

Road Disability of Origin in some territories of Colombia, 2002-2020

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Abstract:

Objective: To characterize demographic, social and prevalence aspects of Road Disability in four territories of Colombia.

Method: Longitudinal and descriptive study of the registry of location and characterization of people with disabilities in the intentionally selected municipalities of Medellín, Cali and Manizales, and the department of Antioquia. The distribution of variables in which it was possible to retrieve information was studied.

Results: 257,966 records of people with disabilities due to any cause were identified in the territories surveyed; in about 50% there was no record of the cause. Of the total, 10,288 had a Road Disability, 3,178 in Medellín, 959 in Cali, 222 in Manizales and 5,929 in Antioquia. The average age in this group was 50 years old. 71.5% of cases were men, whose ratio doubled or tripled that of women depending on the territory. Most had low schooling, with 41% up to primary school and 37% high school. 75% were poor people, almost 60% without income. Nearly half are not in rehab and 60% require help from another person to perform daily activities. On average, 4% of records were of road origin; the prevalence per 100,000 inhabitants had variations between and within the territory due to oscillations in the record.

Conclusion: In the studied territories there are structural conditions, such as the lack of surveillance systems, which determine the underreporting of people with disabilities and prevent the real estimation of the magnitude of the problem with its associated factors.

Key words: Disabled Persons; Statistics on Sequelae and Disability; Health of the Disabled; Transportation.

Resumen

Objetivo: Caracterizar aspectos demográficos, sociales y de la prevalencia de la Discapacidad de Origen Vial en cuatro territorios de Colombia.

Método: Estudio longitudinal y descriptivo del registro de localización y caracterización de personas con discapacidad en los municipios de Medellín, Cali y Manizales, y el departamento de Antioquia, intencionalmente seleccionados. Se estudió la distribución de variables en que fue posible recuperar información.

Resultados: Se identificaron 257.966 registros de personas con discapacidad por toda causa en los territorios abordados; en cerca del 50 % no hubo registro de causa. Del total, 10.288 tenían una discapacidad de origen vial, 3.178 en Medellín, 959 en Cali, 222 en Manizales y 5.929 en Antioquia. La edad media en este grupo fue de 50 años. El 71,5% de casos eran hombres, cuya razón dobló o triplicó a las mujeres según territorio. La mayoría tuvo baja escolaridad, con 41 % hasta primaria y 37 % de secundaria. El 75 % eran personas pobres, 60 % sin ingresos. Casi la mitad no está en rehabilitación y el 60 % requiere ayuda de otra persona para realizar actividades diarias. En media, 4 % de registros fueron de origen vial; la prevalencia por 100.000 habitantes tuvo variaciones entre y dentro del territorio por oscilaciones en el registro.

Conclusión: En los territorios estudiados hay condiciones estructurales, como la falta de sistemas de vigilancia, que determinan el subregistro de personas con discapacidad e impiden la estimación real de la magnitud del problema con sus factores asociados.

Palabras clave: Personas con discapacidad; Estadísticas de secuelas y discapacidad; Salud de la Persona con Discapacidad; Transportes.

Introduction

The automotive industry, which emerged at the end of the 19th century, has generated multiple risks for the health of the population. Since the middle of the last century, morbidity and mortality in road incidents was recognized as a global public health challenge. Seeking to reduce road risk

and its effects, the recently created United Nations organization convened the first world conference to standardize existing and future traffic signs and signals (1).

At the end of the 20th century, on average there were 1,000,000 road fatalities per year. Just two decades later, in 2019, it was estimated that there were up to 1.4 million deaths and 50,000,000,00 million injured, ranging from mild and moderate to very serious, and another unestimated majority without police or health sector records. Road incidents are the leading cause of death, non-fatal injuries and years lived with disability, they generate greater impact on young people, personal, family and social consequences have imprecise estimates, especially in developing regions and countries (2-3).

A key aspect to improve road risk management is the epidemiology of Road Disability of Origin (RDO), the least studied side of the problem (4-5). Only in 1980 the World Health Organization (WHO) generated a classification of Impairments, Disabilities and Handicaps, that was adjusted in 2001 towards Functioning, Disability and Health as the International Classification of Functioning (ICF) according to a specific manual for the evaluation of experiences of social participation of people with disabilities (6).

