Trauma and **Deprivation** in **Quebec**

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SITUATION

Studies show a relationship between social inequality and intentional and unintentional trauma (Marmot et al., 1999; Leclerc et al., 2000). This relationship is poorly understood in Quebec, however, since data on trauma is derived primarily from administrative files (for death and hospitalization), which contain no information on the socioeconomic status of trauma victims.

The recent development of a deprivation index that can be used with these files enables us to at least partially fill this information gap (Pampalon et al., 2000). In this brief paper, we seek to determine whether material and social deprivation is associated with death and hospitalization due to intentional and unintentional trauma in Quebec.

A better understanding of the relationship between deprivation and trauma will make it possible to better target intervention and hopefully prevent a portion of such traumas in the future.

Québec

METHODOLOGY

THE DEPRIVATION INDEX

The Deprivation Index was inspired by the work of P. Townsend (1987), who identified two forms of deprivation—material and social. Material deprivation refers to the conveniences and comforts of everyday life and is closely related to the concept of poverty. Social deprivation refers to the quality of the social network, i.e., the degree of social cohesion or isolation among individuals.

The Quebec-developed Deprivation Index also distinguishes these two forms of deprivation. It is based on 1996 enumeration areas (roughly 750 people per EA) and includes 6 indicators, which has been submitted to a principal component analysis with VARIMAX rotation. Table 1 lists the indicators used to measure the two types of deprivation.

The factor scores indicating the material and social deprivation rating of each EA were first divided into quintiles (1 = the most privileged fifth of the population; 5 = the most deprived fifth of the population). By correlating the EAs with the six-digit postal codes provided in death and hospitalization files, deprivation quintiles were then introduced in each file.

TABLE 1
Indicators of material and social deprivation

MATERIAL COMPONENT	SOCIAL COMPONENT
Proportion of people without high school diplomas	Proportion of people separated, divorced, or widowed
Average personal income	Proportion of single-parent families
Ratio of employment to population	Proportion of people living alone

DATA ON DEATH AND HOSPITALIZATION

This analysis is based on the average annual number of deaths from 1995 to 1997 and the average annual number of hospitalizations from 1997/1998 to 1999/2000. The use of an average annual figure reduces the impact of any random variation due to external factors. Trauma incidents have been divided into two general categories—intentional trauma (IT) and unintentional trauma (UT)—and a number of subcategories (Table 2).

Comparative mortality (CMF) and hospitalization (CHF) figures were calculated for each material and social deprivation quintile using a Poisson regression model. The most privileged quintile was used as the population of reference and attributed a score of 100. Values attributed to the other quintiles represent the deviation from this reference group. For example, a CMF of 144 indicates that the mortality ratio is 44% higher than that of the reference group.

Rates have been adjusted to account for differences in age, sex, and region. For our purposes, the term region refers to the four following groups: the census metropolitan area of Montreal; other census metropolitan areas; medium-sized cities (population of 10,000 to 100,000); small towns and rural areas. Adjustments must be made for region because it is strongly related to certain types of trauma.

TABLE 2
Death and hospitalization statistics by main trauma categories in Quebec
Average annual and percentages per trauma category; rate per 100,000 people

TRAUMA CATEGORY	MORTALITY			HOSPITALIZATIONS		
	1995-1997		1997-1998	1997-2000[1]		1997-1999
	#	%	Rate[2]	#	%	Rate[2]
UNINTENTIONAL TRAUMA						
Motor vehicle accidents	607	30.1%	7.4	3,597	7.3%	50.2
Unintentional falls	579	28.8%	8.1	20,666	42.1%	278.5
Poisonings	111	5.5%	1.6	712	1.5%	10.3
Pedestrian accidents	123	6.1%	1.5	706	1.4%	9.6
Drownings and near-drownings	101	5.0%	1.2	55	0.1%	0.9
Suffocations and airway obstructions	100	5.0%	1.2	136	0.3%	2.3
Fires and burns	70	3.5%	0.9	454	0.9%	6.8
Motorcycle accidents	35	1.7%	0.4	599	1.2%	8.4
Cycling accidents	28	1.4%	0.4	1,150	2.3%	15.9
TOTAL[3]	2,015	100%	26.5	49,084	100%	679.0
INTENTIONAL TRAUMA						
Self-inflicted injuries	1,429	91.7%	18.8	1,906	65.0%	27.1
Interpersonal violence	126	8.1%	1.7	1,014	34.6%	14.4
TOTAL[3]	1,558	100%	20.4	2,933	100%	41.6

