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FUNDACION Gonzalo Rodriguez

Study on conditions of children transport on motorcycles in Latin America

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EDITORIAL

Fundación Gonzalo Rodríguez - Montevideo, Uruguay (2017)

Title: “Study on the Conditions for Children Transport on Motorcycles in Latin America"

Legal Deposit:
1F74320166001763
ISBN
978-980-422-041-8

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Acknowledgments: Special thanks to UPS Foundation, the World Bank, OISEVI and the Development Bank of Latin America (CAF) for their financial support. Especially to Hilda Gómez for her initiative and commitment to the cause. To all FACTUM team for their dedication and effort during field work and report elaboration. To Juan Ramos García for his valuable comments.

Executive Summary

Motorcycles have found there way into Latin America as an opportunity for mobility for large segments of society. As the WHO points out, motorcycle users are exposed to greater risks of collision because they share the circulation space with automobiles, buses and trucks, because they are less visible, and because of the lack of physical protection which makes them more vulnerable to injuries in the event of a crash. Likewise, children have more probabilities than adults of suffering serious injuries because their brains and skulls are more vulnerable than adults´ since they have not reached full maturity.

In Latin America and the Caribbean, road crashes are the first cause of death among children aged 5 - 14 years and the second among people aged 15 - 44 years. In countries such as Uruguay, Brazil, Colombia, Dominican Republic, motorcycles are responsible for half of the deaths in road crashes. This negatively impacts on the possibility of reaching the goal of halving the number of deaths and injured in road crashes by 2020 defined in the United Nations´ Sustainable Development Goals.

Despite these data, the problem has been scarcely analyzed. It is important to get to know the situation to address it and generate changes that protect one of the most vulnerable groups of road users, children.

In this sense, the Fundación Gonzalo Rodríguez together with UPS Foundation, the Latin America Development Bank (CAF), the World Bank, and the Ibero-American Road Safety Observatory (OISEVI), decided to conduct this "**Study on the Conditions for Children Transport on Motorcycles in Latin America**" as a first approximation to the issue aiming to create a knowledge base to improve this reality in the medium term.
This exploratory study, conducted in forty-five cities in six different countries, Argentina, Brazil, Colombia, Paraguay, Dominican Republic and Uruguay, used a non-participant observation technique, describing situations in traffic based on previously defined criteria. On the one hand, perceptions, habits and knowledge on children transported on motorcycles were collected through a survey.
Results describe some challenges regarding child safety on motorcycles. In this sense, there is an observed low use of authorized helmets by younger children, in part because there are no authorized helmets for children younger than 2-3 years old, but also because they are not included in regulations or enforced. Also, the use of other safety measures, such as high-visibility clothing, even in countries were their use is mandatory by law, is very low. Regarding children, one fundamental safety aspect is that they reach the foot rest; results regarding this aspect are worrisome, even in Uruguay where it has been regulated. Another aspect providing safety to children on motorcycles is occupant position; observations of children were worrisome since most of them travel on non-authorized positions. This is confirmed by the survey, there is a lack of information regarding this aspect as a safety measure.

The motorcycle is the chosen means of transport due to its affordability and quickness; these two aspects are mentioned in the first places in all countries. Also, the perception of safety of children on motorcycles is relatively high in all countries.

Cities with the highest number of children traveling on motorcycles are the ones with the lowest use of safety measures. This has to do with perception of safety and also the lack of information.

Generally speaking, there are differences between main cities and capitals and the rest of the country. This shows the importance of local measures when dealing with road safety.

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FIRST PART

1. Introduction

This study was developed by Fundación Gonzalo Rodríguez together with UPS Foundation, the Latin American Development Bank (CAF) and the Ibero-American Road Safety Observatory (OISEVI)-World Bank.

It is an exploratory study to find out the number of children transported on motorcycles in cities of six Latin American countries; a non-participant observation technique was implemented.

Moreover, a coincidental survey was conducted in order to collect data regarding habits and risk perception of traveling by motorcycle.

