

# prevent:



## **Return on Prevention**

Cost-benefit analysis of prevention measures  
for business travellers and international assignees

Research study • January 2015

# Optimising relations between people and work

Leuven, January 2015

Report on the costs and benefits of travel risk management, a research project funded by the International SOS Foundation and conducted by Prevent between February 2012 and January 2014.

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In collaboration with: *International SOS*  
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## Executive summary

Companies are increasingly sending staff on international assignments to address talent shortages, close skill gaps and fuel business growth around the world. Their employees are more mobile than ever. However, the investment required to send employees on international assignment can be substantial; the overall average investment in an international assignment is US\$ 311,000 per annum (as detailed in section 4.1).

Deficiencies in health prevention can have significant consequences for the company and the employee. In order to mitigate the likelihood of an aborted mission, a travel risk management system must be implemented.

Business travel can assume many variations in terms of type, mission, destination, and a trip's purpose. However, any kind of travel brings about particular risks for employees. Unfamiliar environments, specific work requirements, communication in a foreign language, adapting to regional cultures, and separation from the support of the company headquarters as well as from family and friends are just a few challenges that can add to the physical and mental stress of business travel.

When on assignment, an employee's exposure to risks varies according to the location and the duration of the stay. Health related threats may be connected to specific issues such as prolonged periods in high-risk, remote or rural areas of developing countries. In this setting, employees face significant and continuous health risks, for example; infectious diseases, extreme climates, unsafe or poor quality food and water, and sexually transmitted infections/diseases. A number of these environment-specific risks can exacerbate low-grade medical problems, which would otherwise not be a problem in developed areas.

All travelling employees may face difficulties and challenges when abroad. Effective and focused prevention policies are therefore needed to ensure that risks associated with employees' missions are mitigated.

The health and wellbeing of international assignees and business travellers is the responsibility of the employer. There is a need to have clear organisational policies and strategies in place that are aimed at reducing any risks and promoting the health of employees abroad. These include defined selection criteria, preparing and educating international assignees on field conditions, enforcing preventive measures prior to departure – including immunisation – and practices to be followed during posting such as malaria prophylaxis, antivector protection, road safety, water and food precautions, safe sex, and how to handle stress.

## A business case for prevention

This study evidences how the benefits of implementing a travel health prevention strategy significantly outweigh the operating costs. Two specific programmes have been analysed:

- A medical-check for travellers and international assignees aimed at identifying pre-existing medical issues before assigning employees to a foreign country, ensuring that employees are fit-to-work for the proposed assignment, work conditions and identifying general and work-related health problems before expatriation.
- A malaria prevention programme aimed at employees travelling and working in malaria-risk regions. Employees are given information before departure; receive prophylaxis medication and other technical protection means such as mosquito-nets, insecticide sprays and repellents as well as a malaria curative kit.

The cost-benefit analysis showed that US\$ 1 invested in the medical check programme, returns a benefit ranging from US\$ 1,6 (minimum scenario) to US\$ 2,53 (maximum scenario) (as detailed in section 7.4.2).

The malaria prevention programme reduced the occurrence of fatal cases by 70%. The benefits also outweigh the costs in the case of this programme: For each US\$ 1 invested, the payback was estimated at US\$ 1,34 (as detailed in section 7.4.3).

### About PREVENT

Prevent supports companies and institutions, on a day-to-day basis, to prevent workplace accidents and occupational diseases. It has a practical knowledge of hazards, risks and injury prevention within a large range of sectors of activities. Prevent invests in research and development of information and tools to facilitate and improve occupational safety and health practices.

One of its fields of research is the cost-benefit of well-being at work policies.

In 2010, Prevent conducted the benOSH (Benefits of Occupational Safety and Health) project, a study aimed to evaluate the costs of accidents at work and work-related ill health and to demonstrate the incremental benefit to enterprises if they develop an effective prevention policy in occupational safety and health (OSH). The project was funded by the European Commission under the heading 'Socio-economic costs of accidents at work and work-related ill health'.

[www.prevent.be/en/knowledge/research-project-on-the-benefits-of-osh](http://www.prevent.be/en/knowledge/research-project-on-the-benefits-of-osh)

### About International SOS Foundation

The International SOS Foundation seeks to improve the welfare of people working abroad through the study, understanding and mitigation of potential risks. The foundation was started in 2011 with a grant from International SOS, the world's leading medical and travel security services company. It is a fully independent, non-profit organisation.

[www.internationalsosfoundation.org](http://www.internationalsosfoundation.org)



# 1 Introduction

Overseas postings are a growing reality for a number of companies. These companies retain a responsibility for their staff and dependants while they are abroad. This responsibility includes not only providing an occupational health service but also to take care of any health problem the staff may be facing in an unknown or unsafe environment. By sending workers abroad, the employer also makes them more vulnerable if no specific attention is given to the pre-health conditions and travel preparation. Inadequate reaction to any emergency situation may have dramatic consequences for the worker, his/her family, and the company.

Performing risk assessments that take into account the individual, occupational and country related medical issues, the provided immunisations, malaria prophylaxis, advice on infectious disease preventive measures, access to medical care of a high standard and the ability to arrange medical repatriations/evacuations should be part of any company prevention strategy.

When sending employees to a high-risk remote location, medical clearance before departure will ensure that individuals are fit for work and are not exposed to additional risks resulting from unsuitable medical facilities.

When the needs of ill workers exceed what local clinics and hospitals can provide, urgent evacuation to the nearest well-equipped medical facility becomes the key to preserving function and saving lives. However, evacuation can present an additional risk to the health of the victim, causes a lot of anxiety for the family and brings about high costs for the company.

It's the failure of all prevention mechanisms that lead to an incident, which in turn leads to evacuation. Besides the cost of medical care, cost of repatriation, and cost of relocation, the evacuation means the failure of the assignment for the worker and the loss of the investments engaged in it by the company.

Prevention programmes are aimed at avoiding health problems and ensure workers are sent to areas where their health status is compatible with the environment, which can save lives and represent a financial return.

The objective of this study is to evaluate the cost-benefit of prevention measures applied to high mobility employees, by means of a business case study.

Two types of prevention measures have been selected for this study: A pre-travel health check and a malaria prevention programme.

As the cost-benefit analysis is based on a business case, only tangible costs for the company are taken into account, costs for the individual and the society in general such as pain and suffering, loss of production in case of premature death, and cost to the social security system are not considered. However, it must be kept in mind that the suffering and death of an employee also has intangible costs for a business in terms of internal and public image. These are very difficult to quantify.



## 2 International assignment: a growing reality

With businesses increasingly operating globally and rising activity in emerging markets, companies are consistently sending more staff on international assignments and employees are more mobile than ever. International assignments can offer employees valuable career opportunities and enriching life experiences. However, there are significant costs involved for companies.

### 2.1 Types of international assignments

The Centre for Research into the Management of Expatriation (CReME) conducted a survey among European multinationals and European subsidiaries of US multinationals to determine the different international working formats used by organisations. The study distinguishes four types of assignments (table 1):

- Long-term expatriate assignment;
- Short-term expatriate assignment;
- International commuter;
- Frequent traveller.

The study reveals that organisations have an increasing amount of expatriation in all four types of international assignments.

### 2.2 Trends in international assignments

Research shows that companies worldwide are increasing the number of international positions for expatriate workers, although the length of assignments is gradually shortening. Over 70 per cent of companies saw an increase in short-term assignments in 2013, according to a report on expatriate policies and practices by Mercer<sup>1</sup>.

According to this report, the duration of long-term assignments is trending down. The average duration of a long-term assignment is now slightly less than three years (2 years 10 months). The average minimum duration is one year, five months, and the average maximum duration is five years, four months. The average age of long-term assignees is between 35 and 55 years. For short-term assignments, minimum, average and maximum durations, worldwide, stand at respectively 4, 8, and 13 months. The average age of

short-term assignees tends to be lower, with a similar proportion of companies in the below 35-years-old bracket and in the 35-to-55- years-old bracket.

The likelihood of international assignees being female has marginally increased, with the average percentage of female assignees standing at 13 per cent, just 3 per cent higher than two years ago. Multinational companies continue to source most (57 per cent) of their international assignees from the country in which they are headquartered and assign them to foreign subsidiaries. However, there has been an increase in the percentage of subsidiary company transfers (51 per cent) indicating that subsidiary-to-subsidiary transfers, as opposed to HQ-to-subsidiary transfers, have increased since 2010. This evolution is most significant among European companies, with 6 in 10 (61 per cent) reporting an increase of this pattern of assignments, indicating the growing competencies of staff in other parts of the world.

The findings of the 2012 “Global Relocation Trends” show that only 21% of the total assigned employee population has a previous experience of international assignment<sup>2</sup>.

