

## Summary

World's largest urban growth is taking place in Sub Saharan Africa. As a result, the demand for mobility is increasing. However, the supply of urban infrastructure is low. This is causing mobility problems, such as congestion. Improvements are possible by building new infrastructure. This is a long term, complex and expensive solution. A short term solution is to improve the traffic management to maximize the use of existing infrastructure. Intersections can be considered as the bottlenecks of the urban traffic flows. In order to maximize the use of existing infrastructure, it is useful to quantify the influences of the different factors on the intersection flow. Numerous scientists have studied the traffic flow at intersections in both developed countries and developing countries; however, no study about a city in Sub Saharan Africa could be found. The goal of this research is the development of a simulation model that describes the traffic flows at the intersections of Africa Avenue in Addis Ababa, Ethiopia. The aim of the model is to perform ex ante assessment of different flow improvement strategies.

Lanes at three traffic intersections (both officer controlled and signal controlled) were studied during times of congestion. 6573 vehicles were observed, from which 76% were passenger cars, 21% were minibuses and 2% were heavy vehicles. The average queue discharge flow for the straight through traffic was significantly lower than the saturation flow for the same conditions. These were 1358 Passenger Car Units per hour per lane (PCU/h/ln) and 1522 PCU/h/ln respectively. It appeared that the total flow at the studied interfering lanes at the intersection depends on the share of minibuses, the share of slow vehicles, the number of lanes per approach and the productivity of the type of control.

An officer controlled intersection was used as a case study for to flow improvement. Installing traffic responsive signals showed the potential to increase the interference flow. To reach a high productivity with signal control, thorough studies by specialists are needed. However, as a result of the chaotic traffic behavior it is not sure whether the signal settings can be tuned such that signal control results in an improvement compared to officer control. Simple, low-cost and effective solutions with a high certainty appears possible to improve the productivity of officer control. The flow at the studied interfering lanes is expected to increase with 6.4% compared to the current 2275 PCU/h.

To cope with a large expected growth in traffic demand, maximizing the use of existing infrastructure will not be enough. A combination with broader solutions - such as extra infrastructure and coordinated traffic control - is difficult to realize but essential. Further research is needed to determine what the effects of broader solutions will be and how these measures can be implemented successfully.