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Overview of the situation of children involved in road accidents

ACCIDENTOLOGY, BIOMECHANICS, HUMAN BEHAVIOR

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Overview of the situation of children involved in road accidents

- **Introduction**
  - How do children's accidents fit with others
  - Implication per road user types
  - Accident location
- **Injuries distribution**
  - Levels of injury
  - body segments and severe injuries
- **Analysis per road user type**
  - Light vehicle occupants
  - Pedestrians
  - Cyclists
  - Power Two Wheels (PTW) passengers
  - Buses and coaches occupants
- **Countermeasures**
- **Conclusions**

Introduction

- **Objectives:**
  - Analyze all road accidents that occurred in France during the year 2011 in which children (0-13y incl.) have been involved. This includes all types of users and all injury severity levels.

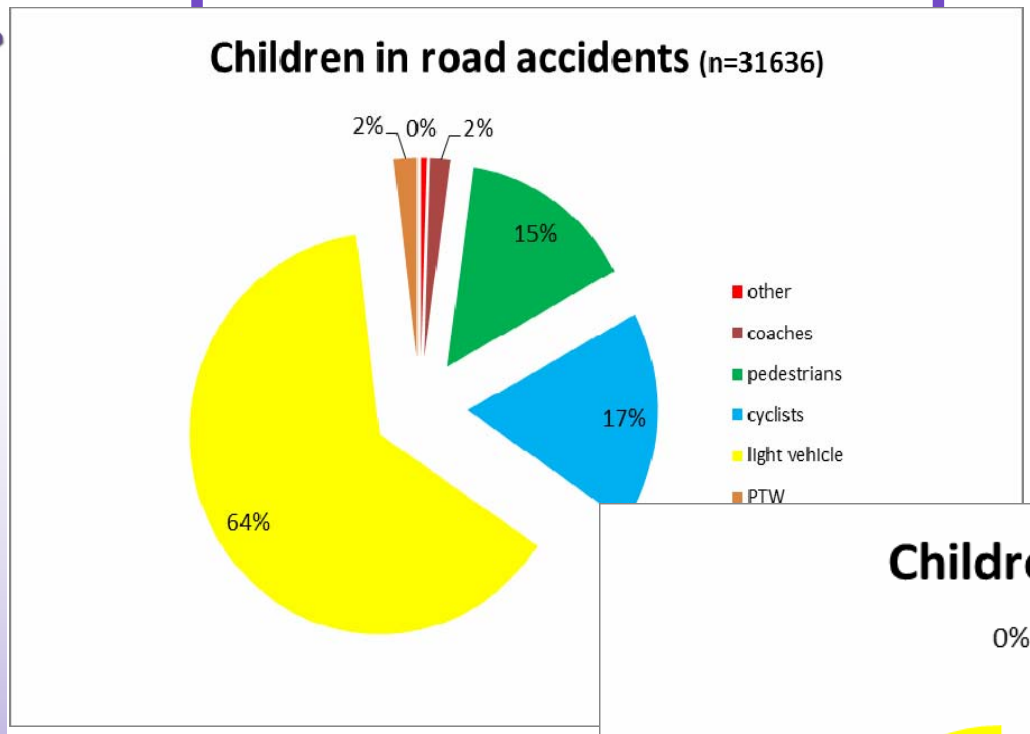
- **Material:**
  - coded data for 915 children on whom factors were applied to obtain this sample representative of an extrapolation of the real road situation.
  - Extrapolation factor: brings the sample size to 31636 children involved in roads accidents in France in 2011.