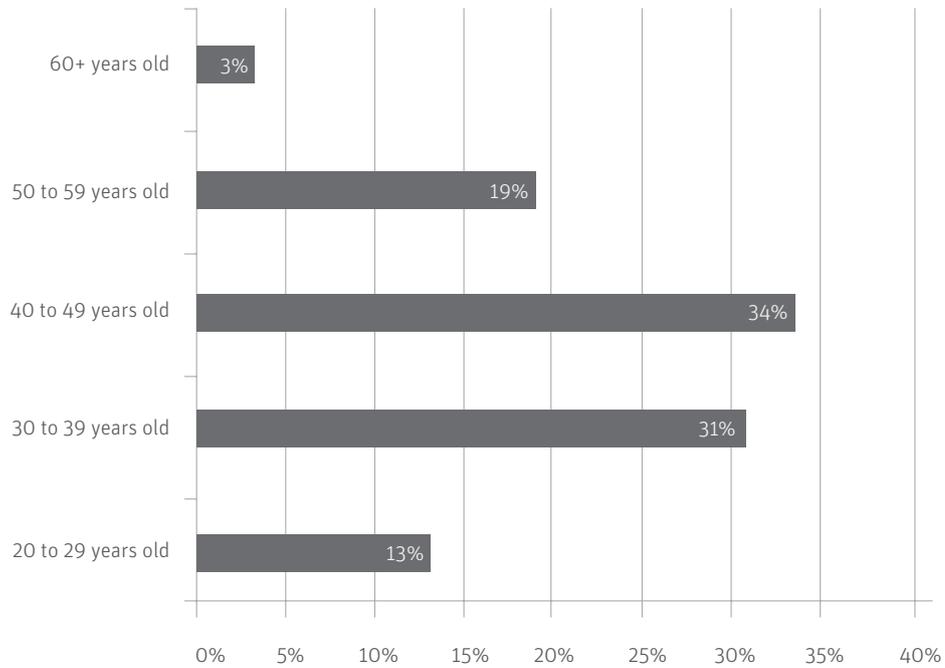
When looking at the ages, the 40 to 49 years old group represents the largest one among international assignees, closely followed by the 30 to 39 years old group. A little more than one out of 10 expatriates is between 20 and 29 years old (figure 1).

Although global mobility requires time and efforts to manage, two out of three employers (65 per cent) have no specific tools to track and manage assignments and their related cost (see 4. Cost of expatriation).

**Table 1 Types of expatriate assignments**

<b>Long-term expatriate assignment</b>	this type of expatriate assignment refers to a long-term assignment where the employee and his/her spouse/family move to the host country for a specified period of time, usually more than one year.
<b>Short-term expatriate assignment</b>	is an assignment with a specified duration, usually less than one year. Family may accompany employee.
<b>International commuter</b>	is an employee who commutes from the home country to a place of work in another country, usually on a weekly or bi-weekly basis, while the family remains at home.
<b>Frequent traveller</b>	is an employee who undertakes frequent international business trips but does not relocate.

Source: Gwendolyn Cuizon, *Expatriates in international assignments*,  
 ► [suite101.com/a/expatriates-in-international-assignments-a94403](http://suite101.com/a/expatriates-in-international-assignments-a94403)

**Figure 1 International assignees by age group**

Source: Global relocation trends, Results of the 2012 survey, Brookfield Global Relocation Services

### Key Points

- The number of assignments abroad is growing
- The average duration of assignments abroad is shortening
- Most expatriates are male and between 30 to 49 years old



## 3 Travel health risks

### 3.1 Impact of travel on stress and health

Business travel can assume many variations in terms of type, mission, destination, and purpose. But every travel involves specific health risks for employees.

#### 3.1.1 Work-related travel and its impact on health

In his study on the employees of the World Bank, Liese<sup>3</sup> shows that, overall, rates of health insurance claims were 80% higher for male and 18% higher for female travellers as opposed to their non-travelling counterparts<sup>3</sup>. Several associations with frequency of travel were found. The greatest excess related to travel was found for psychological disorders.

Why travellers file more medical insurance claims than their counterparts who remain at headquarters is not fully understood but several explanations are plausible.

Travel may exacerbate pre-existing or underlying medical conditions. Before departure travellers may be more inclined to seek medical attention rather than wait -as a non-traveller might- to see whether a condition worsens. On the other hand, the excess rates of claims found among travellers may not be entirely due to greater use of medical services.

Although specific categories of disease would be expected to be greater among travellers (travellers diarrhoea and other infectious diseases), many additional categories of illness may be indirectly related to travel due to physical and mental stress.

Travellers must often endure dramatic and sudden changes in climate, daily activities, food and drink, and sleep patterns. Work requirements on the mission, possibly including communicating in a foreign language, operating in unfamiliar business and regional cultures, long hours in high intensity negotiations, and separation from the support of family and friends at home, may add to the physical and mental stress of travel.

The two categories most strongly and consistently associated with the frequency of travel were infectious diseases and psychological disorders, for both men and women. Infectious diseases have long been associated with international travel. Travellers are more likely to be exposed to infectious organisms to which they are not immune, and the risk of contacting such organisms would logically increase with increased contact, either through more frequent missions or with longer periods abroad (table 2).

**Table 2 - Standardised claims rate ratios overall and according to annual frequency of travel for male travellers (reference category is non-travellers).**

<b>Disease or disorder</b>	<b>Overall</b>	<b>1 mission</b>	<b>2 or 3 missions</b>	<b>4 or more</b>
Infectious and parasitic diseases	1,72	1,28	1,54	1,97
- <i>intestinal</i>	1,71	0,56	1,58	2,26
Malignant neoplasms	1,85	2,56	1,60	1,82
Psychological disorders	2,88	2,11	3,13	3,06
- <i>stress</i>	2,42	1,50	2,18	2,96
Diseases of the nervous system and sense organs	1,82	1,68	1,75	1,96
- <i>Cornea/conjunctiva/eyelid</i>	2,26	1,73	2,42	2,47
Diseases of the circulatory system	1,50	1,35	1,49	1,60
Diseases of the respiratory system	1,91	1,63	1,82	2,05
- <i>Asthma</i>	2,36	2,27	2,15	2,62
Diseases of the digestive system	1,76	1,69	1,91	1,76
Diseases of the genitourinary system	1,78	1,67	1,56	1,97
Diseases of the skin and subcutaneous tissue	2,06	1,48	2,05	2,39
- <i>Skin and subcutaneous tissue infections</i>	2,26	3,32	2,45	1,87
- <i>skin and subcutaneous tissue inflammations</i>	1,81	0,85	2,08	2,17
Diseases of the musculoskeletal system and connective tissue	1,82	1,92	1,78	1,74
- <i>Back disorders</i>	2,15	2,18	2,05	2,05
Symptoms, signs, and ill defined conditions	1,72	1,48	1,61	1,88
Injury and poisoning	1,70	1,80	1,76	1,68
- <i>Back fractures, sprain, and strains</i>	1,79	1,52	2,00	1,78
<b>TOTAL</b>	<b>1,80</b>	<b>1,67</b>	<b>1,77</b>	<b>1,90</b>

Source: Liese (1997)

**Table 3 - Standardised claims rate ratios overall and according to annual frequency of travel for female travellers (reference category is non-travellers).**

<b>Disease or disorder</b>	<b>Overall</b>	<b>1 mission</b>	<b>2 or 3 missions</b>	<b>4 or more</b>
Infectious and parasitic diseases	1,32	1,16	1,28	1,61
- <i>intestinal</i>	1,99	1,40	2,32	2,70
Malignant neoplasms	1,24	1,81	1,21	0,46
Psychological disorders	1,94	1,47	1,96	2,59
- <i>stress</i>	2,08	1,99	1,50	2,79
Diseases of the nervous system and sense organs	1,22	1,19	1,21	1,27
- <i>Cornea/conjunctiva/eyelid</i>	1,55	1,17	1,71	2,01
Diseases of the circulatory system	0,88	0,79	1,11	0,76
Diseases of the respiratory system	1,08	1,19	0,99	0,99
- <i>Asthma</i>	0,82	0,64	0,89	1,06
Diseases of the digestive system	1,01	0,94	1,13	0,96
Diseases of the genitourinary system	1,20	1,19	1,12	1,28
Diseases of the skin and subcutaneous tissue	1,24	1,21	1,23	1,34
- <i>Skin and subcutaneous tissue infections</i>	1,32	1,37	1,22	1,36
- <i>skin and subcutaneous tissue inflammations</i>	1,24	1,35	1,40	0,92
Diseases of the musculoskeletal system and connective tissue	1,12	1,14	1,01	1,27
- <i>Back disorders</i>	1,36	1,41	1,24	1,47
Symptoms, signs, and ill defined conditions	1,08	1,06	1,12	1,07
Injury and poisoning	1,33	1,29	1,24	1,57
- <i>Back fractures, sprain, and strains</i>	0,96	0,76	1,07	1,32
<b>TOTAL</b>	<b>1,18</b>	<b>1,17</b>	<b>1,17</b>	<b>1,22</b>

Source: Liese (1997)

Not all excesses in this study were correlated with frequency of mission, and several diagnostic categories, such as diseases of the circulatory system, showed a relation for male but not for female travellers. However, several striking relations were found with frequency of travel.

The ratios for infectious diseases increased linearly with frequency of travel for both men and women. Claims for psychological disorders rose strongly with frequency of travel for both men and women. For men, psychological disorders among travellers completing one mission was twice that of non-travellers, and more than three times that of non-travellers for those completing two or more missions.

### 3.1.2 Stress

As the results of the study above show, international business travel may pose health risks beyond exposure to infectious diseases. Most researchers who have examined the nature of business trips regard them as a source of stress to travellers.

In his study, James Strikes found that more than a third of the surveyed business travellers reported high-to-very-high travel stress<sup>4</sup>.

According to the Karasek stress model, job stress is highest among workers with increased psychological demands and decreased decision latitude. Although travelling employees may experience a relatively high degree of autonomy with regard to specific job tasks, they may not be able to control when or where they travel and this may overburden their coping mechanisms<sup>5</sup>.

Personality factors such as health condition, workload, jet lag etc. may also cause stress while travelling. Business travellers with cross-culture adaptability, with an open-mind attitude, and other personality factors make travel less or more stressful.

But more generally, travelling may induce sleep disorders, due to disruptions of the circadian system brought on by time zone changes.

The study conducted among the World bank employees suggests that the higher rates of psychological claims found among travellers may be related to a perceived excess workload, multiple and competing demands on travellers' time, and separation from family and friends. Travellers must reorder their personal and professional lives, frequently postponing or interrupting family, business, and social activities. These factors may contribute to stress.