This study aims to better understand a problem which has barely been studied in the region and to prove relevant information for public decision making and contribute to the development of a second work phase based on possible solutions.

In the first part, the problem of children on motorcycles is presented, the methodology used for the observational work and survey is described, and finally, main indicators obtained by the observation and survey results are presented.

In the second part, data collected in each country as well as secondary related sources are presented together with conclusions which allow the reader to understand the situation.

In the third and last part, main challenges from the study results and general recommendations together with a general conclusion are presented.

2. The Problem

Motorcycles have become one of the main challenges from the road safety standpoint in the region. This is stated in the study "*Motorcycles and Road Safety*"[1] (2013), presented by CAF and the OISEVI; according to which the Latin American and Asian motorcycle fleet is in full growth and that contributes to the increase in the number and deaths and injuries in road crashes associated to their use. Also, this negatively impacts in the attempts to meet the objectives proposed by the Decade of Action for Road Safety 2011–2020; the same happens with the goal for 2020 to halve the number of dead and injured in road crashes, included in the UN Sustainable Development Goals. [2].

There is an estimate of almost 30 million motorcycles registered in the region. As way of example, according to data by the CAF, the number of registered motorcycles in Brazil increased from 5.7 millions in 2002 to more than 21.4 millions (346%) in 2013. Between 1997 and 2009 the motorcycle fleet in Colombia increased 400%. This is a coincidence with the fact that the highest rates of mortality of motorcyclists in the region are Colombia (3.6 every 100 thousand population) and Brazil (2.9 every 100 thousand population).

In Latin America and the Caribbean, road crashes are the first cause of death among children aged 5 - 14 years and the second among people aged 14 - 44 years. Motorcycles mortality rate in America was of 1.6 every 100.000 inhabitants in the period 1998 - 2010. This rate has rapidly grown from 0.8/100.000 in 1998 to 3.5/100.000 in 2010. Colombia (3.6 every 100.000), Brazil (2.9 every 100.000) and Paraguay (2.5 every 100.000) are the countries with the highest mortality rate (Rodriguez et. al. 2013

However, the motorcycle is a mobility opportunity for large sectors in society; it is a means of transport which is being adopted and consolidated. It is important to work on its safer use.

As the WHO points out, motorcycle users are exposed to greater risks of collision because they share the circulation space with automobiles, buses and trucks; because they are less visible and because of the lack of physical protection which makes them more vulnerable to injuries in the event of a crash.

The use of helmets among motorcyclists contributes to reduce head injuries and the severity of injuries suffered by riders. Helmets are efficient to reduce the probability of death and severe injuries as a result of head injuries. It reduces the risk and severity of trauma in approximately 72%; it reduces probability of death in 39% (WHO, 2006).

Transporting children by motorcycle is a controversial issue and it is not clearly solved. Thus, as in many other aspects related to Road Safety in Latin America and the Caribbean, theory and practice are opposed to

[1] http://scioteca.caf.com/bitstream/handle/123456789/799/MEMORIAS_MOTOS.pdf?sequence=1&isAllowed=y
[2] http://www.un.org/sustainabledevelopment/health/

reality. Truth is that children are transported by motorcycle, mainly in low and mid-income countries even though it is not a safe means of transport for them.

Children are more likely to suffer severe consequences when compared to adults. This is so because the child´s brain and skull are more vulnerable because they have not reached the complete maturation. At the age of four, the size of a child´s head is 90% of an adult´s and at the age of 12 is 95%. Only when they are 20 years old the skull´s bony plates are fully closed.

The neck, compared to the head, is just 75% of the adult´s size at the age of 4 and 85% at the age of 12. Child´s neck muscles are weaker, ligaments can stretch more and spinal articulations do not register the same forward movement as in adults. Besides, the backbone has more cartilage and less bone (Arbogast et al 2013, in UNECE, 2016)

In Latin America, this issue has not been firmly tackled and no effective measures have been implemented. Therefore, children are transported by this means of transport implying very importante health risks.

In some countries such as Belgium, Denmark, France or Italy it is forbidden to transport by motorcycle children aged 3-10, who do not reach the footrest. The offer of public transport as well as the possibility of having private vehicles makes this possible and viable.

