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**Ankit Singh**
Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

**Tarun Rawat**
Sports Officer, Department of Physical Education and Sports, Govt. College Budhni, Sehore, Madhya Pradesh, India

**Corresponding Author:**
**Ankit Singh**
Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

# Scientific intervention for acclimatization process: Modern sports training approach

**Ankit Singh and Tarun Rawat**

**Abstract**
Nowadays Sports is evolving as an industry worldwide. We know the performance relies on various multiple factors including internal and few external factors. Environment is also an intricate factor to understand well in order to avoid negative impact on performance level of athletes. However, these factors can affect performance in both ways, sometimes negatively or positively. Therefore, athletes or coaches need to be aware about and make an approach to tackle these conditions. Daniel Tang, K.H. (2021), Athletic performance is affected by both internal (athletic ability) and external elements presented in the environment. Altitude, Temperature, Wind, Quality of Air and Rain are common examples of environmental elements of the physical environment that have some influence on sports performance. These conditions are sometimes neglected by coaches during training sessions, due to this ignorance athletes are not able to perform their best in a competitive environment. In this study we are emphasizing on understanding the various environmental factors and their influences i.e., of Temperature, Altitude, Air quality, Wind, and Rain. Here we are trying to provide a general idea or approach which can be followed by the coaches to reduce the impact of different environmental factors which can negatively impact the performance of athletes. Although; Environmental factors are beyond the limits of humans to tackle them completely even then evolution has been observed in the field of sports in terms of its form, technology and the various aspects. Hence there is a need for better understanding of environmental factors for final execution and performance of athletes. We found that few interventions are there to tackle these situations: body takes about 2 weeks to adapt to 2300 m (7545 ft). Thereafter, each 610-m (2000 ft) altitude increase requires an additional week for full adaptation up to 4572 m (15,000 ft). If high altitude is not available, intermediate altitudes can be used for training. Even some major strategies i.e., LHTL, LHTH, LLTH, can be used for adopting the elevation physiological conditions. Few artificial systems have been used to adopt the challenging environmental conditions with reference to world class competitions.

**Keywords:** Athletes, altitude, temperature, wind, quality of air

## Introduction
The issue which attracts researcher from the last few decades, especially after 1968 Mexico City summer Olympics. It is not a new issue to debate; but researches going on in order to tackle these extraneous or beyond the control factors. The more concern is here because these are the factors which are neither trainable nor in the control of athletes and coaches. But these factors cannot be ignored. Coaches prepare to tackle these barriers by using various scientific interventions. Here in this present article, it has been tried to provide those scientific interventions which are already proven and can be helpful for reducing the negative impact of several factors such as Temperature, Altitude, Air quality, Wind, Rain etc. Even coaches/athletes must prepare to acclimatize better with the environmental conditions so it cannot negatively impact the athletics performance.

When we talk about the temperature in relation to the athlete's performance, we generally talk about the two types of temperature i.e., environmental temperature and the other one is core body temperature: directly influenced with environmental temperature of athletes. Let's try to get this phenomenon of the core body temperature in relation to athletic performance with the help of this study. Heat created by dynamic muscles can make increment in core body temperature to fever levels that weaken an individual assuming that brought about by hot environment stress alone. Champion distance runners show no ill effects from rectal temperatures as high as 105.8-degree Fahrenheit (41 degree Celsius) recorded at the end of a 3-mile race.

For unacclimatized persons there is always a big challenge physiologically to adopt new environmental situations. For humans high-altitude natives live in permanent settlements in the Andes and Himalayan mountains as high as 5486 m (18,000 ft). Prolonged openness of an unacclimatized athlete to this altitude can cause passing from encompassing air's odd oxygen pressure, termed hypoxia, even if the person remains inactive. The physiologic challenge of even medium altitude becomes apparent during physical activity for unacclimatized newcomers to oxygen's decreased partial pressure. In the transition from moderate to higher elevations, values for alveolar (arterial) oxygen partial pressure exist on the steep part of the oxyhaemoglobin dissociation curve. This reduces haemoglobin oxygenation dramatically and negatively impacts even moderate aerobic activities. An acute exposure to 4300 m (14,107 ft), for example, reduces aerobic capacity 32% compared with the sea level value. Above 5182 m (17,000 ft), permanent living becomes nearly impossible, and mountain climbing usually progresses with the aid of oxygen equipment. If athletes tend to train at level of altitude; it is necessary to take this exposure by using step method of training. As they have to climb up gradually for adequate adaptation of every level elevation. In all summer Olympics right from the beginning 1968 Mexico City Olympic was one of the most controversial in Olympic history ever. There was 7411 ft elevation had a major challenge for athletes. Also, there was many records broken in that Olympics; surprised everyone.

