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Pollution Effects On Performance Of Athletes In Delhi.

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Abstract:- The pursuit of athletic excellence and the desire to bringhonor to their teams and countries has led to significant focus on athletic performance. Athletic performance is impacted by intrinsic characteristics such as athletic aptitude, as well as extrinsic elementssuch as the physical surroundings. Theenvironmental elementsof the physical environment, such as temperature, pollution, altitude, and wind, have a varying impact on sports performance. An elevated ambient temperature leads to an increased elevation of the body's internaltemperature, a more rapid occurrence of sweating, and a higher likelihood of dehydration. High levels of humidity hinder the process of perspiration evaporation and the release of heat from athletes' bodies. The future impact of global warming is expected to result in a warmer and more humid regional climate, which could pose greater challenges for athletes. In this review, we examine how the environment affects the health and performance of athletes. Although training in natural settings has numerous documented benefits, its impact on elite athletes' health and performance is less well understood. Some Olympic events are held in natural settings, but the vast majority take place in the host city, which is often a big, densely populated location with minimal exposure to natural environments and high exposure to air, water, and noise pollution. The effects of the environment on Olympic athletes can be better understood with the help of a trans-disciplinary approach, which combines the methods and expertise of various but related

fields such as environmental psychology, exercise physiology, biomechanics, environmental science, and epidemiology.

Keywords: PollutionEffects,Athletes,performance,denselypopulated,pollution.

Introduction

When it comes to athletic performance, skills, strength, endurance, and recuperation are typically the determining factors. All types of sportsrequire these qualities, but different sportsmay require a combination of specific factors more than others (Handelsman, 2020). These factors are vital throughout all types of sports. While it istrue that all sportsrequire acertain level ofskill, it isalso true thatcertain activities, such as shooting and board games, demand exceptional focus. On the other hand, sprinting and wrestling require strength, which is typically associated with having a muscular physique (Donnelly, A. A. et al.,2016).

Athletes are subjected to a variety of acute stresses during Olympic competitions, including Rio 2016. These includebothcompetitive(Schinkeetal.,2012;NichollsandLevy,2016)andorganizationalpressures.Although several factors, such as player resilience and adaptation, have been studied (Fletcher and Sarkar, 2012), the context in which sports are played has not been studied to the same extent. To my knowledge, this has never happened before, which is odd given that the Olympic Games are normally hosted by a huge, heavily populated city with significant levels of air, water, and noise pollution. Some of the risks and rewards that athletes face in their natural environments are discussed in this perspective essay.

As opposed to contact sports like Taekwondo, which require recuperation from serious injuries or repeating minor injuries, certain sports, such as triathlon, place a greater emphasis on aerobic effort and endurance (Handelsman,2020).Thefouraspectsofathleticperformance areinfluencedbyavarietyof circumstances,both internal and external to the athlete. Internal determinants may include a person's genetic potential, health issues, athletic ability, and experience in athletics (Iso-Ahola, 1995; Ostrander, Huson, & Ostrander, 2009). An individual's sports experience must also be considered. There are many other aspects that make up the external elements,suchasdiets,thequalityofsleep,socialconnections,occupation,academics,therelationshipbetween the coach and the athlete, and the physical surroundings (Iso-Ahola, 1995; Thun et al., 2015). Physical factors are attributed to the physical environment that an athlete is in, whereas social factors are exemplified by the interaction that an athlete has with his or her coach, which can be either beneficial or detrimental (Kubiak, 2012). The external factors have been further classified into three categories: organizational factors, social factors, and physical factors (Ulrich, R. S. et al., 1991). A new coach, for example, has the potential to have either a good or negative influence on an athlete, depending on whether the coach helps the athlete achieve or maintain their optimum performance level or whether the coach hinders the athlete's capacity to achieve or maintain the ideal condition (Davis et al., 2018). In addition, issues that arise inside the family as well as relationships with coworkers or members of the team would be considered social factors. According to Kubiak (2012), the organizational component is related to the organization or club that an athlete is a member of and may take into consideration issues such as leadership, administration, finances, and other related topics. There may be an overlap between the academic component and the social factor when it comes to the impact on an athlete's performance. It is possible for an athlete to experience stress as a result of interactions with his or her fellow students or as a result of the academic pressures that they are under (Lopes Dos Santos et al., 2020). A summary of the characteristics that influence athletic performance is presented in Figure 1.

