

Travel epidemiology

WHO perspective

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ABSTRACT

International travel is undertaken by large, and ever increasing numbers of people for professional, social, recreational and humanitarian purposes, and this upward trend looks set to continue. Travelers are exposed to a variety of health risks of the unfamiliar environment of the visited area. The risk of exposure is determined by destination, duration of the visit, purpose of the visit, behavior of the traveler and underlying physical and biological status of the traveler. However, most risks can be minimized by suitable precautions taken before, during and after travel. Travelers can themselves, also, easily introduce any infectious agents they may harbor to the visited area. Many infectious diseases have been introduced in many parts of the world through travel and trade. Travel has been identified as a prime factor in the global spread of infectious diseases. In a world of rapid air travel, no country is safe from infectious diseases. An outbreak in one country can easily and rapidly be transmitted across long distances to affect other countries through travel and trade. The World Health Organization devotes great attention to prevention and control of global spread of infectious diseases and minimizing the negative effect of international travel on health. The main strategies of the World Health Organization for minimizing the negative effects of expanding travel on global health security include developing the necessary strategies, rules and regulations; strengthening global communicable diseases surveillance and response; dissemination of related information throughout the world and strengthening national capacity for communicable diseases surveillance and response.

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In recent years, there has been a tremendous increase in the number of people travelling between the various countries of the world for professional, social, recreational and humanitarian purposes. More people travel greater distances and at greater speed than ever before, and this upward trend looks set to continue. Travelers are exposed to a variety of health risks in the area visited. Moreover, travelers can themselves easily introduce the infectious agents they may harbor into the visited area.

Exposure of the traveler to health risks in the visited area. People in their home environment live in a state of equilibrium with the physical environment and with the local strains of micro-organisms. Many physical and environmental

changes were encountered during international travel including changes in altitude, temperature, humidity and microbial flora, exacerbated by stress and fatigue, all may disturb this equilibrium to a greater or lesser extent. Travelers are thus exposed to a variety of health risks in unfamiliar environments that may result in ill-health and inability to achieve the purpose of the journey. However, most such risks can be minimized by suitable precautions taken before, during and after travel.

Destination. Destinations where the standard of accommodation, hygiene and sanitation, medical care and water quality is high, pose relatively few risks for the health of travelers. In contrast, destinations where accommodation is of poor quality, hygiene and sanitation are inadequate, medical services do

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not exist, and safe water is unavailable may pose serious risks for the health of travelers. In these settings, stringent precautions must be taken to avoid illness.

Duration of visit. Duration of visit is important in determining the likelihood of exposure to many infectious agents and will influence decisions on the need for certain vaccinations or medication. Duration of visit will determine also whether the traveler may be subjected to marked changes in temperature and humidity or to prolonged exposure to atmospheric pollution.

Purpose of visit. The purpose of the visit is critical in relation to the associated health risks. A business trip to a city, where the visit is spent in a hotel or conference centre of high standard, or both, or a tourist trip to a well-organized resort, involves fewer risks than a visit to remote rural areas, whether for work or recreation. Travelers involved in humanitarian activities are at greatest health risk.

Behavior of the traveler. Behavior and lifestyle of the traveler play an important role. Going outdoors in the evenings in a malaria-endemic area without taking precautions may result infections. Exposure to insects, rodents or other animals, infectious agents and contaminated food and water, combined with the absence of appropriate medical facilities, makes travel in many regions particularly hazardous.

Physical and biological status of the traveler. Health risks associated with travel are greater for certain groups of travelers, including infants and young children, pregnant women, the elderly, the disabled, and those who have pre-existing health problems. For all of these travelers, medical advice and special precautions are necessary.

Health risks in the area visited. Health risks associated with the unfamiliar environment. Travelers often experience abrupt and dramatic changes in environmental conditions, which may have detrimental effects on health and well-being. Travel may involve major changes in altitude, temperature and humidity, and exposure to different species of animals and insects. Health risks resulting from exposure to a new physical environment include hypoxia in high altitudes, heat exhaustion, heat stroke, sunburn and keratitis due to exposure to high temperature, humidity and ultraviolet radiation. Swimmers and divers may be bitten by certain aquatic animals and stung by venomous invertebrate aquatic species. Venomous snakes, scorpions and spiders are common in tropical, subtropical and desert areas.