At the point when air quality is good, the air is clear and contains just small quantities of strong molecule and compound poisons. Unfortunate air quality, which contains elevated degrees of pollutants, is frequently hazy and dangerous to wellbeing and the climate. The major pollutants of air are ground-level ozone, particle pollution (also known as particulate matter, including PM2.5 and PM10), carbon monoxide, sulphur dioxide, nitrogen dioxide. Both controlled human examinations and observational investigations propose that air quality of the place where they were training influences athletic performance during both- preparation and in the decisive competition. The air contamination measurement during exercise is a lot higher than during rest due to a higher ventilatory rate and both nasal and oral taking in the previous case. In Sports, where very less margin at milliseconds and millimetres often determines the success of athletes, air pollution can be an important factor in affecting their performance level in competition.

## Altitude

One of the major classification of sports on the basis of the oxygen uptake, basically known as aerobic and anaerobic type of sports. Performance will not deteriorate, while athletes going directly in the competition at high altitude are at the same level for the events like single sprints of the events which are based on the anaerobic energy system, but when the multiple repetitions can be taken place with improper recovery time, the performance will be drop as the repetitions were increased (Derby and deWeber, 2010) [3]. For the prolonged kind of activity/sports or the sports which demands more oxygen in comparison to anaerobic type of activity, performance will be reduced (Derby and deWeber, 2010) [3]. Altitude can be detrimental or beneficial for the performance of an athlete. When he is going to be trained for the long period or being acclimatized before the few days of main competition then it will be beneficial but if, athlete is going directly for decisive competition at some place which has an altitude at some range from the sea level that is going to reduce the performance of an athlete.

The altitude not only affects the physiological capacities of an individual but it can also affect the execution of certain techniques such as responding to approaching balls. There is an inverse relationship between altitude and air density. As the altitude increases the air density will decrease which potentially causes lower drag and lift forces on the ball make it travel less and diminishes the curve applied on the ball. At 1000 meters above the sea level the curve made by the ball is about 0.4 meters less than at sea level and as it increases again at 2000 meters above sea level the curve reduction would be 0.8 meters. The same amount of force that can move a ball approximately 30 meters will move 2.95 meters more at 1000 metres above the sea level and 5.9 metres ahead when kicked at 2000 meters of altitude above the sea level (Levine *et al*., 2008) [18].

## Scientific intervention to tackle the impact of altitude i.e., acclimatization

Altitude acclimatization comprehensively depicts the versatile reactions in physiology and digestion that further develop resilience to elevation hypoxia. Acclimatization adjustments occur progressively to each higher elevation, and full acclimatization requires time. As a general guideline, it takes about 2 weeks to adapt to 2300 m (7545 ft). Thereafter, each 610-m (2000 ft) altitude increase requires an additional week for full adaptation up to 4572 m (15,000 ft). If high altitude is not available, intermediate altitudes can be used for training. At intermediate altitudes, the partial pressure of oxygen is still at 20.9%, but it is lower due to the barometric pressure and atmospheric pressure. Acclimatization due to relative lack of oxygen increases the mass of red blood cells and haemoglobin.

Training process of preparing for the main competition at 2000-3000 metres above the sea level can be organized in the high-altitude training centres which can help those athletes which are preparing for the endurance type of events. This training situation make them familiar with the situation which they will face in the main competition (Townsend *et al*., 2016) [21] (Stray-Gundersen & Levine, 2008) [18] The three basic strategies which were followed mainly in context of training of sports person of long duration endurance based activities are as follows:

1. **LHTL (Live-High-Train-Low), (Gore *et al*., 2001) [7], (Stray-Gundersen & Levine, 2008) [18]:** For adaptation which increased erythropoietin (EPO) levels, cause increased red blood cell levels, and higherVO2max.
2. **LHTH (Live-High-Train-High) (Bonne *et al*., 2014) [2]** Initially VO2max drops but with training it improves. The Sports Authority of India (SAI) created the Netaji Subhash High Altitude Training Centre in 1984. Shilaroo, Himanchal Pradesh, India (at 8000 ft altitude) was chosen after consideration of other places because of its climate, which will aid in players' development of endurance and stamina as well as their ability to recover quickly from intense training sessions. SAI is planning to set up a high-altitude training institute in Dharamsala also.
3. **LLTH (Live-Low-Train-High) (McLean *et al*., 2014) [13]:** If we don't have much elevation to train athlete, in limited elevation athlete can be trained by this formula of high training in low altitude.