In line with this finding, other researchers suggest that workers who travel will demonstrate distress because of the frequent changes in their daily routines to which they must adjust. Frequent changes in location can cause a feeling of poor adjustment when there is a great discrepancy between the environment one travels to and one's own home environment. However, any change of place can also create a sense of detachment from the workplace that may be viewed as a respite that alleviates burnout<sup>6</sup>.

Some researchers even distinguish three stages of a business trip: Pre-trip; the on-trip and post-trip<sup>7</sup> and prone that each stage is characterized by different demands. They notice that for the frequent business traveller the three stages will produce a different intensity of stressors and require attention for prevention.

More generally, it can be said that stress can occur when the organization does not provide adequate ways to help and meet the business traveller's needs, or the traveller's personal abilities do not meet the necessary requirements and produce both a misfit and frustration.

#### Key Points

- Work-related health problems are higher among travelling employees than non-travellers.
- Higher incidence rates can be found for all diseases, not only for travel-related diseases.
- Especially mental health problems and stress have a higher incidence.

## 3.2 Location and exposure to risks

Travelling exposure to risks varies according to the location where workers have been sent and the duration of their stay. The type of work also impacts the exposure to risks. Risks and threats that present danger to the health, safety and security of employees are largely influenced by a country's political, economic, social and environmental context.

A survey by PMI Global concluded that 48% of companies fail to conduct assessments of the destinations of their travellers<sup>8</sup>. The employers need to assess the risks on a trip-by-trip basis as destinations can imply different level of risks.

According to the International SOS Health Map, medical risk ratings can be assigned to countries by assessing a broad range of health-related criteria. The five medical risk ratings are: Low Risk, Medium Risk, Medium & High Risk, High Risk and Extreme Risk (table 4).

### 3.2.1 Destinations and health issues

More generally, an unknown environment is always perceived as a threat. According to the International SOS study "Duty of care and travel risk management: Global Benchmarking Study"<sup>9</sup>, four of the top 10 threats perceived by employees when on travel or working abroad were health-related: illness while on assignment, lack of access to Western-standard medical care, infectious diseases and travel-related infections.

Health-related threats may be related to specific risks such as prolonged periods in high-risk, remote, rural areas of developing countries. In this setting, corporate expatriate employees are at significant health risk due to increased exposure to insects, food, water, and sexually transmitted infectious diseases. A number of these environment-specific risks can exacerbate low-grade medical problems, which would not otherwise be a problem in developed countries.

Also being abroad itself may represent an additional risk even in the case of common health problems when no medical care service is easily accessible where employees are located or only poor quality medical care service.

On average, 5 to 7% of international assignees are unable to complete their assignment for medical and psychological reasons<sup>10</sup>.

### 3.2.2 Diseases specific to destinations

Travelling to specific destinations may put the traveller at risk for particular diseases. Hepatitis A, typhoid fever, polio and cholera still occur in countries with poor hygiene.

However, diarrhea is the most common travel disease. Traveller's diarrhea affects 30-60% of travellers to less-developed areas of the world<sup>11</sup>. Diarrhea is caused by contaminated food and drinking water, dirty hands or dirty objects. For this reason, prevention is needed when travelling in less hygienic circumstances<sup>12</sup>.

Tropical diseases encompass all diseases that occur solely, or principally, in the tropics. In practice, the term is often taken to refer to infectious diseases that thrive in hot, humid conditions, such as malaria, leishmaniasis, schistosomiasis, onchocerciasis, lymphatic filariasis, Chagas disease, African trypanosomiasis, and dengue<sup>13</sup>.

Table 4 : International SOS Health Map 2014

**Companies and organisations use programmes tailored to their international traveller' and assignees' risk profiles, to manage medical risk and Duty of Care responsibilities**

	<b>Medical care and infectious disease risk</b>	<b>Pre-travel preparations</b>	<b>Assistance required at destination</b>
<b>Low Risk</b>	Excellent medical care Lower risk of infectious disease	Confirm language spoken by medical staff Understand how to access and pay for medical care	Medical advice Medical referrals Language assistance Paying for medical care
<b>Medium Risk</b>	High standard in selected facilities Some risk of food or water-borne disease	Travel health medical review Disease prevention (e.g. vaccinations, malaria)	Often required Selection of medical providers Language assistance Evacuation for serious illness
<b>Medium &amp; High Risk</b>	Quality medical care available from selected facilities in a few major cities. Limited care elsewhere Medium to high infectious disease risk, especially in rural/remote areas	Travel health medical review Travel risk training recommended for some itineraries Simple medical supplies	Higher level of assistance required Selection of providers critical Language assistance Transfer to higher quality facility Monitoring of medical progress Moderate and severe illness/injury may require international evacuation
<b>High Risk</b>	Very limited medical care High infectious disease risk Road traffic accidents are a medical hazard	Travel health medical review Travel risk, infection prevention, first aid training recommended More extensive medical supplies	Assistance usually required for any medical issue Selection of providers critical Language assistance Transfer to higher quality facility Any condition requiring hospitalisation may require international evacuation
<b>Extreme Risk</b>	Healthcare is almost non-existent or severely overtaxed High infectious disease risk Road traffic accidents are a medical hazard	Medical review recommended Travel risk, infection prevention, first aid training recommended More extensive medical supplies Some specific disease management training recommended (e.g. malaria)	Assistance required for any medical issue Selection of providers critical Language assistance Transfer to higher quality facility All but minor health issues may require international evacuation

**Table 5 : Specific vaccinate-preventable diseases**

<b>Infection</b>	<b>Zones at risk</b>
Yellow fever is a potentially lethal mosquito-borne viral hemorrhagic fever	Endemic in parts of sub-Saharan Africa and South America. The mortality rate is 20% to 50%.
Hepatitis A is a self-limiting disease. Nevertheless, it can cause prolonged incapacity to work, with long-lasting fatigue and an increasing frequency of severe cases and mortality over the age of 45 years.	Easily contracted in many parts of the world through contaminated food or water
Hepatitis B virus (HBV) is a viral infection that attacks the liver and can cause both acute and chronic disease.	Highly endemic in Africa, in the Asia Pacific region and in most other parts of the developing world. Contact with infected blood or other body fluids, and unprotected sex, are risk factors for infection.
Typhoid fever is a bacterial disease, caused by <i>Salmonella typhi</i> . Symptoms usually develop 1–3 weeks after exposure, and may be mild or severe. They include high fever, malaise, headache, constipation or diarrhoea, rose-coloured spots on the chest, and enlarged spleen and liver. Typhoid fever can be treated with antibiotics. However, resistance to common antimicrobials is widespread.	The majority of imported cases in Europe and in North America are acquired in South and Southeast Asia. It is transmitted through the ingestion of food or drink contaminated by the faeces or urine of infected people.
Meningococcal Meningitis is a bacterial form of meningitis, a serious infection of the meninges that affects the brain membrane. It can cause severe brain damage and is fatal in 50% of cases if untreated.	The majority of these cases occur during epidemics in the meningitis belt in sub-Saharan Africa stretching from Senegal in the west to Ethiopia in the east.
Rabies is a zoonotic disease (a disease that is transmitted to humans from animals) that is caused by a virus. The disease affects domestic and wild animals, and is spread to people through close contact with infectious material, usually saliva, via bites or scratches. The World Health Organization (WHO) estimates that rabies causes over 50,000 human deaths annually worldwide. Encephalitis due to rabies is untreatable.	Occurs in more than 150 countries and territories. Rabies is present on all continents with the exception of Antarctica, but more than 95% of human deaths occur in Asia and Africa. Dog bites are the primary cause of rabies transmission.
Japanese Encephalitis is a mosquito-borne arboviral disease. It is transmitted seasonally in most areas by <i>Culex</i> mosquitoes, which bite primarily at night in rural areas. This flavivirus may cause a severe encephalitic disease. The associated mortality rate is 30% to 40%, and up to 50% of those who survive may have neurologic sequelae.	The disease endemic in the rural areas of Nepal, India, and Southeast Asia, and also in parts of Japan, Taiwan, China and Korea.

**Table 5 : Specific vaccinate-preventable diseases (continued)**

<p>Cholera is an acute diarrhoeal infection caused by ingestion of food or water contaminated with the bacterium <i>Vibrio cholerae</i>. It can kill within hours if left untreated. Up to 80% of cases can be successfully treated with oral rehydration salts.</p>	<p>Cholera transmission is closely linked to inadequate environmental management. Typical at-risk areas include peri-urban slums, where basic infrastructure is not available, as well as camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not met. The risk of contracting cholera is low for travellers (0.2 to 13/100,000), but higher for expatriates. During the 1991 epidemic in Lima, the estimated incidence of cholera among US embassy personnel was 44 per 100,000 population per month of exposure.</p>
<p>Tuberculosis (TB) is caused by a bacteria (<i>Mycobacterium tuberculosis</i>) that most often affects the lungs. TB is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air. A person needs to inhale only a few of these germs to become infected.</p>	<p>Over 95% of TB deaths occur in low- and middle-income countries. The risk for long-term residents is estimated to be similar to that for the local population in the host country, at 1% to 3% per year. Following the general recommendations for influenza vaccination in the northern hemisphere, expatriates at high risk for complications of influenza (those &gt;65 years of age, those with chronic disease, and immunocompromised persons) should consider yearly vaccination with the appropriate influenza strain when posted to the tropics and to the southern hemisphere.</p>

Source: Dijkstra (2005), WHO (2013)

### 3.2.3 Vaccine-preventable diseases

Vaccination is a highly effective method of preventing certain infectious diseases. Table 5 describes vaccinate-preventable diseases that pose a risk for travellers. The vaccines for these diseases are generally very safe and serious adverse reactions are uncommon.