Health risks associated with exposure to infectious agents. Depending on the travel destination, travelers may be exposed to a number of infectious diseases. Some infectious diseases can be prevented by vaccination. For other diseases, including some of the most important and most dangerous, there is no vaccine. General precautions

can greatly reduce the risk of exposure to infectious agents and should always be taken for visits to any destination where there is a significant risk of exposure. Infectious diseases of potential risk to travelers include: 1. Diseases transmitted by food and drink such as travelers' diarrhea, cholera, typhoid fever, hepatitis A, hepatitis E, brucellosis, listeriosis and intestinal parasites. 2. Vector-borne diseases, including malaria, yellow fever, plague, dengue fever, trypanosomiasis, filariasis, leishmaniasis. 3. Diseases transmitted by respiration, including meningitis, tuberculosis, influenza, measles. 4. Diseases transmitted by blood and body fluids (including sexually transmitted infections) such as human immuno-deficiency virus (HIV) which causes acquired immune deficiency syndrome (AIDS), hepatitis B, hepatitis C and syphilis.

Minimizing health risks to the travelers in the visited area. Most of the risks associated with travel can be minimized by suitable precautions taken before, during and after travel. Although the medical profession and the travel industry can provide a great deal of help and advice, it is the travelers responsibility to ask for information, to understand the risks involved and to take the necessary precautions for the journey. Medical consultation before travel is essential. It will determine the need for any vaccinations (for example vaccination against yellow fever, measles, meningococcal meningitis, hepatitis B) or chemoprophylaxis (for example anti-malarial drugs) as well as other medical items that the traveler may require. Travelers with underlying medical and biological conditions should be well informed regarding the available medical services at the travel destination. The traveler should comply with all precautions recommended for health protection from the anticipated health hazards. These precautions should be taken regardless of whether any vaccinations or medication have been administered. Sufficient medical supplies should be carried to meet all foreseeable needs for the duration of the trip, taking into consideration destination(s), particularly where the local availability of specific medications is not certain. Some infectious diseases have long incubation periods and clinically appear weeks after the journey. Hence, if travelers experience any symptoms, especially fever or diarrhoea, they should provide the medical personnel with information on recent travel, including destination, purpose and duration of visit.

International travel and global spread of infectious diseases. There is continual change in the public health risks posed by infectious diseases. In a world of rapid air travel, no country is safe from infectious diseases. An outbreak in one country can easily and rapidly be transmitted across long distances to affect other countries through travel and trade. Travel has been identified as a prime factor in the global spread of infectious diseases. History tells

us that the opening up of travel and trade routes between continents was accompanied by the spread of infectious diseases. The Black Death (plague) transmitted from Southeast Asia to Europe in the 14th century, and the cholera pandemics in the 19th and 20th centuries, where the spread started in the Indian subcontinent, are well documented. The spread of syphilis in the 18th and 19th centuries has been related to wars and the movements of armies. More recently, the movement of a large number of troops from Southeast Asia to the Pacific Islands during World War II contributed to the introduction of dengue fever in the South Pacific. With modern fast air transport, global spread of infectious agents became much easier. Travelers infected in one country may still feel quite well when they arrive in another country. Travelers, thus, can easily carry any infectious agent from one area to the other. In addition, travelers may penetrate deep into uncharted ecosystems where they may encounter previously unknown infectious organisms. Since the 1970s, more than 20 new infectious agents or diseases have been recognized, such as Ebola, HIV/AIDS, Hanta virus, hepatitis C, for example. During the past 2 decades, the introduction of the HIV, which causes AIDS, to many parts of the world has been directly related to human mobility. Many communicable diseases, including HIV/AIDS, were introduced to several countries of the Eastern Mediterranean Region through human mobility for work, trade and tourism.

