

Health Risk Assessment of reduced air pollution exposure when changing commuting by car to bike

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Objectives

The main objective of this work is to assess the effect on emissions, population exposure and health of transferring car commuters to bike.

Methods

In this study we have calculated the potential number of car-to-bike switching commuters depending on distance, travel time, age of commuters etc. We have made calculations for a 30-minute biking scenario, i.e. transferring all car commuters to bike if their travel time by bike is less than or equal to 30 minutes. The commuting distance depends on age and sex. For the travel and traffic modelling the LuTrans model was used. It includes all different modes of travel; walking, bicycling, public transport systems and car traffic. The model was developed based on travel survey data and is regularly calibrated using traffic counts. Emissions from were calculated based on HBEFA 3.2. A Gaussian dispersion model was used estimate exposures over the county of Stockholm.

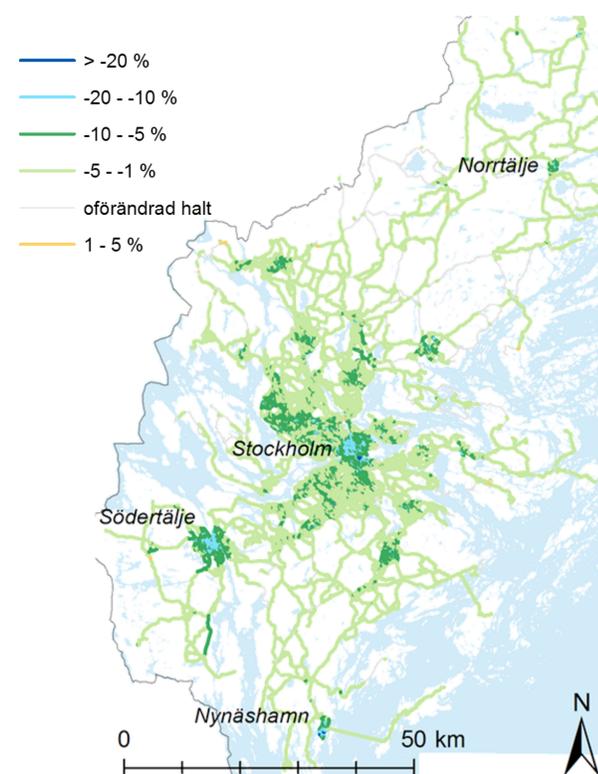
Results

The 30 min scenario resulted in 106 881 more bikers an increase of 2.6 times compared to base scenario. Of all bikers 50% were men and the mean age of all bikers was 42. The traffic emissions of NO_x was reduced 7%. Up to 20% reduction in traffic contribution to NO_x concentrations was calculated as shown in Figure 1. The mean reduction in concentration for the whole area is 6%, but largest reductions occur in the most densely populated areas.

The population weighted mean NO_x concentration for 1.6 million people in Greater Stockholm is estimated to be reduced by 0.41 µg m⁻³. Assuming that the premature mortality is reduced by 8% per 10 µg m⁻³ (Nafstad et al., 2004), this corresponds to 42 avoided premature deaths every year or 514 gained life years gained. This is even somewhat more beneficial than the effects of the congestion charge in Stockholm (Jo-

hansson et al., 2009), which was estimated to save 27 premature deaths per year. The gain in reduced mortality is almost as large as the gain in health of the increased physical activity.

Figure 1. Calculated percent reduction in NO_x concentration due to traffic emission



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Conclusions

Transferring car commuters to bike is not only beneficial for the physical activity, but will also lead to reduced traffic emissions and reduced population exposure. Our estimates show that it may be even more beneficial for mortality due to air pollution exposure than the congestion tax in Stockholm.

References

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