not the species of parasites or the level of parasitemia (level of infection).

The most common, easy and cheap test is the Rapid Diagnostic Test (RDT) (Steffen et al., 2007). Thick and thin blood smears along with other blood tests such as blood glucose, Complete Blood Count (CBC) etc. may also be taken depending on the suspected level of parasitemia (severity of malaria) (World Health Organization, 2000). Rapid Diagnostic Tests detect malaria parasite antigens in the blood and the test can be performed in a short time (15 minutes) with high diagnostic reliability. The test involves taking a small sample of blood from the finger and is relatively painless. It only measures whether the test is positive or negative, not the quantification of parasites or species present, so tests cannot evaluate clinical outcomes (United Republic of Tanzania Ministry of Health and Social Welfare. 2005). All levels of healthcare can use these tests, and they are proven to be especially useful for travelers with suspected malaria. If the RDT results are positive, quantitative tests can be performed to show level of parasitemia and possible species and stages of the infection in order to provide a more comprehensive treatment plan.

Tests that show the parasites in the blood, such as thin and thick blood films can quantify the parasites, as parasites per microliter, which is recommended as a reliable and qualitative method (WHO, 2000). A simpler, cheaper method is the plus method which is semi-quantitative and not as useful as the previous method. Basically, the higher the parasitemia, the higher the number of parasites in the blood films and also a number of plusses in the plus method (+ - ++++). Those tests that show the species and quantity of parasites in the blood can distinguish between the different species' life stages of the parasite in the blood, where the higher amount of mature life stages and reproductive stages, the higher the parasite burden, and more serious is the infection.

Treatment

Symptoms of malaria can rapidly progress and the patients can deteriorate quickly. Therefore, fast access to treatment is essential. According to the United Republic of Tanzania Ministry of Health and Social Welfare (2005), there is a minimum standard of treatment that all patients with malaria or suspected malaria infection should receive. As travelers are defined as a vulnerable group (at-risk) along with neonates, children under 5, pregnant women and immunosuppressed individuals, swift diagnosis and treatment is essential. Previous treatments for malaria such as Chloroquine and Sulfadoxine-Pyrimethamine (SP) are no longer recommended in Tanzania as they have exceeded resistance as reported by the United Republic of Tanzania Ministry of Health and social welfare (2005). Therefore, treatment plans use Artemether/Lumefantrine (ALu) as the first line drug for treatment of uncomplicated malaria for all age groups. Quinine is recommended for pregnant women during the first trimester and children weighing below five kilograms. Quinine is also used in the treatment of severe malaria and can be used as a second-line drug. Sulfadoxine/Pyrimethamine (SP) remains the drug of choice for Intermittent Preventive Treatment (IPT) of malaria during pregnancy, which only prevents the worst effects of malaria during pregnancy, rather than a clinical cure. Treatment of malaria for travelers, and indeed all patients, involves oral treatment (tablets), intramuscular (I.M) injections or I.V treatment in more severe cases.

Stand-by Emergency Treatment (SBET)

Stand-by Emergency Treatment is a method of self-treatment for travelers who are in malaria-endemic areas for less than one week or those who will be in remote places and will be unable to access health care within 24 hours. They may choose to take a reliable course of approved malaria treatment on their travels to an isolated location to be administered presumptively in the event of acquiring a febrile illness (Arguin and Tan, 2013). This should be discussed in pre-travel health advice and is never used as a stand-alone treatment. Malaria chemoprophylaxis should still be taken, especially in malaria-endemic areas, such as Tanzania (Schalgenahauf-Lawlor, 2007). Literature suggests that stand-by emergency treatment (SBET) for travelers has some advantages and disadvantages and the rationale is based on risk-benefit to the traveler.

SBET is only recommended in specific circumstances, which includes: If the traveler is in an isolated area more than 24 hours from access to health care, a traveler has fever of $>37.5^{\circ}\text{C}$ and symptoms associated with malaria, medication is unavailable within 24 hours of onset of symptoms and there has been a minimal period of 6 days since a possible malaria exposure. It is suggested that the traveler attempts to reduce fever using methods such as administering paracetamol. In the event of the traveler having to self-treat for malaria under the above circumstances, it is essential to access health care at the earliest opportunity. Moreover, good quality medication should be bought in the traveler's home country and locally bought medication should not be relied upon as there are cases of counterfeit antimalarial in Tanzania, but also, local resources may be depleted.

Prevention, prophylaxis and (Personal Protection Methods PPM's)

Chemoprophylaxis

The goal of preventing malaria among travelers is challenging and relies on striking a balance between a chemoprophylaxis regime and mosquito- avoidance strategies and although many of the strategies are effective, none are 100% effective and therefore, a combination of strategies is needed (Arguin and Tan, 2013). Chemoprophylaxis is one key component of preventing or reducing the risk of developing malaria and this should be discussed during pre-travel health advice. It is strongly recommended to begin the course of treatment before travel and continue during travel and upon return to the home country. This ensures medication is in the body prior to exposure to mosquito bites. Furthermore, any unwanted side effects can be observed and medications can be changed for something more suitable for the individual. (Arguin and Tan, 2013; Roukens, 2010)

Three malaria medications are recommended for travel to Tanzania. Resistance to Chloroquine means that it is not recommended as a chemoprophylaxis medication in Tanzania. However, Atovaquone-Proguanil (Malarone), Mefloquine (Lariam) and Doxycycline are all suitable for travel to Tanzania. Each of these medications have advantages and disadvantages, their own side effects and schedules (See Table 3), but

each work by basically halting or disrupting parasite synthesis or lifecycle within the body (Arguin, and Tan, 2013.)

Medication	Advantages	Disadvantages
Atovaquone-Proguanil (Malarone)	<p>May be started 1–2 days before travel, therefore suitable for last-minute travelers</p> <p>Some people prefer to take a daily medicine</p> <p>Only taken 7 days after returning from travel, so good for short trips.</p> <p>Well-tolerated medication</p>	<p>Cannot be used by women who are pregnant or breastfeeding</p> <p>Cannot be taken by people with severe renal impairment</p> <p>Tends to be more expensive than some of the other options</p> <p>Some people don't want to take a medicine every day</p>
(Mefloquine) (Lariam)	<p>Taken weekly, which some people prefer</p> <p>Good choice for long trips because it is taken only weekly</p> <p>Can be used in all trimesters of pregnancy</p>	<p>Cannot be used in patients with certain psychiatric conditions</p> <p>Cannot be used in patients with a seizure disorder</p> <p>Not recommended for people with cardiac conduction abnormalities</p> <p>Drug must be started at least 2 weeks before travel so not suitable last minute travels</p> <p>Some people would rather not take a weekly medication</p> <p>Medication must be taken for 4 weeks after travel,</p>
Doxycycline	<p>Some people prefer to take a daily medicine</p> <p>Drug is taken 1-2 days before travel so suitable for last-minute travelers</p> <p>Tends to be the least expensive antimalarial</p> <p>People who are already taking doxycycline chronically do not need additional medicine</p> <p>Doxycycline also can prevent some additional infections</p>	<p>Cannot be used by pregnant women</p> <p>Some people would rather not take a medicine every day</p> <p>Must be taken 4 weeks after travel</p> <p>Not recommended for women prone to vaginal yeast infections when taking antibiotics</p> <p>increased risk of sun</p>

		sensitivity Side effect may include upset stomach from doxycycline
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TABLE 5: Three recommended chemoprophylaxis medications for travel to Tanzania. Information summarized from CDC (2013b)

It has been reported by Steffen et al. (2007) that a small percentage of travelers may choose to use alternative methods for malaria prophylaxis, such as herbal medicine or homeopathy. These options are not recommended due to their lack of proven safety or effectiveness. Homeopathic malaria prophylaxis, for example, has been shown to pose a considerable health risk, resulting in fatalities and prolonged intensive care (Steffen et al., 2007).

Personal protection methods (PPM's) and behavior

With respect to malaria, almost all travelers (> 95%) are informed about the risk in high transmission areas and but it is estimated that only about 50% will use the medication regularly and as directed. The majority of travelers use some form of personal protection measures (PPM) against mosquito bites, but less than 5% attempt to completely avoid bites by using all possible methods (Steffen, 2007).

Mosquito behavior

Mosquitoes of many species are attracted to humans by the human body's moisture and heat, and some mosquito species are able to detect carbon dioxide from up to 30m away. They may also be attracted to body odors and people wearing dark colored clothing. (Steffen, 2010). So, personal protection measures (PPM) are paramount at all times, especially when increased mosquito activity is noted, such as after rainy periods (Roukens, 2010).