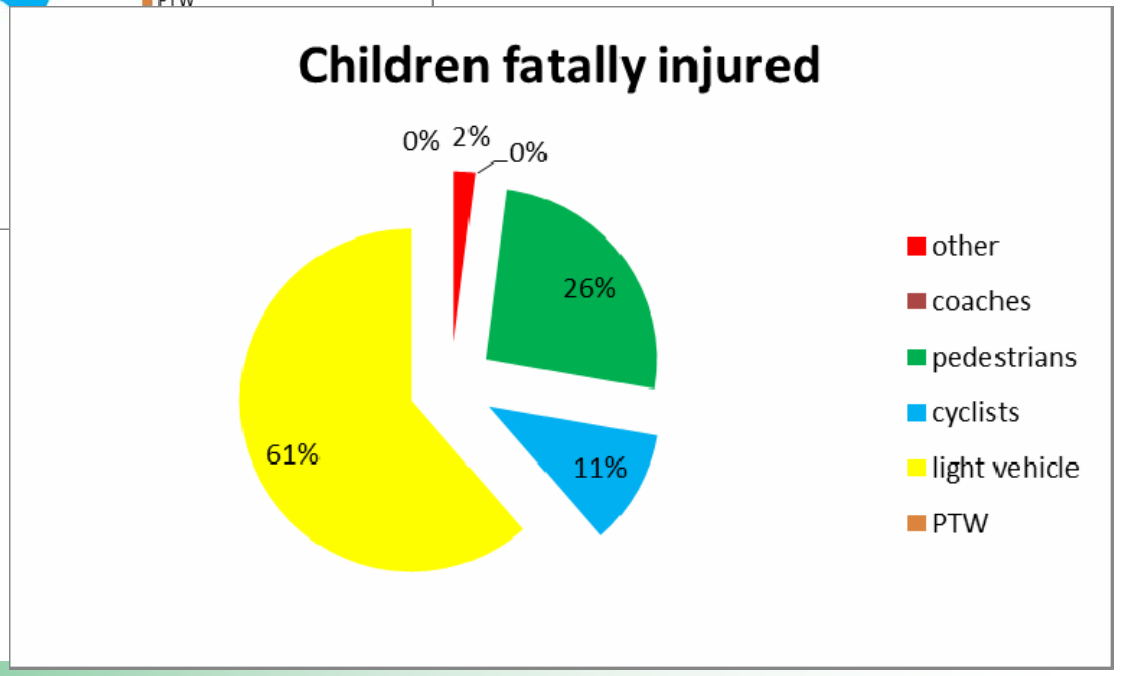
How do children accidents fit with others?

- **Children:**
- 6% of total number of people involved in road accidents
  - 18% of total number of the pedestrians
  - 8% of total number of cyclists.
  - 7% of total number of car occupants.