Although vaccines are available not all travellers (have the opportunity to) protect themselves. Unvaccinated persons travelling into risk areas can get infected. The incidence rate depends on the nature of the disease, the traveller and the area. For travellers, vaccination offers the possibility of avoiding a number of infectious diseases that may be encountered abroad. However, satisfactory vaccines have not yet been developed against several of the most life-threatening infections, including tuberculosis, malaria and HIV/AIDS.

### 3.2.4 Malaria

Especially malaria is considered a typical travel disease for those travelling in tropical countries. It is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected mosquitoes. According to the latest estimates, released in December 2013, there were about 207 million cases of malaria in 2012 (with an uncertainty range of 135 million to 287 million) and an estimated 627,000 deaths (with an uncertainty range of 473,000 to 789,000)<sup>14</sup>. Malaria is caused by Plasmodium parasites. The parasites are spread to people through the bites of infected Anopheles mosquitoes, called “malaria vectors”, which bite mainly between dusk and dawn.

There are five parasite species that cause malaria in humans:

- Plasmodium falciparum
- Plasmodium vivax
- Plasmodium malariae
- Plasmodium ovale
- Plasmodium knowlesi

Plasmodium falciparum and Plasmodium vivax are the most common. Plasmodium falciparum is the most deadly. Most malaria cases and deaths occur in sub-Saharan Africa. However, Asia, Latin America, and to a lesser extent the Middle East and parts of Europe are also affected. In 2013, 97 countries and territories had ongoing malaria transmission.

Long-term travellers and international assignees in malarious areas are at risk for severe malaria throughout their stay, but sometimes they do not recognise the continued need for reducing risk through chemoprophylaxis and personal protective measures (see table 7). Guidelines for malaria prevention might be interpreted as focusing on preventing Plasmodium falciparum malaria in short-term travellers. Optimal malaria prevention in long-term travellers poses dilemmas because of diverse traveller characteristics and itineraries (including travelling in and out of malarious areas), the heterogeneous quality of and access to medical care, and the limited reports on long-term safety and efficacy of antimalarial drugs. Moreover, parasite resistance, seasonality, and the intensity of transmission evolve with environmental and population alterations<sup>15</sup>.

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**Table 6: Key findings from a review of studies relevant to long-term travellers and international assignees**

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- Long-term travellers are at higher risk for malaria than short-term travellers.
  - Long-term travellers underuse personal protective measures and often abandon continuous chemoprophylaxis.
  - Travellers use a variety of incorrect or unproven strategies during long stays: discontinuing chemoprophylaxis after the initial period of stay, using different medications for chemoprophylaxis in succession, relying on standby emergency self-treatment, or taking chemoprophylaxis intermittently during high-transmission periods or locations. All the chemoprophylaxis strategies have advantages and disadvantages, but chemoprophylaxis is recommended for the duration of the stay.
  - Counterfeit drugs (including antimalarial drugs) threaten the health of long-term travellers who obtain their medications in developing countries.
- 

Source: Lin H. Chen



## 4 Cost of expatriation and risk of international assignment failure

### 4.1 Cost of expatriation

The costs associated with a long-term international assignment, defined as the relocation of an employee abroad by a firm for a year or more are high.

According to a PriceWaterhouseCoopers (PwC) study<sup>16</sup>, the major part of the investment in international assignments is the total compensation (gross base salary, bonuses, profit-share, employer social security contributions, and other cash compensation which forms part of non-assignment compensation) and long-term benefits (contributions by the employer to pension plans, healthcare, disability, and life insurance cover) paid by the employer. The sum of these two items of employee reward and benefits is, on average, US\$ 190,000 per annum. The amount paid to international assignees is clearly greater than that paid to their non-expatriated peers generally.

Above the expenditure for assignment allowance (this allowance provides additional financial support for employees and their recognised dependants - spouse/domestic partner and/or dependent children - to meet certain costs associated with living in a foreign country) which may very much vary from one case to another, international companies spend considerable amounts of time, effort and funds in selecting and training international assignees. Additional costs are incurred in addressing overseas challenges for these employees.

Organisations spend significant amounts on supporting their assignment programmes. In its study, PwC defined assignment management costs as being a combination of the costs to the organisation of employing staff primarily devoted to the management of their assignees population, plus the overall costs of outsourced services. In total, the average management cost per expatriate was US\$ 22,378 per annum in comparison to US\$ 3,000 for the average of all employees.

The overall average investment in an international assignment per annum was reported as US\$ 311,000 with a range of between US\$ 103,000 and US\$ 396,000.

Existing studies show that many assignees and accompanying family members find it initially challenging to adjust to life abroad. However, organisations spend relatively little in pre-departure learning and development, compared with the amounts paid in relation to on-assignment allowances.

The PwC study shows the amount spent on pre-assignment preparation represents an average of 0,5% of the total investment per assignee. This was a significantly smaller element of the total investment,

compared with the average levels of on assignment allowance expenditure. The average pre-assignment learning and development spend amounts to only US\$ 1,521 per assignee.

**Table 7: Distribution of the costs for an average investment in an international assignment.**

Category of cost	Description	Average cost for employers by category
Salary and compensation for the employee	gross base salary, bonuses, profit-share, employer social security contributions, other cash, compensation contributions by the employer to pension plans, healthcare, disability, and life insurance cover	\$ 190.000
Assignment allowance	financial support for employees and their recognised dependants (spouse/domestic partner and/or dependent children) to meet certain costs associated with living in a foreign country	\$ 97.101
Pre-assignment costs	selecting and training expatriates	\$ 1.521
Management costs	employing staff for the management of the expatriate population overall costs of outsourced services.	\$ 22.378

Source: PWC (2006)

#### 4.2 Risk of mission failure and its cost

Although some have estimated expatriate failure rates as high as 40%, scholars disagree on what constitutes failure and its rate. Leaving an assignment early is an accepted measure of failure, and reports estimate premature departures between 8 and 12%<sup>17</sup>. The 2012 Global Relocation Trends Survey stipulates that assignment failure rates remain low overall. The surveyed companies reported that 6% of assignments fail.

Key reasons for assignment failure were split between career and family. “Employees leaving the job for an opportunity within another company” was the top cited response, followed closely by spouse/partner dissatisfaction and then family concerns.

The costs of assignment failure are both direct and indirect. The direct cost includes salary, training costs, and travel and relocation expenses. The indirect cost could be a loss of market share, difficulties with host government and demands that parent country nationals be replaced with host country nationals. Indirect cost is invisible and might be much more expensive than the direct cost. Furthermore, assignment failure

also has a negative effect on individuals. He/she may lose self-confidence or honour and his/her later career development will be affected too. Sometimes an assignee and his/her family may suffer unexpected emotional damage<sup>18</sup>.

The cost per assignee of an unfulfilled assignment varies according to the work position, status of the employee and specific situations (country of assignment, family situation,...). The cost of a failed assignment varies and estimates range from US\$ 50,000 to 1,200,000<sup>19</sup> (see table 8).

When calculating the variation to cost of failed assignment, salary is a considerable factor: A failed assignment is estimated to cost three to five times the assignee's annual salary<sup>20</sup>. If this factor is applied to the aforementioned international assignees' salary of US\$ 190,000 per annum (section 4.1), the cost of failed assignment can be estimated to be between US\$ 570,000-950,000.

### Lack of support and services

Not only the financial but also the human toll of maladjustment can be the cause of worry. While they have sophisticated financial, marketing and operational plans for their overseas ventures, organisations too often ignore, under-estimate or misunderstand human dynamics and needs in certain specialised and crucial medical and health-related areas: Ignorance about tropical and infection diseases, lack of emergency structures, ignorance of local and medical care standards.

A research based on hundreds of cases identified six systemic and systematic deficiencies in corporate international health care services (table 9)<sup>21</sup>.

**Table 8: Financial cost of an unfulfilled prematurely terminated assignment abroad**

Authors	Main result/estimations
Edwards (1978)	Ca US\$ 70,000 per family / US\$ 250,000 per senior manager
Misa/Fabricatore (1979)	US\$ 55,000 - 85,000 per family for an expatriation in near East
Lanier (1979)	US\$ 80,000 per family
Holms/Piker (1999)	UK£ 35,000 (ca. US\$ 70,000 - currency April 2007)
Medenhall/Oddou (1985)	US\$ 55,000 - 80,000
Mendenhall et al. (1987)	US\$ 50,000 - 150,000
Harvey (1989)	Costs exceed US\$ 1,000,000 when an expatriate leaves the company after an assignment
Caudron (1992)	US\$ 250,000 - 1,000,000
Copeland/Griggs (1992)	US\$ 200,000 per assignee and family
Swaak (1995)	US\$ 200,000 - 1,200,000

Source: Yann Meunier, *Globalization: health challenges for multinational corporations* (2007)

### 4.3 Emergency evacuation and repatriation

Repatriation is the process of return of employees to their homes. In most cases, it happens at the end of the assignment. However, it may occur in unexpected circumstances and lead to premature termination of the mission.

Contrary to repatriation that may be planned, evacuations are by definition, unplanned, unexpected and urgent. It does not imply a return of the expatriates to their home country but a transportation to a "safer" place.

Thus, emergency evacuations and repatriations occur in a situation of crisis. While definitions of crisis may differ greatly, Lerbinger (2012) distils eight generic characteristics of a crisis event:

- the event is sudden, unexpected and unwanted;
- it is of high impact and low probability;
- it has great ambiguity regarding cause, effect and resolution;
- it interrupts normal operations of an organisation;
- it hinders goals and threatens the firm's profitability or survival;
- it requires fast decision making; it may cause problems if no action is taken;
- and it creates significant psychological stress<sup>22</sup>.