   Few other things also used by coaches to establish adaptation for high altitudes; i.e., by sprinting repeatedly in hypoxia. Run short sprints under 30 seconds as fast as

possible. (Training/Rest Ratio is 1:4) Artificial altitude conditions are developing by different nations as well; where artificial altitude training is possible for athletes.

**Temperature**

The effect of temperature will have two major changes in the environmental climatic conditions which are Humidity and Heat. Tokyo Olympic is a classic example where Europeans had big challenge to perform in high humid temperature. This Olympic played between 23 July to 8 August 2021, this is the time when Asian countries mostly having humid atmosphere. When an athlete exercises in a hotter environment it enhances the core body temperature and makes the body dehydrated. Hyperthermia (raised body temperature more than normal temperature) will reduce the muscular activity for longer duration basically the endurance which means it automatically reduces the ability of the muscles to contract repeatedly for a longer period of time. Increment in the core body temperature may shift in the energy production from different sources (aerobic to anaerobic). It means the energy which is stored in the muscle can be used more quicker to complete the motor task.

In the activity of longer duration like marathons and race-walking events where athletes take the energy drink after a certain fixed distance in between during the events but these energy drinks or bars cannot meet the demands of the fluid balances in the human body and the loss of energy in humid and hotter environmental situations. High core temperature will reduce the blood flow to the heart as blood pools to the limbs and if this goes for longer duration and heart doesn't get much blood to oxygenate it and the heart won't able to provide the oxygenated blood to the working muscles. During Tokyo Olympics 2020 Russian Tennis star Daniil Medvedev told an umpire during heat struggle in a match that "I can finish the match but I can die". Many athletes suffered by heat stroke from the very first day of opening ceremony of Tokyo Olympics. This is the actual summer Olympic from the means.

**Table 1:** Mechanism of temperature regulation

| Stimulated by cold | Mechanism |
|---|---|
| Decrease heat loss | Vaso constriction of skin vessels; postural reduction of surface area (curling up) |
| Increase heat production | Shivering and increased voluntary activity; increased thyroxine and epinephrine secretion |
| Stimulated by heat | Mechanism |
| Increases heat loss | Vasodilation of subcutaneous skin vessels; sweating |
| Decreases heat production | Decreased muscle tone and voluntary activity; decreased thyroxine and epinephrine secretion |

**Heat alleviation strategies**

Gibson, O. R., James, C. A., Mee, J. A., Willmott, A. G. B., Turner, G., Hayes, M., & Maxwell, N. S. (2020) [6]. International events and the rapidly changing climatic conditions were giving more and more challenges to the athletes who were participating in the competition. Recent International event Tokyo Olympics 2020 provides one of the hardest and a significant heat stress to the athletes and they have faced a lot of health issues and some tasks to their athletic performance. The major focus of this article is that it provides two major heat alleviation strategies first, long term heat alleviation techniques known as chronic heat alleviation strategies such as acclimatization at the place which are hotter in the pre, during and post training session which will enable them to tolerate more heat exhaustion. Second is acute sustainable technique for hotter climates which can be executed just before the decisive competition and sometimes during the competition also.

To assist Australian athletes and staff in preparing for one of the hottest modern Olympics and Paralympics ever, the AIS (Australian Institute of Sports) Tokyo Heat Project had been working with sports and Games partners. AIS senior physiologist Dr. Jo Miller stated "Excessive heat can impact performance, that can have flow-on effects physically and cognitively". They putted Ice-baths for 24/7, one of the key cooling strategies on the ground all time. Miller also stated that besides that acclimatization before the games is the real key for athletes and whole staff. One AIS official said: that time Australia look at artificial measure of acclimatization. Few teams have based pre-games training in Darwin, which is probably the closest we can get to Tokyo conditions in Australia. It could be done actively, such as by training in a heat chamber, or passively, such as by relaxing in a spa or sauna after a workout.

