HIGHER INJURY RATES IN DEPRIVED AREAS: WHAT IS THE INFLUENCE OF THE NEIGHBOURHOOD?

Godillon, Sylvanie, Doctoral student in Geography at Panthéon-Sorbonne University (Paris, France), French National Institute for Transport and Safety Research (INRETS), sylvanie.godillon@inrets.fr

ABSTRACT

Even though road safety has improved continuously since the 1970s, all people have not benefited to the same extent. Recent researches indicate that the accident rate proneness differs considerably between different socio-economic groups and between inhabitants of different neighbourhoods: health inequalities exist in term of traffic safety. This research aims at exploring the links between socio-spatial inequalities and traffic safety by defining the influence of the characteristics of area where collision occurs and the characteristics of residential neighbourhood. The results point that the characteristics of areas where accident takes place appear like the characteristics of areas where involved persons live. In fact, spatial proximity exists between accident localisation and home address, especially for pedestrian children. Furthermore, this analysis shows a link between the urban characteristics of area and the type of accident: results indicate issues in terms of traffic safety for urban planning.

Keywords: Traffic safety, urban planning, deprived areas

INTRODUCTION

At the beginning of 21st century, half of the world population lives in urban area and this urban society is characterized by high mobility (Burgel, 2006). In this context, traffic safety in urban areas could become a crucial question of public health. Phenomenon must rise in the following decency, while mobility increases. Indeed, in 2004, for the first time World Health Day, organised by World Health Organisation, was focused on the theme of road safety. This day showed that road safety is a public health subject and tried to advocate a system approach to road safety, which takes into consideration the key aspects of the system: the road user, the vehicle and the infrastructure.

Although, road users are different in term of socio-economic profile, they live in different neighbourhood and have not the same practice of mobility. Even though road safety has improved continuously since the 1970s, all people have not benefited to the same degree (Roberts, Power, 1996). Recent researches indicate that the accident rate proneness differs considerably between different socio-economic groups (Laflamme and Diderichsen, 2000; Hasselberg et al., 2001; Laflamme, Engstrom, 2002; Zambon, Hasselberg, 2006), between different areas (Aguero-Valverde, Jovanis, 2006) and between inhabitants of different neighbourhoods (Abdalla et al., 1997; Hewson, 2004): health inequalities exist in term of traffic safety (White et al., 2000; Grahman et al., 2005). The human behaviour is not the only variable likely to influence road safety, but environmental factors, such as social, economical, cultural and geographical, can also influence the level of road risk propensity. Indeed, road infrastructure and urban form influence traffic safety (Fleury, 1998; Millot, 2003).

This research aims to explore the links between socio-spatial inequalities and traffic safety. The inhabitants of deprived neighbourhoods are more injured in traffic accidents than other inhabitants. What factors could be explained by this health inequality? What is the influence of the characteristics of neighbourhood? This article contributes to understand the process of the production of inequalities in term of road safety by making out the influences in term of social aspects, urban characteristics and traffic.

BACKGROUND

Researches on socio-spatial inequalities and traffic safety are important in Anglo-Saxon and Swedish literature. These are about the injury rates of disadvantage people, the injury rates of people who live in deprived neighbourhoods and the injury rates in disadvantage neighbourhoods. The last point shows the influence of the urban characteristics.

The relationship between social inequalities and injury rates has been known (Wise et al., 1985; Van Beek et al., 1991; Roberts and Power, 1996; Laflamme and Diderichsen, 2000; Hasselberg et al., 2001; Laflamme, Engstrom, 2002; Zambon, Hasselberg, 2006). Social position explains road risks. In fact, an injury rate that decreased with increasing income of head of family was found in a study of children less than twenty years old conducted in Boston (US) by Wise et al. (Wise et al., 1985). In 1991, in the Netherlands, Van Beek et al. show that the death rate for motor vehicle occupants was also found to be negatively associated with individual income, whereas that for cyclists was positively associated (Van Beek et al. 1991). Furthermore, social inequalities increase: from 1981 to 1991, injury rates are more decreased for higher classes than for lower classes (Roberts, Power, 1996). Spatial inequalities are added to these social inequalities.

The injury rates of people living in disadvantage neighbourhood were also analysed. A database with injury rates and the zip code of involved is built for Lothian (Scotland). With zip code, the socio-economic aspects of neighbourhoods are known and the question about the links between injury rates and the socio-economic aspects of residential areas are studied: the injury rates of people living in disadvantage areas are higher than the injury rate of

inhabitants who live in other areas (Abdalla et al., 1997). Hewson confirms this correlation but he moderates this result, showing that the environment of accident is more important. This result means that the urban modifications are more efficient for traffic safety (Hewson, 2004). These rates are due to the sum of individual effects. But contextual effects operate too. In fact, health and safety depend on individuals'caracteristics and on the area where they lived.

The link between the index of area deprivation and the occurrence of accidents in these neighbourhoods has been identified (Kendrick, 1993; Roberts et al., 1995; Aguero-Valverde, Jovanis, 2006). In a study in Nottingham (UK), Kendrick analyzed pedestrian injuries among children under twenty years old, and calculated a zone deprivation score on the basis of low income, unemployment, lack of skills, poor housing, poor health, and family problems. Seven zones were categorized into areas of extreme, serious, moderate, and below average disadvantage. The research found a significantly higher injury rate in deprived areas: a relationship exists between degree of deprivation and injury rates (Kendrick, 1993). In the same way, Roberts et al observed that total injury morbidity, pedestrian injuries, and motor vehicle occupant injuries were strongly correlated with census area unit employment rates in Auckland (New Zealand) (Roberts et al., 1995). Aguero-Valverde and Jovanis (Pennsylvania, US) show that the neighbourhoods with higher poverty concentrate more injury rates (Aguero-Valverde, Jovanis, 2006).