Figure1.FactorsAffectingtheAthleticsPerformance Sources: Stone et al.,2007

Environmental factors can have a significant impact on the performance of athletes. Here are some key environmental factors that can affect athletes:

Temperature and Humidity: Extreme temperatures, whether hot or cold, can affect an athlete's performance. High heatandhumiditycan lead todehydration,increasedheartrate,andreducedendurance.On theotherhand, extremely cold temperatures can decrease muscle flexibility and increase the risk of injury (Larose, J. et al., 2014).

Altitude: Training or competing at high altitudes, where the oxygen levels are lower, can affect an athlete's performance. The reduced oxygen availability can lead to decreased aerobic capacity, increased breathing rate, and decreased endurance. Athletes who are not acclimated to high altitudes may experience fatigue anddifficulty in maintaining optimal performance (Rowe, D. B.,2011).

Air Quality in Delhi: Poor airquality,caused bypollution,allergens,or highpollen counts,canaffectathletes,especially those with respiratory conditions such as asthma. Breathing in polluted air can lead to decreased lung function, coughing, and irritation, impacting an athlete's breathing and overall performance (Wayne, W. S et al., 1967).

Wind: Strong winds can pose challenges for athletes, particularly in sports like cycling, running, or golf. Headwinds can slow down athletes and makeit moredifficult to maintain speed, while tailwinds can provide an advantage by boosting speed. Crosswinds can also affect accuracy and stability, particularly in sports that involve projectiles or require balance (Rundell, K. W. 2012).

Lighting Conditions: Lighting conditions can impact visual perception and depth perception, affecting sportsthat rely on precise hand-eye coordination or timing. Poor lighting, glare, or uneven lighting can lead to decreased accuracy, slower reaction times, and increased risk of injury.

Surface Conditions: The condition of the playing surface can affect an athlete's performance and safety. Variables such as the firmness, traction, and consistency of the surface can impact speed, agility, and therisk of slips or falls. Different sports require specific surface conditions, and variations can influence performance outcomes.

Noise Levels: High noise levels in sports venues or competition environments can affect an athlete's concentration and communication with teammates or coaches. Loud crowds or distracting noises can increase stress levels and impact focus, particularly in sports that require precision and concentration.

Understanding and adapting to these environmental factors is crucial for athletes and their coaches. Strategies such as proper hydration, acclimatization, adjusting training schedules, wearing appropriate clothing, using protective gear, and optimizing nutrition can help athletes mitigate the effects of environmental factors and perform at their best.

The dietary element, which does not really fit into either the physical, social, or organizational dimensions of athleticperformance,hastheabilitytoinfluenceanathlete's strength,endurance,andrecovery,inadditiontohis or her intrinsic health issues (Peeling et al., 2018). This is because nutritional factors are not actually related to either of these aspects of athletic performance. Because of their genetic potential, certain athletes are born with special characteristics that allow them to thrive in particular sports. This is an obvious fact. Ostrander et al. (2009)foundthatthesecharacteristicsalsohavearoleindeterminganathlete'sathleticability.Whenitcomes to the study of athletic performance, the factors that contribute to it frequently work together. For instance, a healthy diet leads to improved health and improved athletic ability, rather than either of these conditions occurring independently (Kaplan, R. et al., 1989). Consequently, it is not uncommon to discover that external elements are connected to interior factors in some fashion or another (Kubiak, 2012 in particular). According to Johnson et al. (2011), the quality of training that an athlete receives is one of the most important factors that determines the athlete's performance, and it is dependent on coaching during the training process. There is a possible correlation betweenthe quality of training andtheorganizational and social aspects, as thissuggests. In the context of the physical elements that influence athletic performance, the purpose of this review is to investigatetheenvironmentalinfluencesasasubsetofthoseaspects.Anumberofenvironmentalelements,such as temperature, humidity, pollution, altitude, and wind, are components of the environment (Pierson, W. E. et al.,1986). It's possible that it doesn't contain everything there is to know about physical aspects, such as the equipment and clothing used for the activity, the configuration of the arena, and so on. According to Tang (2019b) and Tang and Al Qahtani (2020), the objective was accomplished by conducting a review of the pertinent literature, which consisted of scholarly publications published primarily during the last 15 years. A numberofinternetsources,includingWebofScience,Scopus,andProQuest,wereutilizedtogatherthe necessary information for the literature review. Keywords that were utilized were athletic performance, heat, wind, altitude, air pollution, temperature, and humidity.

