

# Pedestrians' performance and satisfaction.

Rob Methorst  
Rijkswaterstaat Centre for Transport and Navigation  
PO Box 5044, 2600 GA Delft, the Netherlands  
rob.methorst@rws.nl

Richard van der Horst  
TNO  
PO Box 23, 3769 ZG Soesterberg, the Netherlands  
richard.vanderhorst@tno.nl

## Abstract

In the framework of the PQN project, assessments have been carried out to arrive at real figures on the pedestrians' performance and satisfaction. The results regarding key figures are:

- About 50% of the pedestrians have limited abilities and about 10% of the population has severe difficulties walking and sojourning in public space.
- Pedestrian mobility concerns door-to-door trips (mono-modal walking) and trips to and from other modes (multi-modal trips); time spent in traffic and distances covered are about the same.
- The normal action radius of a pedestrian is about 1 kilometre; an average (European) citizen walks 250 door-to-door trips per year and 1,800 times to and from other modes. In total, pedestrians cover about 300 kilometres and spend about 100 hours per person per year on walking.
- Sojourning in public space is an important indicator for quality of public space; it encourages all kinds of activities that humans need for their well-being. The average amount of time spent on sojourning is about 300 hours per person per year.
- Hospital data and medical assistance data show that single pedestrian accidents (falls) induce three to nine times as many casualties as pedestrian-vehicle crashes.
- The total number of victims for Europe amounts to at least 1.6 million injured pedestrians per year in Europe (equals more than 3,000 casualties per million inhabitants).
- The total number of pedestrians killed varies from 9 fatalities per million inhabitants in the Netherlands to (more than) 46 in Poland. In the Netherlands the number of vehicle related fatalities per million inhabitants is 6; the number of fatalities from falls is 3.
- The total incidence of pedestrian injuries is 320 per million inhabitants (over 175,000 severely injured Europeans). Of this, 250 per million casualties result from falls (135,000 Europeans) and 75 per million from pedestrian-vehicle collisions (27,000 Europeans). The elderly run extreme risk.
- For security, the number of incidents is less normative than the fear and emotions it evokes. Compared to traffic accidents and falls, the actual risk of getting injured or killed in a criminal incident is low; the real number of criminal acts in public space is stable over the years.
- Satisfaction is related to the fulfilment of one's wishes, expectations, or needs, and it reflects the pleasure derived from this. There is little research carried out on pedestrian satisfaction.

Major issues for policy making with regard to the pedestrian performance and satisfaction are:

- Large numbers of people have real trouble performing 'walking and sojourning' tasks. Because of ageing of the population the numbers will increase substantially.
- With regard to safety, particularly the prevention of falls is important; this is also an age related problem.
- There is too little awareness that without walking transportation is not possible.
- The vicious circle of no data – no awareness – no priority - no research – no data, needs to be broken. The lack of data/information on walking and sojourning is imminent; some crucial concepts and statistical units need to be redefined and internationally applied.



Rob Methorst is chairman of COST 358 Pedestrians' Quality Needs and senior consultant at the DVS Centre for Transport and Navigation (NL Ministry of Transport, Public Works and Water Management). Rob has 30 years of experience in the field transport and traffic safety, both in pedestrian advocacy and in government.

Richard van der Horst is working in the field of human factors in road traffic for over 35 years with a main focus on evaluation and assessment of road design, traffic management and in-vehicle driver support systems in terms of road safety and road user behaviour. He was one of the leading actors behind the development of traffic observation techniques and of time-related measures of road user behaviour. He was also one of the initiators of the ICTCT, the International Cooperation on Theories and Concepts in Traffic Safety.



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## Introduction

In the COST 358 Pedestrians' Quality Needs (PQN) project structure<sup>1</sup>, policy starts with the development of a 'vision' on the desirable and expedient state of the road system environment for pedestrians. The next stage is to evaluate what is actually offered, how pedestrians function under those conditions and how satisfied they are with what their environment offers. In this policy development stage, the aim is to find out what needs to be kept and what needs to be improved. The results of this work serve as input for the next stage, which is to identify or develop strategies that can improve the pedestrian's situation and to select the most promising ones. In the last stage of the policy development process, a decision on measures to be taken is prepared. This includes the assessment of the added value of selected promising strategies for the responsible organisation. The assessment of the added value is important, as for the organisation not only the benefits for pedestrians count, but other policy arguments matter, too. This stage also includes the formulation of the improvement plans and the actual decision on the implementation of the plan.