However, in most developing countries in the region, the transport of children by motorcycle is not regulated generating a legal void, and in those where it is, regulations are not complied with since children of all ages are seen being transported on this means of transport on a daily basis.

The problem is that banning the transport of children by motorcycle should go along with accessible transport alternatives such as a safe pubic transport at reasonable costs.

On the other hand, the requirement of safety measures for transporting children by motorcycle could contribute to reduce injuries and deaths. However, up to date, this issue is barely dealt with. The common requirement for those who travel by motorcycle, in general, is based on the use of helmet but little is said on the necessary regulations or its correct use. There are other measures to improve the visibility of motorcycles occupants such as wearing high visibility clothing and travel with the lights on. However, transporting the child behind the driver and the child reaching the footrest are safety measures which are barely mentioned in the region.

Anyway, this reality is barely studied. The number of children who travel by motorcycle is not quantified (or at least it is not specified in the data presented by the countries); and the conditions in which they travel is unknown (use of safety measures). The study aims to contribute by describing the regional situation which requires actions from different areas to generate changes and to protect one of the most vulnerable groups in traffic.

3. Methodological Notes

In general terms, the observation technique is to systematically record, in a valid and reliable way a specific behavior in a given scenario.

In the case of non-participant observation, there is no interaction between the observer and those who are observed, thus, it allows the collection of behavioral data (in this case, the traffic) without any mediation or interference produced by the interaction of the observer.

In general terms, the non-participant observation technique is to systematically record, in a valid and reliable way a specific behavior in a given scenario. In this case, what happens in the traffic is visually recorded based on data collection criteria and pre-defined data collection tools.

The main advantages of non-participant observation are:

1. It is not an "obstructive" technique, which means that there are no stimuli in any sense on the behavior of observed people; observations are simply recorded without any intervention.
2. In this specific project, observed behaviors are systematically observed in the traffic under a shared criteria implemented in collection forms which enable the homogenization of recorded information.
3. It makes the collection of big amounts of data possible.

Methodology used was agreed on among experts from OISEVI countries; shared parameters were defined to ensure of information generated.[3]

Unit of analysis for this study are children and adolescents traveling on motorcycles in urban and suburban areas in selected cities.

Unit of observation will be c2, 3 or 4-wheeled motorcycles (motorbikes, mopeds, tricycles and quads) transporting children and adolescents (between 0 and 17 years old.

Observation Indicators:

4. Rates of babies, children and teenagers (between 0-17 years old) who travel by motorcycle (2, 3 and 4 wheels) in relation to the total of circulating motorcycles in the observation data collection.
5. Safety measures: use of helmets, helmets´ type and features, technical standards.

[3] Theoretical methodological Manual for the study of urban road behaviors related to protection systems. Buenos Aires, Argentina OISEVI, July 2013

6. Conditions of use of safety measures used.[4]

7. Number of people traveling with the child.

The instrument used is a standardized questionnaire for the analysis of indicators.

The study will be based on a stratified, representative sample for each country, choosing main cities, and with scale in the number of observation points according to population in each city selected. From this point 10 strata were selected[5]:

10. Cities with a population between 5,000 and 20,000 people

9. Cities with a population between 20,000 and 60,000 people

8. Cities with a population between 60,000 and 100,000 people

7. Cities with a population between 100,000 and 500,000 people

6. Cities with a population between 500,000 and 1,000,000 people (not applicable to the Uruguayan case)

5. Cities with a population between 1 and 3 million people

4. Cities with a population between 3 and 5 million people

3. Cities with a population between 5 and 7 million people

2. Cities with a population between 7 and 9 million people

1. Cities with more than 9 million people

Depending on the number of people of each city the following pattern of observation points is defined:

Stratum	Population	Observation Points
10	5.000 to 20.000	2
9	20.000 to 60.000	2
8	60.000 to 100.000	3
7	100.000 to 500.000	4
6	5000.000 to 1,000,000	5
5	1 to 3 million	6
4	3 to 5 million	7
3	5 to 7 million	8
2	7 to 9 million	9
1	Más de 9 millones	10

[4] It refers to the correct or incorrect use.