Multinational companies are increasingly managing expatriates (and other staff) in countries and regions that present substantial health, safety, and security risks. Reports of violence, kidnapping, terrorism, and murders that target international assignees are common. Triggers for evacuation include natural disasters, irregular man-made crises, e.g. kidnapping, and regular man-made crises. Accidents and health problems fall into the category of regular man-made crises (table 10).

Evacuating international assignees incurs large direct and opportunity costs for firms, and can be traumatic for those involved. While data on the actual number of evacuations is unavailable, one global medical assistance firm reports overseeing 18,000 evacuations in a single year and a recent study of international aid workers in 18 countries reported that more than 20% required evacuation over a 12-month period<sup>23</sup>.

#### 4.4 Medical evacuation and repatriation

Worldwide, when the needs of injured or ill patients exceed what local clinics and hospitals can provide, urgent evacuation to the nearest well-equipped medical facility becomes the key to preserving function and saving lives.

The evacuation of patients with less severe conditions is required when they need hospitalisation and adequate facilities are not available. Hospitalisation in facilities with no adherence to universal precautions (e.g., where sinks and gloves are unavailable), where hygiene is a low priority, or expertise or special equipment is absent (e.g., orthopaedic hardware for larger patients) can create unnecessary complications that can be avoided by travel to a comprehensively staffed and stocked centre.

Because blood is not an export commodity in any country, the early transfer of a patient at risk of bleeding (e.g., from an ectopic pregnancy) to a facility with a replete and reliable blood bank can avert a tragedy. This is a special concern in sub-Saharan Africa, where the safety of blood supplies may be suspect, and in Southeast Asia, where Rh-phenotype blood is not always available.

Evacuation is also warranted when critical drugs are substandard, prone to being counterfeited, or unavailable owing to supply disruptions, government regulations, or practice standards<sup>24</sup>.

#### 4.5 Medical reasons for evacuation

For international evacuation, the most common conditions include neurologic and orthopedic sequelae of road trauma, acute coronary syndromes, infections unresponsive to available therapies, infectious diseases, like malaria, and complications of pregnancy.

A study in the energy, mining and infrastructure industry<sup>25</sup> indicates that the overall incident rate for medical evacuations and repatriations was 7% of all assistance cases within a population of 5,057 employees in the examined 40 companies within the segment. Within the entire population the three main reasons for emergency medical evacuation were 28% accident and injury, 14% cardiovascular disorders, and 14% gastro-intestinal disorders.

The cost per case in a high risk country is double the amount as compared to a moderate risk country where risk is quantified by geography, economy, stability and local healthcare.

**Table 9 : Systemic deficiencies in corporate international health care services**

<p><b>Absence of global programma</b></p>	<p>Each medical department works independently despite a wide array of common issues such as :</p> <ul style="list-style-type: none"> <li>• tropical and infectious diseases prevention (particularly, malaria and dengue),</li> <li>• Immunization (particularly, yellow fever),</li> <li>• Emergencies (particularly, medical evacuations),</li> <li>• Screening for employees, spouses and children before overseas assignments (particularly, psychological), etc</li> </ul> <p><b>Negative impacts:</b> Redundancy, doubt in patients' minds, doctor's possible loss of credibility, time wasted in explaining discrepancies, expensive phone bills, sometimes false sense of security if a drug is no longer active against a local parasite unknowingly to its user, etc</p>
<p><b>Absence of common references for corporate clinics overseas</b></p>	<p>Each doctor uses his/her own set of references</p> <p><b>Negative impacts:</b> Same as above</p>
<p><b>Absence of protocols, procedures and policies overseas</b></p>	<p>This includes a large number of issues such as:</p> <ul style="list-style-type: none"> <li>• Kidnappings, rapes, ...</li> <li>• Post-traumatic Stress Disorders and psychological support</li> <li>• List of doctors, clinics and hospitals of reference,</li> <li>• Evacuation, ...</li> </ul> <p><b>Negative impacts:</b> High cost for reacting to situations already established, total uncertainty that the ad hoc solutions found are the best possible, stress and sometimes panic, enormous amount of time spent on solving emergency issues at the expense of core business, bad image with employees, bad press and bad reputation in the countries of operation, inability to find answers rapidly and reliably when a catastrophe strikes.</p>
<p><b>Absence of a computerized and centralized medical file for each employee</b></p>	<p>Negative impacts: Impossibility to gather all the medical data rapidly in case of an emergency, high cost for repeating blood tests and exams, employee time wasted on unnecessary or redundant procedures, vital risk if, for example, allergies are triggered by drugs/other factors or medications discontinued due to absence of information, etc.</p>
<p><b>Struggle in dealing with tropical diseases</b></p>	<p>Because the corporate medical staff has a poor knowledge of these diseases, there are no specialists to refer to or an inadequacy of specialists of Reference.</p> <p><b>Negative impacts:</b> Inappropriate treatments given with serious and sometimes life-threatening consequences, having to face recurrent similar problems, etc</p>
<p><b>Absence of a corporate physician of reference</b></p>	<p>He/she should be available 24/7 for reference, advice, counselling, information, etc.</p> <p><b>Negative impacts:</b> Wasted time, stress, delay in starting a treatment or taking action to address a health problem. This delay can be life threatening.</p>

Source: Yann Meunier (2007)

**Table 10: Triggers for the evacuation of expatriate staff**

<b>Triggers</b>	<p>Natural disasters, like floods, fires, earthquakes, and tsunamis, which typically affect large numbers of people and infrastructure.</p> <p>Irregular man-made crises, including kidnapping, civil or military unrest, or acts of terrorism.</p> <p>Regular man-made crises, which are more familiar, like industrial accidents and non-work misadventures. This category includes road accidents, which have been identified as a major cause of medical evacuation.</p>
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Source: Fee (2013)



## 5 Prevention programmes

All travelling employees may face difficulties when abroad. Effective and focused prevention policies are needed to guarantee that all employee missions abroad will be handled safely and in good working conditions. The promotion of the health of international assignees is the responsibility of the sending organisation.

When abroad, especially long-term, international assignees may experience difficulties. Promotion of health and prevention of incidents, accidents and diseases are for the benefit of both employees and the organisation, as international assignee illness is expensive. Repatriation of a key employee and family may be very costly, in addition to the cost and disruption related to the absence from work.

Organisations sending international assignees abroad need to have clear policies and strategies aimed at reducing risks and promoting the health of their employees in the field. These include defined selection criteria, preparing and informing expatriates on field conditions, enforcing preventive measures prior to departure, such as immunisation, and practices to be followed during posting, such as malaria prophylaxis, antivector protection, water and food precautions, safe sex, safe driving, wearing seat belts, stress handling (see table 11).

According to the study of Duty of care and travel risk management: Global Benchmarking study<sup>26</sup>, companies have greater awareness in assessing risk, and developing policies and procedures and steps to be taken when an incident occurs (Advising, Assisting and Evacuating), but have lower awareness of what it takes to implement (Communication, Education and Training).

Regular contacts, with reminders and easy access to communication lines to share professional or personal problems, should be implemented in a systematic way. Rapid access to medical services and emergency procedures in cases of accidents or life-threatening events should be established and well known by expatriates in the field. Keeping up-to-date information, monitoring and the establishment of a surveillance system allow for an effective health promotion programme adapted to the needs of employees.

### 5.1 Pre-travel policies

Preparing the traveller is the key element of travel risk prevention. The impact of travel on health may be significant. A study finding reveals that 38% of travellers suffered health impairment, of which 14% were incapacitated<sup>27</sup>.

A foundation for healthy journeys can be given to travelling employees by assessing their health, selecting vaccines, and providing education about prevention. Preparing the traveller for a journey to a less developed world is not easy and takes time; education is as vital to healthy travel as are immunisations.

When assessing health conditions before departure, the health provider must look at the employee's current state of health, including underlying illnesses that could be affected by the journey, medical history, medication use, drug or environmental allergies, age-specific issues, and the possibility of pregnancy.

Serious illnesses that should be identified include suppressed immunity, bleeding disorders, seizures, diabetes, heart disease, and psychological or psychiatric conditions. Contraindications for vaccines and medications should be clarified<sup>28</sup>.

### 5.1.1 Vaccination

Although there are multiple components of successful international health programmes, one of the most important is immunisation. The benefits of immunisation to international travellers are well established, both in preventing disease and in lessening its severity and duration. Furthermore, it is a relatively inexpensive means of preventing disease.

Vaccinations can be divided into routine (those recommended in the country of origin), required (mandatory for specific destinations), recommended for all destinations, and those to be applied according to the specific epidemiologic situation and location (Japanese encephalitis, meningococcal meningitis) (see table 12).

**Table 11: Hardship experienced by international assignees and health promotion measures**

<b>Difficulties experienced by long-term international assignees</b>	<b>Promoting health of international assignees</b>
Isolation and loneliness	Have a clear policy to promote the health of international assignees
Cross-cultural adjustment and communication difficulties	Inform on risks and how to reduce them
Difficult living conditions and harsh environment	Promote easy access to information
Unreliable means of communication and transportation	Give clear, simple and effective guidelines
Relatively low professional and psychological support	Have pre-departure medical evaluation, vaccination, and counselling
Lack of community and family network and support (away from relatives and friends)	Promote easy access to preventive measures: malaria prophylaxis, condoms, seat belts, helmets
Exposure to poverty and suffering	Have access to medicine and a medical kit for common illnesses
Exposure to violence, insecurity and death	Have access to medical services, to referral, and medical advice
Exposure to infectious diseases	Have adequate insurance protection, including for medical evacuation
Always immersed in professional activities	Enforce preventive measures: reminders
Higher level of responsibility and self-sufficiency	Epidemiologic surveillance: regular data collection
Lack of privacy	
Little opportunity to rest and socialize	
Reduced access to medical services	

Source : Dijkstra (2005)

**Table 12: Vaccination for international assignees to be considered according to destinations**

<b>Routine vaccination</b>	Diphtheria, tetanus, and pertussis Hepatitis B (Hep B) Haemophilus influenza type b Human papillomavirus a Influenza b Measles, mumps, and rubella Pneumococcal Poliomyelitis Rotavirus Tuberculosis (BCG)c Varicella
<b>Selective vaccines</b>	Cholera for travellers to risk Hepatitis A areas Japanese encephalitis Meningococcal Rabies Tick-borne encephalitis Typhoid fever Yellow fever
<b>Required vaccination</b>	Yellow fever (Country list) Meningococcal (against sero groups A,C,Y, and W135 )

A So far introduced into the routine immunisation programme of a limited number of countries.

