Can carbon footprint serve as proxy of the environmental burden from urban consumption patterns?

Carbon footprint (CFP) is widely applied as an indicator when assessing environmental sustainability of products and services. The objective of the present study is to evaluate the validity of CFP as overall environmental indicator for representing the environmental burden of residents from urbanized areas. Applying four different Life Cycle Impact Assessment (LCIA) methods environmental impact profiles were determined for the consumption patterns of 1281 Danish urban residents. Six main consumption components were distinguished including road transport, air travel, food, accommodation (covering consumption of materials for the construction of dwellings) and use of energy in terms of thermal energy, and electricity. The results for the individual consumption components showed a strong correlation between CFP and nearly all other impact indicators for all the applied LCIA methods. However, upon aggregation of the indicator results across consumption components, the impact indicators for the total consumption showed no significant correlation between CFP and the other impact scores for any of the four impact assessment methods. These findings suggest that while CFP can be a good indicator of the environmental burden associated with specific activities, this is not the case for more complex activities (such as consumption patterns related to urban life styles). This conclusion discourages the use of CFP as sustainability measure in relation to regulation of private or public consumption.