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Effect of Low to Moderate Altitude on Football Performance: An Analysis of Thirteen Seasons in the South African Premier Soccer League

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Abstract : There is limited information on how altitude impacts performance in a team sport. Most altitude research in football has been conducted at high elevation (> 2500m), resulting in a chasm of understanding whether low to moderate altitude affects performance. The South African Premier Soccer League (PSL) fixtures entail matches played at altitudes from sea level to 1700m above mean sea level. Despite coaches highlighting the effect of altitude on performance outcomes in matches, further research is needed to establish whether altitude does impact match results. Greater insight into if and how altitude impacts performance in the PSL will assist coaches in deciding if and how to incorporate altitude in their planning. The purpose of this study is to fill in this gap through the use of a retrospective analysis of PSL matches. This quantitative study is based on a descriptive analysis of 181 PSL matches involving one team based at sea-level, taking place over a period of thirteen seasons. The following data were obtained: altitude at which the match was played, match result, the timing of goals, and timing of substitutions. The altitude was classified in 2 ways: inland (> 500m) and coastal (< 500m) and also further subdivided into narrower categories (< 500m, 500-1000m, 1000-1300m; 1300-1500m, > 1500m). The analysis included a 2-sample t-test to determine differences in total goals scored and timing of goals for inland and coastal matches and the chi-square test to identify the significance of altitude on match results. The level of significance was set at the alpha level of 0.05. Match results are significantly affected by the altitude and level of altitude within inland teams most likely to win when playing at inland venues (p=0.000). The proportion of draws was slightly higher at the coast. At altitudes between 500-1000m, 1300-1500m, and 1500-1700m, a greater percentage of matches were won by coastal teams as opposed to draws. The timing of goals varied based on the team's base altitude and the match elevation. The most significant differences were between 36-40 minutes (p=0.023), 41-45 minutes (p=0.000) and 50-65 minutes (p=0.000). When breaking down inland team's matches to different altitude categories, greater differences were highlighted. Inland teams scored more goals per minute between 10-20 minute (p=0.009), 41-45 minutes (p=0.003) and 50-65 minutes (p=0.015). The total number of goals scored per match at different altitudes by a) inland teams (p=0.000), b) coastal teams (p=0.006). Coastal teams made significantly more substitutions when playing at altitude (p=0.034), although there were no significant differences when comparing the different altitude categories. The timing of all three changes, however, did vary significantly at the different altitudes. There were no significant differences in timing or number of substitutions for inland teams. Match results and timing of goals are influenced by altitude, with differences between the level of altitude also playing a role. The trends indicate that inland teams win more matches when playing at altitude against coastal teams, and they score more goals just prior to half-time and in the first quarter of the second half.

Keywords : coastal teams, inland teams, timing of goals, results, substitutions
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