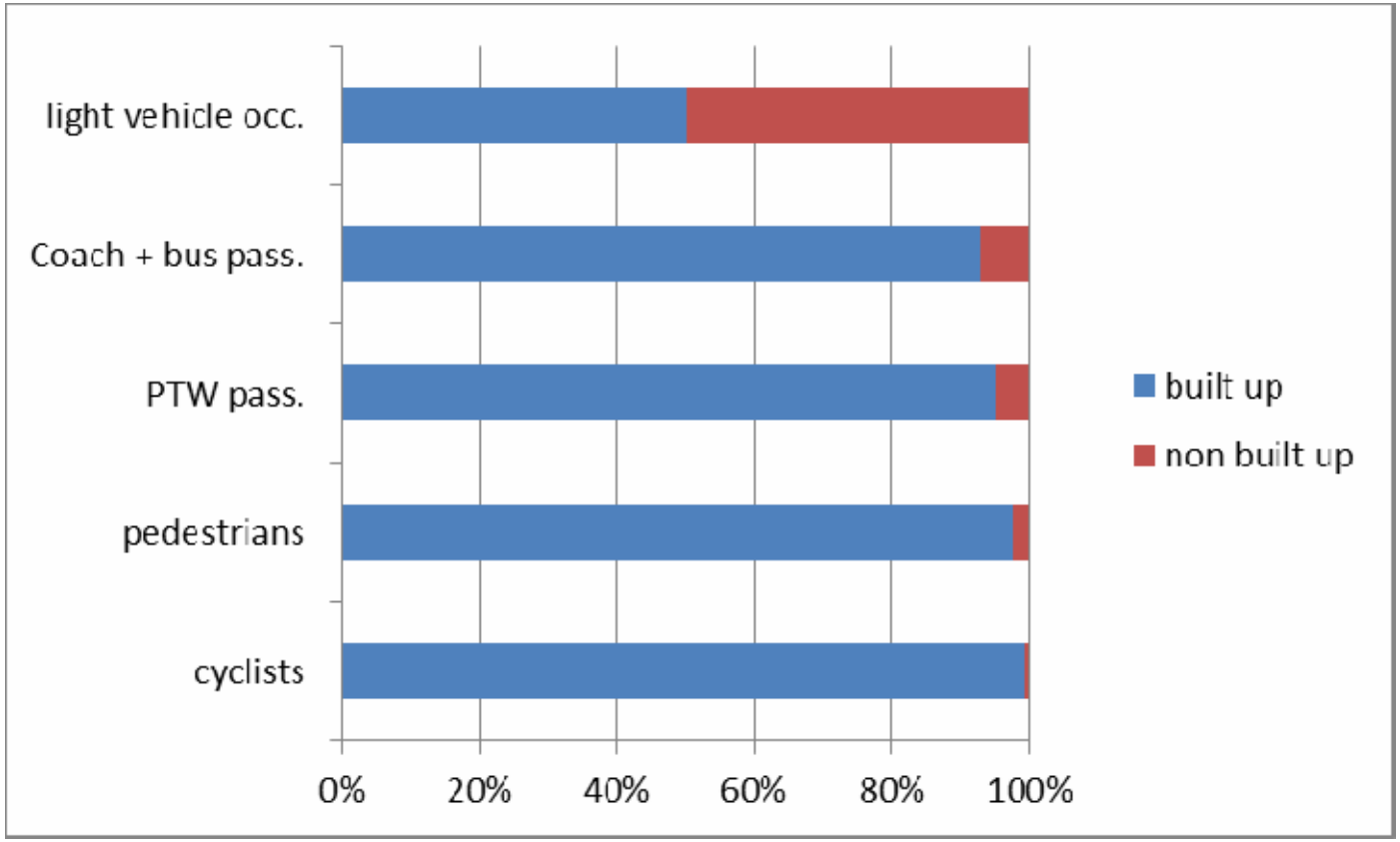
- **Vulnerable road users :**
  - 34% of the total number of children vs 40% for adults
  - excluding PTW=32% for children, vs17% for adults