This article deals with the second stage of the policy development process 'Evaluation of the current situation'. For an account of how well the pedestrian's *environment*<sup>2</sup> and the conditions and opportunities that are actually offered, comply with the quality requirements as they are identified in the 'vision', in guidelines, legislation, policy statements etc., we refer to the article 'Evaluation of the current system' by Nicole Muhlrاد (see PQN Final Report section B.5.8). In the current paper we will provide a shortened account of an evaluation of how *pedestrians* actually function and how satisfied they are with what their environment offers them. The paper aims to show what the general situation regarding the pedestrian's performance and satisfaction is and what issues need policy attention.

Some important issues in this context, which need to be substantiated, are:

- How can walking and sojourning performance, benefits and risks be assessed? What use do pedestrians make of the offered facilities, services and opportunities? What performance indicators can be identified and applied?
- To what extent are pedestrians satisfied with offered facilities, services and opportunities to walk and sojourn in public space?
- What current deficiencies and future prospects need attention? What is or may become a problem?

<sup>1</sup> see PQN Final Report Part A and Part B, section B.5.2, Figure 1

<sup>2</sup> The pedestrian's environment includes the physical environment (sites, networks, land use, atmospheric conditions), the social environment (other persons in the environment, behavioural rules, legislation, policies, media attention etc.) and transportation (vehicles, public transport, traffic and mobility management).



## Objective

The aim of the present evaluation study is to present a comprehensive and true generic picture of the pedestrian's functioning and satisfaction with offered conditions, and to identify clues for improvement. In order to provide a true picture of reality, hidden issues must be uncovered, and figures be corrected for bias, by complementary estimations. Furthermore, reality must be evaluated from all relevant perspectives: functionality, perception, durability and future prospects, and coherence and integration.

## Quality of Life, disabilities and handicaps

Abilities are a major determinant for walking and sojourning performance. As mentioned, limited abilities restrict the pedestrians' mobility, sojourning and safety performances. In this context it is important to know what limitations pedestrians can have, how many people or what share of the population it concerns and how serious the consequences are for individual persons as well as for the functioning of society, at the local, regional, national or even European level.

Pedestrians form an extremely heterogeneous group. With regard to walking and sojourning performance, in general young and healthy male adults have the least limitations. They can walk the greatest distance, have fair safety records and the least problems with accessibility of buildings and other destinations. They are, however, not a majority, but a minority. Asmussen (1996) showed that a remarkably large proportion of citizens (almost 40%) can be considered to belong to a vulnerable group (see Table 1). On top of this, even competent persons can be temporarily impaired by being under the influence of alcohol or medical drugs, the use of a mobile phone or MP3 player, having fogged glasses, heavy bags, or simply distracted by their companions or interesting objects in shop windows (Fuller, 2005).

Walking is the only travel mode that is available for everyone. In this respect it is important to note that there are persons that have the option to choose to travel by other modes and people that do not have such options. In general, the most capable persons also have most options. Most handicapped persons, children and persons that are financially less well off, if they want to travel independently, their only option is to walk. So, in order to make the system work, the norms for the walking population cannot be defined by the most able persons or the average situation, but have to be defined by the greatest common denominator, which is a low competence level. This reflects the Design for All principle.

Asmussen's table provides a general indication of the walking and sojourning limitations a population can have. More precise and detailed insight in the pedestrian's limitations regarding walking can be deduced from general Quality of Life studies, which are performed in a number of countries. According to Statistics Netherlands (see: [www.cbs.nl](http://www.cbs.nl)) there are two frequently used standards for measuring the citizen's Quality of Life situation, the so called Short Format 12 (SF12) and the OECD indicators for Quality of Life. Both surveys include items that are relevant for walking and sojourning performance. These indicators will be highlighted in the following sections. In the Netherlands, in addition to this, a third indicator on perceived mobility handicaps is available from a special study related to the national travel survey.