Relations between socio-spatial deprivation and high accident rates may be explained in terms of increased exposure to hazardous environments. Hazards include huge roads with a lack of safe crossing sites, the location of schools within the community, availability and access to safe play-areas (Preston, 1972; Mueller et al., 1990; Christie, 1995). The reasons of the highest rates of injury are due to the physical characteristics of area. In 1972, Preston reports that the injury rate for child pedestrians was higher in some areas of Manchester and Salford (UK) than in others. This author observes that the injury rate correlated with distance of the area from the town centre and with an index of social class for the area (but only for boys). Conclusions show that the differences are due to a lack of safe play space in unsafe areas (Preston, 1972). The link between social deprivation and the high accident rate of child pedestrians, from lower socio-economic group families, may be explained in term of increased exposure to hazardous environments. Mueller and al. have proved that children living in building are 5,5 times more injured than other children (Mueller et al., 1990). Hazards may include busy roads with a lack of safe crossing sites, the location of schools within the community, availability and access to safe play-areas etc (Christie, 1995).

Injury research lacks explanatory models for contextual and individual factors. Research of that kind would be of considerable help in understanding the social patterning of exposures to traffic injury and, ultimately, in increasing equity in the benefits of local or national preventive strategies, where it is needed (Laflamme, Diderichsen, 2000). This paper explores the description of the links between deprived areas and traffic safety with a territorial approach. Injury researches need to improve one's knowledge of the links between socio-spatial inequalities and traffic safety.

Literature review shows the influences of the characteristics of residential areas and the characteristics of the area where collision takes place. The influenced characteristics are social and urban and traffic for both neighbourhoods. This paper analyses the characteristics of residential areas and ones of area where collision takes place in view of the traditional characteristics of accident analysis (sex, age, traffic).

METHODS

From a localised database concerning two groups of involved persons living in deprived and non-deprived areas, the method consists to analyse its socio-spatial structure. Previous researches have showed the inequalities in term of traffic safety and the objective is now to describe the links between these inequalities and the socio-spatial characteristics of injured people. To describe proximity between many variables in database, a method from statistic with multivariate analysis is suitable.

The data

This article leans on a recent research by the French National Institute for Transport and Safety Research (INRETS) (Fleury et al, 2009). To show if poor inhabitants living in deprived neighbourhoods are more injured than other inhabitants, this research compares injury rates in five deprived ones between accidents in five non-deprived areas in Lille, in the North of France. Rates of risk were calculated as the number of residents involved in bodily-injury traffic accidents during the period studied compared with the total population of the area. The adjusted relative risk run by those living in deprived areas compared with those living in other areas was estimated at 1.366, within the interval [1.240; 1.505]. The relative risk is the risk of an event relative to exposure. It is a ratio of the probability of the event occurring in the exposed group versus a non-exposed group. The 95% test-based confidence bounds are estimated for the Mantel-Haenszel adjusted relative risk as follows. The contribution of relative risk is a simple rate to compare two populations by adjusting individual variables. This test allows to determinate the influence of residential neighbourhoods.

In 1999, socioeconomics figures show that the inhabitants of these five neighbourhoods are younger than all of the inhabitants of Greater Lille (33% than 28%), the number of inhabitants who have a foreign nationality is larger (13% than 6%), who are unemployed (31% than 16%), the family composed by six persons and more (8% than 1%), and single-parent family (25% than 15%). A large part of these five deprived areas are built before 1949 and are composed by small houses or buildings. These neighbourhoods are old industrial neighbourhoods. Non-deprived areas have the same socio-economic profile than means of Greater Lille. Housings are larger than in deprived areas and the aged of construction is more diversified.

The accidents of the inhabitants of deprived neighbourhoods are compared with the accidents of the inhabitants of other richer areas in Lille, in the North of France. Statistics are

based on Police Authorities figures: age, sex, employment, and vehicle. Addresses of domicile and of accident are localised in Geographical Information System. These localisations allow analyzing the influences of neighbourhoods: rate of unemployment, rate of collective dwelling, traffic. Figures come from French national institute of statistics and economic studies and local survey about traffic.

The database contains 1 136 persons involving in an accident from 2001 to 2007 in the region. Variables are encoded by disjunctive modalities. For each person, the database lists:

- the characteristics of accident and the description of involved person (sex, age, means of transportation, traffic, scenario-type),
- the characteristics of residential area (deprived rate and building rate),
- the characteristics of area where collision takes place (deprived rate, building rate, traffic on road where accident occurs).

The database integrates accident scenario-type for each person (Table 1). The notion of accident scenario-type is used in the field of the prevention of major accidents (for example for industrial risk). Therefore, the accident scenario-type is a priori model of possible accident. An accident scenario can be defined as “a prototype of an accident process corresponding to a series of accidents which present overall similarities regarding the chain of facts and causal relationships throughout the various accident stages” (Fleury, Brenac, 2001). Eleven scenario-types are defined by Clabaux (Clabaux, 2005; Clabaux, 2006) (Table 1).