Chemical repellents

DEET, Ethylexanediol, Indalone, DMP and EBAAP and Picaridin are all chemical repellent products that can be used on the skin to repel mosquitoes. DEET has been used successfully for over 40 years and it is recommended that skin-repellents

containing 10-35% DEET are the most suitable for almost all travelers as they are almost free of side effects. Any DEET repellents of a higher concentration are of little extra benefit and are toxic and some travelers may experience rare and severe allergic reactions (Steffen et al., 2007; Roukens, 2010).

It is essential to follow instructions on the packaging of chemical repellents. It is advised that repellent should be applied sparingly on all exposed areas of the body. Repellents should not be inhaled, ingested, applied on open wounds or irritated skin, or allowed to get into the eye. Furthermore, if using sunscreen, the sunscreen should be applied first and insect repellent second (Arguin and Tan, 2013). The above synthetic repellents are effective for several hours (approximately 3-4 hours) so require reapplication during prolonged exposure or when swimming. Environmental and human factors can reduce the efficiency of repellents. High temperatures, sweating, odor, abrasion by clothing can all affect the efficacy. Most repellents are solvents of plastic materials, eyeglasses or lenses, plastic watches etc. must be protected or removed before the repellent is applied. It is recommended to wash off the repellent when it is no longer needed.

Arguin and Tan (2013) have noted that products containing natural oils such as oil of lemon, eucalyptus or citronella are considered ineffective as mosquito repellents because of the short duration on the skin (less than one hour) and their effect is considered minima. Furthermore, Roukens (2010) noted that many natural oils can cause skin irritation and allergies.

Insecticides:

In Tanzania, it is recommended to use Permethrin-treated clothing and gear (either purchasing spray or pre-treated clothing). The product information for clothing that has been treated should be checked as it remains protective after multiple washings and can last variable lengths of time. It is also important to note that Permethrin is not for use directly on the skin. (Steffen et al., 2007.)

Preventing mosquito bites

In order to prevent mosquito bites, it is essential to follow chemoprophylaxis regimen and follow chemical methods noted above, stay and sleep in screened (with wire meshes of 6-8 meshes per cm²) or air- conditioned rooms and to use a bed net if the area exposed or is outdoors (Steffen et al., 2007). Furthermore, Steffen et al. (2007) suggested that the body should be covered by wearing light- colored, long-sleeved shirts, long pants, and hats as mosquito bites can penetrate thin clothes that are less than 1mm thick or with openings greater than 0.02mm.

Return from travel

Upon return to the home country, any febrile illnesses or experiences of symptoms of malaria (see Table 2) should be reported to health care provider and the traveller should be tested for malaria (Steffen et al., 2007). Symptoms of malaria in returned travelers can present up to one year after first exposure for some species of *Plasmodium* parasite as the parasite is dormant in the body. As a consequence, it is not recommended to donate blood in the home country for approximately one year after travel (CDC, 2013b).

First aid kit list for travelers

It is generally accepted that travelers should carry a basic medical kit when traveling (WHO,2010, Roukens, 2010). The World Health Organization (2010) recommends the following items in a first aid kit list, especially for those travelers to developing countries or places with unknown quality of medical care and supplies.

Contents of a basic medical kit:

Basic injuries:

Adhesive tape

Antiseptic wound cleanser

Bandages

Scissors and safety pins

Sterile dressing

Clinical thermometer – To monitor fever if malaria or other severe disease is indicated

Allergies

Antihistamine cream or tablets – For allergies or reactions to insect bites

Insect bite treatment – to reduce itching of insect bites

Emollient eye drops, nasal decongestant -for allergy symptoms due to pollution or dust.

Gastrointestinal issues

Antidiarrheal medication (to include an anti-motility drug and oral rehydration salts (ORS) with appropriate written instructions regarding their use), Pepto-Bismol for gastrointestinal discomfort

Sexual health

Adequate supplies of good quality condoms and the oral contraceptive (if using)

Medication for any pre-existing medical condition

Sterile syringes and needles

Other items to meet foreseeable needs, according to the destination and duration

Antibiotic prophylaxis or Stand-by treatments, if discussed in pre-travel health advice

Everyday items

Sunscreens – At least SPF 30 to avoid sun damage

Insect repellent – containing 15-35% DEET or other recommended repellents. Also Permethrin to treat clothes and gear. This helps to avoid insect bites (especially mosquito bites)

Earplugs- For sharing rooms and getting a peaceful night sleep

Anti-malarial medication – Taken as directed

Simple analgesics (e.g. paracetamol) – for pain relief and to help reduce fevers.

6 DISCUSSION

6.1 Discussion of the process and product

The vast majority of the 980 million trips made globally in the tourism and travel industry do not result in injury, disease or death. However, there is a link between youth travelers and failure to adhere to travel advice and sensible travel behaviors (Alon et al., 2010).

Non-vaccine preventable infectious diseases, especially travelers' malaria were highlighted in this educational material as travelers' malaria remains one of the most common concerns for travelers, and one of the most common reasons for febrile illnesses and infectious disease deaths among travelers returning from developing countries (Siikämäki et al., 2011, 2013). Furthermore, travelers' diarrhea (TD) was a main topic of interest in this project as gastrointestinal disorders such as TD are the main causes of mild, self-limiting illnesses while abroad (Leder et al., 2013).

Environmental factors were also considered, such as personal safety, accident risk and climate as these are easily avoided and prevented by sensible travel behavior (Steffen et al., 2007).

Following the creation of the health education material, the logical following steps in the process of this project would be to evaluate how the material was used by the Stakeholders and the effectiveness of the educational material. At the time of writing, such evaluation was not possible due to staffing issues at Art in Tanzania. However, it is hoped that in the near future, staff will evaluate the material by requesting feedback from the Users on the quality, style and suitability of content of the product.

The challenges associated with producing educational material and health promotion activities in an issue-orientated, impersonal, written communication manner included using correct language, phrasing, and content. Therefore, to build on this project, future research and collaboration with Art in Tanzania could revise the information used in this project (according to feedback received) to better suit the Users.

Furthermore, more quantitative evaluation methods could be implemented in future work by assessing travelers' perceptions of travel risks and behaviors before and after receiving the educational material. Indeed, it would also be interesting to study travel behavior within this demographic of long-term volunteer and intern travelers as detailed studies are somewhat lacking in the literature.

A main challenge in producing health education material, and in nursing and counseling of clients, includes finding a way to keep customers and clients motivated regarding behaviors and attitudes towards their health. Client motivation is an important concept in all aspects of nursing science and patient counseling at large (Shumaker et al., 2008). Shumaker et al. (2008) discussed certain challenges involved in motivating clients and the difficulties in overcoming these. This is especially the case in this project as the information presented to the Users is in the absence of a health professional and moreover, once travelers arrive in the destination country, pre-travel health advice can be quickly forgotten in a novel and exotic location.

General health motivation consists of both positive and negative factors, and these complex factors affect how people change and maintain their behavior. Factors under control of the health provider include complicated regimes, care and counseling and a lack of adequate instruction. These aspects were avoided in this project by attempting to make the material understandable and informative. These Provider-related challenges could further be avoided in this project by assessing feedback from the Users. Furthermore, in public health nursing at large, these challenges are also important to overcome, as is encouraging successful communication with clients so as to overcome these barriers. (Shumaker et al., 2008)

There are other predictors of motivation according to the person being counseled. Certain characteristics such as personality, mood and socialization affect how a person may react to counseling (Shumaker et al., 2008). This remains one weakness in providing this thesis project for a third party (Stakeholders) as it is impossible for interactions with the Users and the health professional which makes it impossible to interact with clients.

The Health Belief Model is related to helping motivate clients to consider their health more closely. Perceived severity and perceived susceptibility of diseases are important both for adherence and motivation of the client (Champion and Skinner, 2002). When clients receive knowledge and education about health problems, it is more likely to result in understanding of the risks and therefore changing the clients' perceptions and motivation. Subsequently, while this thesis project has some limitations in the form of being an impersonal approach to educating Users at Art in Tanzania about travel-related health issues, its main advantage has been that it provides education and knowledge about the most common traveler health issues in Tanzania, which could ultimately lead to altered behavioral intentions, motivation and adherence to travel advice.

6.2 Product reliability

The reliability of the product was ensured by adhering to the inclusion and exclusion criteria discussed in the Methods. The product met the aims and purpose of the thesis in that a literature search was implemented to create educational health material for the Stakeholders (Art in Tanzania).

The literature search method is considered to have certain limitations compared to a systematic literature review, such as risking author bias, but one key advantage was that it enabled a wide range of material to be searched and collected to create the educational material for the project while still upholding the principle of utilizing credible sources.

From the author's perspective, the project itself has been successful in that it has increased both the amount and specificity of information available to volunteers and interns (Users). Previous health information from AIT focused mostly on travelers' malaria and the advice was oversimplified in previous presentations made by AIT.

