TØI report 677/2003
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Summary:

Urban travel

Object

The research project presented in this report is part of a department project at The Norwegian Public Roads Administration focusing on challenges associated with urban transport. The object of the department project is to establish knowledge about instruments and efforts for increasing public health and environmental quality in urban areas through reduction in car use.

The report presents analyses of travel behaviour in the three largest Norwegian cities, Oslo (780 000 inhabitants in the greater metropolitan area), Bergen (209 000), and Trondheim (143 000). The main focus is on how travel behaviour is affected by everyday doings, the location of homes (trip origin), the location of trip destinations, people's access to travel modes, and in addition, how the local transport network influences travel pattern and accessibility.

Travel surveys

The report is based on a database containing merged data from five large travel surveys conducted in 2001: The National Travel Survey, and four local surveys covering respectively the counties of Oslo and Akershus, the county of Vestfold, the Bergen region (the municipality of Bergen and the surrounding municipalities), and the Trondheim region (the municipality of Trondheim and the surrounding municipalities). These five travel surveys contain information from nearly 53 000 interviews representing about 177 000 trips (approximately half of them are applied in this report).

In the Norwegian Travel Survey, trips are defined as all forms of transfers outdoors, irrespective of the distance travelled, duration, trip purpose, or travel mode. The surveys include persons older than 12 years.

Geocoding

The origins and destinations are geocoded with reference to census units. This gives unbiased information about exactly where the trips started and ended, and makes it possible to emphasize the geographical context in the analyses of travel behaviour. Through the geographical references, we are able to integrate other information with the same geographical references (for instance travel time matrices). The large number of interviews makes it possible to produce thematic maps of travel behaviour.

The report can be ordered from:
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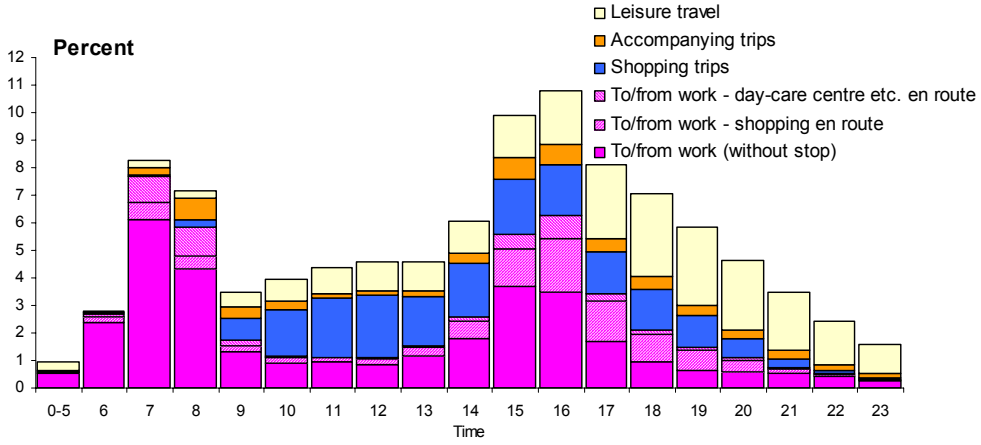
Travel behaviour during the day and by travel purpose

The variations in travel activities in the course of a workday are almost identical in the three cities. About half the trips on workdays are made by people travelling to or from their work. It is common for many to do shopping en route, visit some service institution, or bring children to or from day-care centre, kindergarten or school. In travel surveys such stops en route are normally classified as separate trips (shopping trips, accompanying trips etc), but in the diagram below they are seen as links within work trips.



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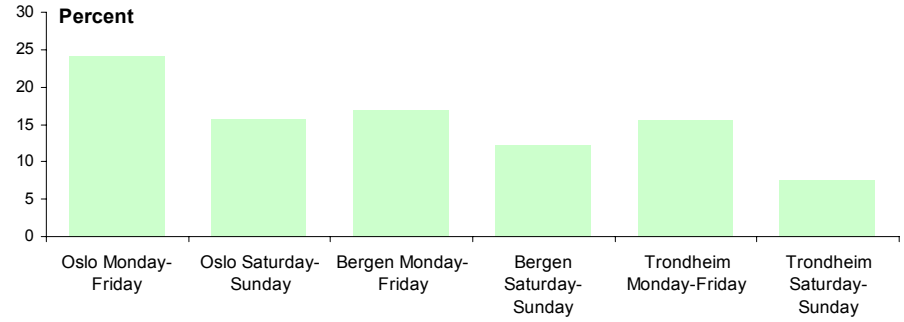
Trip distribution during workdays. Oslo, Bergen, and Trondheim combined. Percent. (Diagrams for each city are shown separately in chapter 3.1.)