Minimizing the negative effect of travel on health. World Health Organization perspective. The WHO has been in the forefront in recognizing the impact of travel on health. Every possible step has been taken to increase awareness and draw attention to the seriousness of this challenge. World Health Organization establishes global standards, actively gathers and disseminates information, coordinates international activities and supports countries in infectious disease surveillance, preparedness and response to the outbreaks that threaten global health security. The main WHO strategies for minimizing the negative effects of expanding travel on global health security are: 1. Development of strategies, rules and regulations. 2. Strengthening global communicable diseases surveillance and response 3. Dissemination of information. 4. Strengthening national capacity for communicable disease surveillance and response.

Development of strategies, rules and regulations. International Health Regulations. The IHR comprise the only internationally binding legislation on the reporting of epidemics. They were endorsed by the World Health Assembly in 1969 and amended in 1973, particularly with regards to provisions for cholera, and in 1981, to exclude smallpox after its eradication. Their purpose is to ensure maximum security against international spread of diseases with

minimum interference with world traffic and trade. Their main objectives are to ensure the consistent application of routine preventive measures (namely at ports and airports); the use, by all, of internationally approved documents (for example, vaccination certificates); and the formal notification to WHO and implementation of predetermined measures in the event of the occurrence of one of the 3 notifiable diseases (cholera, plague and yellow fever). The 2 main applications of the Regulations likely to be directly related to travel are the yellow fever vaccination requirements imposed by certain countries and the disinfections of aircraft to prevent importation of disease vectors. In 1995, the World Health Assembly adopted a resolution on the revision and updating of the International Health Regulations in order to ensure that they are better adapted to the present volume of international traffic and trade and take account of current trends in the epidemiology of infectious diseases, including emerging disease threats. Negotiation over a revised version started in 1999. The main proposed shift is to depart from the 3 diseases mentioned above and to focus on any "health emergency of international concern". The main challenges encountered during the revision include: Ensuring that only public health risks (usually caused by an infectious agent) that are of urgent international importance are reported under the Regulations; avoiding stigmatization and unnecessary negative impact on international travel and trade of invalid reporting from sources other than Member States, which can have serious economic consequences for countries; and making sure that the system is sensitive enough to detect new or re-emerging public health risks. The updated version is expected to be submitted to the World Health Assembly for approval by 2004.

International travel and health. International travel and health is a WHO publication that is updated each January. The purpose of this book is to provide guidance on measures to prevent or reduce any adverse consequences of travel on health. It is addressed primarily to medical and public health professionals who provide health advice to travelers. It is also intended to provide guidance to travel agents and organizers as well as airlines and shipping companies. It provides the latest information on specific health risks in various parts of the world, on the general precautions all travelers should take during travel, on vaccinations recommended or deemed advisable by WHO, and on vaccinations legally required by the different countries for people entering their territories.

Developing strategies and standards for prevention and control of communicable diseases. World Health Organization has a unique health mandate from 191 Member States which gives it major responsibility for health concerns in the world. Therefore, WHO devotes great attention to

developing and widely distributing global and regional strategies and standards for surveillance, prevention and control of the different infectious diseases. These strategies and standards are crucial for the planning process at the global, regional and country level, to ensure common approaches for achieving the global agenda for combating communicable diseases (for example, EMRO Regional Plan on Emerging and Re-emerging Diseases, 1996, Emerging and other communicable diseases strategic plan 1996-2000, WHO recommended surveillance standards, 1999).

Strengthening global communicable diseases surveillance and response. ***Outbreak verification and response.*** With the increasing ease and speed of travel and with the ongoing globalization process, an infectious disease in one country represents a real health threat for the rest of the world. Recognizing the pressing need for a mechanism for early detection and rapid response to outbreaks, WHO established a mechanism for outbreak verification and rapid response in 1997. This mechanism ensures that reports of infectious disease events throughout the world are regularly gathered by WHO from formal epidemiological and laboratory channels and from other sources, such as non-governmental organizations, the media or electronic discussion groups. The Global Public Health Information Network (GPHIN) is an internet-based early warning application, developed in partnership with WHO and Health Canada. It continuously explores key web sites, media wires and specialized discussion groups, seeking information related to epidemic threats. It then passes these reports to WHO for verification. Suspected outbreaks are followed up with the affected countries to verify their true existence. WHO then responds to requests from Member States for assistance with outbreak management in collaboration with WHO collaborating centres, non-governmental organizations and other partners in the field of health.