**Table 1 Indicative figures on number of (partially) handicapped persons**

	in Netherlands 1995	per million of population
<b>People with total loss of function</b>		
Wheelchair users	70,000	4,400 = 0.4 %
Blind	15,000	940 = 0.1 %
Deaf	20,000	1,250 = 0.2 %
Total	105,000	6,590 = 0.7 %
<b>People with functional limitations</b>		
Children 0 -14 years	2,800,000	175,000 = 17.5 %
Walking impaired	400,000	25,000 = 2.5 %
Balance disorder	400,000	25,000 = 2.5 %
Limited stamina	400,000	25,000 = 2.5 %
Visually impaired	300,000	18,750 = 1.9%
Hearing impaired	300,000	18,750 = 1.9%
Cognitive and mental impaired	400,000	25,000 = 2.5 %
Temporary handicapped	500,000	31,250 = 3.1 %
Parents with prams	500,000	31,250 = 3.1 %
Total	6,000,000	375,000 = 37.5 %
Source: Asmussen, 1996		

Within the context of the PQN project for all three indicators only data from the Netherlands are available. Although the actual figures may vary from country to country, the Dutch data can help to determine the order of magnitude. It can be concluded that about 50% of the pedestrians have limited abilities and about 10% of the population has severe difficulties walking and sojourning in public space.

## Mobility

Mobility is defined by the freedom to choose to travel and sojourn in public space. The amount of distance that one can cover is less important than being able to make a trip. Pedestrian mobility differs from other modes by that it is part of almost all other trips. Multi-modal walking is (almost) as extensive as walking from door to door, but this is hidden in statistics. However, the hidden amount of walking can be estimated within reasonable margins by using data on the number of trips by other modes and indices for average distances to and from these modes (see Figure 1 and 2).

Based on available statistics an image of major characteristics of walking can be formed. Action radius, age, urbanity and opportunities seem to be the most significant factors. The normal action radius of a pedestrian is about 1 kilometre; an average (European) citizen walks 250 door-to-door trips per year and 1,800 times to and from other modes. In total pedestrians cover about 300 kilometres and spend about 100 hours per person per year on walking.

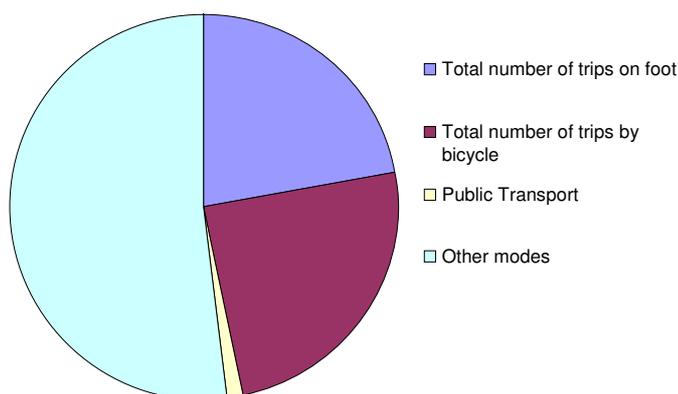
The majority of the trips are quite short. For example Swiss data indicate that 60% of the walking trips do not exceed 1 km, and only 10% exceeded 2 km (Peddie, 2009). In the Netherlands it was found that the number of mono-modal walking trips increase with the level of urbanity (Methorst et al., 2010). Children walk more than any age group; on the whole females tend to walk more than males.



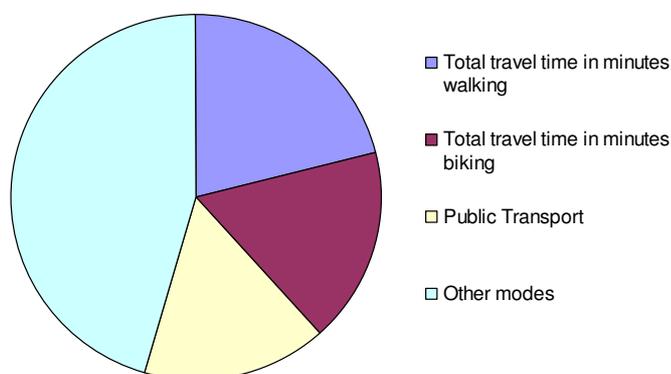
In general, leisure and recreation, shopping, conducting personal business, and education are the highest ranked among the purposes of walking. In figure 3 the example of the ranking of trip purposes in the Netherlands is displayed.