Due to the impacts observed in more than a century of expansion of the automotive industry, and those expected in developing countries with intense motorization processes, the RDO has gained recognition (7-8). In the context of public health, it is as important as road death figures have historically been. The rehabilitation of people with RDO is very relevant, but making the problem visible, prioritizing policies, formulating plans, road control, marketing safer vehicles and improving victim care, among others of recognized impact, cannot be postponed. Although road risk and incidents and their outcomes are preventable, it is assumed that RDO is a phenomenon that is difficult to measure and monitor, especially without strong epidemiological surveillance systems (9-10).

The global study of disease, injuries, and risk factors, considered a landmark on magnitude, trends, and challenges in global health (11-12), revealed that the burden of years lived with RDO from ages 10 to 49 between 1990 and 2019 surpassed that of self-injury, physical assaults, infectious such as HIV-AIDS, and mental events such as depression. It indicated that social security and health systems need better data in response to the increasing frequency of disabilities due to external causes, like road traffic injuries. In

addition, it was assumed that Public Health was lagging in addressing the observed and projected for this risk factor (13-14).

Although the magnitude and general characteristics of global road mortality are known, there are still gaps in the quantity and quality of data on road injuries and their sequelae, an aspect considered very critical in Latin American and Caribbean countries. In this context, we present the synthesis of a five-year experience that seeks to make visible and respond to this dimension of the road problem in some territories of Colombia (15).

Methods

Longitudinal and descriptive study of some demographic, social and prevalence characteristics of RDO in three cities and one department of Colombia, the latter with the highest historical figures of mortality and road injury in the country. Secondary information from the Registry of Localization and Characterization of Persons with Disabilities (RLCPcD by its acronym in Spanish) in the country's Integrated Social Protection Information System (SISPRO by its acronym in Spanish) was used. The registry captures the clinical assessment of individuals who voluntarily undergo identification of the level of their physical, psychological, and cognitive capacities, limitations in activities and participation restrictions, as a basis for certifying the type and severity of disabilities at the municipal, district and departmental levels in Colombia (16).

The reference population was the individuals in the RLCPcD of the municipalities of Medellín, Cali and Manizales, and those of the Antioquia department. The units of analysis were people certified with RDO according to Colombia's standard evaluation procedure. All RDO records were analyzed in their complete, incomplete, and inactive variants as of 2020; records of deceased people, of those who overcame the condition of disability or changed their identity document at the end of adolescence were excluded.

To estimate the frequencies and prevalences of RDO in the territories of interest, annual population projections and back projections of the National Administrative Department of Statistics (DANE by its acronym in Spanish) of Colombia were used (17). Prevalence was understood as an indicator of the burden of the event and was estimated as the proportion of individuals presenting the event under study in a given period (18). It should be noted that the record of people is not immediate after the road incident. Several periods, even years, go by while people go through the process, which leads to biases, especially memory biases. The magnitude of the RDO was judged

a priori to be greater than that recorded due to the voluntary nature of the incident, the lack of knowledge of the process in a significant proportion of injured people, with sequelae, and the fact that it is a secondary source. Resolution 8430 of 1993 of the Ministry of Health and Social Protection, on ethical, scientific, technical, and administrative norms for health research, was applied, which classified it without risk (19). The SPSS® V.22 software licensed by the Universidad de Antioquia, Stata V.12, Excel® and Word® were used®.

Results

In the four territories studied, 257,966 people with disabilities of various origins were registered; about 50% did not have a specific cause. Among the records with a cause, the most common were: 30% general disease, 11% incidents on the road, at home, at work, in educational or sports centers, and 10% genetic alteration. Causes associated with pregnancy, childbirth, growth-development, violence, occupational disease, and disasters, among others, were less than 5%. In this 11% of incidental causes, road traffic was the most frequent, surpassing disable events in homes and jobs.

In the total number of records consulted, there were 10,288 (4%) of RDO, of which 3,178 were in Medellín, 959 in Cali, 222 in Manizales and 5,929 in Antioquia. The demographic and social characteristics variables that were recovered are summarized in Table 1. In these, the male gender predominated with a mean of 71.5% and was identical in Medellín and Cali where, for every woman with RDO, there were two men in the same condition, unlike in Manizales and Antioquia, which had an average of three men for every woman with RDO.