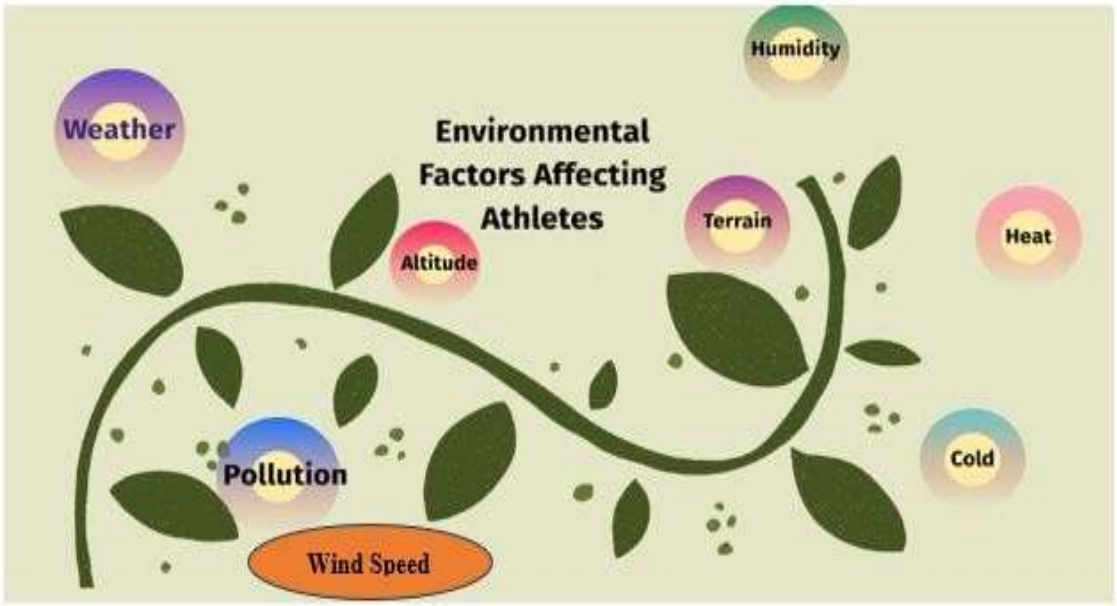

Figure2.EnvironmentalFactorsAffectingAthletes

Sources:https://prezi.com/p/ug8l5c3akxaf/environmental-factors-affecting-athletes/

The Indian environment presents unique challenges and opportunities for athletes due to its diverse geography, climate, and cultural context. Here are some specific aspects to consider regarding the Indian environment and athletes:

Climate and Weather : India experiences a wide range of climates, from the hot and humid conditions in coastal regions to the cold and dry climates in the northern mountainous areas (Tang, K.H.D. 2021). Athletes need to adapt their training and competition strategies based on the specific climate they are in (Ryan, R. M.,2010). For example, athletes training in hot and humid conditions may need to focus on heat acclimatization and hydration strategies, while those in colder regions may require additional preparation for endurance in low temperatures (Hayes, M. et al.,2014).

Altitude and High-Altitude Training: India is home to several high-altitude regions, including the Himalayan Mountain range. These areas offer opportunities for altitude training, which can enhance athletes' performance by improving their aerobic capacity and red blood cell production. Athletes often choose to train in places like Leh, Srinagar, or Shimla to take advantage of the high-altitude conditions.