6.3 Ethics

Professional ethics are essential principles in nursing care and there is an emphasis on ensuring personal choice and personal autonomy for patients and clients (Bell, 2006; Tschidin, 1995). Some of the most fundamental principles in nursing ethics involve beneficence and non-maleficence – doing good for the patient and not doing harm, along with ensuring autonomy, advocacy and fidelity – acting for the patient and being truthful (Potter and Perry, 2007). In this project thesis, the focus was to provide volunteers with knowledge to enable them to realize the importance of adhering to travel health advice, which, from a health perspective, is preventing harm to the client and is important in terms of patient/client advocacy and fidelity (truthfulness).

According to the Code of Ethics for nurses (Nursing World, 2001) nurses have an ethical duty and responsibility to the public, not only when caring for the sick, injured and vulnerable. Nurses also have a duty to be knowledgeable about a community's health status and threats to the health and safety of their clients. Health promotion and education, along with knowledge of barriers to good health are important initiatives to ensure effective health prevention and promotion (Nursing World, 2001). Therefore, when considering travel health, it is ethically and practically important to be knowledgeable about the community at which the proposed educational material will be aimed. In the case of this thesis, knowledge and information about malaria and important travel-related illnesses for this 'community' (i.e. Users) was used to produce health promotion and education material.

Rumbold (1993) stated that the nurse has a responsibility to help patients and clients understand more fully the information that is presented about threats to the community health, but not use their power of authority to persuade the patient to make one choice over another. The information presented to the volunteers and interns (Users) attempted to be impartial and clearly presented so individuals could use this information to make educated decisions about their behavior and choices, without being influenced to act in a certain way against their will.

While the above principles are considered essential in all fields of nursing, there are other values to take into account when considering nursing research. Generally, subjects of any research or project are guaranteed that they will not suffer physical or mental discomfort. From the point of view of this thesis project, we may regard the ethical considerations from a similar perspective. Providing AIT volunteers/interns (Users) with wrong or sub-standard information contravenes the ethical principles of nursing, especially beneficence, non-maleficence and fidelity. It could also result in a lack of trust from the clients (in this case both Stakeholders and Customers/Clients) and, at worst, result in physical and mental harm from disease or infection.

6.4 Conclusions and recommendations

This thesis project used a literature search to compile health education material aimed specifically towards traveler health at the Art in Tanzania organization (Stakeholders). This project enabled Users i.e. volunteers and interns in the Art in Tanzania Organization in Dar es Salaam to become more familiar with traveler health problems in Tanzania and travel behaviors that may result in injury or disease. The literature search approach enabled a large amount of information to be searched and a wide variety of credible resources to be used to ensure reliability of the information provided.

As a result of increased travel and tourism worldwide, the importance of traveler health is becoming more widespread in public health services. Travel health education has previously been almost exclusively in the form of pre-travel health advice in travel clinics/GP surgeries in travelers' home countries, so this thesis has been a unique opportunity to target travelers during their stay abroad to reaffirm the pre-travel health advice that travelers receive before their departure.

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APPENDICES

APPENDIX 1: LITERATURE SEARCH RESULTS AND THEIR USE IN THE THESIS

(* 1=use in the general travel health manual, 2=use in the malaria presentation and information, 3= use in the first aid kit list)

Author and Reference	Type of literature	Use in the thesis project*	Findings and information used
Alon et al. 2010. Risk behavior and spectrum of diseases among elderly travellers: a comparison of younger and older adults.	Journal article Source: PubMed	1,2	Differences between youth and elderly travelers Risks to morbidity and mortality, i.e. risk of cardiovascular deaths in elderly compared to increased death due to accident and infection among youth travelers
Arguin, P.M and Tan, K.R. 2013. Infectious disease related to travel: Malaria. Center for Disease Control: Yellow Book	Website	2	Travelers malaria General global transmission of malaria Advice on SBET Advice on malaria chemoprophylaxis Types of insect repellents and their usage
Bhatta, et al. 2009. A Questionnaire Study of Voluntary Service Overseas (VSO) Volunteers: Health Risk and	Journal Article Source: PubMed	1	Studying the health of long-term volunteers High chance of developing TD (80% of volunteers experienced travelers' diarrhea)

Problems Encountered.			<p>TD was the most prevalent health problem.</p> <p>Sexual health: The study reported that 11% of long-term volunteers had placed themselves at risk of HIV and STIs by unprotected sex (45%) or split condoms (30%), typically with a partner from host country or fellow volunteers</p> <p>Unplanned or unforeseen sexual encounters raised the risk of unprotected sex.</p> <p>Reasons for unprotected sex were given as monotony, loneliness, sense of freedom and alcohol or drug use, which tends to limit inhibitions</p> <p>Low quality of consultation prior to the journey resulted in increased risk of unsafe sexual encounters</p>
deBruyn, et al. 2000. Antibiotic treatment for controversialists.	Journal article : Cochrane Database Systematic Review Source: PubMed	1	Evidence for the benefits of antibiotic treatment for travelers' diarrhea over a placebo. However, the study noticed more side effects among those taking the antibiotic treatment.
Center of Disease Control and Prevention. 2013a.	Website	1,2	<p>Sexual health</p> <p>Food and drink behavior</p>

Health Information for travelers to Tanzania, including Zanzibar; Clinician View. Accessed: 08.10.2013			to reduce risks of gastrointestinal problems Ensuring good fluid intake (for climate-related health problems i.e. dehydration)
Center of Disease Control and Prevention, 2013b. Health Information for Travelers to Tanzania, including Zanzibar; Traveler View. Accessed: 15.10.2013	Website	1,2	General travel health advice Knowledge of seeking pre-travel health advice Advice on the responsibilities of maintaining one's health while traveling
EBM Guidelines. 2013. Travellers' diarrhea.	Online Database Source: Nelli Portal, Terveysportti Database	1	Travelers' Diarrhea Epidemiology among international travelers Causes of TD: bacterial, viral and parasitic Most common bacteria causing travelers' diarrhea are E. coli such as ETEC (Enterotoxigenic Escherichia coli), Campylobacter, Salmonella and Yersinia. Generalized symptoms of TD and more specific symptoms are according the origin of the TD (bacterial, viral or parasitic)
Ericsson et al. 2007.	E-book. Source: Ebrary	1	Travelers' Diarrhea Risks of TD depend on risk

Traveler's Diarrhea.			<p>groups</p> <p>Attack rate of TD In Africa as a whole</p> <p>The bacterial etiology of travelers' diarrhea in Kenya (East Africa)</p> <p>Bacterial, viral and parasitic origin of TD</p> <p>Treatments of TD: Antibiotics for severe TD Self-treatment options: Use of anti-motility medications and Peptobismol</p>
Freedman et al. 2006. Spectrum of disease and relation to place of exposure among ill-returned travelers.	Journal article Source: PubMed	1	Main finding: Most health problems that travelers encounter are mild, self-limited illnesses such as diarrhea, respiratory infections, and skin disorders.
Leder et al. 2013. Geosentinel surveillance of illness in returned travelers.	Journal article Source: PubMed	1,2	<p>Main finding: Objective: To describe typical diseases in returned travelers according to region, travel reason, and patient demographic characteristics Refine key messages for care before and after travel.</p> <p>Setting: 53 tropical or travel disease units in 24 countries.</p> <p>Patients: 42,173 ill-returned</p>

			<p>travelers seen between 2007 and 2011.</p> <p>Results: Asia (32.6%) and sub-Saharan Africa (26.7%) were the most common regions where illnesses were acquired. Illness was mostly due to gastrointestinal (34.0%), febrile (23.3%), and dermatological (19.5%) diseases. 40.5% of all ill travelers reported pre-travel medical visits.</p>
Roukens. 2010. Travel Medicine.	E-Book Source: Ebrary	1,2	General travel health and advice Infectious health issues (malaria, HIV, TD)
Schalgenauf-Lawlor. 2007. Traveler's Malaria	E-book Source: Ebrary	2	<p>Travelers' malaria</p> <p>Epidemiology of malaria in Sub-Saharan Africa</p> <p>Epidemiology of travelers' malaria around the world and the risk of acquiring malaria in locations worldwide</p> <p>Symptoms of malaria and a table of symptoms</p> <p>Treatment including advice on stand-by emergency treatment (SBET)</p>
Steffen et al. 2007. Manual of Travel	E-Book. Source: Ebrary	1,2,3	General travel health and advice: Non-infectious and infectious health issues.