Implication of children per road user types

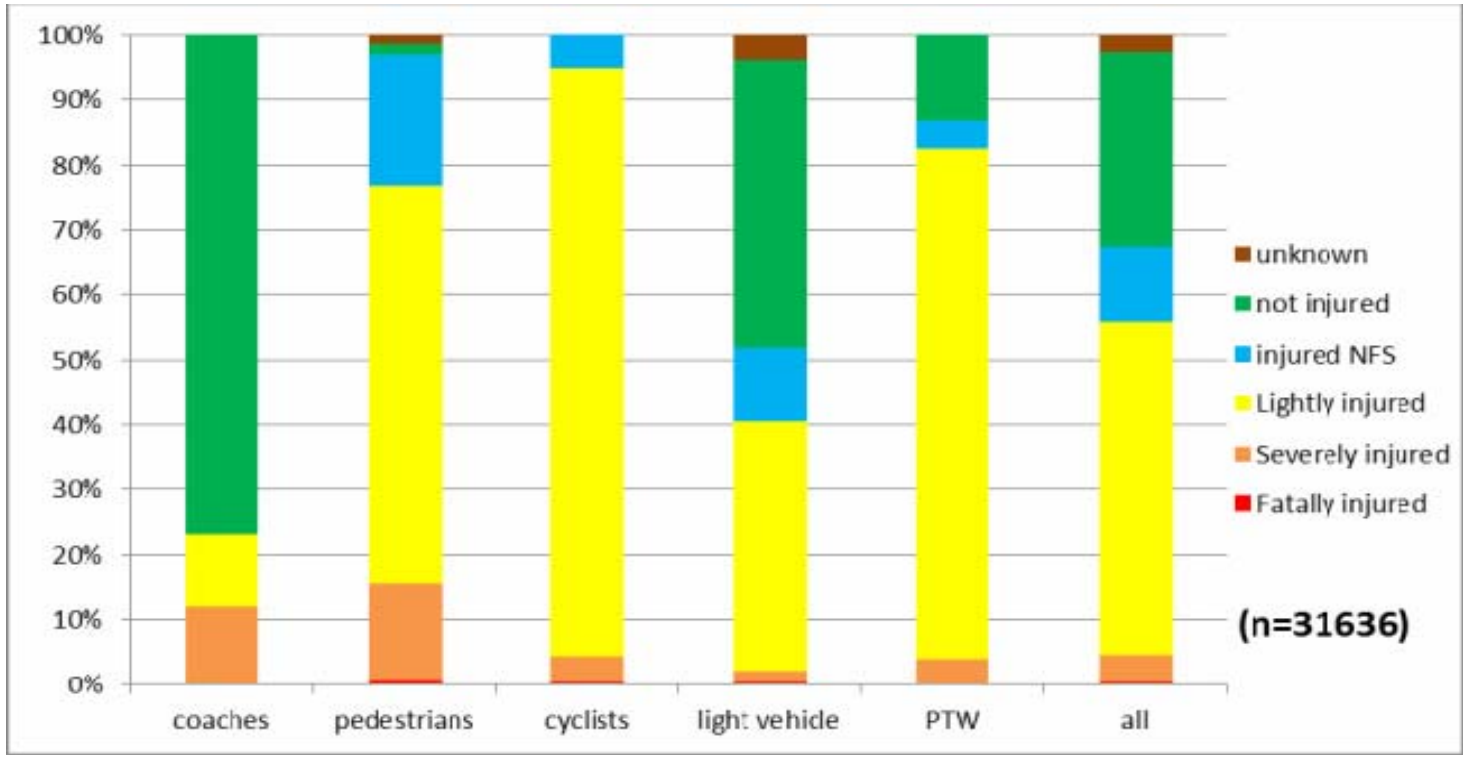




Accident location for children per user types



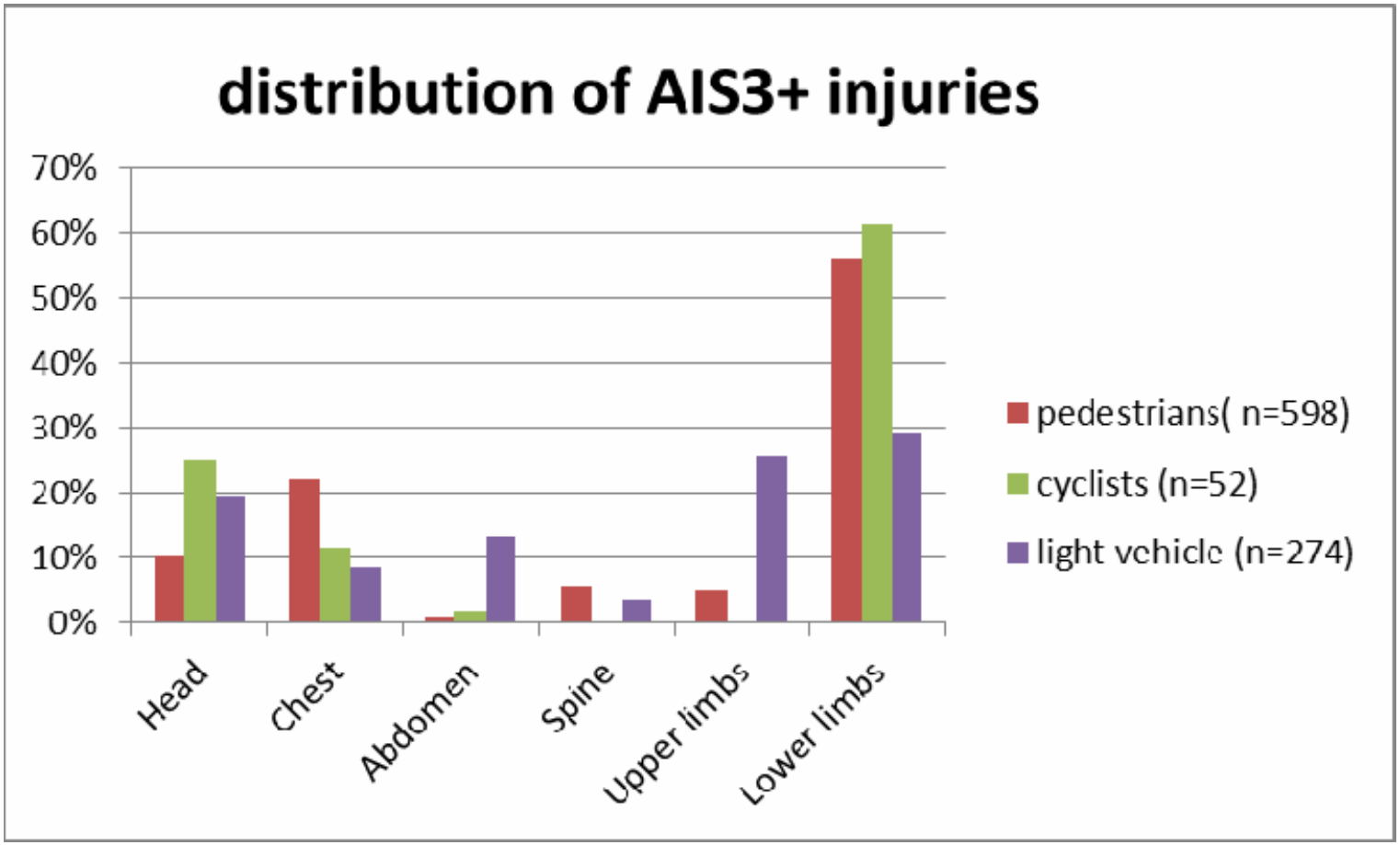
Injury severity per type of road users



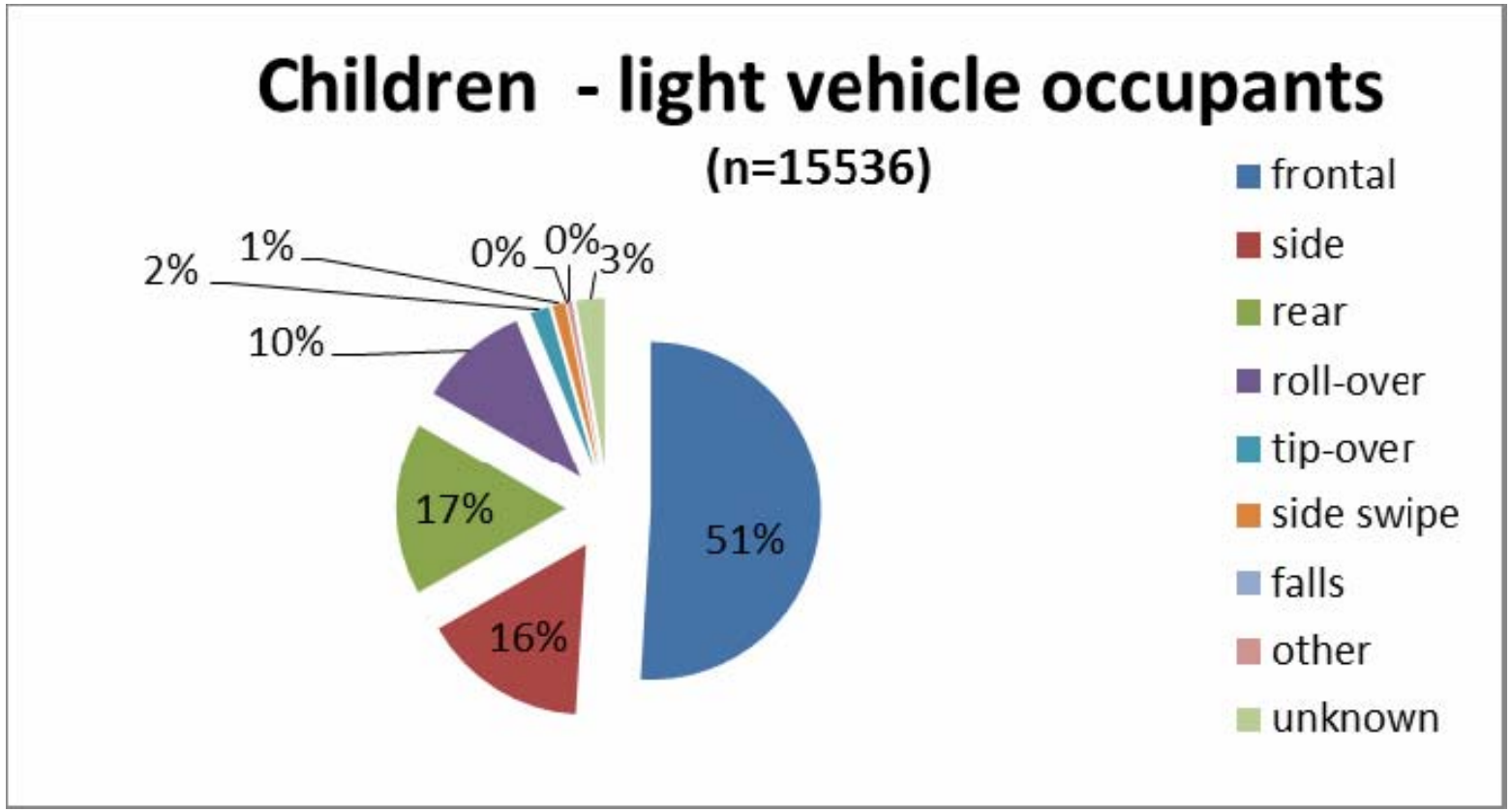
Caution: **due to the use of extrapolation factors figures differ from what is usually shown. It influences highly the injury severity repartition, uninjured and few severely injured people being more often unreported by the police.**