To neutralize the impact of warm climate on competitors, Wegmann *et al*. (2012) [22] proposed pre-cooling of competitors to build the time taken to arrive at basic temperature accordingly supporting athletic execution and forestalling heat pressure. Pre-cooling could be accomplished with ice showers, ice coats and drinking cold water. These pre-cooling systems have been displayed to upgrade athletic execution in warm climate (Siegel and Laursen, 2012) [27]. (Tang, 2021) [19].

Donnan, K., Williams, E. L., & Stanger, N. (2021) [4]. It is found that exposure to an increased hotter environment impacts the physical as well as cognitive performances of long duration-based activities with high intensity intermittent exercises which could impaired/depraved due to increment in the exercise induced catecholamines.

**Picture 1:** Cooling strategy used by Australian athletes in preparation of Tokyo Olympics under Tokyo heat project

**Cold temperature**

Human exposure to extreme cold produces considerable physiologic and psychological challenges. Cold ranks high among the differing terrestrial environmental stressors for its potentially lethal consequences. Water represents an excellent medium to study physio-logic adjustment to cold; the body loses heat about two to four times faster in cool water compared with air at the same temperature. Metabolic heat generated by muscular activity contributes to thermoregulation during cold stress. Shivering frequently results if people remain inactive in a pool or ocean environment because of a large conductive heat loss. Swimming at a submaximal pace in 18-degree Celsius (64-degree Fahrenheit) water requires about 500 mL more oxygen each minute than similar swimming in 26-degree Celsius (79-degree Fahrenheit) water. The extra oxygen directly relates to the added energy cost of shivering as the body attempts to

combat heat loss. At this point, core temperature declines because additional metabolic heat from shivering and exercise cannot counter the large thermal drain.

**Scientific intervention to tackle the impact of cold**

**Three integrated factors regulate body temperature during cold exposure**

1. **Vascular adjustments:** Circulatory adjustments "fine tune" temperature regulation.
2. Stimulation cutaneous cold receptors constricts peripheral blood vessels. Vasoconstriction immediately reduces the flow of warm blood to the body's cooler surface and redirects it to the warmer core that includes cranial, thoracic, and abdominal cavities and portions of the muscle mass. Consequently, skin temperature decreases toward ambient temperature to optimize the insulator benefits of skin and subcutaneous fat
3. **Muscular activity:** Shivering generates metabolic heat (maximum of three to five times resting metabolism), but physical activity provides the greatest contribution in defending against cold. Exercise energy metabolism can sustain a constant core temperature when air temperatures decrease to-30 degree Celsius (22-degree Fahrenheit) without the need for heavy clothing.
4. **Hormonal output:** Expanded arrival of the "calorigenic" chemicals epinephrine and norepinephrine by the adrenal medulla somewhat represent expanded basal heat creation during cold exhibition sure. Prolonged cold stress also increases the thyroid gland's release of thyroxine to elevate resting metabolism.

Exercise can be utilized to balance heat misfortune in cold conditions; notwithstanding, the power should defeat the adverse consequences of the activity, which incorporate losing the insulative limit of the resting muscle and any insulative limit layer around the body. Proper layering of clothing and rapid response to changing weather conditions can help maintain adequate core temperature and decrease heat loss in cold weather. Every individual will require various layers relying upon their intensity creation and the weather patterns. Competitors ought to be urged to individualize layering in light of past chilly climate experience and preparing. Similarly essential to remaining warm is restricting body sweat, which builds wetness and cold injury risk. The deepest layer, which is in direct contact with the skin, should wick dampness away from the body to keep a protecting air layer close to the skin and move water to external layers of clothing. The exception to this is wool, which can retain heat even when wet. Good base layers include polypropylene, polyester, and synthetic wool. Avoid cotton layers that trap moisture. The middle layer or layers are primarily for insulation and should be made of a material like fleece or wool. The number of layers is dictated by the temperature and exertion level. As exercise severity or intensity increases, how much dress protection expected to keep up with body heat at a given temperature diminishes. The external fume layer should permit dampness move, permit ventilation, and safeguard against wind and downpour. Hats or balaclavas can decrease heat loss from the head. Mittens protect the hands from frostbite better than gloves

