

Abstract

Traffic congestion significantly contributes to climate change due to the emissions of greenhouse gases such as carbon dioxide (CO₂), nitrous oxide (N₂O) and ozone (O₃). Rapid urbanization and poor planning coupled with increased motorization and fragmented public transport systems in cities such as Nairobi have led to increased vehicle emissions especially during heavy traffic along the various roads and within the central business district. To reduce greenhouse gas emissions in the urban transport sector, institutional coordination and relevant policy tools must be considered. This study aimed at estimating CO₂ emissions from different vehicle categories during traffic congestion, using Uhuru Highway as a case study. The relationship between traffic congestion and CO₂ emissions was analyzed using qualitative and quantitative methods, through a bottom-up approach. 120 questionnaires were administered to vehicle owners, passengers and pedestrians to get individual vehicle characteristics and opinions on the best actions for reduction of CO₂ emissions along Uhuru Highway in Nairobi. The average annual daily traffic (AADT) for different vehicles from 2014 to 2019 was used to estimate the CO₂ emissions. Results showed that private cars predominate over other vehicle types, contributing 73% of the total CO₂ emissions in the Nairobi CBD. Private cars are the highest contributors of CO₂ emissions with a total of 25.3 million grams of carbon dioxide equivalent (gCO₂e), between 2014 and 2019. In comparison, public service vehicles, commonly referred to as Matatus, emitted 6.89 million gCO₂e, light commercial vehicles 1.82 million gCO₂e, heavy goods vehicles 251,683 gCO₂e and motorcycles 181,054 gCO₂e. To minimize CO₂ emissions, the study recommends the enforcement of strong mobility policies to control the high motorization rate. One of these policies is the prioritization of the development of a mass public transport system to achieve the potential health, economic and environmental gains within the CBD.