Age at entry into the registry of the 10,288 people with RDO ranged from 2 to 107 years, with mean 50 (SD 18) and mode 53. Almost half of these people were 50 years of age or younger and, by Colombian standards, two-thirds were from economically active age groups. Among the territories studied, there were variations in percentages of age groups.

On average, 14% of people with RDO reported being illiterate. Education was low; 54% had no more than primary schooling and 37% had secondary schooling. With variations between territories, especially for Cali's figures, more than 72 % were people from social levels 1 and 2, the poorest in the country, while 25 % were from social levels 3 and 4, with average incomes. 58% reported no monetary income, and 25% said they received less

than COP \$500,000, which is less than the legal monthly minimum wage in the country.

Moreover, 48% were not in the process of rehabilitation for their RDO condition; in 60% there was no information on the public or private agent paying for the process. When information was available, payment was mainly from the Social Security Health System (SGSSS). There was variation between territories in the percentage of people with RDO in functional dependence to receive help from another person to perform activities of daily living, from 32% in Medellín to 81% in Manizales.

Table 1. Some characteristics of people with road-related disabilities in some Colombian territories, 2002-2020..

Variables	Medellín		Cali		Manizales		Antioquia		Total n (10288)	%
	n (3178)	%	n (959)	%	n (222)	%	n (5929)	%		
Gender										
Male	2246	70,7	678	70,7	169	76,1	4261	71,9	7354	71,5
Female	932	29,3	281	29,3	53	23,9	1668	28,1	2934	28,5
Ratio Male: Female										
Ratio	2		2		3		3		3	
Age										
0-14	49	1,5	7	0,7	1	0,5	95	1,6	148	1,4
15-29	432	13,6	135	14,1	44	19,8	818	19,8	1174	11,4
30-44	749	23,6	247	25,8	49	22,1	1359	22,9	2284	22,2
45-59	988	31,1	310	32,3	78	35,1	1941	32,7	3145	30,6
60 and over	960	30,2	260	27,1	50	22,5	1716	28,9	3537	34,4
Illiteracy										
Yes	466	14,7	82	8,6	29	13,1	881	14,9	1458	14,2
No	2710	85,3	875	91,2	193	86,9	5031	84,9	8809	85,6
No data	2	0,1	2	0,2	0	0,0	17	0,3	21	0,2
Education										
None	381	12,0	92	9,6	25	11,3	709	12,0	1207	11,7
Preschool	15	0,5	9	0,9	3	1,4	65	1,1	92	0,9
Elementary	1294	40,7	363	37,9	85	38,3	2442	41,2	4184	40,7
High School	1201	37,8	384	40,0	80	36,0	2171	36,6	3836	37,3
Higher Education	286	9,0	111	11,6	29	13,1	534	9,0	960	9,3
No data	1	0,0	0	0		0,0	8	0,1	9	0,1
Socioeconomic level										
One	587	18,5	378	39,4	49	22,1	1857	31,3	2871	27,9
Two	1537	48,4	326	34,0	84	37,8	2602	43,9	4549	44,2
Three	885	27,8	189	19,7	64	28,8	1233	20,8	2371	23,0