B Routine vaccination for certain age groups and for individuals potentially exposed to certain risk factors.

C No longer routine in most industrialised countries.

D For diseases in this category a summary of vaccine recommendations and other precautions is provided.

E These vaccines are also included in the routine immunisation programme in several high-risk countries.

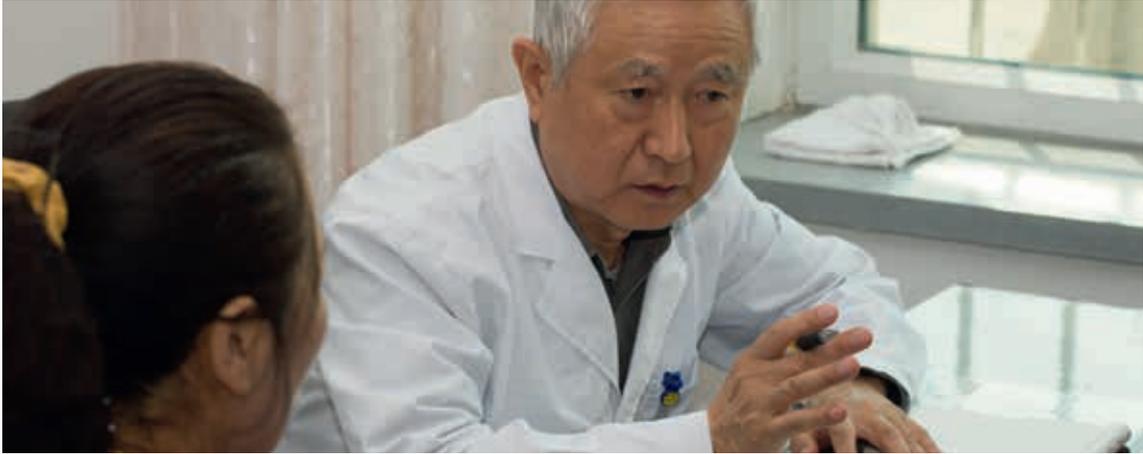
Source : Dijkstra (2005)

### 5.1.2 Non vaccine preventable diseases

Some typical tropical diseases are vaccine preventable, but not all of them, like malaria. An estimated 30,000 cases of malaria, 10,000 of them reported, are imported annually to non endemic industrialised countries. The risk of malaria varies widely by geographic region. Recent analyses of traveller databases have found the highest risk of acquiring malaria in Africa and Oceania, an intermediate risk in South Asia, and a lower risk in Central America, Southeast Asia, and South America<sup>29</sup>.

Although no preventive intervention is 100% effective, several approaches are available and can be used in combination. Any preparation should begin with education about basic elements of malaria transmission that will be tailored to the region where the person will be living and working. The importance and effectiveness of personal protective measures should be emphasised with long-term travellers, including behaviours to minimise exposure to mosquitoes (e.g., stay indoors from dusk to dawn, choose screened accommodations), barrier clothing, insecticide- impregnated bed nets, spraying of residence with insecticide and application of effective insect repellent.

Although personal protective measures and environmental and behavioural modifications can reduce the risk of exposure to infective mosquitoes, these interventions cannot eliminate risk of infection. In combination with these measures, chemoprophylaxis can further reduce the risk of disease when a person is bitten by infected mosquitoes. Most chemo prophylactic regimens provide about 75% to 95% protection, even if taken correctly no chemo prophylactic regimen is 100% effective.



## 6 Cost-benefit of prevention

### 6.1 Introduction

The costs of occupational injuries and by extension the cost of health problems experienced by high mobility employees can be grouped into three categories: direct costs, indirect costs, and human costs. There is no consensus regarding what each category comprises. Generally speaking, direct costs consist of components associated with the treatment of the health problems, such as medical costs. Indirect costs are considered to be costs related to the lost opportunities for the injured employee, the employer, the co-workers, and the community. They consist mainly of salary costs, administrative costs, and productivity losses. Compared with direct costs, indirect costs are usually more difficult to measure.

Human costs relate to the value of the change in the quality of life of the worker and the people around him / her. So called intangible costs for the company can be added to these categories such as those arising from a deterioration of the company image among employees or potential future employees or the alteration of the company public image. This last category is very difficult to estimate and is usually not included into calculations.

The company case studies specifically focus on the costs for the company concerned and are supposed to use only the company data and experience for evaluating the costs and the benefits of their prevention programmes. The usual data collection method consists of developing a questionnaire, which is distributed to the company or participating companies. The questions allow the financial consequences of a prevention programme to be identified and estimated.

Calculating the costs of accidents at work and cases of work-related ill-health may give an indication of their impact on company performance. However, it is much more interesting to know how the causes of such accidents and cases of ill-health can be effectively prevented and how much companies can benefit from this prevention in monetary terms. Legal compliance is the most important driver for occupational safety and health (OSH) on corporate level but higher-level activities and resources sometimes require a business case. Moving beyond legal compliance requires a sound strategy on OSH, tying its outcomes to the overall business outcomes.

The fact that the business case can function as a driver for OSH emphasises the need to set-up economic assessments of OSH interventions on company level as a part and in support of strategic business cases. Cost-benefit analysis is a useful assessment method because it compares benefits and costs of OSH interventions in monetary values. This method is useful in assessing the economic impact of interventions but it presents some methodological limitations (See 7.5).

## 6.2 Prevention and return on investment: findings from research studies

### 6.2.1 Prevention is sound business

Many companies are willing to tackle the costs associated with work-related accidents and illness by improving the physical environment of the workplace.

If they do make an effort to address problems related to health practices and the psychosocial environment, what is the likely cost-benefit, or return on investment, for them? The literature is encouraging even though there are often difficulties quantifying some of the results.

A literature study<sup>30</sup> indicates that there is growing evidence that the cost-benefit ratio of prevention programmes ranges from 1,50 to 6,15 (see examples cited below, table 13).

The higher numbers result when a comprehensive approach to a healthy workplace is used, rather than a single focus and when cost-benefit is measured several years after inception of the interventions, rather than at the beginning.

Many of the cost-benefit analyses published in the literature are based on the return on investment of “wellness” programmes only, meaning health promotion programmes aimed at improving the personal health practices of employees. The greatest gains are those that occur when health promotion programmes are implemented in a workplace that is already an open, trusting, and supportive work environment.

**Table 13: A few examples of ROI of occupational health programmes from the published literature**

BC Hydro	For every CAN \$1 spent on the organization’s wellness programme, the company saved an estimated CAN \$3 (after running 10 years).
Canada Life Insurance	The company saved CAN \$3.43 for every CAN \$1 spent on its fitness programme
University of Michigan	For every USD \$1 spent on workplace health programs, savings were estimated at USD \$1.50 to \$2.50.
Dupont (USA)	For every \$1 USD spent on a company health promotion program, the company saved \$2.05 USD on disability after 2 years

Source: Joan Burton (2008)

### 6.2.2 Prevention of occupational accidents

In the field of prevention of occupational accidents, the Benosh study<sup>31</sup> analysed 401 cases of accidents at work: 276 with low severity, 73 with medium severity and 52 with high severity. For each accident at work or each case of work-related ill-health the costs were calculated based on an analysis of the consequences. A cost-benefit analysis was carried out for 56 projects. This analysis shows a variety of results. Three scenarios were analysed: a minimum scenario, a maximum scenario and an alternative. In the cost-benefit analysis the potential benefits rely (in part) on an estimate of the costs due to the cases of accidents at work or work-related ill-health that will be avoided in the future.

The minimum scenario is based on the lowest estimate of cases that will be avoided; the maximum scenario is based on a higher estimate. So the minimum and maximum scenario consider the same set of measures but are based on a low, respective high(er) assumption of the avoided costs. The estimates were based on discussions with the company, expert opinions, data from research, ... The third scenario considered either an alternative measure or additional measures.

The median values of the Profitability Index and Benefit-Cost ratios calculated for all types of prevention measures ranged respectively from 1,29 and 1,21 in the minimum scenario to 2,88 and 2,18 in the most optimistic scenario (table 14).

In another study published in 2011<sup>32</sup>, the microeconomic effects of workplace prevention were obtained using standardized interviews. The interviews were conducted with experts (e.g. company owners, controllers, safety officers, work council members) in the selected companies. Where possible, the interviews were conducted in groups.

Interviewees were asked to assess the costs and benefits of occupational safety and health based on their experience.

Half of the interviewed companies expected that additional investments in occupational safety and health would decrease company costs over the long term. Most companies rated the benefit-cost ratio between 1 and 1,99. The mean benefit-cost ratio (Return on Prevention) was 2,2.

When quantifying the costs and the benefit per employee, the researchers calculated a prevention net benefit of 1,445 (table 15).

The prevention net benefit, as well as the Return on Prevention, expresses the economic success of occupational safety and health from different perspectives<sup>33</sup>.