In the three cities, 60 percent of the trips within a week are by car. Twenty-four percent are by walking or cycling. Only 15 percent are by public transport. In Oslo the share of public transport is somewhat higher than in Bergen and Trondheim.



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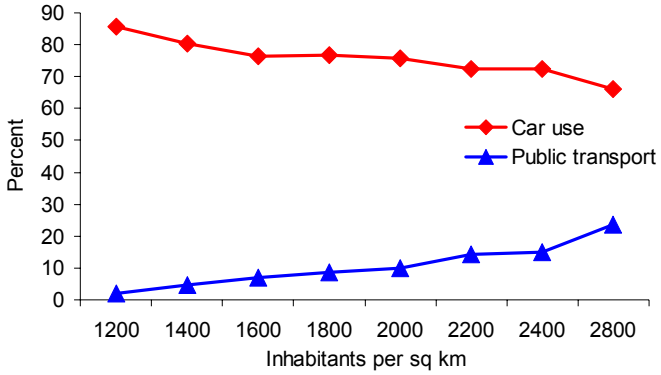
Travel by public transport as share of all motorised transports. Oslo, Bergen and Trondheim. Percent.

The amount of car use varies by travel purpose. The most extensive car use is on accompanying trips. On trips to/from work via day-care centre etc. there is almost no use of public transport.

Two thirds of the people travelling have a driving license and access to a car, but not everyone chooses to use her/his car. A common reason for leaving the car at home, is parking restrictions at the trip destination.

Urban structure and accessibility – geography of travel behaviour

In land use and transport planning there is an understanding that densely built up urban areas can contribute to less motorised transport in the city. To some extent, the results from the national travel survey confirm that there is such a relationship, since an increasing number of inhabitants per sq km seem to result in a decreasing share of car use and an increasing share of public transport (see graph below).



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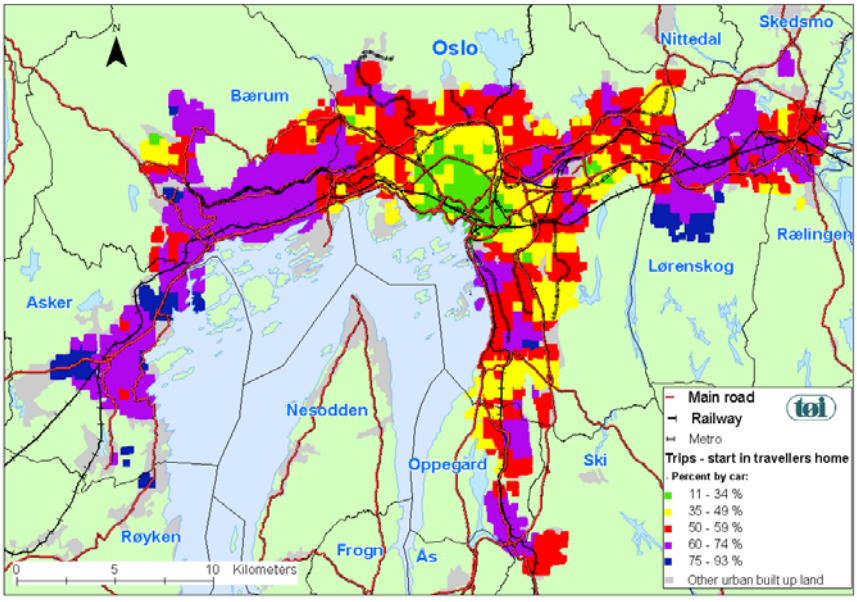
The share of daily travel distance (passenger km) by car or public transport by population density in cities. Trips with origin and destination in the same city. Cities with more than 20 000 inhabitants.