Four	125	3,9	27	2,8	7	3,2	120	2,0	279	2,7
Five	36	1,1	39	4,1	1	0,5	35	0,6	111	1,1
Six	0	0,0	0	0,0	0	0,0	70	1,2	70	0,7
No level	2	0,1	0	0	17	7,7	11	0,2	30	0,3
No data	6	0,2	0	0	0	0,0	1	0,0	7	0,1
Attends rehab										
Yes	1793	56,4	356	37,1	112	50,5	2053	34,6	4314	41,9
No	1385	43,6	448	46,7	91	41,0	2991	50,4	4915	47,8
No data	0	0,0	155	16,2	19	8,6	885	14,9	1059	10,3
Rehabilitation payer										
SGSSS	1020	32,1	333	34,7	98	44,1	1741	29,4	3192	31,0
Other	207	6,5	14	1,5	9	4,1	325	5,5	555	5,4
Personal	55	1,7	8	0,8	5	2,3	67	1,1	135	1,3
Family	96	3,0	15	1,6	3	1,4	102	1,7	216	2,1
Employer	8	0,3	1	0,1	0	0,0	15	0,3	24	0,2
NGO	4	0,1	3	0,3	0	0,0	3	0,1	10	0,1
No data	1788	56,3	585	61,0	107	48,2	3676	62,0	6156	59,8
Requires assistance from someone else										
Yes	1019	32,1	374	39,0	179	80,6	4624	78,0	6196	60,2
No	2159	67,9	584	60,9	43	19,4	1254	21,2	4040	39,3
No data	0	0,0	1	0,1	0	0,0	51	0,9	52	0,5
Income										
No income	1715	54,0	552	57,6	126	56,8	3551	59,9	5944	57,8
Less than \$500.000	944	29,7	213	22,2	57	25,7	1355	22,9	2569	25,0
From \$500.001 a \$1'000.000	464	14,6	72	7,5	26	11,7	695	11,7	1257	12,2
From \$1'000.001 a \$1'500.000	22	0,7	20	2,1	8	3,6	51	0,9	101	1,0
From \$1'500.001 a \$2'000.000	11	0,3	7	0,7	0	0,0	23	0,4	41	0,4
From \$2'000.001 a \$2'500.000	2	0,1	10	1,0	2	0,9	12	0,2	26	0,3
More than \$2'500.001	2	0,1	25	2,6	2	0,9	8	0,1	37	0,4
Not reported	10	0,3	55	5,7	0	0,0	157	2,6	222	2,2
No data	8	0,3	5	0,5	1	0,5	77	1,3	91	0,9

In 56% of the records with RDO, the most frequent typology was the one that compromised personal mobility, followed by multiple disability with 12% and cognitive disability with 5%. In 17% of the records there was no information on this, as shown in Table 2.

Table 2. Types of road-related disability reported in selected territories of Colombia, 2002-2020.

Type of RDO	Medellín		Cali		Manizales		Antioquia		Total	%
	n	%	n	%	n	%	n	%		
Mobility	951	29,9	723	75,4	142	64,0	3977	67,1	5793	56,3
Multiple	372	11,7	9	0,9	31	14,0	810	13,7	1222	11,9
Cognitive mental	81	2,5	36	3,8	28	12,6	368	6,2	513	5,0
Visual	52	1,6	53	5,5	9	4,1	235	4,0	349	3,4
Psychosocial mental	55	1,7	19	2,0	3	1,4	156	2,6	233	2,3
Hearing	23	0,7	11	1,1	7	3,2	105	1,8	146	1,4
Systemic	18	0,6	30	3,1	0	0,0	93	1,6	141	1,4
Cannot name	19	0,6	0	0,0	1	0,5	80	1,3	100	1,0
Voice and Speech	4	0,1	8	0,8	1	0,5	20	0,3	33	0,3
Taste-Smell-Touch	1	0,0	6	0,6	0	0,0	11	0,2	18	0,2
Skin, Nails and Hair	1	0,0	2	0,2	0	0,0	3	0,1	6	0,1
No Data	1601	50,4	62	6,5	0	0,0	71	1,2	1734	16,9
Total	3178	100	959	100	222	100	5929	100	10288	100

According to the records, the prevalence between and in each territory of RDO per 100,000 inhabitants fluctuated over the years. In Medellín, for example, there were years with 20 new RDO records, but others with 244, significantly affecting the expression of prevalence from a minimum of 0.01 to a maximum of 58.7 cases. Antioquia recorded prevalences ranging from 0.01 to a maximum of 17.6 new cases of RDO per 100,000 inhabitants, with 312 annual registrations on average. According to the consolidation of the last available year of causes of disability, RDO in Cali accounted for 4.6%, in Medellín for 4.2%, in Antioquia 3.8% and in Manizales 2.2%.