Medicine and Health.			Recommended equipment for a first aid kit list for travelers
Travel Medicine. 2008a. Chapter One: Overview of Traveler Health. Accessed: 20.07.2013.	Website	1	General travel health advice and information. Illnesses and risk of hospital stay among international travelers Proportion of travelers getting ill Comparison of youth travelers and elderly travelers Accidental death statistics
Travel Medicine. 2008b. Chapter Six: Traveler Diarrhea.	Website	1	Travelers' diarrhea Epidemiology of TD Severe TD may require antibiotic treatment. Self-treatment can include: Anti-motility medication and Peptobismol Important to note that Loperamide and other anti-motility/anti-diarrheals are not recommended for those with fever and/or bloody stools. General self-treatment replacing lost fluids: ORS (Oral Rehydration Solutions) Suitable diet Suitable drinks

			<p>Avoiding alcohol and dairy/milk</p> <p>Hand hygiene: Essential to reduce the spread of bacteria.</p> <p>Tendency of travelers to break the “boil it, cook it, peel it forget it” rule within 72 hours</p>
UNAIDS. 2013. Tanzania Overview.	Website	1	<p>Sexual health</p> <p>HIV/Aids: In Tanzania, the prevalence of HIV/AIDS is 5.1%, which is considered high prevalence from a global perspective</p>
United Republic of Tanzania Ministry of Health and Social Welfare. 2005. National Guidelines for the diagnosis and treatment of malaria.	Online publication	2	<p>Malaria</p> <p>Malaria and the guidelines of treatment in Tanzania</p> <p>Epidemiology in the Tanzania population and risk groups</p> <p>Validity of diagnostic tests :</p> <p>Standard of treatment to which malaria patients are expected to receive.</p> <p>Suitable treatments and non-suitable treatments in Tanzania (e.g. ALu, quinine, etc.)</p>
World Health Organization. 2000. Bench aids for the	E-book. Source: Ebrary	2	<p>Malaria</p> <p>Diagnosis of malaria and its quantification</p>

diagnosis of malaria			Other tests used in diagnosis e.g. blood glucose and complete blood count
World Health Organization. 2010. International Health: Situation as of 1 January 2010.	E-book. Source Ebrary	1,2	General travel health advice Vaccination advice Advice for climate and eye and dermatological conditions Warnings of phototoxic and photosensitive medications, General advice regarding malaria
World Health Organization. 2013a. Malaria Fact sheet.	Website	2	Malaria Epidemiology: Globally and in African region countries Important species of mosquitoes and parasites Lifecycle of the malaria parasite Intensity of transmission and associated factors Mosquito behavior
World Health Organization. 2013b. Country Profile: Tanzania. Road Safety	Online Publication	1	Accident Dangers of traffic accidents in Tanzania

APPENDIX 2: TRAVEL MANUAL FOR VOLUNTEERS AND INTERNS ARRIVING TO AIT

This short travel manual is aimed towards new volunteers arriving to Dar es Salaam. It shortly describes the most common health issues that are of interest to the traveler in Tanzania. It is hoped that this manual can help to prepare volunteers and interns for their arrival and the duration of their volunteering period.



TRAVEL MANUAL FOR VOLUNTEERS AND INTERNS AT AIT



Pre-travel health....Before you leave.....

You should consult pre-travel health advice in your own country at least 4-8 weeks before travel. Pre-travel health advice is essential for:

1. Travel counseling
2. Discussing malaria medications
3. Ensuring that any chronic health conditions are discussed and medications are prepared e.g. prescriptions are sufficient for the length of trip
4. Vaccinations are up to date and you should bring your vaccination card along!

Vaccinations for Tanzania

In travel health, the following infectious diseases are called vaccine-preventable infectious diseases and are easily prevented by being up to date with vaccination regimes in your own home country.

In Tanzania, you will need to have the following vaccinations up to date:

1. General vaccinations (vaccinations and boosters from childhood and early adult life)

- Diphtheria
- Tetanus
- MMR (measles mumps rubella)
- Hepatitis B, A

2. Vaccinations specific for Tanzania

Hepatitis A – one of the most common vaccine-preventable infections, typically from contaminated foods etc.

Typhoid – From contaminated food and water

Meningococcal meningitis

Tuberculosis – bacteria transmitted in the air from an infected individual resulting in severe infection in the lungs

Rabies – recommended if the traveler is at risk of handling animals (not common)

Cholera – recommended if involved in health care – i.e. relief work, or in hospital setting long-term

Yellow Fever -recommended in some countries, needed for travel to Zanzibar

Important non-vaccine preventable health issues

Health problems that cannot be prevented by vaccinations are called non-vaccine preventable illnesses and include diarrhea, malaria and sexually transmitted infections (e.g. HIV).

Travelers' Diarrhea

Traveler's diarrhea (TD) is the most common health problem for travelers and tourists around the world, including Tanzania.

It is the most common self-limiting condition (gets better by itself without treatment, or with self-treatment) but can cause distress and also can lead to lost time during your travels.



Epidemiology

Diarrhea is experienced within the first one to two weeks of a stay abroad, and generally lasts between 2 and 5 days. In Africa as a whole, the attack rate of traveler diarrhea was estimated to be between 30-50 % during a one week stay and rose to 60% during a 2 week stay. This can be even higher risk the longer your stay.

Travelers' diarrhea (TD) is typically caused by:

- Bacteria (80% of cases) e.g. *E.coli* (ETEC)
- Viruses (5% of cases)
- Parasites (10% of cases) organisms especially *Giardia* in Tanzania.

Giardia and other parasites are typically spread from surfaces or from soil, food or water contaminated by feces from infected humans or animals.

Type of TD	Bacteria (E.g. ETEC)	Viral	Parasite e.g. Giardia
Cases (%)	80	10	5
General symptoms*	Abdominal cramps and pain, bloody stools, loss of appetite,	Watery diarrhea and vomiting.	Prolonged diarrhea, fatigue, abdominal cramps, bloating, malodorous stool, flatulence, weight loss, fever and vomiting are less common
All types of TD result in diarrhea	nausea and vomiting	Also, headache, fever, chills, abdominal pain.	

General symptoms of travelers' diarrhea. *Symptoms may vary according to the patient.

Diagnosis

Diagnosis can be challenging where medical facilities are basic. In some health care facilities in Dar es Salaam it is possible to get a diagnosis by submitting a stool sample. However, fortunately, most cases of diarrhea are self-limiting and treatment is similar for many types of TD.

Treatment

Severe Diarrhea

- Antibiotics may be prescribed for treatment of severe diarrhea.
- IV fluids may be necessary for prolonged severe cases of TD.
- **ALWAYS** seek medical care in cases of **prolonged diarrhea, fever, severe vomiting and abdominal pain or bloody stools** as these prolonged symptoms may be a sign of serious health conditions

Self-treatment options

Antibiotics may be prescribed in pre-travel health advice before arrival to the destination. These can be carried in a first aid kit as a preventive strategy **IF** there is a severe case of TD and health care is not available. These self-treatments should be used with caution and may not be an option in all pre-travel health consultations due to the worldwide overuse and resistance to antibiotic treatments.

Mild- moderate TD: Self-treatment medications

- Anti-motility medications (Loperamide/ Imodium) slow the down bowel movement. These should be taken during acute phases of diarrhea and stopped as soon as symptoms improve (to avoid constipation)
- Other medications e.g. Peptobismol to ease Gastrointestinal discomfort

Loperamide and other anti-motility/antidiarrheal are not recommended for those with fever and/or bloody stools. Seek health care in case of these symptoms!



Self-treatment

The main aim of self-treatment for less severe diarrhea is to replace lost fluids and electrolytes (salts and sugars lost during acute diarrhea).

- *Oral rehydration salts (ORS)*

Oral rehydration salts are small sachets that are mixed with water to replace lost electrolytes. They should be used in sufficient volume to recover urine output (according to the instructions). These are available from pharmacies in travelers' home countries.

- *Diet*

- Sports drinks, fruit juices, non-diet soft drinks and other fluids high in 'simple' sugars, should be avoided as the proportion of carbohydrates is too large and sodium (and other electrolytes) balance is too low.
- Water itself is too low in carbohydrates and electrolytes
- Small, regular meals with water (and ORS) and foods such as soups, crackers and toast, rice, apple, banana can be eaten.
- Avoid alcohol and dairy/milk products during the acute phases of diarrhea.

Prevention of Travelers' Diarrhea

- *Hand hygiene*

Transmission of acute diarrhea and gastrointestinal problems is almost exclusively caused by bacteria on the hands. These bacteria are easy to remove from the hands by hand-washing

- Wash hands for at least thirty seconds, which reduces the number of bacteria, parasites and viruses acquired through human contact and contaminated surfaces by up to 95%.
- Antiseptic wipes and hand sanitizer gels containing more than 60% alcohol are also effective and handy to carry. Use gels and wipes on all areas of the hands and rub until hands are dry. Avoid using the hands while gels are still wet on the hands.
- Hand washing and hand sanitizer gels have also been shown to reduce the spread of colds and other respiratory illness

- *Food and drink behavior*

It is difficult to avoid all suspicious foods and drinks, but it is still recommended to avoid obvious dietary indiscretions, where possible, to reduce chances of diarrhea (e.g. food not cooked properly, food not stored properly, or food not prepared properly) Following careful eating and drinking habits also helps prevent diseases other than travelers' diarrhea. e.g. Hepatitis A or E, typhoid fever and parasitic infections (e.g. *Giardia*) that have been reported in Tanzania.

