Urban Climate Exposure and Vulnerability of Outdoor Workers in Colombo, Sri Lanka

J N D Jayathunga[1], M Karunarathne[2], M S P Sumaiya[1], S Gamsathvani[1], W M M Fernando[1]

1. **Department of Geography, University of Colombo, Sri Lanka**
2. **Department of Demography, University of Colombo, Sri Lanka**

Outdoor workers in tropical cities are increasingly exposed to climate-related stresses such as rising temperatures, humidity, and intensified rainfall. As a result, climate-related risks are becoming more severe for outdoor workers living and working in Colombo, Sri Lanka. There is limited research on how climate exposures interact with urban infrastructure and informal labour systems among vulnerable outdoor workers in Colombo. This research will fill currently existing gaps in literature by providing evidence that will become part of the basis to implement inclusive urban climate adaptation strategies. The main objective of this study is to examine how climate-related exposures interact with urban infrastructure and labor arrangements affecting outdoor workers. The study was carried out utilising semi-structured interviews through a purposive sampling method. Thirty outdoor workers (6 from each) were interviewed, including different types of outdoor workers within the Colombo Municipal Council's boundaries, which were covered under five categories, including construction, municipal utility, street vendors, transport workers and app-based gig workers. The qualitative data were analysed using Framework Analysis. An analytical framework was developed around five core domains, such as Climate exposure characteristics, Urban infrastructure conditions, Occupational positioning and informality, Differential vulnerability and social differentiation, and Coping strategies and institutional interface. Findings reveal that construction workers experienced prolonged periods of heat exposure in addition to not having enough shaded areas at their work sites to help alleviate the fatigue caused by heat-related illnesses. Municipal employees are facing hazards related to extreme flooding due to rainfall and having unsafe working environments due to inadequate drainage systems. Street vendors reported that problems related to income instability were caused by the effects of high heat levels, as well as rain. Transportation drivers also have experienced cumulative heat levels from driving through heavy traffic, causing them to lose fluids and become dehydrated faster. Gig workers reported that they are subject to working pressures that are generated by algorithms, which limit their ability to stop working in times of extreme weather. Results show that urban systems prioritise heat and rainfall, acting as stress multipliers rather than sole causes. Climate vulnerability among outdoor workers is socially constructed through the interaction between urban infrastructure and labour practices. The findings suggest the need for structural climate adaptation strategies that explicitly recognise outdoor and informal workers as at-risk populations and promote equitable, participatory, and gender-responsive urban resilience.

Keywords: *Climate Exposure, Heat, Outdoor Workers, Rainfall, Urban Infrastructure Deficiencies*