**Table 14: Results from the Benosh study**

Measure	Code	#	%	Minimum scenario			Maximum scenario		
				Net Present Value	Profitability Index	Benefit Cost Ratio	Net Present Value	Profitability Index	Benefit Cost Ratio
substitution /avoidance	I	3	5.4	2,207.52	2.56	1.60	13,857.89	4.08	2.25
organisational measure	II	6	10.7	2,310.96	1.74	1.04	21,829.57	3.18	1.36
new equipment /auxiliaries	III	20	35.7	1,713.35	1.41	1.40	8,983.74	2.76	2.70
workplace adjustment	IV	6	10.7	2,389.38	1.37	1.22	8,984.01	2.15	1.66
training	V	16	28.6	605.02	0.95	1.12	8,092.65	3.39	2.51
personal protective equipment	VI	5	8.9	154.38	1.05	1.18	11,038.12	1.83	2.10
all		56	100	1,434.875	1.29	1.21	9,218.81	2.89	2.18

Source: De Greef (2011)

### 6.2.3 Cost-benefit of prevention programmes for travelling employees

#### Vaccination

Corporate vaccination programmes support organisations in fulfilling their legal responsibilities for the health of employees working abroad and emphasises an organisation's commitment to the well-being of employees asked to work abroad. However, also expatriate illness is expensive. If it necessitates repatriation of a key employee and their family, it can cost between \$500,000 and \$1,000,000.

Vaccination programmes can be cost-efficient. For example, an employee bound for East Africa would be likely to receive vaccinations against yellow fever, Hepatitis A, Hepatitis B, typhoid, tetanus, diphtheria, measles and rubella at an estimated cost of \$350. In general, appropriate vaccination costs \$200-400; broader health screening costs \$500 per year, on average. Given a population of 100 expatriates, six repa-

triations are expected per year at a cost of \$3,600,000 (six repatriations at a typical cost of \$600,000). An effective screening programme will cost less than 2,0% of this figure (\$50,000 a year, one \$500 screening for each of the 100 expatriates)<sup>34</sup>.

## Malaria

An impact study of malaria conducted by SCB-Lafarge<sup>35</sup>, a French company from the construction sector with 540 employees (mostly local workers), indicates that malaria was responsible of 50% of the absenteeism within its staff in Benin (900 workdays lost a year) and 42% of the medical consultations (3,400 consultations a year). The cost of malaria has been estimated around €42,175 per year including the workdays lost (€16,800), diagnostic and medication (€14,175), medical staff costs (€11,200).

The estimation of the cost of the prevention programme was calculated taking into account the following costs components: supply of bednets, education programme, and supply of a quick diagnostic test kit.

The total cost per employee per year was estimated at €4,5 to €7 per year. This estimation represents a yearly cost for the prevention programme of €7,500. The avoided costs generated by the programme were estimated at €16,395 (50% avoided absenteeism and avoided medical costs).

The cost of malaria with the prevention programme decreased to €33,280 a year. This represents a return on investment of 119%.

## Pre-travel health screening

The study conducted by Dr. Myles Druckman and Carl Spitznagel aimed at understanding the effectiveness and financial benefit of pre-assignment health assessment programmes organised for international travelling and long-term assignment employees<sup>36</sup>.

The programme contains a self-assessment questionnaire (on-line) and a health examination by a medical staff. The results of the on-line programme were the following:

- for 68% of the employees no follow up was required,
- 10% of the cases were review by the medical director,
- 4% of the employees required a medical exam.

The questionnaire programme identified and positively intervened to limit or prevent the failure of an assignment for medical reasons. The researchers considered 1,5% of the cases a “critical intervention” or a “save”, respectively “a non-urgent and controllable health issue for which the medical staff has positively intervened to help the employee manage the issues in order to limit potential business disruption and productivity impacts” and “a serious, potential life threatening medical illness that has been identified which if not addresses would have likely resulted in a medical evacuation and/or failed assignment”.

The on-line programme permitted the identification of 16 «critical interventions» and 3 “save”. The cost of a critical intervention was estimated as the avoided loss of eight work days at \$1,500 per day and the cost of a “save” as being equal to the avoided assignment failure, where financial consequences for the company were estimated at \$500,000.

The cost of the programme includes the use of the on-line questionnaire and the medical staff that supported the programme.

As table 18 shows, the total avoided costs exceed the cost of the programme by far. This means that each \$1 invested in the programme offered a return of \$9,34.

**Table 15: Companies' global prevention costs and benefits of occupational safety and health (in EUR)**

Occupational safety and health costs per employee per year (in EUR)		Occupational safety and health benefits per employee per year (in EUR)	
Personal protective equipment	159	Cost savings through prevention of disruptions	506
Guidance on safety technology and company medical support	251	Cost savings through prevention of wastage and reduction of time spent for catching up after disruptions	386
Specific prevention training measures	142	Added value generated by increased employee motivation and satisfaction	561
Preventive medical check-ups	56	Added value generated by sustained focus on quality and better quality of products	400
Organizational costs	235	Added value generated by product innovations	229
Investment costs	241	Added value generated by better corporate image	563
Start-up costs	116		
<b>Total costs</b>	<b>1.200</b>	<b>Total benefits</b>	<b>2.645</b>
Prevention net benefit = 1,445			

Source : DGUV, ISSA (2013)

**Table 16: Calculation of the profitability index**

Critical Intervention Value	16 Interventions x 8 lost working days x \$1500 per day	\$192.000
Save Value	3 saves x \$500,000 per save	\$1.500.000
Total of the avoided costs		\$1.692.000
Cost of Programme		\$1.692.000
Profitability index		9.34

Source: M. Druckman (2011)



## 7 Case study

### 7.1 Introduction

In the framework of this study, a case study was made of two travel prevention programmes in one company. The first prevention programme consists of a pre-travel medical check and the second is a malaria prevention programme. For both programmes the costs and benefits are compared using company data.

Each case study described in the following chapters is related to a company that is a world leading supplier in the oil and gas sector. The company employs approximately 120,000 people representing over 140 nationalities and working in more than 85 countries. Among the personnel, 15,000 employees are referred to as “expatriates” or “high mobility” employees. They originate from one country and work in another country. Expatriate international assignees are often accompanied by their spouse or husband and children.

The high mobility employees cover a large amount of professions: geologists, field engineers, electrical engineers, chemical engineers, drillers, technicians, electricians, managers, finance people, personnel etc. All types of job categories are actually found on international assignment.

Some of the employees are sent to high-risk locations. This can be an offshore rig, a vessel in the middle of the ocean, a location in an extreme environment (desert, arctic, jungle) or a location located in a country where medical facilities are poor and not capable of managing major health issues and where an evacuation may be required for serious medical issues (e.g. Congo, Chad, Papua New Guinea, etc.).

The highest risk area is Sub-Saharan Africa, followed by North Africa, Russia and Caspian area, south-east Asia, Middle East and parts of South America (Amazon basin). But it should be noted that in a very developed country such as the US or Australia, very remote operations are conducted far away from any type of medical infrastructure.

Since the early 1990s, the company initiated a fitness-to-work assessment programme for its employees and in 2003, in response to a series of malaria fatalities among employees during the previous 18 months, the company also launched a Malaria Prevention Programme aimed at protecting employees and their families mostly in Sub-Saharan Africa, where the malaria risk is the highest.

The aim of this business case is to estimate the cost-benefit of these two specific prevention programmes.

## 7.2 Methodology

This case study applies a methodology inspired by the Benosh study (see p. 34). The data has been collected using a working document and organising interviews. The objective of this first phase was to establish the data availability within the company allowing to determine the method for estimating the effectiveness of the programmes.

The most accurate way for estimating the impact of a prevention programme is to record the necessary data before the start of the programme and to collect the same information three or five years after the implementation of the programme. However, such data is not always readily available.

Furthermore, the before/after method permits to isolate the effect of the prevention programme at a condition where the contextual characteristics (risk, risk exposure and the characteristics of the studied population) are comparable or at least cannot have a significant impact on the study results. The prevention measures applied (type of health checks, medical criteria,...) should remain more or less comparable between the two observed situations.

It is also necessary to ensure that health problems considered in the study could have been prevented by the programme and exclude from the study all other health problems (accidents such as falls) as well as the persons that did not benefit from the programme.

For the analysis of the malaria programme sufficient data were available to evaluate the effectiveness of the programme based on the before/after approach. The method was not used in the case of the fitness-to-work assessment programme since no data was available to assess the situation before the implementation of the programme. Therefore, the cost-benefit analysis of fitness-to-work assessment is based on a hypothetical approach. This method is also used by Dr. Myles Druckman in his study (see p. 37). In this case, the collection of data before the implementation of the programme is not necessary. It consists of viewing the results of the health checks instead of observing the recorded health incidents and medical evacuations.

The method is based on a counterfactual: the assumption that employees who are not assigned to high risk zones for health reasons (employees whose health conditions are revealed by the health check programme) may be associated with a strong probability of failure of their mission (evacuation/repatriation). In other words, without the prevention programme, all employees would have been assigned and there is a probability that those in critical health conditions would have experienced a health problem and would have been evacuated. By varying the probability we can hypothetically elaborate two different scenarios as detailed below.

## 7.3 Description of the programmes

### 7.3.1 Medical check fitness-to-work assessment programme

The main aims of this prevention programme created in 1990 were to identify pre-existing medical issues before assigning employees to a foreign country, ensure that employees were fit-to-work for the proposed job and work conditions and identify general and work-related health problems before expatriation. This programme is offered to the company employees as well as to the accompanying dependents, although not mandatory in the latter case.

The Medical check fitness-to-work assessment is performed by a doctor and medical centre selected by the employee. The medical check consists of several medical components (table 17).