Travelers' Malaria

Malaria is a major international public health problem causing 219 million cases of malaria and approximately 660,000 deaths in 2010 alone (WHO, 2013). Global mortality rates for malaria have fallen by more than by 33% in the African Region alone, according the World Health Organization but it is the most common health problem and number one cause of morbidity and mortality in the Tanzanian population, especially among vulnerable groups, such as pregnant women and children under 5 years old.

Travelers are considered a vulnerable group due to their lack of acquired immunity and the number of malaria cases among travelers has shown a steadily increasing trend.

Importantly, Sub-Saharan Africa is the most common destination for travelers who acquire fatal cases of malaria. Fatal cases among travelers are low compared to Tanzanian population, due to anti-malarials and personal protection methods (PPMs).

Epidemiology and life cycle of the malaria parasite

There are 4 are important species of malaria parasite:

Plasmodium falciparum (the most common and causes the most serious symptoms and fatalities), *P.vivax* (one of the most common parasites), *P.ovale* and *P.malariae*. These protozoans are passed from an *Anopheles* mosquito to a human during a blood meal.

A female mosquito injects infective stages of the parasite life cycle from the salivary gland of the mosquito into the bloodstream of the human host. These parasites enter the liver cells (hepatocytes), replicate and develop, and thousands of the parasite stage is in the liver cells within 5.5- 7 days. These parasite stages from the liver then infect red blood cells and the parasites growing in the red blood cells infect new red blood cells. The completion of this blood cycle corresponds to fever. There can be several broods of parasite in the bloodstream which can lead to sub tertian or quotidian fever (fever that rises and falls regularly over a 24 hour period). Some of the life stages of the parasite remain dormant in the body and are responsible for relapses in malaria (*P.falciparum* and *P.malariae* do not produce dormant parasites but can cause relapses due to recrudescence).

Most parasite species then develop into sexual forms which can be transmitted from the blood of a human back to a mosquito when another mosquito takes a blood meal from a human. These stages are transported to the stomach of the mosquito and the life cycle continues, resulting in the parasites returning to the salivary gland of the mosquito to infect another human.

The salivary glands of mosquitoes can contain up to 60-70,000 parasite stages, but only a few are injected into a person at each time. It is estimated that at least half of bites from an infected

Anopheles mosquito will result in a blood infection and clinical attack in non-immune subjects (i.e. travelers)

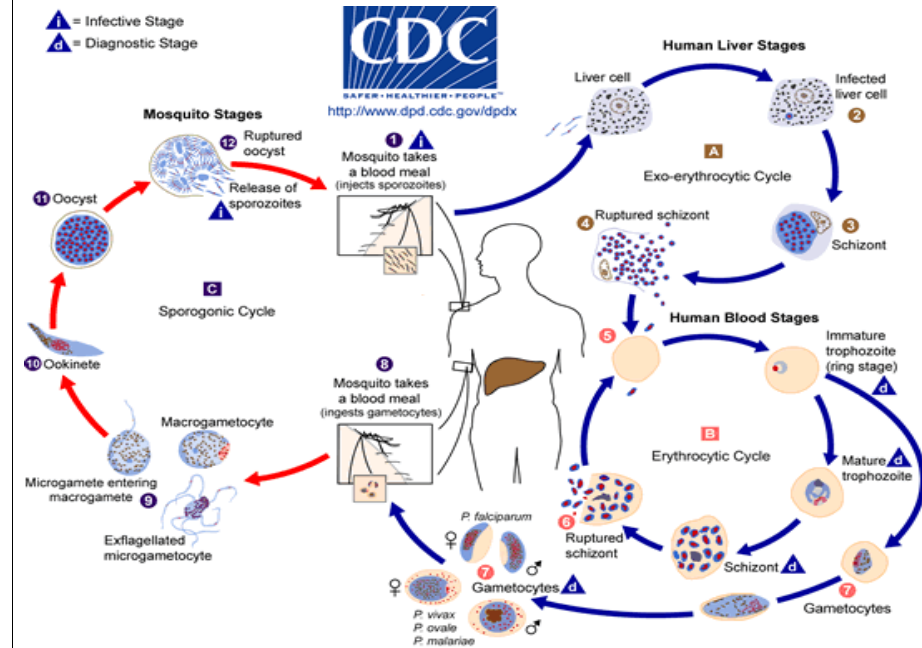


Illustration of the malaria parasite lifecycle. From CDC (2013b). Cycle A represents human liver stage where parasites multiply in the liver cells. Cycle B represents the erythrocyte stage where parasites multiply in the blood. Cycle C represents the stages in the mosquito vector. 'd' represents the stages at which malaria can be diagnosed (i.e. blood cycle stage). 'i' represents the infective stage.

Transmission of the parasite to a human

The intensity of transmission depends on several factors related to the parasite, the vector, the human host, and the environment.

Anopheles mosquitoes:

Breed in shallow, fresh water and all of the important vector (mosquito) species bite at night, between dawn and dusk (WHO, 2013).

Transmission is more intense:

Where the mosquito species has a longer lifespan as the parasite has time to complete its lifecycle.

The mosquito prefers to bite humans rather than animals, which increases the chance of infecting a human host. For example African vector species have a long lifespan and strong human-biting habit.

Transmission depends on:

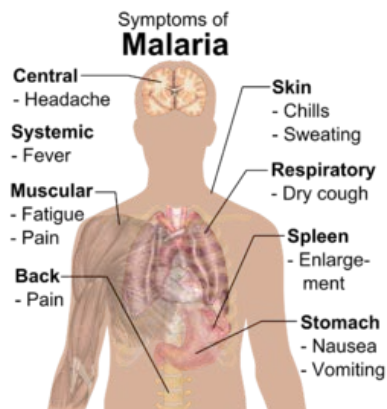
The climate, temperature, humidity and rainfall: In many places, transmission occurs according seasons and e.g. peak during rainy seasons

Human immunity: The lack of immunity among many travelers means that they are especially susceptible to malaria transmission.

Symptoms

Plasmodium falciparum is the most clinically significant parasite species and accounts for most cases of malaria in Sub-Saharan Africa. It takes 7-27 days for clinical signs to occur (incubation period) and if a patient lacks immunity, infection can develop quickly and acutely.

Malaria symptoms can be separated into **complicated** and **uncomplicated malaria**. Symptoms of uncomplicated malaria include fever in the majority of patients followed by chills, pain such as headaches and muscle aches. Furthermore, nausea and vomiting may be present in some adult patients, but is more common in children



Uncomplicated malaria	Complicated malaria
Fever (97% of cases),	Impaired Consciousness, coma, Hypoglycemia
Chills (78%),	Generalized seizures
Headache (74%),	Hemoglobinuria (blood in the urine) Acute Renal Failure
Sweats (64%)	Severe Anemia, Jaundice,
Myalgia (Muscle pain) (34%)	Acute Respiratory Distress Syndrome (ARDS)
Nausea and vomiting (27% each), with vomiting being more frequent in children.	Hypotension (low blood pressure), Circulatory Collapse
	Parasitemia (level of infection) >5%

Symptoms of complicated and uncomplicated malaria.

Symptoms can progress from uncomplicated malaria to complicated malaria rapidly. Rapid diagnosis is important as delayed treatment, inadequate treatment, high parasite burden, or lack of acquired immunity (i.e. travelers) all are risk factors for uncomplicated malaria progressing to complicated malaria.

Cerebral malaria may be diagnosed in very severe cases. It is defined as a coma that is not attributable to any other cause in a patient infected with *P.falciparum*. It is a life threatening complication that has been reported in up to 80% of fatal cases of malaria

Diagnosing malaria

Early symptoms resemble those of influenza or any other viral infection. Fortunately, diagnosing malaria is easy and cheap for many healthcare facilities.

- Test for malaria parasite antigens in the blood (Rapid Diagnostic Test)
 - Test can be performed in a short time (15 minutes)
 - High diagnostic reliability. The test involves taking a small sample of blood from the finger and is relatively painless.
 - Measures whether the test is positive or negative, not the level of infection or the species of parasites.