Table 1: Eleven scenario-types

Name
Pedestrian goes into a road or crosses a road
Pedestrian on a road or goes out vehicle
Non-attendance a-priori between pedestrian and vehicle
Pedestrian: specific context
Mask of visibility by passing
Problem of non-perception or information
Passing or driving lane back up
Driver passes over traffic light
Problem of speed
Problem of control
Other

The database is located: accident and address are located for each involved person (Figures 1 and 2). This localisation allows to link a lot of databases each other and it allows to conduct a spatial analyse.

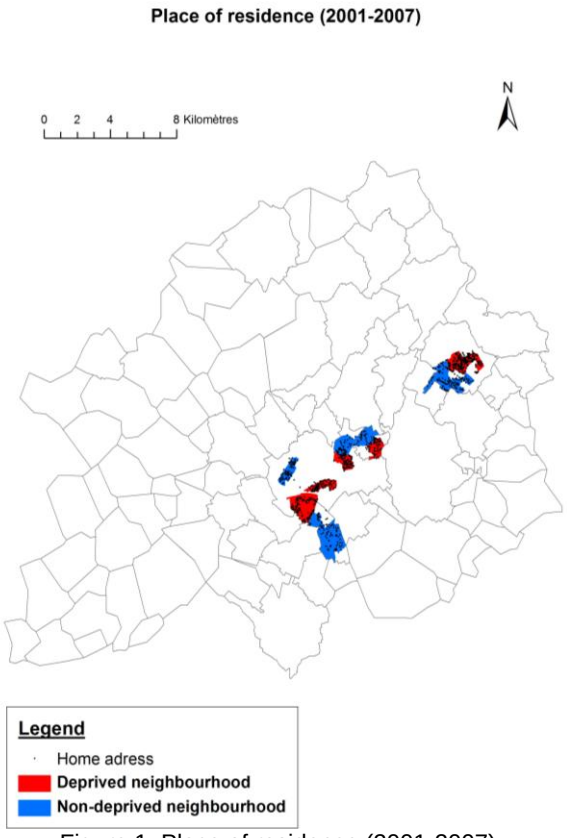

Figure 1: Place of residence (2001-2007)

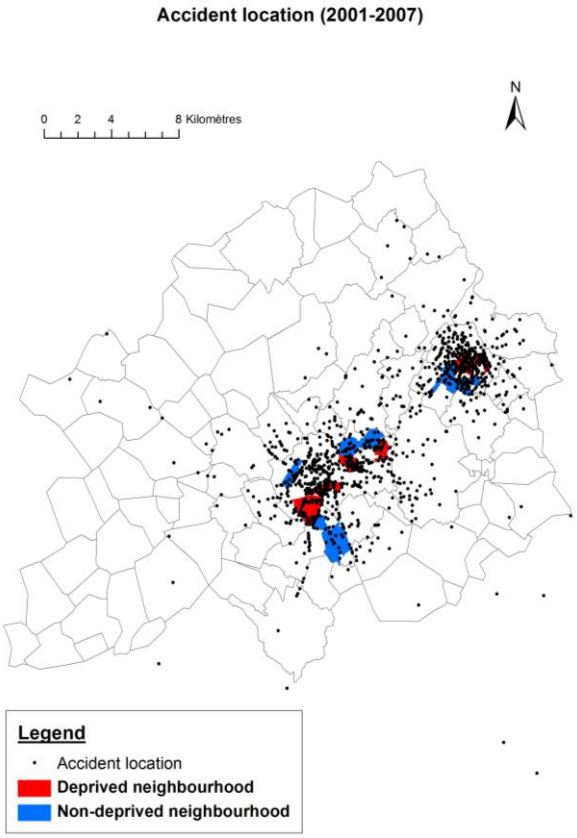

Figure 2: Accident location (2001-2007)

We know that disparities exist between socio-spatial conditions. The objective is now to understand the influence of personal characteristics, the influence of the characteristics of accident, and the influence of the characteristics of area where collision takes place and residential neighbourhoods by this localised database. These influences could be studied by statistical methods which describe the proximity between variables of database.

Spatial and statistical analysis

The Geographic Information System enables to link the different bases and to localise geographic objects. A Geographical Information System (GIS) is a software system for the visualisation, analysis and storage of spatial datasets. The ArcInfo® GIS is developed by ESRI Inc.

Statistic methods are used to describe the localised database. The objective is to describe the proximity between variables.

Multiple Correspondence Analysis is a factor analysis approach which deals with database where a set of examples are described by a set of categorical variables. The aim is to draw the database in a reduced dimension space which allows us to highlight the associations between the variables. It is useful to understand the principal structure of a database.

Variables

The objective is to define the influence degree of distinct factors that influence involved rates. Individual factors studied are age and sex and socio-economic factors with socioeconomic status and occupation.

The characteristics of accident are means of transportation and the scenario-type associated with accident.

The aim is to analyse the description of neighbourhoods thought socio-economic aspects, urban structure and the influence of traffic. The characteristics of residential neighbourhoods and the characteristics of area where accident occurs are studied by socio-economic aspects (unemployed rates and unqualified rates in neighbourhood), urban factors (the rate of building before 1949 and the rate of dwelling housing). We add traffic aspects (the level of traffic and hierarchic level of road) to analyse the influence of traffic in the localisation of accident (Table 2).