For example: the proportion of severely injured children in cars seems low but they are approximately 860 children M.AIS2+, among which 220 are M.AIS 3+ including 61 fatalities

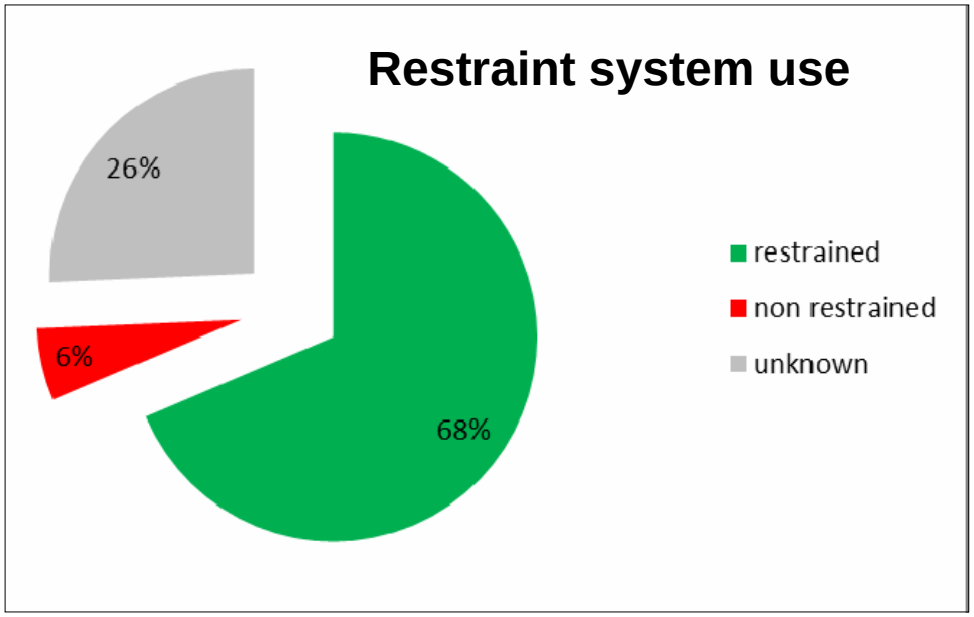
Distribution of severe injuries per type users



Children as light vehicle occupants



Children as light vehicle occupants



Remarkable points:

