HEAT STRESS AND ABILITY TO WORK IN THE CONTEXT OF CLIMATE CHANGE

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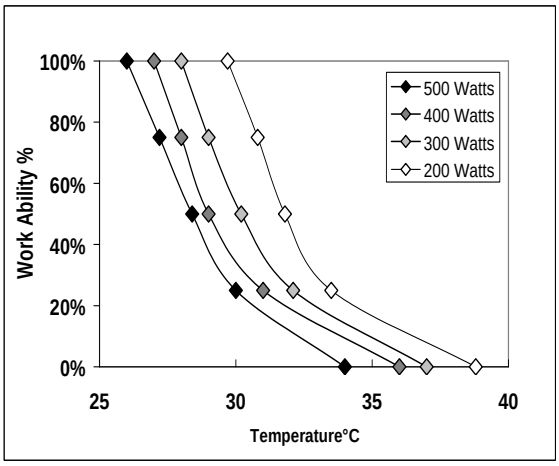
Work environments which are too hot do not just affect comfort, but are a real concern for health protection, and for the ability of workers to perform tasks associated with their work. High temperatures have been found to be associated with lower work productivity, increased accident frequency and reduced motor task performance. This study investigated the likely effect of increasing temperature as a result of climate change, on work productivity, using as a framework the international standard for work in hot environments (ISO7243, 1989). The results are based entirely on modeling work, using the functions provided in this report. The international standard for work in hot environments identifies maximum Wet Bulb Globe Temperatures (WBGT) for continuous work (8 hours per day) and interrupted work (for example 75% work with 25% rest), beyond which a worker is at risk of heat exhaustion. These values are given for metabolic rates ranging from 120 to 340 Wm^{-2} (ISO7243, 1989). WBGT values as low as 22.5°C can result in restrictions of the "time allowed for work", or the "work ability" for un-acclimatised people. For people who are acclimatized to hot environments, such restrictions on work time begin at about 26°C (WBGT). We accept that the WBGT index of heat exposure is "comfort-based". Nevertheless, it is used to manage heat exposure by restricting the time of work in heat. A model of the relationship between WBGT and "work ability" was created from the international standard functions. The reduction of work ability per °C increase is substantial in the range of 26-33°C: 20-30%. The modelling results are shown in the Figure below. The Inter-governmental Panel on Climate Change suggest that temperature increases in this century will be within the range of 1.4-5.8°C (IPCC, 2001). Further, the future temperature increase is likely to vary greatly by region and season. A 1°C increase in global temperature may result in increases of several degrees during the hottest months of the year in certain parts of the world. We calculated the impact on "work ability" in a population, and put the reduction indicated by the model above into a context of "preventable burden of disease". In this case, "disease" was defined as the reduction of "work ability". It was considered that a reduction of the ability to work, and do normal household chores due to heat, would have a similar impact on "heath" as a temporary disability from clinical disease (e.g. malaria fever). A 1°C increase in temperature for two months may contribute up to 10% of the total preventable "burden of disease". These results have potentially serious consequences for the economic conditions of populations in relation to predicted climate change, particularly in tropical regions.



IPCC, 2001. Third Assessment Report. Inter-governmental Panel on Climate Change, Geneva.

ISO, 1989. Hot Environments - Estimation of the heat stress on working man, based on the WBGT-index. ISO Standard 7243. International Standards Organization, Geneva.

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