**Wind**

Wind is also one of those factors which can be a performance enhancer or can be detrimental to the performance which are of sprinting nature. When we talk about the wind's role in sports performance- then there are 2 kinds of wind which will affect the athletes as Headwind and Tailwind. A Tailwind signalize to the breeze blowing in a similar heading a competitor is moving. In easier terms, assuming that the competitor is running forward the breeze is hitting the athlete's back, as a result pushing the competitor forward. A Headwind refers to the breeze blowing the other way a competitor is moving. In less complex terms, on the off chance that the competitor is running forward and the breeze is raising a hitting around athlete's face, essentially pushing the competitor in reverse. Few peoples talk about the crosswind as prime factor in Sports. Crosswinds are disconcerting for the simple reason that they cause balance problems, which lead to rhythm problems, which lead to technique problems.If the wind velocity, measured in the direction of running, averages more than 2 metres per second, the performance will not be ratified. (World Athletics). A tail wind of 2.0 m/s advantages an athlete of 0.125 s, 0.140 s and 0.146 s for the races of 100 meters, 200 meters, 100/110 meters Hurdles respectively. And an advantage of 0.058 meters and 0.102 meters for long jump and Triple jump respectively (Moinat, M., Fabius, O., & Emanuel, K. S.) (2018) [14].

**Scientific intervention to tackle the impact of wind**

Each cyclist who has at any point accelerated into a firm headwind is familiar with wind obstruction. To push ahead, the cyclist should push through the mass of air before her. This takes energy. Streamlined proficiency a smoothed out shape that slices through the air all the more easily empowers a cyclist to travel a lot quicker, with less exertion. Streamlined drag comprises of two powers: air force hauls and direct rubbing (otherwise called surface grinding or skin erosion).

**Drafting**

Drafting is a significant strategy in Road races. Exploratorium Senior Researcher Paul Doherty made sense of, "The bicyclist, as he travels through the air, creates a fierce wake behind himself. It makes vortices. The vortices really make a low-tension region behind the bicyclist and an area of wind that moves alongside the bicyclist. On the off chance that you're following a bicyclist and can move into the breeze behind the front bicyclist, you can acquire a benefit. The low tension pushes you ahead and the whirlpools push you forward.

Drafting isn't generally a choice and its advantages are to some degree restricted. The least demanding method for conquering wind opposition and decrease drag is to turn out to be more streamlined out.

**Hair removal technique and experimental evidence**

In sports, even a fraction of a second can mean the contrast among triumph and making due with second spot. A typical hypothesis among competitors is that an absence of hair brings about a reduction in opposition from wind and water, subsequently making them quicker.

A concentrate in the Diary of Medication and Science in Sports and Exercise showed that bare sprinters decline times by .01 seconds in the 100m and up to 5.7 seconds throughout a long- distance race. A concentrate on swimmers, directed by American School of Sports Medication, found that those without hair performed better in the 400m, showing an expanded stroke length and decreases in blood lactate and VO2.