- Thick and thin blood smears
 - Tells more detailed information about the level of infection and are taken if the RDT shows positive. Also takes a small sample of blood from the finger (finger prick)

- Other blood tests
 - Blood glucose
 - Complete Blood Count (CBC)These assess other symptoms e.g. hypoglycemia, anemia etc. and may be taken if symptoms are more severe.

Tests are shown either in parasites per microliter of blood 4-40 parasites per μl blood – 4000-40,000 parasites per μl blood
The plus method + - ++++ (the more plusses, the higher the level of infection)

Treatment

First line drug for treatment of uncomplicated malaria for all age groups - Artemether/Lumefantrine (ALu)

Second-line drug and treatment of severe malaria (or first trimester pregnancy and children below 5 years old) - Quinine
Intermittent Preventive Treatment (IPT) of malaria during pregnancy Sulfadoxine/Pyrimethamine (SP)

Treatment of malaria for travelers involves the above medications as oral treatment (tablets), intramuscular (I.M) injections or I.V treatment in the more severe cases.

Stand-by Emergency Treatment (SBET)

Stand-by Emergency Treatment is a method of self-treatment for travelers who are in a malaria-endemic area for less than one week or those who will be in remote places and will be unable to access health care within 24 hours. They may choose to take a reliable course of approved malaria treatment on their travels to an isolated location to be administered presumptively in the event of acquiring a febrile illness

This should be discussed in pre-travel health advice and is **NOT** used as a stand-alone treatment. Malaria chemoprophylaxis should still be taken, especially in malaria-endemic areas, such as Tanzania. Stand-by emergency treatment (SBET) for travelers has some advantages and disadvantages and the rationale is based on risk-benefit to the traveler.

SBET is only recommended in specific circumstances, which include:

- If the traveler is in an isolated area more than 24 hours from access to health care, a traveler has fever of $>37.5^{\circ}\text{C}$ and has symptoms associated with malaria,
- Medication and health care is unavailable within 24 hours of onset of symptoms
- There has been a minimal period of 6 days since a possible malaria exposure

- In the event of the traveler having to self-treat for malaria under the above circumstances, it is essential to access health care at the earliest opportunity.

Prevention, prophylaxis and (Personal Protection Methods PPM's)

Chemoprophylaxis

The goal of preventing malaria among travelers is challenging and relies on striking a balance between the correct choice of anti-malarials (chemoprophylaxis) and mosquito- avoidance strategies. Many of the strategies are effective, but none are 100% effective so a combination of strategies is needed.

Chemoprophylaxis is one key component of preventing or reducing the risk of developing malaria and this should be discussed during pre-travel health advice in the home country. It is strongly recommended to begin the course of treatment before travel and continue during travel and upon return to the home country. This ensures medication is in the body prior to exposure to mosquito bites. Furthermore, any unwanted side effects can be observed and medications can be changed for something more suitable for the individual.

Three malaria medications are recommended for travel to Tanzania. Resistance to Chloroquine means that it is not

recommended as a chemoprophylaxis medication in Tanzania. However, Atovaquone-Proguanil (Malarone), Mefloquine (Lariam) and Doxycycline are all suitable. Each of these medications has advantages and disadvantages, their own side effects and schedules (as shown in the following table) but each works by basically halting or disrupting the parasite lifecycle within the body (Arguin, and Tan, 2013)

Medication	Advantages	Disadvantages
Atovaquone-Proguanil (Malarone)	May be started 1–2 days before travel, therefore suitable for last-minute travelers Some people prefer to take a daily medicine Only taken 7 days after returning from travel, so good for short trips. Well-tolerated medication	Cannot be used by women who are pregnant or breastfeeding Cannot be taken by people with severe renal impairment Tends to be more expensive than some of the other options Some people don't want to take a medicine every day
(Mefloquine) (Lariam)	Taken weekly, which some people prefer Good choice for long trips because it is taken only weekly Can be used in all trimesters of pregnancy	Cannot be used in patients with certain psychiatric conditions Cannot be used in patients with a seizure disorder Not recommended for people with cardiac conduction abnormalities Drug must be started at least 2 weeks before travel so not suitable for last minute travels Some people would rather not take a weekly medication Medication must be taken for 4 weeks after travel,

Doxycycline	Some people prefer to take a daily medicine Drug is taken 1-2 days before travel so suitable for last-minute travelers Tends to be the least expensive antimalarial People who are already taking doxycycline chronically do not need additional medicine Doxycycline also can prevent some additional infections	Cannot be used by pregnant women Some people would rather not take a medicine every day Must be taken 4 weeks after travel Not recommended for women prone to vaginal yeast infections when taking antibiotics increased risk of sun sensitivity Side effect may include upset stomach from doxycycline
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Personal protection methods (PPM's) and behavior

Almost all travelers (> 95%) are informed about the risk of malaria in high transmission areas and but it is estimated that less than 50% will use the medication regularly and as directed. The majority of travelers use some form of personal protection measures (PPM) against mosquito bites, but less than 5% use all possible methods. Therefore, your own choices while you travel directly affect your health and chances of getting an illness while abroad.

Mosquito behavior

Mosquitoes of many species are attracted to humans by the human body's moisture and heat, and some mosquito species are able to detect carbon dioxide from up to 30m away. They may also be attracted to body odors and people wearing dark colored clothing, therefore avoiding dark clothing all over the body may help reduce the mosquito species being attracted to the body.

Keep the Bugs Away with



Chemical repellents

DEET, ethylexanediol, indalone, DMP and EBAAP and Picaridin are all chemical repellent products that can be used on the skin to repel mosquitoes. DEET has been used successfully for over 40 years and it is recommended that skin-repellents containing 10-35% DEET are the most suitable for almost all travelers as they are almost free of side effects- Higher concentration are of little benefit and are toxic It is important to note that there are some cases of rare and severe allergic reactions .

Repellents should:

- Be used as directed!
- Used sparingly on all parts of the exposed body
- Not be inhaled or applied on open wounds/skin or near the eyes
- Be washed off the hands
- Be reapplied after swimming
- Be used after applying sunscreen

It should also be noted:

- Factors can reduce the efficiency of the repellent (sweating, high temperatures, rubbing by clothing)

- Repellents are solvents which can damage glasses, plastics, lenses plastic watches and some other jewelry
- Wash the repellent off when it is no longer needed.

Natural oils such as oil of lemon, eucalyptus or citronella are considered ineffective as mosquito repellents because of the short duration on the skin (less than one hour) and their effect is considered minimal. Furthermore, many natural oils can cause skin irritation and allergies.

Insecticides:

In Tanzania, it is recommended to use Permethrin-treated clothing and gear including boots, pants, socks, and tents which can be purchased as pre-treated clothing and gear or clothing and bedding can be sprayed with the insecticides themselves. It is important to check product information for clothing that has been treated as it remains protective after multiple washings and can be protected for variable lengths of time. It is also important to note that Permethrin is not for use directly on the skin. (Steffen et al., 2007)

Preventing mosquito bites

In order to prevent mosquito bites, it is essential to follow anti-malarial regime and follow chemical methods noted above, stay and sleep in screened (with wire meshes of 6-8 meshes per cm²) or air- conditioned rooms and to use a bed net if the area exposed

or is outdoors (Steffen et al., 2007). Furthermore, in the evenings, the body should be covered by wearing light- colored, long-sleeved shirts, long pants, and hats as mosquito bites can penetrate thin clothes that are less than 1mm thick.

Return from travel

If you experience any febrile illnesses or experiences of symptoms of malaria, you consult a health care provider as there is a small malaria risk up to one year after return from Tanzania as some parasite species lay dormant in the body.

As a consequence, it is not recommended to donate blood in the home country for approximately one year after travel (CDC, 2013b).



Sexual health

Tourists, especially young and single travelers and long-term volunteers are more likely to be exposed to STI's or be involved in unprotected sex than short-stay businessmen or tourists.

The prevalence of HIV/AIDS 5.1% in Tanzania, which is considered high prevalence.

It is recommended that protection against sexually transmitted diseases :

- Condoms should always be used as protection, and should be used correctly
- Casual sex should be limited if abstinence is not a personal choice and
- Travelers should be vaccinated against hepatitis B.
- Injecting drugs or sharing needles that can break the skin (tattoos, piercings or acupuncture) should be avoided.

- Other medical or dental equipment, for example, should be disinfected or sanitized.



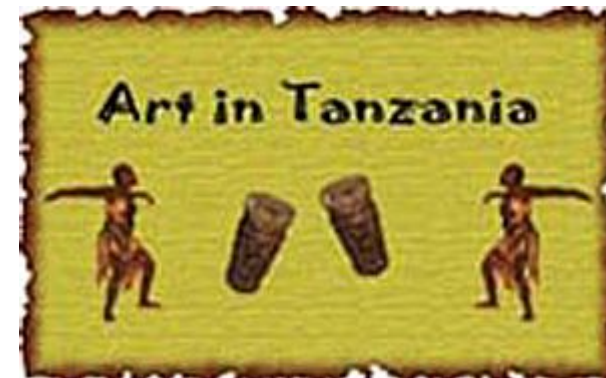
Finally, alcohol consumption should be limited as people take more risks when intoxicated, and this is not only limited to sexual behavior.