Air Pollution level in Delhi: Delhi and NCR face significant air pollution challenges, primarily due to vehicular emissions, industrial activities, and agricultural practices (Teunissen, L.P.J. et al.,2013). Poor air quality can have adverse effects on athletes' respiratory health andoverall performance. Athletes may need to take precautions, such as wearing masks or adjusting their training schedules, to minimize exposure to polluted air (Sousa, S. et al., 2012a & 2012b).

Traditional Sports and Cultural Context: India has a rich heritage of traditional sports and games, such as kabaddi,khokho, andyoga. These sportsare deeply rooted in the country's cultural fabricand havegained popularity both nationally and internationally. The cultural context provides a unique environment for athletes, as they draw inspiration from traditional practices and incorporate them into their training and performance routines (Hollings, S. C., 2012).

Access to Facilities and Infrastructure: The availability and quality of sports facilities and infrastructurecan vary acrossdifferentregionsofIndia. Majorcitiesoftenhavewell-equipped stadiums,training centers, and academies, while rural areas may have limited resources. Accessibility to quality facilities can impact

anathlete'strainingopportunitiesanddevelopment,withathletesinwell-servedareashavingacompetitive advantage.

Dietary Considerations: India's diverse culinary traditions offer a wide range of food choices, including vegetarian and vegan options. Athletes need to carefully plan their diets to ensure they meet their nutritional needs for optimal performance and recovery. Indian athletes often rely on local foods rich in carbohydrates, proteins, and essential nutrients to fuel their training and competition.

Sports Culture and Fan Support: India has a passionate sports culture, with cricket being the most popular sport. Athletes in other sports, such as field hockey, badminton, wrestling, and athletics, also have dedicated fan bases. The enthusiastic support from fans can serve as a motivating factor for athletes and contribute to their performance on the national and international stages.

Environmental Sustainability: India, like many other countries, is increasingly focusing on environmental sustainability and conservation efforts (Tang, K.H. D. et al., 2020). Athletes and sports organizations are recognizing the importance of promoting eco-friendly practices, reducing waste, and raising awareness about environmental issues. Initiatives like greener stadiums, eco-friendly sporting events, and campaigns for environmental awareness are gaining momentum (Hug, S.et al.,2009).

Indian environment poses both challenges and opportunities for athletes (Kinnafick, F.-E. et al., 2014). Athletes need to adapt to diverse climates, consider air pollution concerns, leverage high-altitude training opportunities, and navigate cultural contexts (Schleicher, N. et al.,2012). The availability of sports facilities, dietary considerations, and the support of passionate fans also play significant roles in shaping the environment for athletes in India. Furthermore, there is an increasing emphasis on environmental sustainability within the sports community, aiming to minimize the impact on the environment and raise awareness about conservation.

It is widely acknowledged that hot and humid conditions pose significant difficulties for athletes because they hinder heat dissipation, raising body temperatures and impairing performance. On the other hand, a too low temperaturecancreateweariness,impactmusclefunction,and straintherespiratory system.Itisanticipatedthat global warming will worsen the impact of heat and humidity on sports performance, particularly in tropical regions, but it may also improve the performance of athletes in some frigid climates (Wegmann, M. et al.,2012). Athletes will continue to face additional pressure due to rising levels of pollution in metropolitan areas, which has a negative impact on athletic performance. Different sports are affected differently by increasing altitude; sprints benefit from it, whereas aerobic events like marathons suffer from it. Considering the intricate relationships that exist between the direction of the wind, running lanes, and athletes, the effects of wind on athletes differ. Nonetheless, it has been demonstrated that a2 m/s trailing wind helps in sprinting. The effects of significant environmental elements on different sporting events are carefully presented in this review. It advances knowledge of the relationships between these elements, athletics, and equipment utilized in sporting activities. It draws attention to the fact that future sporting environments will be more difficult for athletes, emphasizes the value of acclimatization, assesses environmental dangers in sports, and develops practical methods for athletes to control their body temperature for peak performance.