1 Over the three-year period from April 1, 1997, to March 31, 2000.
2 Average annual rate, adjusted for age and sex, for the Quebec population, 1996.
3 Includes any remaining intentional or unintentional subcategories.

Sources: INSPQ, Évolution des traumatismes au Québec, de 1991 à 1999; MSSS, Death Database, 1995 to 1998; MSSS, MED-ÉCHO hospitalization database, 1996/1997 to 1999/2000.

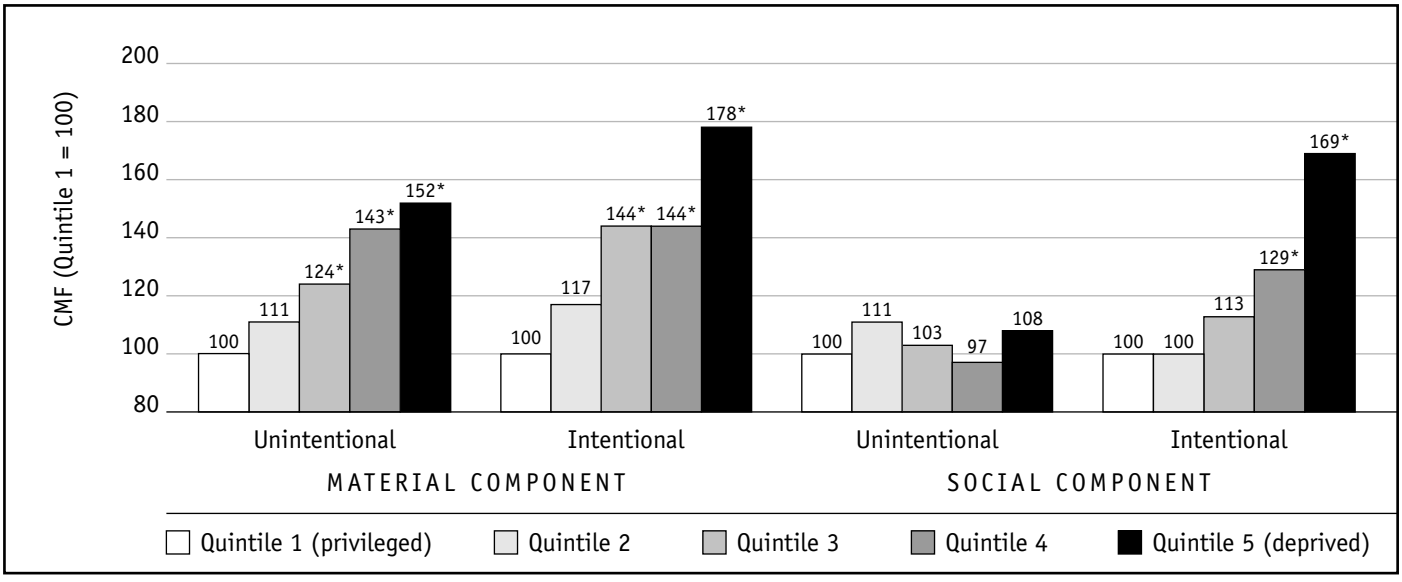
RESULTS

UNINTENTIONAL TRAUMA (UT)

Death due to UT increases systematically with material deprivation. Individuals in the most deprived quintile are at 52% higher risk of UT than those in the most privileged quintile (Figure 1). Social deprivation does not have the same effect. In our study, the fourth quintile of the social component actually has an even lower death rate than the reference group. This deviation, however, is not statistically significant.

