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Evaluation of Building Materials and Proposal to Improve Thermal Comfort in Rural Housing

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Evaluation of Building Materials and Proposal to Improve Thermal Comfort in Rural Housing

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Abstract In the District of Rio Tambo, specifically in the village of Cana Eden in Satipo, rural dwellings face a significant problem of thermal comfort. Structures built with industrial materials present greater thermal discomfort compared to those built with mixed or natural materials. This research focused on determining the incidence of construction materials on the level of thermal comfort of these dwellings. The methodology used was applied, with an explanatory level and a non-experimental causal cross-sectional research design. The study population comprised the dwellings of the Cana Edén population centre, with a census sample of 30 dwellings. Observation sheets were used for data collection. The analysis included the evaluation of the thermal properties of the building materials, such as thermal conductivity and transmittance, and their impact on the thermal comfort of the inhabitants. Environmental and personal factors influencing the perception of thermal comfort were also considered. In addition, a detailed study of the sunshine of the dwellings was carried out, using tools such as the Givoni bioclimatic diagram and Mahoney tables to assess local climatic conditions. The results revealed that dwellings built with industrial materials presented greater thermal discomfort compared to those built with mixed or natural materials, which offered a higher level of thermal comfort. This finding underlines the importance of carefully selecting building materials in architectural design, considering the specific conditions of the environment and the cultural and socio-economic needs of the community. Finally, the research developed an architectural design proposal that promotes the use of natural materials in jungle dwellings, with the aim of significantly improving thermal comfort and habitability conditions for local inhabitants. This proposal not only seeks to solve the problem of thermal discomfort, but also to contribute to sustainability and energy efficiency in housing construction in the region.

Keywords Thermal Comfort, Building Materials, Thermal Conductivity, Air Temperature, Air Velocity, Relative Humidity

1. Introduction

In the rural housing context of the Río Tambo district, specifically in the Cana Edén village centre in Satipo, a significant challenge was identified regarding the thermal comfort of residents. This issue was closely linked to the choice of construction materials used in these homes. Although the structures were adapted to local needs, a troubling trend emerged: dwellings built with industrial materials exhibited a markedly higher level of thermal discomfort. This observation underscored the critical importance of examining how construction materials directly influenced the thermal well-being of the inhabitants in these rural communities [1], [2].

The pursuit of sustainable alternatives in the construction industry led to the exploration of bio-based materials as a potential solution. As highlighted in the work of Yadava and Agarwal, bio-based building materials not