1. INTRODUCTION
For several years population numbers are falling in certain regions of the Netherlands. This is particularly the case in the countryside of the South, North and East. In the next decades some areas will lose more than 10 percent of its population. The question is whether a shrinking population will have an impact on mobility growth? Will there be less congestion in areas with a shrinking population, because of a decline in the number of commuters? On the other hand, regional population decline will probably lead to population growth in the economic core regions, like the Dutch Randstad (Amsterdam-Rotterdam-Utrecht-The Hague conurbation), and consequently give more pressure and congestion on the road system there. What can be said about the public transport services, the use and accessibility of public transport in regions with a shrinking population? This paper presents the results of a study on regional differences in mobility effects in relation to population decline and growth (Harms, Olde Kalter & Jorritsma 2010) The main research question to be answered in this paper is:
What is the impact of changes in the size and composition the population on car use and public transport in the period up to 2030 and what is the contribution of economic, spatial and socio-cultural factors? The mobility effects are based on calculations with the National Model System (LMS). The presented results (kilometres travelled by car) do only apply to the Dutch main road network and describe changes between 2005 and 2030. The analyses and results are at the regional level (COROP) and distinguished for the effect of size/composition of the population and the effect of behavioural changes within the region. In addition estimates for through traffic were made. These are the result of changes in population and changed behaviour elsewhere\(^1\).
Recent population forecasts for 2030 from Statistics Netherlands and Netherlands Environmental Assessment Agency (CBS, PBL 2009) were used. For the 2030 mobility estimates we used different economic scenarios, describing possible future roles of Europe (Janssen et al. 2007). In the study two extreme scenarios in terms of growth and shrinkage of the population were used: Global Economy (GE) for the scenario with the highest population growth, and Regional Communities (RC) for the scenario with an assumed population decline.

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\(^1\) Demographic trends lead to volume changes that affect congestion and travel times. Such effects on demand and congestion are taken into account in the estimates (the results of calculations with the LMS is a ‘new’ equilibrium which is corrected for various effects).
2. POPULATION GROWTH AND DECLINE IN THE NETHERLANDS.

The Dutch population will continue to grow from 16.5 million people in 2009 to 17.5 million by 2040 (CBS, PBL, 2009). According to existing scenarios the Dutch population continues to grow until 2020. Depending on the scenario a further increase or a slight decrease is expected: almost 16 million inhabitants in the scenario with the assumed population decline (RC) and almost 20 million inhabitants in the growth scenario (GE). With 17.5 million inhabitants in 2040 the CBS/ PBL projections are approximately in the middle of this range. However, there are large regional differences in the expected population development. About 25 percent of all municipalities are confronted with a decline in population numbers, mainly in the peripheral regions of the North, South and East of the Netherlands (see figure 1). In these regions population numbers are dropping since the mid-nineties of the 20th century. According to the CBS/PBL projections the extent of population decline in these areas will be over 50,000 residents around 2030 (on a total of 860,000 inhabitants (CBS, PBL 2009, De Jong 2010). Two factors are contributing to this. First, an aging population caused by a higher mortality rate amongst elderly and a lower birth rate amongst women (less children are born). Second, many young people move from these areas to the central parts of the Netherlands for study and work (Van Nimwegen & Heering 2009).

By contrast, an increase in the number of inhabitants in the more central parts of the country is expected. In the urbanized western Randstad region and in the main large cities the population will probably continue to grow as well as in the so-called Brabant (middle South) and Arnhem-Nijmegen (middle East) conurbations. This growth in population is mainly caused by natural increase, by immigration from abroad and immigration of young people from Dutch peripheral regions.
In comparison to other European regions, population decline in the Netherlands is quite limited. Particularly Eastern European regions are suffering from large reductions in population. Due to migration to the ‘richer’ western parts of Europe caused by free choice of settlement in the European Union for many Eastern Europeans. Besides that, birth rates in Eastern and other parts of Europe are declining. The population is Spain and Portugal is still growing, due to immigration, but Italy’s population is declining (see figure 2). Even in Germany, migration from east to west is still in progress. Particularly women are moving to the western part, resulting in a surplus of men in East Germany (Kröhnert, Hossman & Klingholz 2008).
3. SHRINKING POPULATION: LESS MOBILITY?
Developments in the total mobility are determined by the result of changes in the volume and composition of the population and (individual) changes in travel behaviour, due to changing lifestyles and activity patterns (see figure 3). Population growth results in an increase in the total number of people travelling and thereby to increasing mobility (more trips). In addition, a change in composition of the population will result in an in- or decrease of mobility (more or less trips, shorter or longer distances). An example is the increase in the number of people over 65 to almost 15 percent in 2010 to 25 percent in 2030 (Jorritsma & Olde Kalter 2008, Arentze et al 2008). Changing lifestyles and activity patterns have an impact on personal travel behaviour. Socio-cultural developments such as changes in preferences and needs with respect to the family, marriage, the position of women or household responsibilities can have an impact on car usage (Olde Kalter, Jorritsma & Harms 2009, Harms, Olde Kalter & Jorritsma 2010).