OVERVIEW

There are many health issues that can affect travelers. Fortunately, many illnesses are short in duration and require only simple self-treatment.


And, remember to look after your health!

Take care of your health, use your common sense and seek treatment quickly for any serious health complaints, you will enjoy your opportunity as a volunteer/intern and have many happy memories from your stay!



Karibu sana!

And remember.....

FOOD		Boil it, peel it, cook it or forget it		Wear safety belt where possible, avoid night driving, where possible
FLUIDS		Avoid tap water, drink plenty	SAFE CARS SWIMMING 	Avoid excessive alcohol consumption when swimming. Swim in designated areas
FLIES		Measures against mosquito bites and other insect bites		Don't get burned, use SPF (>30) and clothing protection, avoid midday sun
FLIRTS		Avoid unprotected sex and casual sex, always use condoms	SUN STRESS 	Get rest, don't overload your program!

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**ART IN
TANZANIA**



Travelers' Malaria

Malaria: From a Global Perspective

- A major international public health problem
- 219 million cases, 660,000 deaths worldwide

Most deaths occur in Sub-Saharan Africa

- Global mortality is falling
→ mortality rates have fallen
in African region by 33%
- Cases among travelers are
increasing



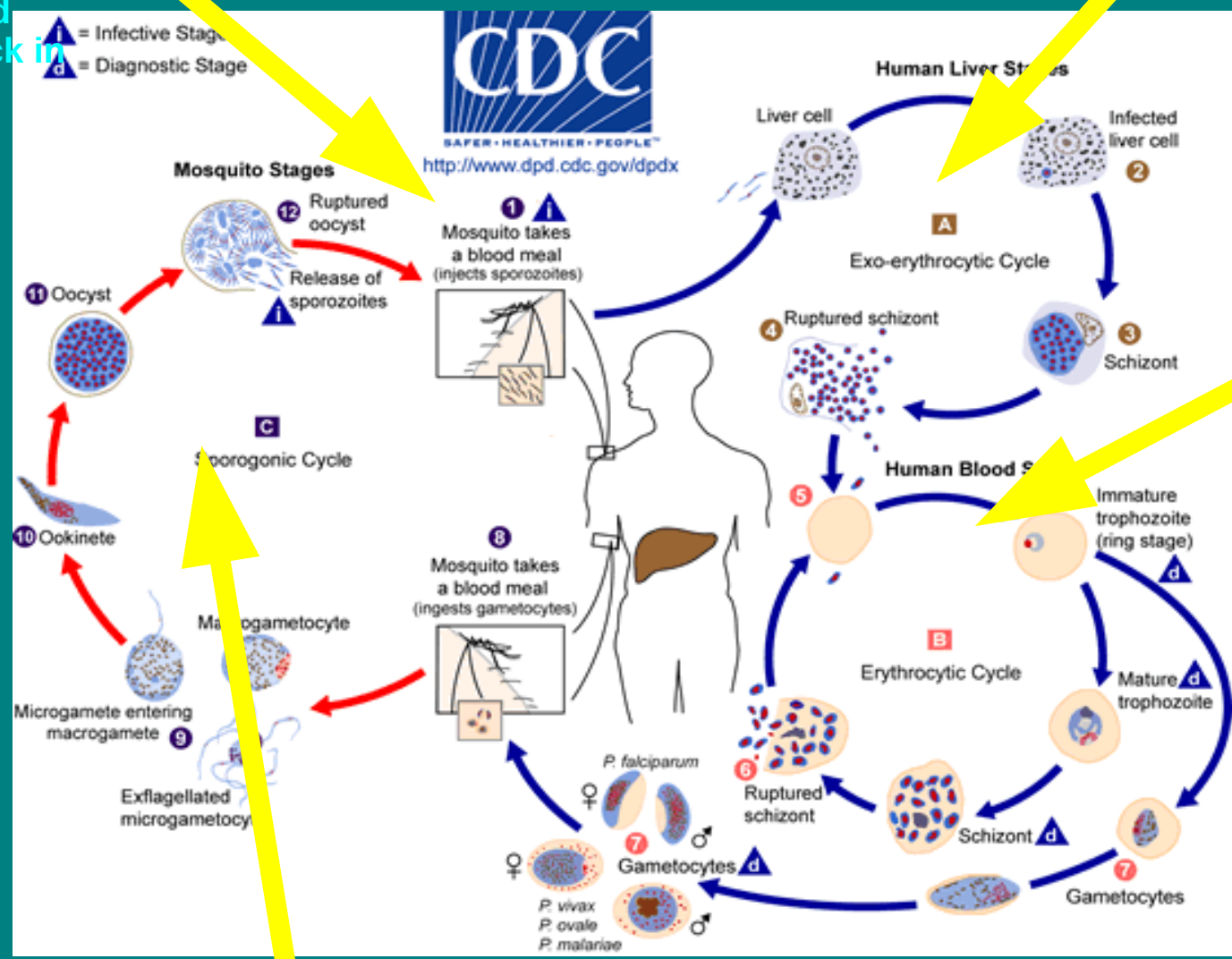
Epidemiology and life cycle

- Protozoan parasite – *Plasmodium*
- 4 species are important to humans : *P.falciparum*, *P.vivax*, *P. ovale* and *P. malariae*
- *P.falciparum* leads to the most severe symptoms and cases of mortality and is common in Tanzania
- The *Anopheles* mosquito is the vector (that transmits the parasite to the human)

INFECTIVE STAGE – at least half of bites from an infected *Anopheles* mosquito will result in a blood infection and clinical attack in travelers

The salivary glands of mosquitoes can contain up to 60-70,000 parasite stages, but only a few are injected into a person at each time

A. LIVER STAGES



B. BLOOD CELL STAGE

CYCLES = RISING AND FALLING FEVER

DIAGNOSTIC STAGE – Tests will be positive

C. MOSQUITO STAGE

Illustration from CDC 2012 b.

*Life cycle

When a female mosquito feeds on a human, it may inject between several and 200 sporozoites (infective stages of the parasite life cycle) bloodstream of the human host.

It is estimated that about half of bites from infected anopheles will result in an infection

Sporozoites enter the liver cells (hepatocytes), replicate and develop, which gives rise to thousands of infective merozoites within **5.5- 7 days**. The merozoites from the liver infect red blood cells and the parasites growing in the red blood cells to infect new red blood cells. The completion of this blood cycle corresponds to **fever**.

There can be several broods of parasite in the bloodstream which can lead to **sub tertian or quotidian fever (fever that rises and falls regularly over a 24 hour period)**

The life cycle of the parasite continues when the life stages are transmitted from a human back to a mosquito when another mosquito takes a blood meal from an infected human. These stages are transported to the stomach of the mosquito and the life cycle continues within the mosquito and new life stages of the parasite migrate to the salivary gland of the mosquito to infect another human.

Transmission from mosquito to human depends on several factors.....

1.The mosquito and its behavior

- Breed in shallow, fresh water
- Bite at night, between dawn and dusk
- The mosquito prefers to bite humans rather than animals

2.Transmission is more intense :

- Where the mosquito species has a longer lifespan (the parasite has time to complete its lifecycle)

3. Environment

- The climate : Temperature, humidity and rainfall, rainy seasons may be peak mosquito season

4. Human immunity: The lack of immunity among many travelers means that they are especially susceptible to malaria transmission.