**Table 2 Corrected figures for walking (incl. estimates for multi-modal walking NL 2007)**

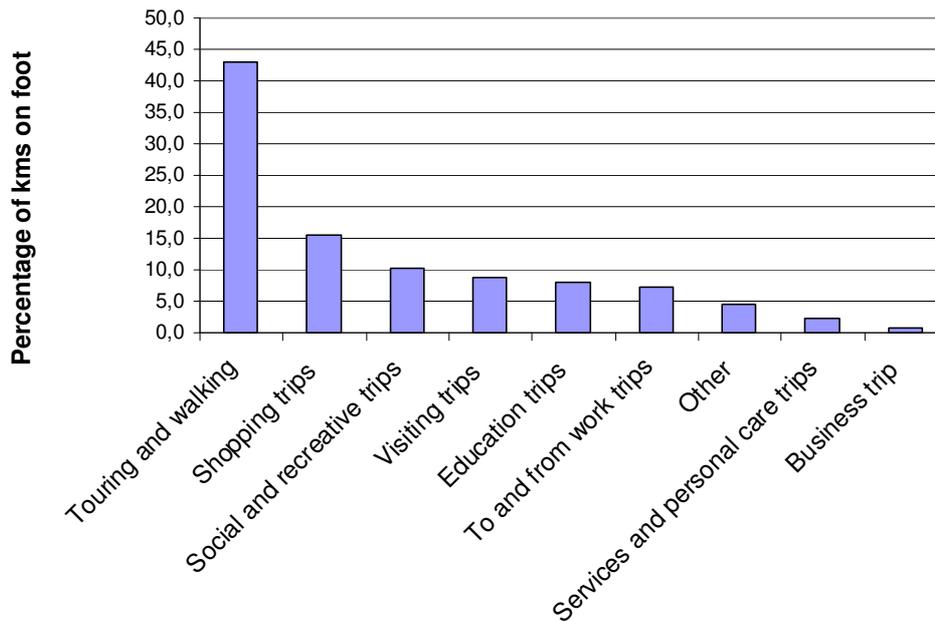
Share of walking in relation to total distance covered (kilometres)	units	per person per day	per person per year
Total distance covered in 2007 (all modes) in kms	187.440.132.155	31,4 kms	11.459
Total distance covered <b>on foot</b> in 2007 in kms	5.257.616.382	0,9 kms	321
of which in door-to-door trips	3.088.689.480	0,5 kms	189
of which in multi modal trips	2.168.926.902	0,4 kms	133
Total number of journeys	16.997.956.850	2,8 journeys	1.039
Total number of (sub)trips	43.357.648.009	7,3 (sub) trips	2.651
Total number of journeys on foot	3.555.472.219	0,6 journeys	217
Total number of (sub)trips on foot	29.915.163.379	5,0 (sub) trips	1.829
Total travel time in minutes	448.907.752.791	75,2 minutes	457 hours
Total travel time in minutes on foot	105.152.327.637	17,6 minutes	107 hours
<b>Share in % of distance covered of (sub) trips on foot</b>	<b>2,8%</b>	(kms)	
<b>Share in % of (sub)trips</b>	<b>69,0%</b>	(sub-trips)	
<b>Share in % of travel time of (sub) trips on foot</b>	<b>23,4%</b>	(minutes)	



**Figure 1 Number of trips per mode (NL 2007)**



**Figure 2 Travel time per mode (NL 2007)**



**Figure 3 Distances covered on foot by travel purpose (NL, 2007)**

## Sojourning in public space

Sojourning in public space is important because it is an indicator for quality of public space and it encourages all kinds of activities, which humans need for their well-being. Sojourning in public space concerns all pedestrian activities in public space that are not purposeful walking from an origin to a destination or a round trip like walking the dog. Sojourning in public space is important because it is an indicator for quality of public space. People in the street, means business for shops, safety and security for all because of common supervision and that it is a place to be for inhabitants and tourists. By making public space attractive, it also supports property value and helps attracting people from the outside (Project for Public Spaces, 2010). Well-designed public open space (POS) that encourages physical activity is a community asset that could potentially contribute to the health of local residents (Giles-Corti et al, 2005).