The same trend can be seen for hospitalization due to UT. The hospitalization rate increases with material deprivation, although not as significantly as the death rate, whereas no significant relationship is observed between social deprivation and UT hospitalization (Figure 2). When we examine the principle causes of hospitalization due to unintentional trauma (Table 3), we find that the strongest relationship is between road traffic injuries and material deprivation. The correlation between accidental falls (42% of all UT) and material deprivation is much less pronounced, although still statistically significant.

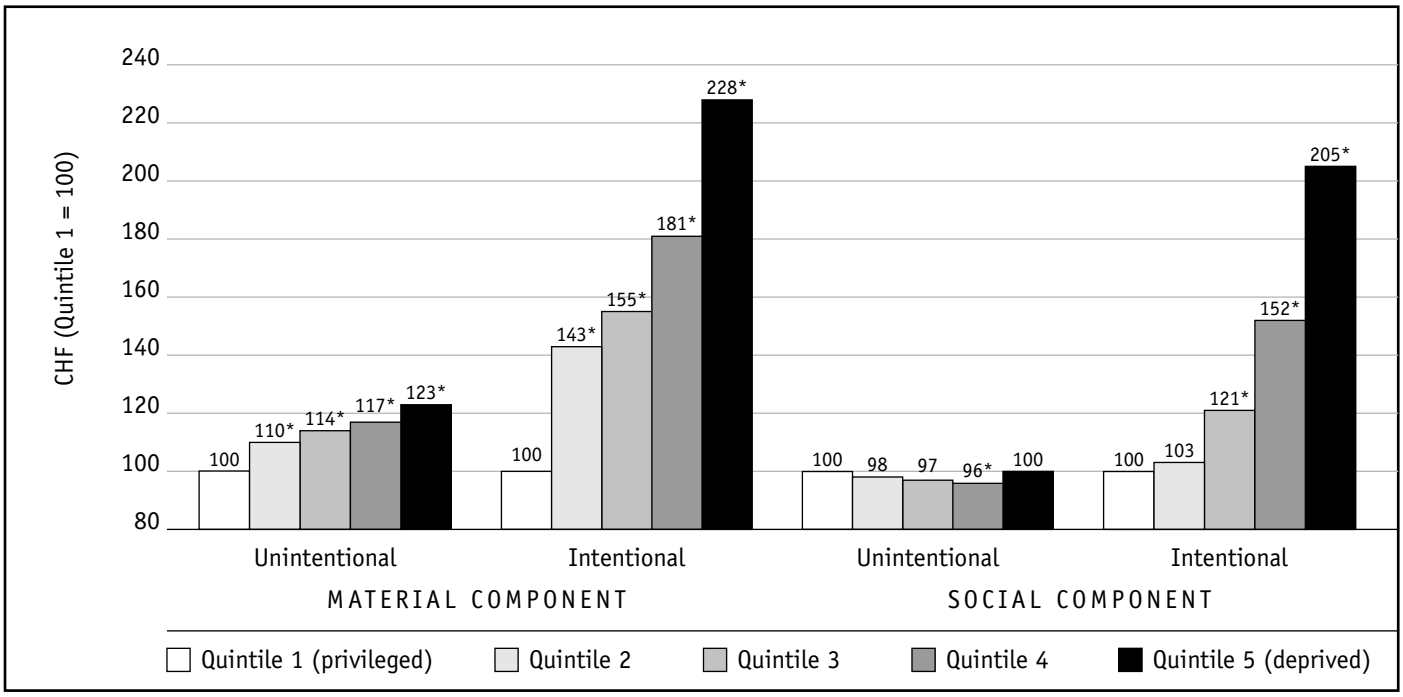
FIGURE 1
Comparative mortality figures (CMF) for intentional and unintentional trauma according to social and material deprivation, Quebec, 1995-1997



* Significant difference at 1% level with the most privileged group (quintile 1), according to the Poisson regression model and adjusted for age, sex, and region.