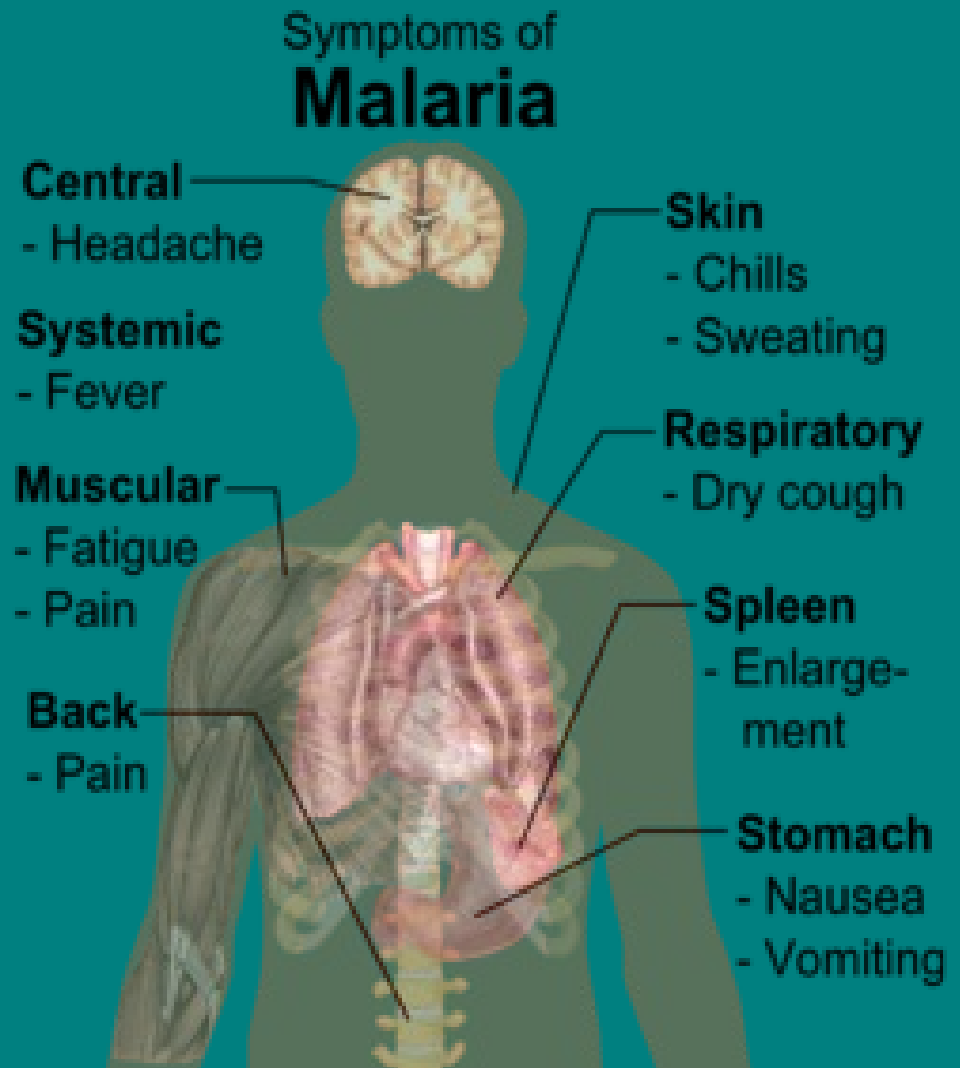
Symptoms – usually seen within 7-10 days of bite

- Early symptoms resemble virus-like illness or influenza
- Typical cyclical fevers and shivering
- Symptoms can rapidly progress from uncomplicated to complicated malaria
- **Cerebral malaria** (coma due to malaria) is most severe outcome and is seen in 80% of fatal cases

Uncomplicated malaria	Complicated malaria
Fever (97% of cases),	Impaired Consciousness, coma, Hypoglycemia
Chills (78%),	Generalized seizures
Headache (74%),	Hemoglobinuria Acute Renal Failure
Sweats (64%)	Severe Anemia, Jaundice,
Myalgia (34%)	Acute Respiratory Distress Syndrome (ARDS)
Nausea and vomiting (27% each), with vomiting being more frequent in children.	Hypotension, Circulatory Collapse
	Parasitemia > 5%

Rapid diagnosis is essential!

If you have any symptoms, seek health care immediately



Diagnosing

- Simple finger prick test – cheap, fast and reliable
- Tests for presence of antigens
- Thin and thick blood films can test for species and level of infection
- In more severe cases, blood glucose may be taken, complete blood count and other tests



Treatment

- Get treatment in local health centers or hospitals.
- Treatment is cheap and straightforward

- **Uncomplicated malaria:**

Artemeter-Lumefantrine (Alu) as Oral (tablets) or injections (I.M)

- **Severe malaria:**

IV Alu as a first-line treatment

Quinine as a second line treatment

*Stand-by emergency treatment (SBET) is a **LAST** resort if you are not within 24 hours reach of health care and you display symptoms of malaria and only if discussed in pre-travel health advice . SBET involves the decision to carry extra anti-malarial medication in cases of infection and self-treating for malaria. This is **NOT** recommended as a replacement for malaria chemoprophylaxis!*

Personal Protection Measures (PPMs)

- How to reduce risks of infection?
- Understanding mosquito behavior
- Take anti-malarials **AS DIRECTED!**
- Sprays: Permethrin and DEET
- Nets, screens and air-conditioning
- Own behavior
 - Clothing, adherence to antimalarials, sprays and nets



**DON'T GO TO BED WITH
A MALARIA MOSQUITO**

★ SLEEP UNDER A NET! ★ KEEP IT
REPAIRED! ★ TUCK IT IN! ★

BE SURE NO MOSQUITO IS INSIDE
WAITING FOR YOU

FIGHT THE PERIL BEHIND THE LINES

Don't strip tease for Anopheles



The anopheles mosquito
is a carrier of

MALARIA

KEEP COVERED

Awareness:



**RECOGNIZING
MALARIA!**

Awareness: recognizing Malaria!

Initial symptoms:

- Fever
- Sweats
- Chills
- Headache
- Body aches
- Muscular pain
- Nausea and vomiting

**Cerebral malaria is a
consequence of severe malaria with
supplementary signs:**

- Irritability
- Confusion
- Convulsions
- Coma

Bite prevention:



**CONTROLLING
MOSQUITOES!**

Bite prevention: controlling mosquitoes!

How to eliminate mosquitoes:

- Draining of swamps, ditches
- Eliminating standing water

Mosquito bite protection **INSIDE:**

- Permethrin insecticide treated bed nets (use correctly and check for holes!)
- Doors and windows closed
- When available, use air-conditioning
- Indoor residual spraying (IRS)

Mosquito bite protection **OUTSIDE:**

- Limit outdoor activities from dusk to dawn whenever possible
- Wear long sleeves and Permethrin treated shirts and pants
- Use insect repellent on exposed skin, minimal 30% DEET (PAN-Diety/Avella/Lebanakki)

Preventing malaria

Mind before Madness



Chemo- prophylaxis:



**USE PREVENTIVE
MEDICATION!**

Chemoprophylaxis: use preventive medication!

Take anti-malarial drugs:

- Mosquito bites cannot be completely avoided
- Regular medication required to prevent/suppress malaria

Recommended treatment:

- Atovaquone-proguanil combination (Malarone®)
- Mefloquine (Lariam 250®)
- Doxycycline (Doxypalu®)

Diagnosis:



**EARLY
RECOGNITION!**

Diagnosis: early recognition!

**See a doctor urgently if you
suspect Malaria!**

- Symptoms may arise one week or more after entering a malaria risk area
- Symptoms may develop up to 3 months after departure
- Immediate treatment is essential
- Even if you are taking preventive treatment: be aware, ensure early diagnosis

YOUR ABCD AGAINST MALARIA

www.dietmann.com/preventingmalaria

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Appendix 4: First aid kit list for traveling

It is generally accepted that travelers should carry a basic medical kit when traveling and have knowledge on how to use it. The World Health Organization recommends the following items in a first aid kit list, especially for those travelers to developing countries, such as Tanzania, or places with unknown quality of medical care and supplies.

Contents of a basic medical kit	Use	
Everyday items	Sunscreens Insect repellent Earplugs Anti-malarials Simple analgesic (e.g. Paracetamol, Ibuprofen) Insect bite treatment Emollient eye drops, nasal decongestant Clinical thermometer	High SPF e.g. SPF 30+ DEET 15-35% (higher strength has no extra protection) Permethrin for treating clothes, gear and equipment For a peaceful night's sleep! Take the whole course, as directed! For pain relief, Paracetamol also helps to a reduce fever To reduce itching from insect bites For air pollution, dusty roads, allergies To confirm a fever
Sexual health	Adequate supplies of condoms and the oral contraceptive (if	Be prepared!

	using)	
Gastrointestinal issues	<i>Anti-diarrheal medications:</i> Anti-motility drugs (Loperamide) Oral rehydration salts (ORS) (with appropriate written instructions regarding their use) Peptobismol	To reduce frequency and urgency of TD To replace lost electrolytes and fluids due to diarrhea Eases gastrointestinal discomfort
Allergies	Antihistamine cream or tablet	Such as hydrocortisone creams and allergy tablets
Basic injuries	Adhesive tape Antiseptic wound cleanser Bandages Scissors and safety pins Sterile dressings	
Medication for any pre-existing medical condition	Sterile syringes, needles, medications or other items to meet foreseeable needs, according to the duration Antibiotic prophylaxis (for TD) or Stand-by treatments (for malaria)	If medical condition requires If discussed in pre-travel health advice (NOT TO BE USED AS STAND-ALONE METHODS)

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