- Appropriate and correctly used:44%

- Unrestrained children : average 6%
  5% when driver is restrained;
  26% for unrestrained drivers

Main differences for children in light vehicles

All following results are statistically significant	ALL	FATAL
Non - built up area	50%	94%
Night time accident	22%	35%
Side impacts	16%	20%
Rear impacts	17%	8%
Unrestrained children	6%	22%
Children sleeping (stated in police report)	2%	26%
Children' s driver responsibility in the accident	47%	70%
Recent change in the driver's family status	5%	13%
Recent change in the driver's professional activity	5%	16%
Presence of drug in the accident	1%	10%

Children – pedestrians

4695 children pedestrians in road accidents in 2011 in France

Accidents occurring in a large majority during week days

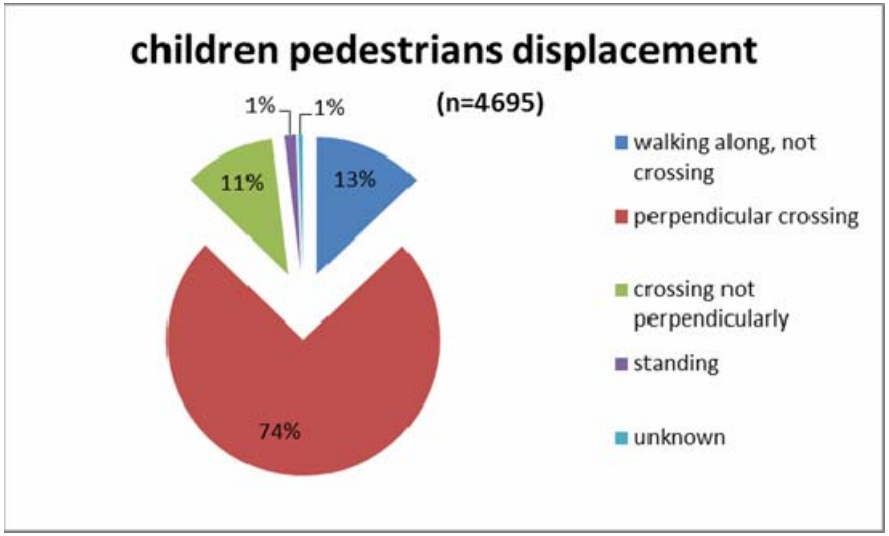
between 4 and 6 pm
+ peak observed at 8 am

Opposite: **58% light vehicle**
27% PTW
10% HGV

Contact area : **71% front**
22% side
5% wheel only

Crosswalk use : **47% no**
(when crossing) **44% yes**
9% unknown

Running in 50% of the cases



Differences and countermeasures children pedestrians

All following results are statistically significant	ALL	FATAL
Rate compared to total nb of children/children killed	15%	26%
Accident in built up area	98%	88%
Crossing the road not perpendicularly	11%	68%
Crossing the road perpendicularly	74%	4%
Static pedestrian	1%	16%
Overpassed (incl. contacts prior to overpassing)	9%	44%
Opposite = light vehicles	58%	88%

Children – cyclists

5472 children cyclists in road accidents in 2011 in France

Age>= 8 years, their number is regularly increasing with the age

99% in built-up areas, wednesdays + saturdays, during daylight

Children are responsible in a very high number of cases (>85%)