Table 2: variables

Factors	Variables	Numbers of modalities
Individual factors	Age	11
	Sex	2
Social factors	Activity	6
	Socio-economic status	7
Factors of accident	Mean of transportation	3
	Scenario-type associate with accident	11
Socio-economic factors of area where collision occurs	Unemployment rate	4
	Unqualified rate	4
Urban factors of area where collision occurs	The rate of buildings before 1949	4
	The rate of dwelling housing	4
Traffic factors of areas where collision occurs (also a factor of accident)	Level of traffic (daily number of vehicles)	6
	Hierarchic level of road	4
Socio-economic factors of residential areas	Unemployment rate	4
	Unqualified rate	4
Urban factors of residential areas	The rate of buildings before 1949	4
	The rate of dwelling housing	4

RESULTS

Multivariate analyse

A Multiple Correspondence Analysis is made about these 16 variables. The global inertia is 4,125. This analysis, made with XLStat©, is about known points (1 136 persons). The four first factorial axes explain 51% of the points. The next table shows the four first eigenvalues and the corresponding percentage of inertia (Table 3).

Table 3: four first factorial axes

	F1	F2	F3	F4
Eigenvalues	0,217	0,161	0,139	0,134
Inertia (%)	5,273	3,895	3,361	3,251
Cumulative %	5,273	9,168	12,529	15,780
Adjusted Inertia	0,027	0,011	0,007	0,006
Adjusted Inertia (%)	27,608	11,078	6,662	5,893
Eigenvalues	27,608	38,685	45,347	51,240

The first factorial axe (28%) shows the difference between the non-deprived neighbourhood (on the left of symmetric plot – Figure 3) and the deprived neighbourhood (on the right of symmetric plot – Figure 3). On the figure, only some of points are represented for clearly, but the analysis shows proximity between social and urban variables of two types of areas. This analysis does not distinguished residential neighbourhoods and neighbourhoods where collision occurs: both areas have the same social and urban characteristics. In fact, residential area and area where accident takes place have the same social profile: on the

side of deprived areas, the rates of unemployment and the rate of unqualified people are high; on the side of non-deprived areas, these rates are lows. Concerning the urban form, the deprived areas were built before 1949 with a large part of houses. The urban form is old industrial neighbourhoods.

Furthermore, people living in deprived areas are involved in the road where the traffic is 6 000 to 13 000 vehicles daily. The persons living in non-deprived areas are involved on high roads or local roads.

This factorial axe gives also information about the involved persons and scenario-type: on the side of non-deprived area, the involved have executives and old people who have problem of perception; on the side of deprived area, the involved are young pedestrian in specific context.