However, differences *within* the cities are larger than *between* the cities. For trips starting at home, the share of car use increases from the central business district (CBD) to the outskirts of the city. The map below shows the differences in Oslo (for maps covering Bergen and Trondheim, see chapter 4.2). The central areas are characterized by a relatively low car use by the residents. This is partly due to less car ownership than in the rest of the city. The most important cause for low car use is, however, that the trip destinations are primarily located in or near the CBD, which encourages walking and cycling. On the other hand, when the residents of these inner city areas travel to the outskirts of the city, their car use is almost at the average level for the city as a whole.



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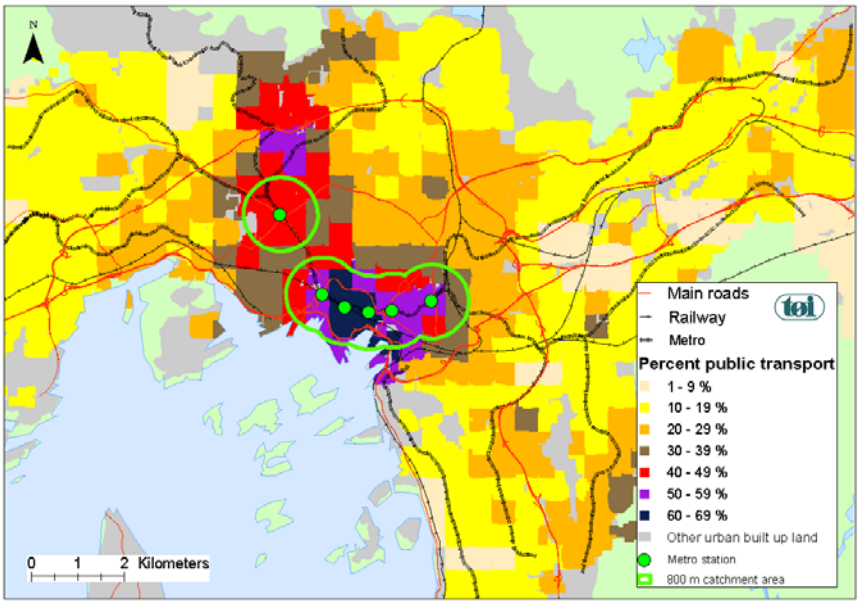
Trips starting in travellers' homes. Percent by car. Workdays. Urban settlement of Oslo.

The mode choice varies by trip destinations. The amount of travelling by public transport increases the closer the destination is to the CBD. Most of the trips by public transport (not counting trips that end in the traveller's own home) terminate in the CBD or its surrounding areas. It is therefore primarily for trips to this part of the city that public transport has any substantial market share.

For motorised trips to the central areas (CBD + surrounding areas within 2-4 km), public transport has a share of at least 20 percent on workdays. For trips to the CBD the share is 60-70 percent in Oslo and 40-50 percent in Bergen and Trondheim. A high market share for public transport is achieved where the system offers good accessibility (from other parts of the city) combined with very limited access to free car parking. Good accessibility by public transport means that travel time (from door to door) is less or almost the same as by car.

The map below shows the percentage of motorised trips made by public transport to different destinations in the municipality of Oslo (for maps covering the whole urban area of Oslo and maps covering Bergen and Trondheim, please turn to chapter 4.5, 4.6 and 4.7 respectively).



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Destinations for motorised trips (not counting trips that end in the traveller's own home). Percent by public transport. Workdays. Municipality of Oslo.

More than half the traffic by public transport is work trips. To achieve high public transport shares on work trips, the workplaces should be located close to the CBD or other areas with good accessibility by public transport. Today 30-40 percent of the work sites are in such "favourable" areas. However, new commercial buildings are often located outside these areas, thus resulting in a more car-based city. (For maps showing the geographical distribution of sq metres floor space of new commercial buildings built in the period 1992-2002, see figures 4.26, 4.27, and 4.28 in chapter 4.9.)