Sources: MSSS, Death Database, 1995 to 1997; MSSS, Demographic outlook, based on 1996 census.

FIGURE 2
Comparative hospitalization figures (CHF) for intentional and unintentional trauma according to social and material deprivation, Quebec, 1997-2000



* Significant difference at 1% level with the most privileged group (quintile 1), according to the Poisson regression model and adjusted for age, sex, and region.

Sources: MSSS, MED-ÉCHO hospitalization database, 1996/1997 to 1999/2000; MSSS, Demographic outlook, based on 1996 census.

INTENTIONAL TRAUMA (IT)

Mortality due to IT increases systematically with material deprivation at a much higher rate than mortality due to UT (Figure 1); quintile 5 has a 78% higher death rate than quintile 1. Social deprivation has an equally systematic effect on death by IT, as quintile 5 shows a 69% increase over quintile 1.

Hospitalization due to IT follows the same trend (Figure 2), with the relative risk more than doubling from quintile 1 to 5 for both the material and social indicators. The situation is the same for self-inflicted injuries and interpersonal violence (Table 3).

TABLE 3

Comparative hospitalization figures (CHF) for road traffic injuries, falls, self-inflicted injuries, and interpersonal violence, according to social and material deprivation, Quebec, 1997-2000[1]

	UNINTENTIONAL TRAUMA		INTENTIONAL TRAUMA	
	Road Traffic Injuries[2]	Falls	Self-inflicted Injuries	Interpersonal Violence
MATERIAL DEPRIVATION				
Quintile 1 (most privileged)	100	100	100	100
Quintile 2	115.2**	103.1	146.3**	139.2**
Quintile 3	126.6**	104.3	162.4**	139.4**
Quintile 4	130.8**	105.5*	173.8**	196.2**
Quintile 5 (least privileged)	140.8**	108.2**	221.8**	247.2**
SOCIAL DEPRIVATION				
Quintile 1 (most privileged)	100	100	100	100
Quintile 2	99.4	96.8	102.2	102.6
Quintile 3	100.0	96.6	115.0	135.5**
Quintile 4	95.2	94.3*	143.8**	172.1**
Quintile 5 (least privileged)	107.6	101.9	189.5**	243.6**

1 Figures based on average annual rate for the period from April 1, 1995, to March 31, 2001.
2 Includes road traffic injuries involving motorcyclists, cyclists, pedestrians, and occupants of motor vehicles.
* Significant difference at 5% level with the most privileged group (quintile 1), according to the Poisson regression model and adjusted for age, sex, and region.
**Significant difference at 1% level.

Sources: MSSS, MED-ÉCHO hospitalization database, 1996/1997 to 1999/2000; MSSS, Demographic outlook, based on 1996 census.

DISCUSSION

In Quebec, material and social deprivation are strongly associated with trauma. While UT (mostly road traffic accidents) is affected by material deprivation, IT (suicide and homicide) is affected in equal measure by the social and material components. Social deprivation does not appear to be a factor in explaining trauma such as road traffic injuries, falls, poisonings, and drownings.

In the case of IT, the risk of hospitalization associated with each of the two forms of deprivation doubles between the most privileged and most deprived populations. The risk climbs as high as 4:1 when the two components are combined, a calculation made possible by their relative statistical independence.

These findings show the importance of both economic conditions and social network in cases of suicide and homicide. An epidemiological study of suicide conducted in London, UK, using similar tools, also found that material deprivation and social isolation were major explanatory factors (Congdon et al. 1999).

In conclusion, any trauma intervention programs should clearly take deprivation into account, in both its material and social forms.

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