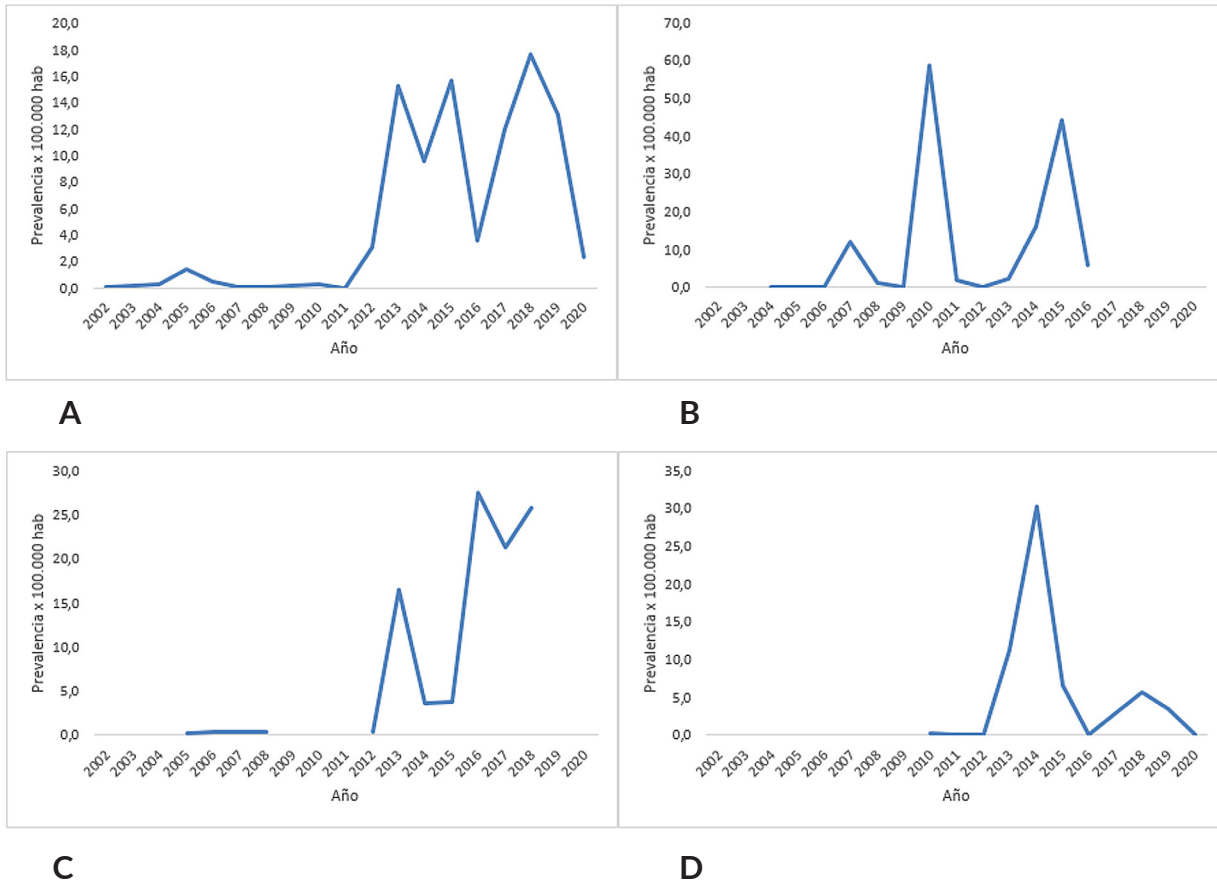


Figure 1. Prevalence of road-related disability in some territories of Colombia, 2002-2020. a. Antioquia; b. Medellín; c. Cali; d. Manizales.

Discussion

The 2011 World Report on Disability, based on projections using measurements from the first decade of the century, indicated that between 15% and 19% of people over the age of fifteen, a minimum of 1 billion, had a physical or mental impairment. This report, which did not indicate the relative weight of RDO in the grand total or in the subgroup of unintentional injuries, highlighted the growing trend and projection of disabilities of all types, and the significant underreporting. It called it essential and urgent to improve national capacities to identify populations at risk or with disabilities, and to prioritize relevant actions (20).