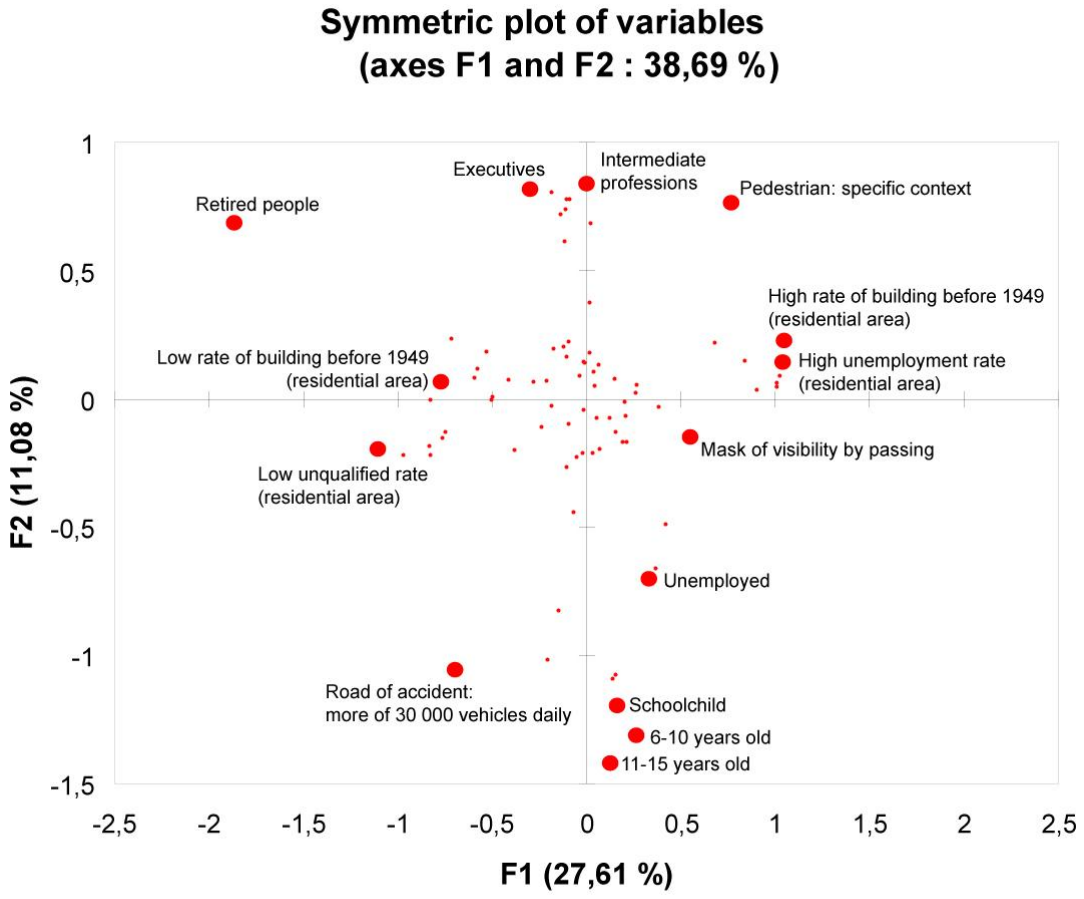

Figure 3: First and second factorial axes

Socio-economic factors of residential areas and socio-economic factors of area where collision occurs contribute to 32% and 29% of the first axe. Urban factors of residential areas and urban factors of area where collision occurs contribute to 24% and 11% of this axe (Figure 4). This first axe shows an important similarity between social and urban characteristics of residential areas and area where accident takes place.

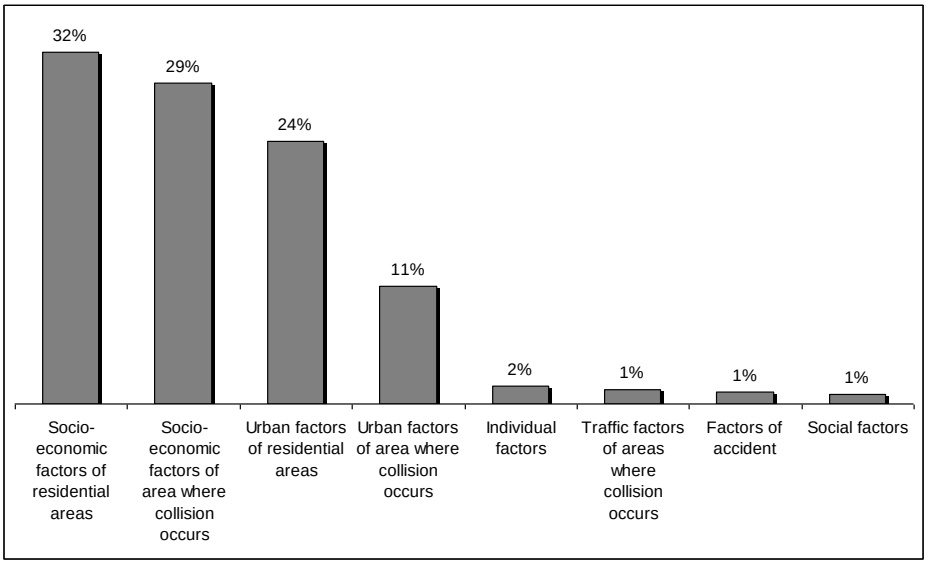

Figure 4: Percentage of contribution of axe 1

The second factorial axe (11%) separates children and others people (Figure 3): age and activity show this result. The variables of accidents and neighbourhoods are less significant. The trends are that the accidents of children happen on transit road. Deprived areas are towards accidents of children.

Individual factors (age and sex) contribute to 66% of the first axe. Social factors contribute to 23% of this axe (Figure 5). This second axe shows the importance of individual and social variables to explain traffic insecurity.

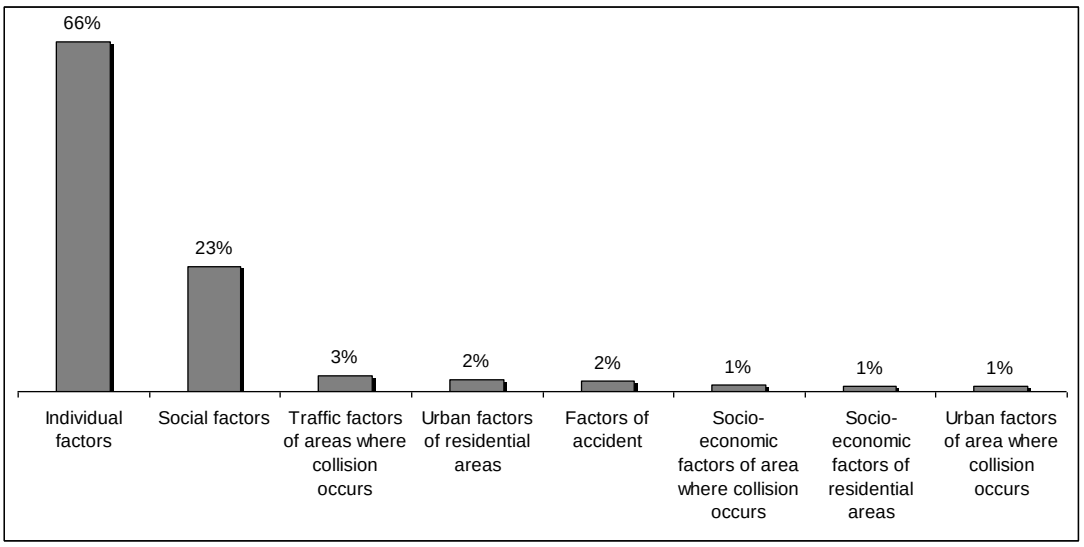

Figure 5: Percentage of contribution of axe 2

The third factorial axe (7%) distinguishes the non-deprived neighbourhood and the deprived neighbourhood only for areas where collision takes place (Figure 6). Traffic factors and the factors of accident are also important to explain the repartition of variables. This axe proves proximity between the characteristics where collision occurs and the characteristics of accident. Finally, the areas where collision happens determine the nature of accident.