Athletes in sports have been shaving their legs for far longer

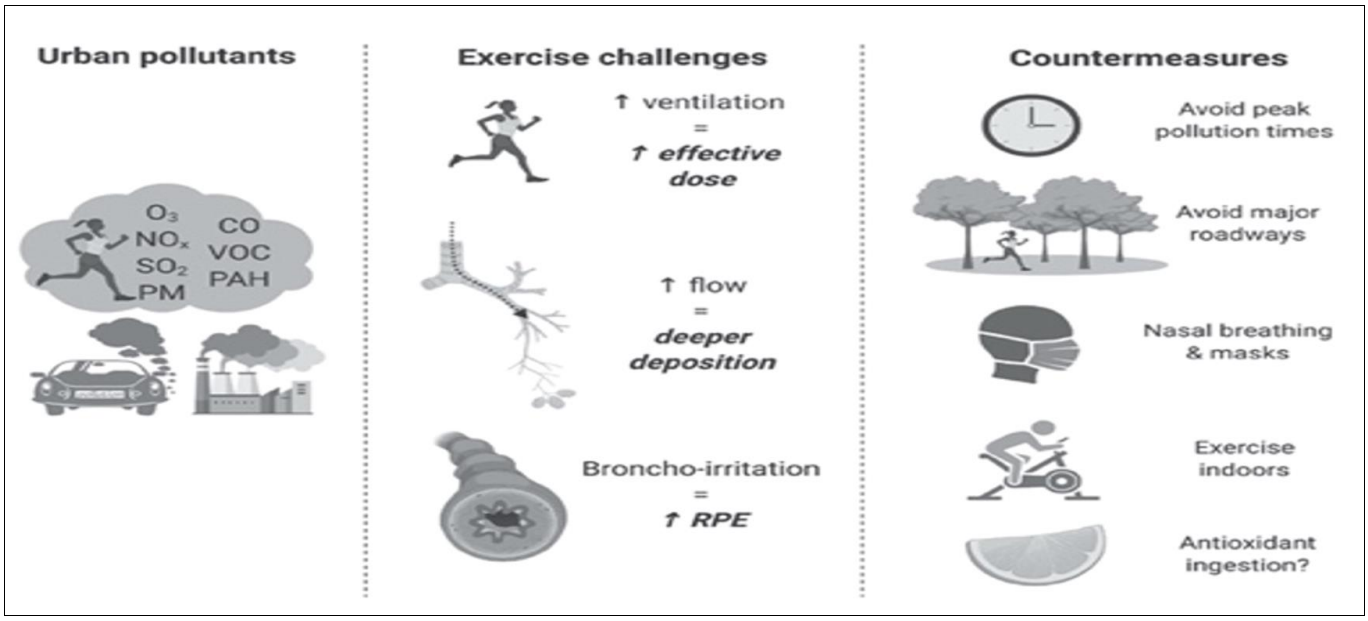
than females. In females, where shaving legs is generally connected with beauty, guys shave their legs to acquire an upper hand over contenders. The main benefit that comes from shaven legs is drag decrease. In 1987, Chester Kyle was quick to direct a review to confirm in the event that shaven legs for sure gave any streamlined benefit. The review was directed inside a small air stream on a prosthetic leg with hair stuck to it. The review was distributed in Bicycling Magazine. The consequences of the review asserted that shaven legs assist cyclists with saving roughly 5 seconds while riding at 37 kmph. Just 5 seconds might appear to be frustrating, yet in serious games, all minor addition merits taking advantage of

**Quality of air**

The yearly average concentration of natural carbon (organic carbon, a term used to depict the thousands of broken up elements found in water that get from natural materials) and elemental carbon (EC, a marker for diesel particulate matter), at the metropolitan site in Beijing are a lot higher than those in certain urban communities with serious air contamination. In spite of the fact that guidelines for air contamination can be adequate considering the consequences for wellbeing and climate, the ongoing U.S. experimentally known. S. Environmental Protection Organization (EPA) limit for carbon monoxide (CO), a dry and scentless poisonous gas, is 10 mg/m-3 (9 sections for each million, ppm) arrived at the midpoint of north of 8 hours, an edge that can be worryingly moved toward in Beijing: the typical everyday centralisation of CO during the warming time of the year is 3.5±2.6 mg/m3 (3.15±2.34 ppm), with tops from 14 (12.6 ppm) to 17 mg/m3 (15.3 ppm). With expanded blood groupings of CO, maximal cardiovascular result and maximal arteriovenous distinction are brought down, bringing about a higher pulse, in a lessening in maximal oxygen take-up and work yield, which will at last deteriorate athletic performance, particularly long-duration sporting events (e.g., 10 000 m, long distance race, 20-and 50-km race walking). It is clear, particularly with intense openness, that air contamination can represent a test to the respiratory and circulatory frameworks and consequently present a significant snag for top athletic execution. Public and big showdowns and huge multisport contests will stay attached to significant cities to a great extent due to operations and promotion, so air contamination is probably going to be an issue for the majority first class competitors before long. During exhaust cloud ready days or periods when air quality is low, additional arranging is expected for competitors during both preparation and contest.

**Scientific intervention to tackle the impact for poor air quality**

The scientific or the general things we can use to prevent the harmful effects of the poor quality of the city where you were training, residing. I am attaching this picture mentioning the pollutants and how polluted air becomes a challenge for the sports person to continue their regimen and at the end the countermeasures for tackling the challenges provided by the polluted air and air pollutants.




**Picture 2:** Strategies to reduce the negative impact of pollution on exercise and health. Created with BioRender.com

**Rain**

This doesn't change whether rain is a decent climate to adapt to in any case. As far as its effect on the body, rain can have a huge cooling impact.