[5] Stratification used by OISEVI

Basic criteria for the study´s representativity and feasibility are:

1. The different observation points should be far enough between themselves as to cover as much as possible of the urban area.

2. Streets and crossings where observations took place should be representative of the city, looking for high vehicle concentration and circulation heterogeneity.

3. The fact that no exceptional traffic controls, such as enforcers, traffic police, video cameras, were in place at the time was considered

4. Observation points were set up at traffic lights, to maximize observation during red-light periods. If this is not possible, low-speed points were selected (speed bumps, pedestrian crossings, etc.)

Following standard procedures for this type of observational studies, analysis was conducted for each of the points, during 4 consecutive days, 2 shifts every day.

Of those 4 days selected, two were working days (Monday to Friday) and the other two weekend days (Saturday and Sunday).

There were morning and afternoon shifts. The morning shift covered from 8am to 2pm, and the afternoon shift from 3pm to 8pm.

Country	Morning Shift	Afternoon Shift
Paraguay	8:00 to 10:00 AM	4:00 PM to 6:00 PM
Uruguay	Thursdays, Fridays and Saturdays: from 8:00 to 10:00 AM -Sundays: from 10:00 to 12:00.	4:30 PM to 6:30 PM
Colombia	Saturdays, Mondays and Tuesdays: from 7 to 9 AM -Sundays: from 8:30 to 10:30 AM	4:30 to 6:30 PM
Brazil	Saturdays, Mondays and Tuesdays: from 8:00 to 10:00-Sundays: from 9:00 AM to 11:00 AM.	4:00 to 6:00 PM
Dominican Republic	Saturdays and Sundays: from 9:00 to 11:00 AM -Mondays and Tuesdays: from 8:00 to 10:00 AM.	4:00 to 6:00 PM
Argentina	Saturdays, Mondays and Tuesdays: from 8:00 to 10:00 AM-Sundays: from 9:00 to 11:00 AM hs.	4:30 to 6:30 PM

Survey

On the other hand, the study aims to collect perceptions, knowledge and habits about circulation of both children and adults. In this sense the survey conducted is **personal coincidental**. It is applied among men and women who ride motorcycles regularly transporting children.

By doing this, the sample type is intentional, among people riding motorcycles in the areas surrounding the observation points.

Personal surveys through coincidental sample consist in applying a survey questionnaire standardized to a specific population according to parameters defined for the research.

A survey conducted through a coincidental sample is not probabilistic and it surveys people by selecting them at random until a certain number of cases are covered.

The target audience is composed of persons, thus, personal surveys are developed by intercepting people on the street-in this case-motorcycles riders-, located in previously defined locations.

In the coincidental survey, the interviewer is located at a geographical point (in this case near the Observation Points of the Observational Study and near school centers) and selects motorcycles riders near the area, the questionnaire is applied to all those willing to answer.

As an advantage, coincidental surveys have the peculiarity of being low cost since they are answered in less time, and traveling costs and selection of sample units are lower.

Taking into consideration that the coincidental survey is an additional phase to the main study (observation), the aim is to obtain initial input on the statements by interviewees riding motorcycles and transporting children in the different countries.

Web Information Collection

It is the collection of information through documentary sources - mainly free access sites on the Internet.

Criteria and method: to carry out the necessary search of information, the following items were taken into consideration:

- *Search Engine*: Google Search Engine by default
- *Browser*: Google Chrome

An iterative process was developed later. This is to follow a logical path according to available data in different stages of the research and was modified according to what was found.
The bodies which produce, systematize and publish information were identified through previously available information and/or inquires in search engines.

Taking into consideration the previous information, each site was browsed according to the following criteria:

a. Search in navigation menus of each site.

b. If there was no reference, key words were searched through an internal search engine (this is to say, the one which searches for words that the user proposes within the URL domain where the web page is published)

c. In case there was no search engine and that the information was not available when using the internal search engines, key words were searched through an external engine.