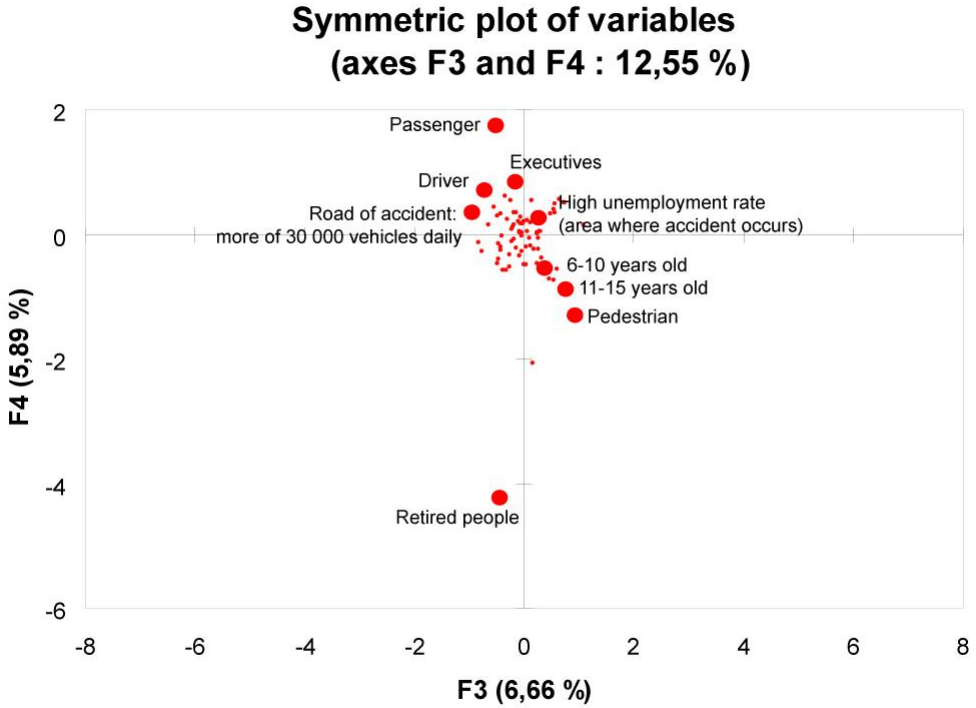

Figure 6: Third and fourth factorial axes

Socio-economic factors (28%) and traffic factors of area where collision takes place (18%) contribute to 46% of the third axe. The second result is logical, because traffic and accident are linked. This third axe shows the importance of the neighbourhood where accident happens with socio-economic factors more important than traffic factors and factors of accident. In addition, socio-economic factors of area where collision occurs are more important than socio-economic factors of residential area (Figure 7).

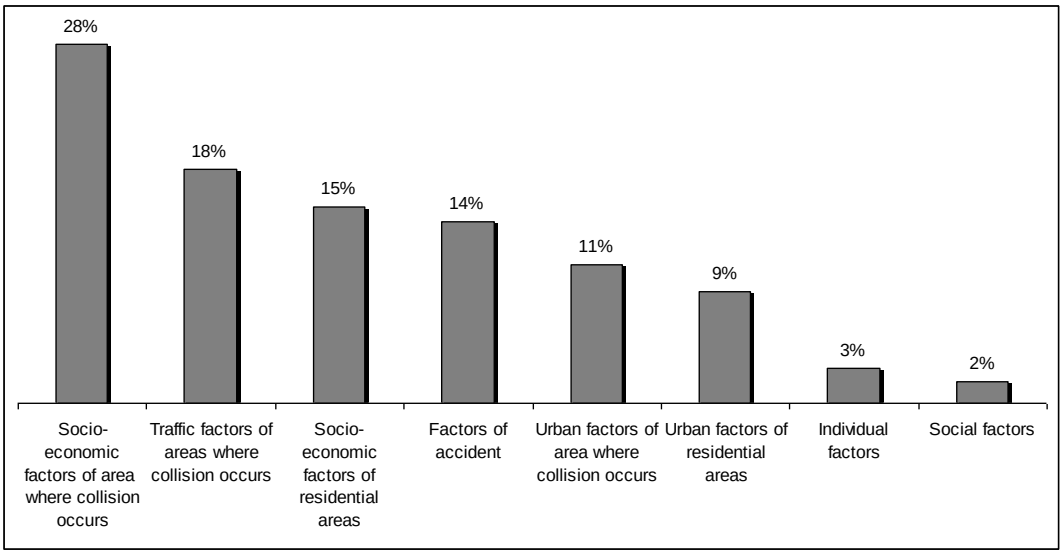

Figure 7: Percentage of contribution of axe 3

The fourth factorial axe (6%) makes out the different means of transportation: driver, passenger and pedestrian (Figure 6). This factorial axe shows also personal qualities on involved persons according to their mean of transportation: pedestrians are children, employees or retired persons. The characteristics of neighbourhoods where collision occurs are significant for socio-economic factors and traffic. Particularly, the analysis proves proximity between pedestrian accident, children and a high unemployment rate in area where accident occurs.

Traffic factors contribute to 28% of the fourth axe and factors of accident contribute to 25% of this axe (Figure 8). This fourth axe is explained by traditional causes of accident: traffic, means of transportation… However socio-economic and urban factors of residential areas are not insignificant: these variables explain 23% of this fourth axe.