A carefully controlled study, published in the Journal of Sports Medicine and Physical Fitness, tasked a group of 12 men with running at a constant speed in a low temperature environment with and without a replica rain effect. The outcomes showed that body heat misfortune escalated when the men were running with the rainier circumstances. The investigation additionally discovered that energy use was higher in the rainier circumstances. This implies that a stormy run will consume a larger number of calories than a calm run - assuming you match your standard speed - which is uplifting news assuming you're attempting to accomplish a calorie shortfall.

Rain can be a pain, if really heavy, it can impact vision but can also bring down the athlete's core temperature. This will impact a game of Soccer. The player may not see their team mate down field when they could've scored a goal. On the flip side of this, rainy conditions could make it harder to achieve a new personal best, because your body is using up energy trying to keep warm – so you're likely to feel fatigued. To shield yourself from the effects of the rain, Almstedt recommends warming up properly and layering up for the exercise. Outdoor sport events practice frequently continues

in rainy situations. In any case, there are not many examinations revealing the physiological impacts of cold with deluge or wet-cold openness on people during exercise. The reason for this study was to research the impacts of heavy rainfall on physiological reactions during running activity at 80% V̇ O2 max vulnerable. Ito, R., Yamashita, N., Ishihara, K., & Matsumoto, T. (2019) [9].

Rain is one those environmental factors that can be one of the most influential factors for the decisive competition and changes the total scenario for the competition. Rain is the factor that is not in the control of the athletes, officials, organizers and any others it can happen pre, during and post competition and can badly influence the playing surface if happen pre competition, if it happened during the competition can be beneficial or disadvantageous for any of the team or any particular individual.

Let's understand this effect of rain in motor sports as F-1 races it deteriorates the grip of the tyres from the initial stages of the races as the laps goes on, secondly it also affects the aerodynamics because of the wet and low speed the front wings didn't work well which causes difficulty while turning and lastly it also reduces the visibility because of the sheer amount of spray that those racing cars pushed it out the more the amount of rain lesser the visibility and higher the release of spray from the cars and may be dangerous for the drivers.

**Scientific intervention to tackle the impact of rain**

Rain is also one the external factor that is beyond the control of the participants which means organizers have no control over this. It can be in more controlled manner in the indoor sports in comparison to the outdoor sports. Now a days few stadiums have the facilities of covering the open area over the play playfields but the cost of those infrastructure is very high so everybody cannot afford that. For the track events like half-marathon and full marathon where participants have to run on the pre-decided path organizers don't have control over the rain and athletes must face the negative impact of rain which are mentioned above. To reduce the impact of rain the coaches must train their athletes and also made them prepare for these kinds of situations with artificially created area where water can be poured with different kind of intensities, so one can be aware or have idea about how to tackle these conditions.

In the event that it's a freezing precipitation, use of Vaseline on uncovered body parts will assist with keeping you warm. Vaseline is waterproof, which will assist with holding your hands and lower legs back from getting excessively cold.

**Conclusion**

As we conclude this paper on countering the effect of the environmental factors which effects the athletic performance. In account of getting the best performance at the decisive competition the coaches must be aware of counter measure to tackle these factors and get the performance least affected, because the athletes prepares themselves for over the period of long time to participate at Olympic games, world cup of their respective sport and at any level of competition. These counter measures which we have discussed in the paper on the basis of reviews and findings can be helpful to reduce the affect of these factors. There is an agreement that hot and humid climate presents serious difficulties to competitors because of unfortunate scattering of intensity in such climate prompting the expansion in their core temperatures which influences their exhibition. Excessively cool climate, nonetheless, could pressure the respiratory framework, influence muscle power and cause fatigue. An unnatural weather change is predicted to compound the impacts of intensity and mugginess on athletic execution particularly in the jungles while it could make specific cold climate more helpful for competitors. Contamination is a negative powerhouse of athletic execution and expanding contamination in metropolitans will keep on applying extra strain on competitors. Expanding height produces various outcomes on various kinds of game with valuable impacts on runs and adverse consequences on high-impact exercises like long distance race. The impact of wind on competitor changes, taking into account the mind boggling cooperation of wind heading with competitors and running paths. Notwithstanding, a following breeze of 2 m/s has been displayed to work with runs. This survey deliberately presents the effects of major ecological elements on different game occasions. It adds to a superior comprehension of the connections between these variables, games and the things utilized in sport occasions. It points out really testing climate for competitors later on and features the significance of acclimatization, assessment of ecological dangers in sports and advancement of successful procedures to control the internal heat levels of competitors for ideal execution.

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