In Latin America and the Caribbean, the 2014 all-cause disability report made explicit the limitations in the actuality and quality of the sources. On average, 12.5% of the inhabitants in the subregion would have some limitation in their performance. The variation between countries in the subregion, of national prevalences, was very relevant, from a very low of 3.3% reported by Bolivia to the considerably high of 24% in Brazil. This report also did not

report the relative weight of the RDO compared to the country or subregion totals (21).

In Colombia, the latest population surveys indicated an all-cause disability prevalence of 6.4 % in 2005 and 7.2 % in 2018; they also did not indicate specific estimates of the relative magnitude of RDO (22).

Recently, the Colombian Ministry of Health and Social Protection reported that as of 2020 there were more than 1.3 million people in the RLCPCD, a universe that corresponded to a national prevalence of all-cause disability of 2.6 % considered low compared to the 2018 population survey estimate. The most frequent origins of disability were general disease with 40 %, external incidences including road traffic with 17 % and genetic alterations with 15 %. It was noted that while 95% of the general population was affiliated to the SGSS, among people of the RLCPCD it was only 77%, eighteen percentage points less, confirming the inequitable access to health coverage of this population subgroup (23).

All reports, from global to national, emphatically, and systematically highlight the conceptual, methodological, technical, financial, and organizational challenge of systematically, continuously and reliably measuring levels of disability in the world's regions, nations and their territories. Together, they emphasize that the challenge of monitoring unintentional external causes, such as road risk, remains. The goal of reducing road deaths, serious injuries, and consequently RDO in mobility by 50% by 2030, present in the Sustainable Development Goals since 2015 and ratified in 2020 by the 3rd Road Safety Summit in Stockholm and the 74th resolution of the United Nations General Assembly, is a challenge of civilization, particularly challenging for developing areas, due to their historical limitation in prevention, surveillance and intervention of road risk and its effects (24-25).

Incidents that generate RDO interrupt the personal and family life project, with the restructuring not always possible in the way of living and relating to others. Victims suffer restrictions in their autonomy to develop their daily activities, which causes damage in biopsychosocial and psychic dimensions, compromising the perception of the people to their living conditions and capabilities, generating post-traumatic stress disorders, sadness, guilt, abandonment, and general impoverishment (26-27).

Studies on the incidence and prevalence of RDO are complex and costly (5-12). Considering that the lack of accuracy and systematic monitoring of the burden of disease and RDO in populations are at the center of the de-

bate to demonstrate the magnitude of the problem, prioritization of policies and resources are essential to design and execute coherent plans to develop statistical surveillance systems that reveal the factors involved, patterns, trends, and implications of the problem (28).

Spencer et al. in the global burden study tracked incidence, prevalence, death, and years lost due to RDO from 1990 to 2017. They started from a case definition supported by postulates of Abdel Omran's epidemiological transition, and the need to objectively assess global commitments to the issue; they generated evidence of obstacles to human development mainly due to the effect of cancer, cardiovascular vascular diseases, and road injuries (29). With an estimated 1.25 million road deaths and 55 million injuries in 2017, they found that while age-standardized injury incidence rates increased since 1990, mortality rates decreased except and especially in South Asia and Latin America. Also, fractures of the extremities, especially lower extremities, and skull fractures, were the most common injuries to generate RDO worldwide (28).

Tingvall and his group, who followed 20,500 car occupants with road injuries in Sweden from 1995 to 2001 for five years, found a final prevalence of 10% of permanent RDO, mostly associated with head, cervical spine, and upper or lower limb injuries. Cerebrospinal central nervous system involvement was the highest risk for receiving a diagnosis of RDO in this cohort (7).

Ameratunga and collaborators, in their review of publications between 1980 and 2002, pointed out that the reduction in the mortality rate in road incidents, due to the improvement in the use of helmets, seat belts, vehicle construction or infrastructure and the response to care, had increased the incidence and the average number of years lived with RDO. There were prevalences in a very wide range, from 2% to 87%, derived from the effect of study designs, periods and medical-legal or compensatory context, heterogeneous case definition, exposure or outcome, and case selection, assessment, classification, and follow-up biases. The adjusted prevalence of RDO ranged from 6% to 9%, with increases associated with total hospital days. Injury patterns and effects varied by type of road user and severity assessment methods; in developed countries RDO of car occupants predominated, while in developing countries it was higher in motorcyclists and pedestrians (5).