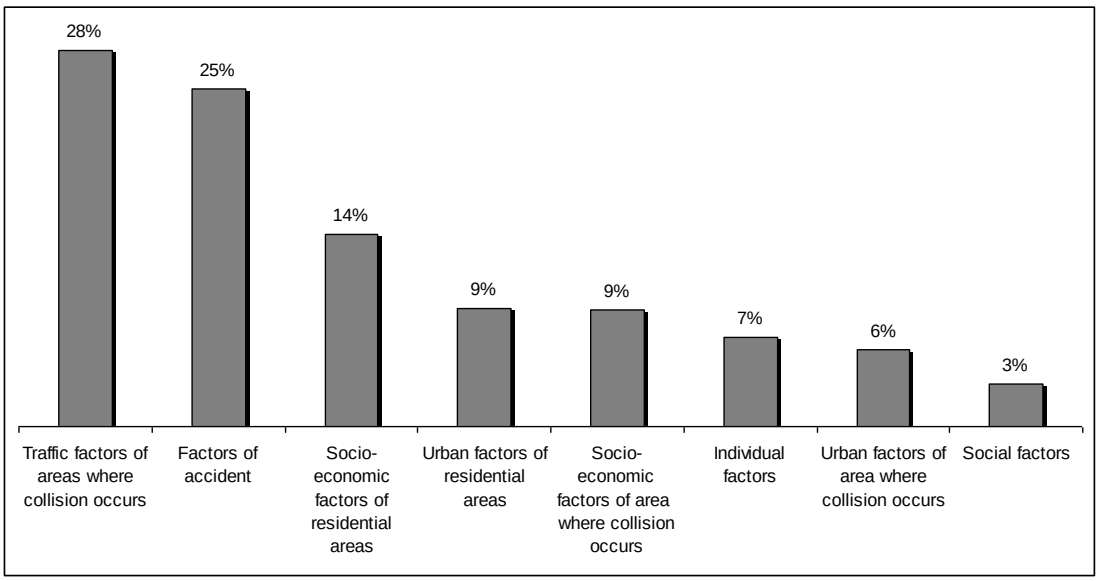

Figure 8: Percentage of contribution of axe 4

Important trends

This Multiple Correspondence Analysis shows important trends about the proximity between variables and about the structure of the database.

The first trend concerns the influence of contextual and individual factors. Contextual factors are the social and urban characteristics of neighbourhoods. The first and the second axes point up the influence of contextual and individual variables to explain the structure of database. Instead, in the first axe, the contribution of social and urban characteristics goes over 60%, and in the second axe, the contribution of individual variables surpasses 60%. The factors of accident take place in third axe, however before social characteristics of area where accident occurs. Finally, contextual and individuals factors are related. This link requires a discussion about a systemic approach which allows thinking them together.

The second trend is that involved persons have an accident in an area which has the same profile than theirs residential neighbourhood in term of social and urban characteristics. In fact, the contribution of these variables of the first axe exceeds 60%. This result should be related with mobility. This first axe explains 28% of observations, indeed the structure of database is determined by the proximity between residential areas and areas where accident happens.

The third trend is that social characteristics of area where collision takes place determine the nature of accident (means of transportation, scenario-types). In fact, the third axe of the Multiple Correspondence Analysis shows that the socio-economic factors of area where collision takes place contribute to 28% rather than the factors of accident contribute to 14%. This result needs to be discussed with some of results of preview researches.

The fourth trend is that people who live in deprived areas are involved in their residential areas, with problem of visibility and difficulties concerning pedestrians. The result should be linked with age-groups and urban and social explications.

These trends should be discussed with results of review of literatures and others hypothesises in order to prove that road safety is an issue for urban planning in deprived areas.

DISCUSSIONS

Inequalities in terms of traffic safety were proved (Fleury et al., 2009) and this result appears in the first factorial axe which distinguishes deprived area and non-deprived area. The multivariate analysis shows many results about the influences of residential neighbourhood and area where collision occurs which could be discussed. This discussion leads up to define issues and urban measures in term of traffic safety in deprived areas.

Individual and contextual factors

Influences are complex: behaviour, social origin, mobility, and the spatial characteristics of area affect road safety. Research lacks explanatory models for contextual and individual factors. Each academic discipline deals about a specific aspect of road safety, but a global vision is necessary (Laflamme, Diderichsen, 2000). This paper explored the description of the links between deprived areas and traffic safety with a territorial approach.

The territorial approach aims to build a systemic vision of road safety by considering individual and spatial and planning variables. This contribution targets particularly the two first variables in order to help public decisions in terms of urban planning.

The analyse shows that road safety depends on individual and contextual factors. Contextual factors are the characteristics of neighbourhoods as well as social and urban and traffic aspects. The contextual variables and the age are more explicative than social and individual variables. In fact, the first axe differentiates the two types of neighbourhoods (deprived and non-deprived) which are associated with age-group, but social variables are not distinguished. Furthermore, the second axe of the Multiple Correspondence Analysis distinguishes involved persons between age-groups.

These results prove that individual variables are not enough to explain road safety. Contextual variables determine also a part of safety. In particular, involved persons have an accident in an area which has the same profile than theirs residential neighbourhood in term of social aspects, urban characteristics and traffic. This result should be related with mobility.