Land-use may also affect the non-motorized traffic in the city. Analyses of the maps indicate that a basis for a relatively high market share for cycling may be found in urban areas with high density mixed land-use and short distances to

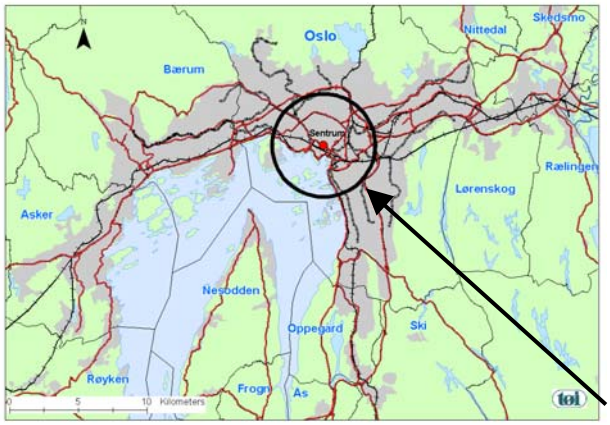
important destinations. Large areas in Trondheim do have this quality. There are also some smaller areas in Oslo. Medium sized cities will often have a land-use pattern suited for cycling.

Two transport zones

Based on the travel surveys we can point out two main transport zones in large cities – "the inner city" and "the outer city". The inner city includes the most densely built up area, i.e the area within 4,5-5 km from the CBD in Oslo, within 2,5 km from the CBD in Bergen and within two km from the CBD in Trondheim. The outer city includes all the built up urban land outside the inner city, mostly suburban, residential areas and some industrial zones.

The inner city is characterized by a relatively low car use by the local residents and high public transport use by the daily visitors.

Except for the residents' trips to the inner city, the outer city is characterized by much car use and scattered trip destinations both among the residents and the daily visitors (for maps showing distribution of car trip destinations, see figures 5.2, 5.5 and 5.8 in chapter 5.1). This makes it very difficult to establish a competitive public transport network, especially for trips across the arterial routes towards the CBD. Most of the trip destinations are outside the inner city. This means that the public transport system only serves smaller parts of the travel demand in the outer city.



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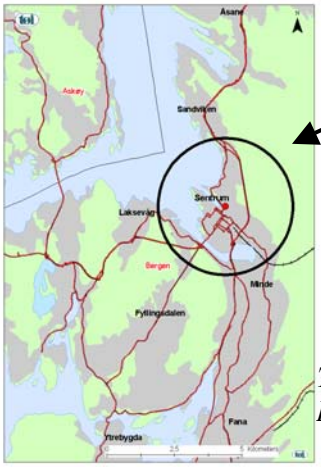
The urban settlement of Oslo. (Scale approximately 1:560 000.)

The rings delimit the "inner city" characterized by a relatively low car use among the local residents and a high public transport use among the daily visitors.



The urban settlement of Bergen. (Scale approx 1:280 000.)

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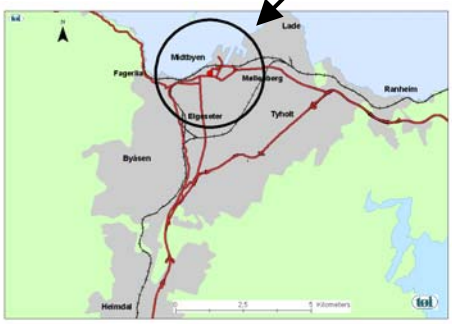

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The urban settlement of Trondheim. (Scale approx 1:280 000.)

Challenges

If the aim is to reduce the total amount of car traffic (e.g. in order to reduce the total carbon dioxide emission), the results from the project indicate that the focus should be on the car trips to destinations in the outer city. These car trips represent 40 percent of all trips (all modes) in each of the three cities. Because it is difficult to operate a public transport network that can compete with the flexibility of the car for trips to the existing scattered destinations, the challenge is to work out a land-use policy for concentrating new industries and other activities in the outer city to a limited number of nodes that can be more effectively connected by an upgraded public transport system.

If the aim is to reduce local environmental and traffic problems, the focus should rather be on car trips to the inner city. Even if the public transport has a high market share for travels to this area, most of the traffic is still by car. Twenty percent of the total passenger kilometres in each of the cities are the result of car trips to the inner city. Many measures are possible to influence the car traffic to the central areas, ranging from improved public transport to restrictions on car use (e.g. road pricing and car parking restrictions).