Global specialized surveillance networks. World Health Organization has established a number of international networks for surveillance of specific diseases that threaten global health security such as: FluNet for influenza, Global Salm-Surv for salmonellosis and DengueNet for dengue fever. These networks keep watch over disease-related events, such as the emergence of new or drug-resistant strains and early detection of outbreaks. Most of these networks include also quality assurance and training components to ensure that data submitted from all parts of the world are comparable and conform to the established standards.

World Health Organization collaborating centers. The weak laboratory and epidemiological capacity in many countries, especially those at greatest risk of occurrence of epidemics, is a critical element in outbreak detection and timely response. Delayed

confirmation of outbreaks and late application of the appropriate containment measures could result in global spread of infection through travel and trade. The ability to draw on assistance from top experts and facilities is vital. This is especially important given the fact that most of the previously unknown and highly threatening outbreaks have tended to affect those countries that lack the laboratory and epidemiological capacities to detect unusual disease events and to identify causative agents. World Health Organizations control activities are supported by a network of over 250 laboratories and institutions formally designated as WHO collaborating centres. These centres provide the expertise and the facilities needed to conduct field investigation, handle dangerous pathogens, test samples, identify unknown agents and confirm the diagnosis. The Centers for Disease Control and Prevention (CDC), Atlanta, United States of America, the National Institute of Virology (NIV), South Africa, and the Pasteur Institute, Paris, France, are among the collaborating centres that continuously provide assistance in management of outbreaks of major public health importance, such as viral hemorrhagic fever.

Global outbreak alert and response network. Recognizing that partnership is the key to effective cooperation around the world in order to detect and contain outbreaks promptly, WHO took the lead in creating a global outbreak alert and response network. This network formalizes WHO's partnership with various institutions, such as pre-existing networks, WHO collaborating centres, International Humanitarian Organization and other United Nations organizations. This network aims to ensure that the best expertise is available wherever and whenever it is needed. It also mobilizes and coordinates global resources for timely application of the appropriate control measures for the outbreaks that threaten global health security.

Dissemination of information. The global awareness of infectious diseases is occurring in the context of an information revolution, which allows the public access to a huge amount of information, most of which is generated by media sources. Inaccurate information on disease outbreaks often results in over-reaction by both the media and politicians, leading to panic and inappropriate responses. Such responses can lead to unjustified disruption of travel and trade with affected countries, which may result in great unnecessary economic loss. Therefore, WHO is highly concerned with the collection, verification and dissemination of accurate information regarding any rumor concerning infectious diseases outbreaks. Reports of outbreaks/rumors received through the outbreak alert mechanism, and thought to be of potential international importance, are included in a weekly e-mail message, the Outbreak Verification List (OVL), which is distributed to public health professionals

and global surveillance partners worldwide. Over 900 institutions and key decision-makers in international public health, including WHO collaborating centres, national institutes of public health and major NGOs are alerted by the OVL. Information on confirmed outbreaks is made available to the public on the WHO website and in the Weekly Epidemiological Record, which is available in electronic and printed forms. World Health Organization continually publishes relevant information through fact sheets and press releases. To avoid any inappropriate or delayed response to communicable disease outbreaks and their further expansion to other areas in the world via travel and trade, and to ensure availability of appropriate and sufficient information on effective strategies for communicable disease prevention and control, WHO continuously produces, and regularly updates, guidelines on effective prevention and control measures for all diseases and distributes these guidelines to all countries. World Health Organization's website of the different programs at the global and regional levels continues to be an up-to-date source of all information related to the specific diseases and activities of those programs.