High altitude (>2,250 m) running performance was studied at the XIX Olympiad in Mexico in 1968 (Jokl et al., 1969), therefore taking into account environmental constraints for athletes is not a new subject. This

harmful perspective on the environment persisted in 2008 at the Olympic Games in Beijing, despite having been around for four decades. Controversies surrounding human impacts on the environment, especially air pollution, were front and center throughout the 2008 games. According to Lippi et al. (2008), Beijing was the second most polluted city in the world at the time.

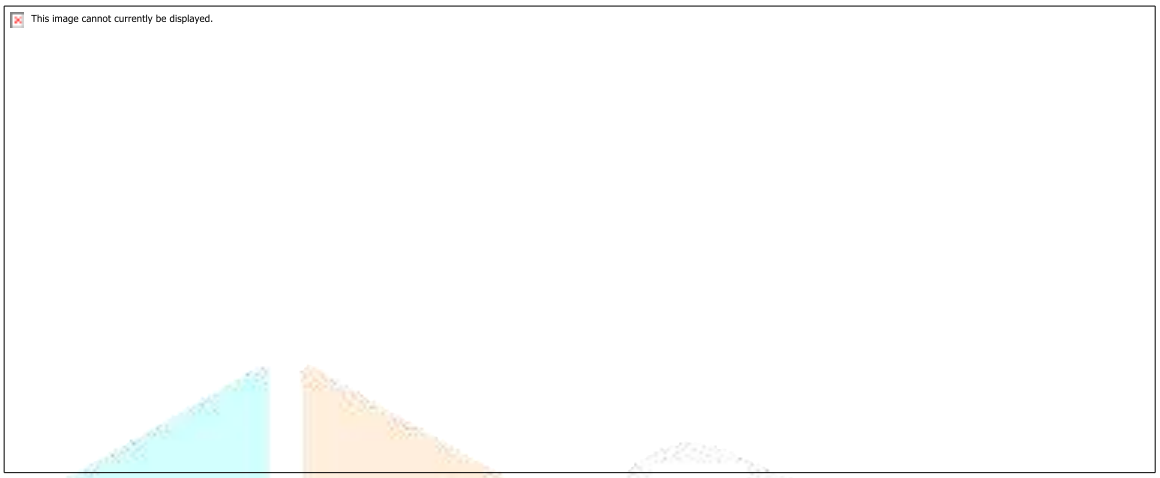

Figure3.CO2emissionfromRioOlympicGames Sources: Inhabitat

The 2004 Olympic organizing committee in Beijing aimed to have pollution levels at the Olympics that year meetWHOstandards.DuringtheSummerGamescompetitiontime,anumberofmeasureswereimplementedto reduce congestion, including an "odd-even ban" that restricted the usage of private vehicles to just odd or even numbered days (Jokl, E. et al., 1969). Studies conducted after the Olympic Games found that air pollution in Beijing fell dramatically throughout the enforcement period, lending credence to the effectiveness of the mitigation measures (Styles, D. et al., 2009).

Conclusion:

Impacts on human health, ecosystems, and climate change from environmental pollution have risen to the level of a global scientific concern. High-level athletes may benefit from improvements in their physical and mental health due to improvements in environmental quality. It's important to learn more about the synergistic benefits of green exercise, in which physical activity is combined with direct exposure to nature. More research into the effectsof spending time in green andbluenatural settings has the potential to improve thehealth andwell-being of athletes competing in the Tokyo 2020 Olympics. Increasing pro-environmental behavior and a greener Olympic movement might make "green and blue" a common sight on the road to success. This would be true both on an individual and societal level, benefiting mental health. Perhaps the IOC might prioritize athletehealth and well-being by giving more consideration to the environmental ethos of hosting cities when making theirdecisions.WeproposeanewwayofthinkingabouttheenvironmentintheOlympiccontext,onethatshifts the focus away from pollution and onto the positive impact that nature has on people's health, happiness, and ability to perform at their best.

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