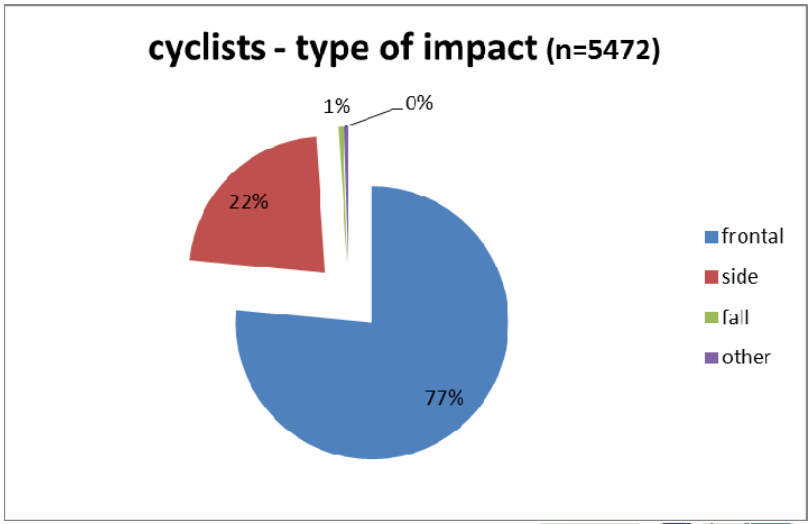
Intersection: **13%**

85% children were crossing the intersection

Opposite: **1 - light vehicles**
2 - HGV
3 - fixed obstacles

Use of helmets: 8%

Injuries: **85% light**
10% moderate



Differences and countermeasures children cyclists

All following results are statistically significant

	ALL	FATAL
Rate compared to total nb of children/children killed	17%	11%
Intersection	13%	44%
Urban area	99%	66%
Helmet wearing	8%	0%

REMARKS:

-case by case analysis of helmet efficiency has been conducted on fatal accidents. Principally because of the severity of the accident, very few benefit would have been expected on the studied cases.

-Fatal cases, nearly all perpendicular to the opposite vehicle trajectory.

Children – PTW passengers

624 children that have been involved in 2011 in France - No fatality

Age>=6 years old - implication is growing with the age of children.

Type of PTW:
- **30% - engine <49cc**
- **46% - 50cc <engine <125cc**
- **15% - engine >125cc**
- **9% unknown**

The majority of collisions took place at intersections

Opposite obstacle: very often another vehicle (light vehicles)

Presence of helmet: 91% of children PTW passengers, incl. 9% not attached

Majority of PTW riders with children are not responsible of the accident

Type of journey: leisure and rides (shopping is very far behind)

Very few AIS3+ injuries recorded, but only 13% of uninjured children

Children – Bus/coach occupants

311 children that have been involved in 2011 in France - No fatality

Age>=4 years old.

Type of impact (not only children):

- **40% - Frontal impact**
- **30% - Side impact**
- **15% - Rear impact**
- **2% - Roll over**

97% during the day time

Very few cases with EES > 15 kph

Injuries:

- **for children <12y – no injury or minor injuries recorded**
- **for children >=12y – some AIS3+ injuries to lower limbs**

Nb accidents in bus and coaches can show fluctuation from one year to another one, so conclusions are only valid for the year 2011

Countermeasures - based on fatal cases

Infrastructure

Slow down the speed of vehicles, improve vision around crossing points (pedestrians)
Manage sidewalks in a way to limit crossing possibilities (pedestrians)
Separate ways per type of vehicles/roads users (all)
Guardrails in curves close to rivers, in front of ravines, in front of trees,… (light vehicles, coaches)

Primary safety

Improve children's visibility even by day (pedestrians, cyclists)
Implement the Detection of vulnerable road users (pedestrians, cyclists, PTW)
Collision avoidance systems (all) + Car to car/car to X communication (light vehicles)

Passive safety

Systematic and correct use of adapted protection device (Cyclists, PTW, light vehicles)

Education / law enforcement

Alcohol and drug consumption controls of vehicle drivers/riders (all)
General behaviour of children being on the road (pedestrians, cyclists)
Raise awareness of parents

- driving safety rules (light vehicles, PTW)
- children are not ready to be left alone in the road traffic (pedestrians, cyclists)
- Protecting children while travelling is necessary (cyclists, PTW, light vehicles)
- Protection items are efficient only if adapted and correctly used (PTW, light vehicles)

Children – conclusions

- Children pedestrians are more at risk than other types of road users
- Children as vulnerable road users: in built up areas
- Children in cars with severe injuries/fatalities: non built-up
- Separating road users ones from the others is one of the safest solution

- <u>Light vehicles</u>
- Unrestrained drivers lead more often to unrestrained children situations
- Driver's psychological status has an effect on his implication in accidents regarding children's fatalities.
- Correct use of adapted restraint system is THE priority for children in cars.