Employees can perform the medical examination in the medical centre of their choice, anywhere in the world. The examining doctor provides his fitness conclusion. A final review by the company's medical director is performed if numerous and/or serious medical issues are identified. The final conclusion is communicated to the employee. The fitness conclusion will determine the location and type of assignment that suits the employee's health.

This medical examination takes place every three years.

**Table 17: Medical check fitness-to-work procedure**

Health check components	<ul style="list-style-type: none"> <li>• full history and habitus of the patient;</li> <li>• complete clinical examination;</li> <li>• analysis of blood, stools and urine;</li> <li>• chest X ray and resting electrocardiogram;</li> <li>• update of vaccinations;</li> <li>• provision of malaria prevention information and medication if as signed to a malaria country (see second prevention programme);</li> <li>• drug testing performed only upon pre-employment, in countries where legally acceptable.</li> </ul>
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### 7.3.2 Malaria prevention programme

The malaria prevention programme was launched in 2003. As part of the Malaria Prevention Programme, mobile employees travelling to malaria-risk regions are given information before departure. They receive prophylaxis medication and other technical protection means such as bed-nets, insecticide sprays and repellents. All employees travelling overseas from high-risk locations are also issued with a Malaria Curative Kit which they must present at the point of exit as a condition for travelling overseas. If they develop flu-like symptoms within two months of leaving the location, the kit enables them to self-test and, if necessary, take the anti-malarial medication and go to a doctor.

## 7.4 Cost-benefit analysis of the prevention

### 7.4.1 Pre-travel health check: Methodological considerations and assumptions

A number of methodological choices have been made. They are mainly driven by the availability and reliability of data.

For this study only high mobility employees have been considered, accompanying dependents were excluded from the analysis because they benefit from the programme on voluntary basis only. As this information was not traceable, it was considered that the preventive measure was not fully applied to this category of people.

To ensure the causal link between the prevention programme and the avoided medical evacuation cases, only health incidents that can be prevented by the programme were considered. The avoided cost calculation is thus performed in this study on typical cardiovascular events (heart attacks and stroke) resulting in a medical evacuation of an area at risk. Those two medical issues were identified by the company as the most significant ones.

The company covers all medical expenses, transportation costs and the payment of wages in case of illness. The distinction between insured and uninsured costs is therefore not relevant in this case.

### 7.4.2 Cost-benefit calculation medical check programme

In the company, 10,000 employees either work on a permanent basis, rotate in and out, or have repeated business trips during the year to high risk locations. The fitness-to-work assessment takes place every three years. Each year, approximately 5,000 employees travelling to a high-risk area are assessed.

The direct cost of the medical examination amounts on average to \$1,000 per employee. The cost may vary from one country to another. The indirect cost is about \$500 per employee (travel, meals, hotel, etc. and salary paid to the employee while doing his medical examination).

Overall, the average cost of the medical check sums up to about \$1.500 every three years per employee.

The results of the health checks show that the average number of cases reviewed by the internal company doctor per year (for high risk employees) is around 250. By precaution, these 250 employees are relocated in safe workplace locations and are not assigned to high risk areas.

According to the experience of the medical department of the company the assumption can be made that without the programme 5 to 8% of the unfit employees incurs the risk of experiencing a health problem within the next two years and as a consequence could encounter a medical evacuation and failure of the assignment.

According to the company, each case represents the avoided estimated cost of an assignment failure which comes to US\$ 1,000,000 for failure of an expatriation. This amount is accredited by the scientific literature (can also be found in literature sources<sup>37</sup>). The results of the cost-benefit calculation are presented in table 20. The cost-benefit calculation shows that the maximum scenario results in a cost-benefit ratio of 2,53 and the minimum scenario in 1,6. Every \$ invested in the programme yields a result ranging from \$1,6 to \$2,53.

**Table 18: Cost-benefit calculation of the fit-to-work assessment programme (maximum and minimum scenario)**

<b>Cost</b>		
Cost of the prevention measure (year 1)		\$7.500.000
<b>Benefit (Avoided costs)</b>		
<i>Scenario 1:</i>		
3% health problems during year 2	7 medical evacuations and mission failures	\$7.000.000
5% health problems during year 3	12 medical evacuations and mission failure	\$12.000.000
<i>Scenario 2:</i>		
2% health problems during year 2	5 medical evacuations and mission failures	\$5.000.000
3% health problems during year 3	7 medical evacuations and mission failures	\$7.000.000
Cost-Benefit ratio (scenario 1)		2,53
Cost-Benefit ratio (scenario 2)		1,6

### 7.4.3 Cost-benefit calculation malaria prevention programme

At least 3.000 to 5.000 employees travel to malaria endemic areas per year. Before the programme was launched in 2003, the company recorded four fatal cases over three years. Since the programme is in place, three additional cases have been recorded. It is reasonable to believe that without the programme, the company could have known twelve fatalities instead of three. The programme reduced the occurrence of fatal cases by 70%.

There are no data about absenteeism for sickness. Data for the inpatient cases are assumptions based on literature. The results of the cost-benefit calculation are presented in table 20. The cost-benefit calculation shows that the malaria prevention programme results into a cost-benefit ratio of 1,34. Every \$1 invested in the programme yields a result of \$1,34.

## 7.5 Limitations of the case study

The business case as described above is based on a particular case and on the available data. Therefore, any generalisation of results is possible. Each industry, each company, each job, has its own characteristics that will influence results. The study case should be looked upon as an example that demonstrates the costs and benefits of prevention measures.

In calculating the costs and benefits, one is also confronted with the limits of the available data. Although the costs of a prevention programme are part of the company's expenses, it is not always possible to get exact figures. Costs for prevention are not a separate entry in the bookkeeping system. However, it is possible to make estimates based on the available data by combining data on time spent (average salary costs) and costs paid to third parties.

Although assessing the benefits in monetary terms proves to be difficult, one could argue that the most important limitation lies in the fact that intangible aspects are not taken into account. The calculation of costs and benefits only looks at the dollars saved and spent on the specific programme. Programmes such as medical checks clearly have other benefits that are not valued into monetary terms such as employee satisfaction, company image, improvement of the general status, etc. Some of these benefits are also long-term and a cost-benefit calculation is clearly not suited to account for these benefits.

**Table 19: Cost-benefit calculation of the malaria prevention programme**

<b>Cost</b>		
<b>Cost components</b>	<b>Cost per employee</b>	<b>Total</b>
Training and test kit	\$30	\$90.000
Prophylaxis and technical measures	\$250/month (6 months average duration of stay)	\$4.500.000
<b>Average annual cost</b>		<b>\$4.590.000</b>
<b>Benefit (Avoided costs)</b>		
<i>Fatal cases</i>		
1 avoided case per year	\$1.000.000/case	\$1.000.000
<i>Inpatient cases (sickness and production loss)</i>		
Incidence rate: 15% <sup>38</sup>	450 cases	
Absenteeism	18 days <sup>39</sup> (average per case)	
Salary costs	\$500/day	\$4.050.000
Average duration in hospital	3,5 days <sup>40</sup>	
Cost of hospitalisation	\$700/day <sup>41</sup>	
Total medical cost		\$1.102.500
Total production loss and medical costs/year		\$5.152.500
<b>Total avoided costs</b>		<b>\$6.152.500</b>
Cost benefit ratio		1,34



## 8 Conclusions

International assignments represent a costly investment for multinational companies and it is both challenging for the employer and the employee. Failure of an assignment may have consequences on the performance of the company and on the future career of employees. The interest of investing in good management of international travels and long-term assignment is, above all, a question of duty of care and even common sense. But consistently more evidence exists that there is a return on investment of good practices in managing high mobility employees. If good management covers a large range of aspects, it is obvious that health and safety issues represent an integral part of good management.

Investing in good health and safety may save many avoidable direct costs but it also generates better work motivation, involvement and loyalty. It is also important for the image of a company among a larger public and potential further employees.

If cost-benefit analyses are currently the best known and most frequently used tool in estimating the return of occupational health practices, the benefits of caring for health and safety of the working force cannot be synthesised in a formula.

In its simplest form, the costs and benefits of a particular policy or programme are measured in terms of their equivalent monetary value. When benefits outweigh the costs, it is worth the effort. However, cost-benefit analyses cannot be neutral or comprehensive if they cannot deal with a wide range of moral and legal concerns. The improvement in occupational health and safety is more than a technical issue of costs. Decisions based on cost-benefit analysis, for example, may fail to consider all of a company's objectives, including important social and ethical objectives.

Where legal, moral and cultural values are at stake, there is a need to make a more "subjective" judgement. A cost-benefit analysis can be a driver for prevention but is not a decision making instrument as it ignores the non-economic values it cannot handle.

From a more holistic point of view, integrating health and safety in company strategy and policy can easily be seen as a key to business excellence and success, allowing businesses to contribute to sustainable growth enhancing welfare and innovation. Occupational safety and health programmes generate effects and outcomes that influence company performance positively and which contribute to the company goals. In order to have an effective influence on company performance, the occupational safety and health programme must be aligned with the company goals. In this respect, it forms part of the business strategy and also the continuous improvement circle that drives a company towards excellence. Outcomes are noticeable on organisational level since occupational safety and health measures lead to change by

creating better working conditions, improving the social climate, and the organisational process. The results are positive organisational outcomes such as less costs, of course, but also improved company image, less job turnover, and higher productivity.

By preserving the health and safety of its staff and improving working conditions, the company meets the expectations of employees, and more generally of the whole society. Care for the welfare of employees increases the attractiveness of the company for both teams in place and for future personnel. It contributes to sustainable development of society. The corporate image is thereby also valued among customers.

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## Optimising relations between people and work