

Smoke Pollution and Exercise

Bushfire smoke can pose a health risk to athletes. The health impact of bushfire smoke can vary based on an individual's current health status and previous medical conditions. Current public health advice is aimed at high-risk groups, including people over 65, children 14 years and younger, pregnant women and those with existing heart or lung conditions. However, athletes involved in high performance sport can also be at higher risk while performing high intensity prolonged exercise outdoors and additional caution should be taken.

When pollution exposure is at low levels, the respiratory tract usual defence mechanisms trap, transport and clear pollutants effectively. With elevated exposure, short-term accumulation can occur resulting in inflammation and this can exacerbate a number of health conditions with asthma being the most common in athletes.

During exercise, respiratory rate and volume increases, this in turn increases the total airway exposure to pollutants. In high performance athletes, moderate exercise can increase the total amount of air passing through the airway by more than 10 times and vigorous exercise by more the 20 times, compared to resting values. Even at moderately reduced air quality, this can represent a significant increase in pollutant exposure during a one-hour, high intensity training session.

Air Quality Index (AQI)

The AQI is an accepted means of quantifying air quality by public health authorities encompassing:

- Air pollution levels at your nearest monitoring site or region
- The common contributing pollutants
- The overall health risk associated with a given rating

Each state and territory has live online updates on current, local AQI levels. The AQI evaluates the current level of air quality with general advice on implications for individuals. In athletes performing extended higher intensity exercise the risk of airway irritation is higher at lower levels of pollution. Table 1 (below) is a suggested modification of the current NSW public health guidelines for those athletes who train outdoors at higher exercise intensities and longer durations such as cycling, rowing and running.

Table 1. AQI and suggested risk stratification, adapted from NSW Public Health Unit.

General population and low intensity exercise		Endurance based and high intensity exercise	
AQI	Action	AQI	Action
VERY GOOD [0-33]	Enjoy activities	VERY GOOD [0-33]	Enjoy activities
GOOD [34-66]	Enjoy activities	GOOD [34-66]	Enjoy activities
FAIR [67-99]	People unusually sensitive to air pollution: Plan strenuous outdoor activities when air quality is better	FAIR [67-99]	Asthmatic athletes: Should have medical review prior to performing high intensity extended training outdoors

POOR [100-149]	<i>AIR POLLUTION HEALTH ALERT</i> Sensitive groups: Avoid strenuous outdoor activities Everyone: Cut back or reschedule strenuous outdoor activities	VERY POOR [100-149]	<i>AIR POLLUTION HEALTH ALERT</i> Asthmatics or symptomatic non-asthmatics should not compete or train outdoors. Minimise asymptomatic athlete exposure
VERY POOR [150-200]	<i>AIR POLLUTION HEALTH ALERT</i> Sensitive groups: Avoid strenuous outdoor activities Everyone: Cut back or reschedule strenuous outdoor activities	HAZARDOUS [150-200]	<i>AIR POLLUTION HEALTH ALERT</i> Outdoor training should be rescheduled indoors, and exposure should be minimised for everyone
HAZARDOUS [>200]	<i>AIR POLLUTION HEALTH ALERT</i> Sensitive groups: Avoid strenuous outdoor activities Everyone: Significantly cut back on outdoor physical activities		

The following links will be useful in helping you determine your region's air quality;

- [Australian Capital Territory](#)
- [Victoria](#)
- [New South Wales](#)
- [Queensland](#)
- [Western Australia](#)
- [South Australia](#)
- [Tasmania](#)

Additional Information

- Air quality information is generally updated hourly; therefore, there can be a lag between official measurements and what is occurring in real time. This can cause limitations when it comes to determining the air quality in your local environment. If smoke is affecting usual visibility within your area, it is likely that the air quality will fall into a higher risk category.
- Consecutive days of exposure to polluted air can have a cumulative effect, lowering an athlete's threshold for symptoms. This should be considered if your region has been exposed to increased smoke for several days in succession
- Increases in exercise intensity and duration result in increased airway exposure to polluted air AIS recommends modifying training, or training locations based on table 1.
- All athletes who suffer from asthma should have an updated asthma management plan and consult their doctor prior to exercising in smoke-affected environments.
- Recent respiratory infection increases the risk for development of smoke-related symptoms, even in non-asthmatics.