Similarity between area where collision occurs and area where involved person lives: the influence of mobility

The multivariate analysis establishes that persons are involved in an area which has the same profile than theirs residential neighbourhood in term of social aspects, urban characteristics and traffic. This result proves that involved persons have an accident near home or travel in the same type of neighbourhoods in term of social and urban aspects.

The spatial proximity between the place where the collision occurred and the home address explains a proportion of the results showing a correlation between deprived neighbourhood and higher injury rates. In fact, Fleury et al. prove that the distance between the place of collision and the home address is less than 4 kilometres (Fleury et al., 2009). The probability to be injured near home is huge, especially for pedestrian children and old people (Preston, 1972; Ward et al., 1994; Abdalla et al., 1997).

These results echo mobility. In fact, the inhabitants of deprived areas move also less and less far than other inhabitants (Quetelard, 1998). They move more goes as pedestrian (Quetelard, 1998): their exposure of road risk is high (Erskine, 1996). To better understand

the influence of mobility, the following research has to stretch the database and include the question of mobility.

In fact, an issue of deprived neighbourhoods is children's accident. Results demonstrate that the pedestrian accidents of children living in deprived areas with houses building before 1949 are an issue in term of road safety. The kinds of accidents are clearly identified by this analyse: especially, the problem of visibility and accidents of children living in deprived neighbourhoods with house building before 1949 and having an accident in same area.

Young pedestrian who cross the road is a frequent scenario-type in deprived neighbourhoods. This result should be linked with urban characteristics which explains problem of visibility.

Contextual factors determine the nature of accident

Even if the profile of residential areas and the areas where accident happens are near, the analysis demonstrates that social characteristics of area where collision takes place appear more determined that social characteristics of residential area.

This result echoes Hewson's results. Hewson demonstrates a correlation between traffic safety, the deprivation of areas where collision occurs and the deprivation of residential areas. He shows that "some ambiguity as to whether this relationship is more strongly associated with the deprivation measures related to the home postcode of the casualty or with the location of the collision" (Hewson, 2004). In fact, environmental factors are correlated and influence the results.

Our results show a relationship between the deprivation measures of area where collision occurs and the nature of accident. Individual and social factors are also related with these variables: in fact proximity exists between pedestrian, children and deprived neighbourhoods (for areas where collision occurs). This research agrees with Hewson's results.

Problem of visibility in deprived areas

The Multiple Correspondence Analysis distinguishes first the socio-economic and urban aspects of neighbourhoods. This analysis shows that deprived neighbourhoods are associated with urban characteristics: a large part of houses was built before 1949; and that involved persons living in deprived areas are instead young pedestrian who cross the road. Problem of visibility characterizes collision which takes place in deprived areas. In addition, the second class of the Ascendant Hierarchical Classification groups together deprived areas and the scenario-types concerning drivers who pass or drive lane back up, and a problem of speed. Except problem of speed, these scenarios reference to problem of visibility and estimation.

The urban form and socio-economic composition have a huge influence and induce the type of accident due to a lake of visibility and the appropriation of public spaces. This result about urban form concurs with others researches. In 1972, Preston had proved that the highest injury rates correspond to neighbourhoods with huge urban concentration and less public places (Preston, 1972). Bagley had showed that high injury pedestrian rates are correlated with the proportion of public places (Bagley, 1992).

We have proved the influence of urban form with higher injury rates in neighbourhoods composed by houses building before 1949. However, Mueller et al. had showed that children living in multifamily dwellings had a risk for injury that was 5.5 times greater than children living in single family homes (Mueller et al., 1990). Our result comes maybe from the structure of deprived neighbourhoods which are composed in majority by houses. To better understand the influence of the characteristics of housing, another research is in process in order to stretch the database and include more deprived neighbourhoods which composed by multifamily dwellings.

Results influenced public decisions in terms of urban planning

Results are implication for urban planning: in deprived areas, urban policies should focus on traffic safety. These results could help public decisions. It is possible to deal with this problem by urban planning (Fleury, 1998; Millot, 2003) by making feel secure in border of deprived areas or by creating safety places for children.

In fact, since 1970s, France has been conducting an urban renovation programme on deprived neighbourhoods. While a main intend of the urban renovation programme is to get better living conditions, the tools used frequently deal with urban planning, type of housing, road layout and road management. Previous research has shown that these properties have an influence on road safety (Millot, 2003). Thus the urban programme on these neighbourhoods is an opportunity to take road safety into consideration (CERTU, 2008).

This opportunity is grabbed in Great Britain by setting up of The Neighbourhood Road Safety Initiative for 2003. To tackle the higher injury rates of inhabitants in deprived areas, the Department for Transport initiated the Neighbourhood Road Safety Initiative (NRSI) as part of the Government's Dealing with Disadvantage Programme.

CONCLUSION

An accident depends on many factors: behaviour, vehicle, mobility, but also on the characteristics of neighbourhoods. The place where collision takes place is important: urban environment influences injury rates (Fleury, 1998; Millot, 2003). At the same time researches

haven showed that the characteristics of place of residence influence injury rates too. The aim is thus to understand the degree of influence of both them.

The characteristics of areas where collision takes place and the characteristics of areas where involved persons live look alike. In fact, spatial proximity exists between accident localisation and home address, especially for pedestrian children. Furthermore, this analysis shows a link between the urban characteristics of area and the type of accident: results indicate issues in terms of traffic safety for urban planning.

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