There are many kinds of sojourning: professional activities, recreational activities, waiting, hanging out, but public space is also the home of the homeless and sometimes the scene of crime and violence. The concept of sojourning is rather unknown in the Anglo Saxon countries, but this article aims to help to change that.

Although almost everyone knows that many important things happen in public space, very little information is available about time spending in public space. From time spending and leisure time studies some indications of the order of magnitude and time characteristics can be deduced. Particularly during the weekends and holidays much time is spent outdoors. It is found that the average amount of time spent on sojourning is about 300 hours per person per year (1 hour per person per day).



## Safety and security

Safety and security concern the absence of risk, accidents and potentially harmful incidents. Safety includes security; security is seen as a condition, where one is protected against danger from the outside. As walking is the only mode open to all persons, safety and security must always be seen in the context of mobility and accessibility, particularly protecting the ones that do not have a choice but to walk.

The most frequently used safety indicator is the number of traffic accidents. As accidents that do not involve a moving vehicle, are excluded by definition, the data provide a severely biased image of pedestrian safety. Hospital data and medical assistance data show that single pedestrian accidents (falls), where no moving vehicle is involved, induce three to nine times as many casualties as pedestrian-vehicle crashes (Draaisma, 2010). Although the risk varies per country and type of accident, the total number of victims for Europe amounts to at least 1.6 million injured pedestrians per year in Europe (equals more than 3,000 casualties per million inhabitants).

As for fatalities, because of the overwhelming external force, pedestrian-vehicle crashes dominate the outcome. The total number of pedestrians killed varies from 9 fatalities per million inhabitants in the Netherlands to (more than) 46 in Poland. In the Netherlands, the number of vehicle related fatalities per million inhabitants is 6, whilst the number of fatalities from falls is 3.

Concerning severe injuries (casualties admitted to a hospital), for the moment, the only figures available come from the Netherlands. As traffic statistics indicate that the Netherlands is the safest country, the figures for other countries will probably be (much) higher. It is found that the total incidence of pedestrian injuries is 320 per million inhabitants (over 175,000 severely injured Europeans). Of this, 250 per million casualties result from falls (135,000 Europeans) and 75 per million from pedestrian-vehicle collisions (27,000 Europeans). The elderly run extreme risk.

For security the number of incidents is less normative than the fear and emotions it evokes. Compared to traffic accidents and falls, the actual risk on getting injured or killed in a criminal incident is substantially lower. Fear is a reality that needs to be taken into account, because it takes away people's freedom of mobility. Particularly during dusk and night time, especially females and the elderly fear to be involved in a harmful incident. Statistics show that the real number of criminal acts in public space is stable over the years.

## Satisfaction

Satisfaction is a state of mind related to the fulfilment of one's wishes, expectations, or needs, and it reflects the pleasure derived from this. There is little research carried out on pedestrian satisfaction. The sparse information about what *dissatisfies* people comes mainly from complaints that local authorities and NGO's received via hotlines, questionnaires or internet sites. It is striking that the aspects people communicate are mainly about operational nuisances and that hardly anyone mentions tactical or strategic level deficits, such as network deficiencies, dysfunctional distribution of services etc.

## Conclusions

With regard to walking and sojourning, demonstrable serious problems and deficits problems are partly or totally hidden from public, scientific and political attention. Major issues for policy making with regard to the pedestrian performance and satisfaction are:



- Large numbers of people have real trouble performing 'walking and sojourning' tasks. Because of ageing of the population the numbers will increase substantially.
- With regard to safety of pedestrians, particularly the prevention of falls is important; this is also an age related problem.
- There is too little awareness that without walking transportation is not possible.
- The vicious circle of no data – no awareness – no priority - no research – no data, needs to be broken. The lack of data/information on walking and sojourning is imminent; Some crucial concepts and statistical units need to be redefined and internationally applied.

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