

3.2.2 Altitude

Popular high-altitude destinations for UK travellers include the Andes (e.g. Quito, Ecuador; Inca trail, Peru), the Himalayas (e.g. Nepal and Tibet, including Everest Base Camp) and accessible volcanoes such as Mount Kilimanjaro, Tanzania. Travellers should discuss their exact itinerary, including sleeping altitudes, and plans for acclimatisation, with a travel health specialist prior to booking. Those intending to travel to altitude should read the information provided by expeditions, mountain and wilderness societies. See **Resource Guide: 3.2.2 Websites**.

- Risk management advice should follow that of the general traveller and be tailored as described below.
- Destination-specific risk management advice can be found on the NaTHNaC Country Information Pages¹ www.nathnac.org.
- See **Resource Guide: 3.2.2a and 3.2.2b**.
- A Health Information Sheet, *Altitude illness*, is available to download from NaTHNaC¹. See **Resource Guide: A26 – Key Resources**.



Medical Preparation

- Comprehensive travel insurance is essential for all travellers. A full declaration of medical conditions should be made to the insurers. All equipment and planned activities should be covered.
- Hypoxia (low blood oxygen levels) is one of the main physiological alterations during ascent to high altitude; the body's response is to increase the breathing rate. Over several days, aided by the kidneys, acclimatisation (balancing of the body's response to altitude) usually occurs.
- It is not possible to predict the susceptibility of a traveller to altitude illness; physically fit travellers are not necessarily at lower risk. The best indicator of how altitude will affect a traveller is previous experience at altitude, but even this may be unreliable.
- Risk factors for altitude illness include total altitude gained, rate of ascent, altitude achieved, sleeping altitude and level of exertion. Rapid ascent without a period of acclimatisation puts a traveller at higher risk.
- The most important prevention of altitude illness is adequate acclimatisation and regular rest days. Travellers should be advised to acclimatise at an altitude below 3,000m, and ascend gradually with no more than a 300m to 500m increase in sleeping altitude each day, and a rest day every 3 days.
- Travellers to altitude should be able to recognise the signs and symptoms of acute mountain sickness (AMS), high-altitude cerebral oedema (HACE) and high-altitude pulmonary oedema (HAPE). See **Box 3-6**.
- If symptoms of altitude illness develop, no further ascent should be made until the traveller has recovered. A rapid descent should be made if severe AMS occurs.

1 Alternatively see Travax <http://www.travax.nhs.uk/> or Fit for Travel <http://www.fitfortravel.nhs.uk/>

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- Acetazolamide (Diamox®) has been extensively used as prevention for altitude illness, although it is unlicensed for this purpose. If travellers are to take acetazolamide (Diamox®), trial doses of 125mg twice daily for 2 days should be taken prior to travel. Assuming there are no adverse events it should then be commenced 1 to 2 days prior to ascent to 3,000m and above, and continued for at least 2 days after reaching the highest altitude.
- Acetazolamide (Diamox®) can cause nausea, a mild diuresis, and sensations of oral and finger tingling. More unusual side effects include rashes, flushing and thirst. It is contraindicated in those with an allergy to sulphonamides.
- Acetazolamide (Diamox®) is not an alternative to adequate acclimatisation.
- Travellers with pre-existing medical conditions should receive a medical opinion prior to booking their trip, in order to assess their fitness to travel to altitude. Those planning to exercise/trek at altitude should be physically fit.
- All travellers with pre-existing medical conditions should carefully consider the medical care available to them in case of altitude illness and plan for any emergency.

Treatment of altitude illness

Although mild AMS is unpleasant, it is usually self-limiting, resolving spontaneously over several hours or days if no further ascent is made. Acclimatisation can take between 2 days and 3 weeks depending on several factors including the altitude to be attained. Paracetamol, aspirin or ibuprofen can be used to relieve headache, and antiemetics can be taken for nausea.

Acetazolamide (Diamox®) can be used for treatment but the onset of its effect can be delayed. A person with AMS should never be left unattended in case symptoms worsen. If no improvement occurs, or symptoms worsen, an immediate descent of at least 500m to 1,000m should be made.