Strengthening national capacity for communicable diseases surveillance and response. World Health Organization is fully aware that strengthening epidemiological and laboratory surveillance as well as strengthening control activities at the national level, where the diseases occur, is the main defence against the international spread of communicable diseases. Having staff trained in intervention epidemiology is a cornerstone in strengthening national and regional epidemic alert and response mechanisms. Therefore, WHO supports national training programs in intervention epidemiology worldwide. The Training in Epidemiology and Public Health Intervention Network (TEPHINET), a global alliance of epidemiology training programs, continues to expand with WHO support. In addition, WHO has developed the necessary tools for establishment and evaluation of the surveillance systems at the national levels. World Health Organization surveillance standards and WHO guidelines for assessment of the national surveillance system were developed and disseminated to all countries. World Health Organization provides laboratory supplies and training opportunities to strengthen national laboratory capacity. The establishment of a WHO Office in Lyon, France, is a new initiative to strengthen global surveillance and response capacity through national capacity building, with particular emphasis on enhancement of laboratory skills in countries at greatest risk. During outbreaks, WHO provides technical and material support for the affected country for rapid containment of the outbreak. This support includes fielding rapid response teams for field investigation, advising on/ implementing case management and necessary

control measures to prevent spread of the disease, providing necessary supplies for epidemic management, in-place human capacity building and health education, as well as facilitating laboratory confirmation by the WHO collaborating centres.

Unnecessary measures for prevention of international spread of infectious diseases. Protection of travelers against potentially hazardous situations in the visited area is crucial. However, restriction of travel to/from any area in the world should have its scientific rationale. On many occasions, WHO has not recommended restriction of travel to or from countries that have certain infections in part of their territory. Nevertheless, countries themselves have imposed such restriction, resulting in negative impact for both parties.

Further reading

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Authors: D. A. Warrell

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Title: Leishmaniasis, Malaria and Schistosomiasis in Saudi Arabia

Source: Saudi Med J 1993 May, 3 : 203-208

Abstract

Three species of leishmania infect humans in Saudi Arabia. In the southwest *L. infantum* zymodeme *lon + 42* has its reservoir in *Rattus rattus* and causes kala-azar in infants and children. In the northern half of the country *L. major*, is transmitted by *Phlebotomus papatasi* from gerbils and merions causing cutaneous (oriental sore) and oronasal leishmaniasis, while inland from the red sea coast *L. tropica* transmitted by *Ph. sergenti* causes oriental sore and leishmaniasis recidivans. There was an increase in reported malaria cases in the early 1980s, but control programmes which were initiated as early as 1948 in the eastern part of the country have had an impact so that transmission is now confined to the western provinces. *Plasmodium falciparum* is the predominant species, but *P. malariae* and *P. vivax* have also been recorded. Vector mosquitoes include *Anopheles arabiensis* along the red sea coast, *A. fluviatilis* and *A. stephensi* in the eastern part of the country and *A. sergentii* and *A. superpictus* throughout. Chloroquine resistant *P. falciparum* has been detected near the yemen border. Apart from autochthonous malaria, imported cases in travelers and immigrant workers may become an increasing problem. Chloroquine remains the treatment of choice for malaria in the middle east unless the infection has broken through chloroquine prophylaxis, the geographical origin of the infection could have been in a chloroquine resistant area or if the patient has clinical features of severe malaria. Patients with severe *P. falciparum* malaria should be treated with quinine by slow intravenous infusion starting with a loading dose of 20 mg of quinine dihydrochloride per kilogram body weight infused over 4 h. Foci of *Schistosoma haematobium* infection exist in northwest, central and southwest Saudi Arabia, while *S. mansoni* infection occurs in larger areas in the western half of the country. Humans acquire these infections by bathing in or drinking water containing fork-tailed larvae (cercariae) released from intermediate snail hosts (*Biomphalaria* for *S. mansoni*, *Bulinus* for *S. haematobium*). Cercariae burrow into the skin, lose their tails and enter blood vessels. The resulting schistosomes migrate to the heart, lungs and liver. Adult male and female flukes move to their definitive homes in the veins of the perivesical plexus (*S. haematobium*) or inferior mesenteric plexus (*S. mansoni*). Some ova burrow through the wall of the bowel (*S. mansoni*) or bladder (*S. haematobium*) and if discharged in stools or urine into fresh water may infect snails and thence new human hosts. Damaging effects of schistosomiasis result from an inflammatory response to the ova which embolize through the bloodstream to the lungs, liver, central nervous system and elsewhere and which lodge in the wall of the bowel and bladder. Treatment has been revolutionized by the advent of praziquantel.