Gustafsson led a study of nearly 37,000 insured car occupants in Sweden injured from 1995 to 2010, the years when road death in that country

fell by more than 50% but survival with sequelae increased. At the end of the 3rd year of follow-up about 5,000 people, 14%, had some RDO. Cervical spine injuries were more prevalent, especially in women younger than 44 years; those aged 60 years and older were at higher risk of RDO due to extremity injuries. Among older adults of both sexes, significantly, and even for minor injuries, there was some permanent RDO (30).

Palmera et al., according to a 2008 national survey in Spain with a representative sample of 91,000 households and more than 20,000 people over 15 years of age with disabilities, identified 443 people with RDO, mainly with mobility compromises. The prevalence was 2.1 per 1,000 inhabitants. There was no difference by gender, but there was a significant risk from 31 to 64 years of age, in people with lower education and income. Only 24% of adults identified in the survey with RDO worked and received some income (31).

Lin and his group, analyzing a representative sample of the 2006 China Disability Survey, identified 1.5 million people with RDO, for an adjusted prevalence of 1.12 per 1,000 population of all ages, and 1.44 in those aged 18 years and older. RDO was associated with being male in a rural setting, having no housing or access to electrical appliances at home, being unemployed, having low education and low household income (32).

Previously Liu and his team, using the same data source, had identified an increase in the adjusted incidence rate in RDO from 1.5 in 1980 to 11.2 in 2005 per 100,000 people, in an analysis that included the late 20th century, years when motor vehicles increased 20-fold and road death grew 250% in their study area. Both studies pointed to the importance of improving the surveillance of incident and prevalent cases of RDO (33).

The study on RDO in Bogotá and Colombia, using data from the Institute of Legal Medicine, DANE and the Mobility Department of the capital city of the country, by Camelo and collaborators, indicated that the historical records of violence due to different causes, including road violence, did not capture all the events of interest, so there was notable under-recording, almost completely corrected in the last five years by the new registry of care for road injuries by the Ministry and the Federation of Motor Vehicle Insurers (FASECOLDA by its acronym in Spanish). Camelo pointed out that the more than 70,000 deaths and 7 million road injuries in the country in the last decade were concentrated in people from lower income quintiles, in two-wheeled vehicles and vulnerable road users. The specific proportion

of RDO generating variables and their characteristics are not known, except that they seem to be associated with economic growth, motorization, and disrespect of regulations (34).

In Colombia, the lack of objective and reliable data on the magnitude of several problems of interest in Public Health, such as RDO, has prevented the best articulation of interests to address them. A research agenda in Disability that gathers the needs and capacities of the various actors involved in the generation and appropriation of knowledge in this field, aims at the better use and development of capacities and resources, as well as transdisciplinary research that contributes to political decision-making and the transformation of the social realities of the group of people with disabilities and their families in the country and its territories (35).

According to Bhalla, the need for surveillance systems and reliable statistics on road injuries is based on several arguments. First, they would allow knowing the true magnitude of the problem for its objective comparison with other risks and outcomes of illness and death, favoring the definition of public agendas for decision making and prioritization of investments. Second, reliable and timely data would offer the opportunity to monitor, evaluate and generate evidence of the efficiency, efficacy and effectiveness of the proposed interventions (36).

Low and middle-income countries such as Colombia need timely and reliable data, generated through solid systems for capturing, reporting and consolidating statistics on the occurrence of road incidents, their mortality, morbidity and outcomes in sequels such as RDO in survivors, in order to monitor and evaluate, independently of political or uninformative interference, progress in meeting global and national goals guided by the global Vision Zero initiative, within the framework of the Safe Systems for Human Mobility model (37).

The low prevalence of RDO in the registries of the Colombian territories studied seems to be related to the low national coverage of the RLCPCD. The lack of its dissemination and the absence of affirmative actions to encourage people with disabilities to register could reveal the lack of interest of institutional leaders in making the problem visible. In addition, failures in the quality of information, due to incomplete or erroneous completion of variables, make it difficult to classify cases, concealing the origin of the disability and perpetuating the underestimation of the magnitude of the problem of RDO in the country (38).

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