Impact on car use

What impact do the changes in size and composition of the population and changes in behaviour specifically have on car use on the Dutch road network? In the growth scenario (GE) one quarter of the growth in car use (measured in passenger kilometres) on the main road network can be attributed to changes in the size and composition of the population. Three quarters of the growth is due to other factors (changing behaviour). Even in the ‘shrink’ scenario (RC) car use is increasing at the national level, which is entirely explained by changes in behaviour and other developments² (figure 4).


If only population size and composition would change, all other conditions remaining equal, then a shrinking population will lead to a reduction in car use

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² In the RC scenario the population for 2030 is at the same level as in 2005.
in several regions. As an example we look at two regions with an expected strong population decline in the coming decades (figure 5).

FIGURE 5: Change in car use on the main road network 2005-2030 (RC and GE scenario) in regions with a shrinking population, distinguished for population size/composition and other developments. Source: Harms, Olde-Kalter, and Jorritsma 2010.

In the RC scenario a reduction in car use is expected in both regions, respectively by 8% and 4%. Due to other developments the net effect is an increase in car use by 30% and 34% respectively. In regions with a growing population to 2030, car use is increasing due to population change. However, other factors like economic, social and spatial changes show a greater impact. Figure 6 shows the regional effects in car use on the main road network, due to population decline and socio-economic changes for the ‘shrinkage’ scenario (Regional Communities). This shows that the impact of population change is limited in all Dutch regions. Once again, the effect of other developments in the growth in car use until 2030 is more significant.

Impact on congestion
Regions dealing with a shrinking population are already showing hardly any congestion. Estimates show that congestion levels will not change in these regions by 2030. Congestion is mainly concentrated in the Randstad region and on the main roads leading to the Randstad (CPB et al, 2006).

Impact on public transport
What can be said about the public transport services, the use and accessibility of public transport in regions with a shrinking population? We try to give an answer to these questions in a more qualitative way, by looking in brief to the rural areas; mostly areas with a shrinking and greying population.

The use and the basis of all kinds of services are primarily determined by supply and demand and to a lesser extent by demographic factors. This also applies to regions where the population is shrinking. A shrinking population will obviously have an effect on the supply of services. Other factors however, such as changing consumer behaviour, increased prosperity and mobility, changes in lifestyles and strategies of providers are more influential (Van Dam et al, 2006).

In general we see no decrease in the availability of public transport services in rural areas in the Netherlands at the moment. Moreover, since 2000 there has been an increase in bus services (MuConsult, 2006). Many regular services
were converted to flexible on-demand services. Despite of this, market shares of public transport in rural areas are declining (KpVV 2008). This is mainly due to rising car ownership and a growth in car use caused by increasing prosperity and changing lifestyles: other factors than population decline. Recent analyses show a limited contribution of population change to the growth in regional and urban public transport use (Jorritsma et al 2009). Rising tariffs and a decline in public transport use for recreational purposes are reducing factors.

The main target groups for public transport in rural areas (mostly areas with a shrinking population) are students and the elderly. The first group is the most frequent public transport user. Elderly on the other hand, hardly use these means of transport. Only 2% of all trips elderly make are by regular public transport services. On-demand public transport is more popular among elderly people. These on-demand systems are perceived as more comfortable. They are offering more departures, people are picked up from their homes and brought closer to their destination, while the vehicles generally offer more comfort.

It can be concluded that developments on the supply side and socio-economic factors determine the availability of public transport services. The operating costs and the role of public funds are determining factors. These are independent from demographic trends and changes in traffic demand. In areas where the demand for public transport is already low and are faced with a declining population, regular public transport will undoubtedly lose quality, because the operation of the system will be under pressure. Other transport concepts such as on-demand transport services can contribute in maintaining the quality of public transport and the accessibility of these regions. In regions where population is still increasing, mobility will also grow. In these regions population growth leads to a heavier load of the road network and an increase of public transport use, especially in the metropolitan areas of the Randstad.

4. CONCLUSIONS

Population decline does not, by definition, lead to less mobility. Although the size and composition of the population does influence mobility and traffic congestion levels, the defining factor is the total of various other developments, such as economic, spatial and social-cultural changes. This is the reason why mobility will continue to increase in the coming decades, even in regions where the population is shrinking. A decrease in the population does not lead to less traffic congestion in the so-called population declining regions. The most important explanation for this is that the effect of fewer people is compensated by higher travel rates per person. Population growth leads to greater pressure being exerted on the road network in major urban areas, particularly in the Randstad and its surroundings. In areas where the demand for public transport is already low, while they are faced with a declining population, regular public transport will undoubtedly lose quality, because of high operational costs. To the regional authorities and providers of public transport services, the task to anticipate by introducing more flexible on demand services.

It is conceivable that local population decline will have an increase on regional cross-border mobility, because of increasing distances to facilities. In some
regions, access to shopping malls and post offices is already reduced. Although not yet visible, doctors and schools will be faced with declining demand (ABF, 2007). The effect of these processes is probably an increase in mobility. Residents have to travel greater distances to reach facilities. These kinds of effects are not included in our study. Additional research will have to give more insight into the effects of a declining population on a more disaggregated spatial level. Changes in the level of services, residential areas and workplaces have to be taken into account.

REFERENCES