The main principle of treatment of severe AMS, HACE or HAPE is immediate descent. Both HACE and HAPE can progress rapidly and death is the likely outcome if a descent is not made as soon as the symptoms are recognised. Oxygen by face mask can help to relieve symptoms. Nifedipine and dexamethasone are useful in the treatment of HAPE, and dexamethasone can relieve symptoms of HACE. These drugs are not routinely recommended for travellers to carry to altitude. They are usually reserved for climbing expeditions to extreme altitudes and administered by persons with extensive experience in the management of high-altitude illness. Portable hyperbaric chambers may also be used by expeditions.



Vaccination

Hepatitis B

- Travellers participating in hazardous sports or activities are at increased risk of accidents and injuries. Invasive medical treatment can expose the traveller to blood-borne viruses. Hepatitis B vaccination should be given.

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Journey Risks

- Airlines often fly directly to a high-altitude destination allowing limited or no opportunity for gradual acclimatisation. Cities with airports over 2,000m include Bogotá (Colombia), Quito (Ecuador), Cusco (Peru), Mexico City (Mexico), Addis Ababa (Ethiopia), Sana'a (Yemen) and Lhasa (Tibet, China). Travellers should be aware of the altitude at each of their destinations and discuss their itinerary in detail with a health professional, ideally prior to booking.
- Travellers flying directly to high altitude should ensure they are acclimatised to that altitude before ascending any higher.
- Travel to altitude can involve hazardous activities and sports such as climbing and mountaineering. Appropriate training, experience and guiding is essential; safety equipment should be carried or thoroughly checked if sourced overseas.



Food- and Water-borne Risks

- Travel at altitude can cause dehydration and loss of appetite. Travellers should be encouraged to pay attention to their fluid intake and eat small, regular meals.
- Access to safe drinking water is often more difficult in remote areas. Travellers should pay particular attention to water purification advice.
- Travellers should be advised, and receive written instructions, on the use of medication for self-treatment of travellers' diarrhoea, and know when and how to seek medical assistance. [See Box 2-7 in The Pre-Travel Health Consultation Section 2.](#)



Skin Health

- Levels of UV radiation are higher at altitude; the risk of sunburn is increased. Sun protection measures should be taken.
- Travel to high altitude can expose the traveller to sub-zero temperatures. Appropriate warm clothing should be worn and skin checked regularly for signs of frostbite.



Psychological Health

- Sleep disturbance and loss of appetite, often experienced during acclimatisation to altitude, can precipitate low mood.
- High-altitude expeditions may involve periods of time living in close proximity to others and in basic accommodation.
- Travellers should be psychologically prepared for their trip.

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Box 3-6. Signs and symptoms of altitude illness

Altitude illness is a term used to describe a spectrum of illness associated with ascent to altitudes usually higher than 2,500 metres. It can be divided into 3 syndromes:

1. Acute mountain sickness (AMS). This is most common, and usually begins at altitudes of 2,500m to 3,500m (8,200ft to 11,500ft) but can occur at lower altitudes between 1,500m to 2,500m (5,000ft to 8,200ft). Symptoms of AMS typically begin 6 to 12 hours after arrival at altitude, but can begin more than 24 hours after ascent. Initial symptoms include headache, fatigue, loss of appetite, nausea and sleep disturbance. These symptoms usually resolve within 1 to 2 days if further ascent does not occur.
2. High-altitude cerebral oedema (HACE). AMS progresses in less than 10% of cases to the more severe HACE where travellers experience lethargy, confusion and ataxia in addition to the symptoms of AMS. If untreated, HACE will eventually progress to coma and death.
3. High-altitude pulmonary oedema (HAPE) typically occurs in the first 2 to 4 days after arrival at altitudes higher than 2,500m. HAPE is not necessarily preceded by AMS. Initial symptoms of HAPE include shortness of breath with exertion, and a dry cough, progressing to shortness of breath at rest. The cough may become productive with blood-stained sputum. HAPE is frequently accompanied by symptoms of HACE.