2. In case there was no previous information, the body in charge of planning, elaborating and disseminating official statistics in each country under study was looked for (national institutes of statistics, census and similar sites). Within each site, information regarding the target sub-dimension was searched as well as which bodies generated these data according to iterative criteria similar to those previously mentioned.

3. Finally, if none of the three previous points were satisfactory, another search was conducted with key words of each sub-dimension and then there was an exhaustive reading of who created the data, the source, the methodology used, etc. If the needed data was not found, it was considered as "not available".

On the other hand, information on regulations and official statistics was requested from authorities such as Road Safety National Agencies, Ministries of Transport, Ministries of Public Health, Enforcing bodies, among others.

4. Field Study

Between June 11 and 14 a pre-test was carried out in Montevideo, in six Observation Points, totaling 1,841 motorcycles observations.

Table N°7: Data collection: observational and survey

	Paraguay	Uruguay	Colombia	Brazil	Argentina	Dominican Republic
Date of survey	August 20-23	September 01 - 09	September 17 - 20	October 22 - 25	November 19 - 23	November 05 - 08
Supervision Date	August 20-31	September 08 - 13	September 22 - 30	November 07	December 11	November 11
Number of observers	20	94	24	27	26	24
Number of interviewers	20	60	24	27	26	24
Number of supervisors	3	19	7	6	8	6
Number of observations carried out	7.893	20.501[6]	11.866	12.848	13.072	21.169
Number of interviews conducted	400	600	500	540	520	480
Company in charge	ICA MARKET Research	FACTUM	IPSOS	Fine Research	Fine Research	Sigma dos

Developed by author

Regarding the initial proposal of observation points (PO), it is worth mentioning some of the modifications made:

In the case of Paraguay and due to security reasons, Concepción was replaced by Caaguazú.

Once in Caaguazú, and due to the resistance expressed by neighbors and authorities at the PO 4 (Pedro Juan Caballero and Guillermo Arias), location was changed after 40 cases to the crossing between 15 de agosto and Roberto L. Pettit streets. In other points there were security incidents that could be overcome without having to change the PO location.

In Uruguay, the initial proposal was to have 18 PO; said number was extended to 47 PO as a consequence of OISEVI-UNASEV´s observational study complementarity.

[6] IMPORTANT NOTE: Eighteen observations points were initially planned for Uruguay, but thanks to the observational study OISEVI-UNASEV, a larger sample of 47 points was possible.

Some changes were implemented in Colombia as suggested by one of the project´s partners, knowledgeable in the country, cities, and the transport system. Some changes were then implemented, Medellín in the province of Antoquia and Barranquilla, in the province of Atlántico, were replaced by Riohacha, in La Guajira province, Santa Marta, in Magdalena province and Galapa, Atlántico province

For this same reason the Brazilian cities of Sao Paulo and Porto Alegre were replaced by Belem, Fortaleza and Recife.

5. Main Observation Indicators

Main observation study results in the six Latin American and the Caribbean countries are shown below focusing on the transport of children by motorcycle.

Table Nº 8: General description of motorcycle use (all)

Country	Wears helmet	Visible clothing	Lights	Uses mobile
Uruguay				
Montevideo	89.5%	36.5%	68.0%	0.3%
Paysandú	98.1%	4%	75.7%	0.0%
Maldonado	95.9%	13.0%	53.3%	0.1%
Colonia	94.5%	35.9%	67.7%	0.0%
Cerro Largo	16.1%	3.7%	61.4%	0.7%
Florida	96.8%	77.3%	20.7%	0.9%
Argentina				
CABA	94.9%	3.8%	72.8%	2.1%
La Plata	65.5%	0.6%	54.8%	0.5%
Córdoba	84.9%	1.3%	41.6%	0.4%
Jujuy	50.8%	6.1%	41.2%	0.5%
Tucumán	38.1%	1.3%	41.1%	1.7%
Paraguay				
Asunción	76.9%	6.0%	43.0%	1.6%
Ciudad del Este	72.8%	13.8%	49.7%	0.5%
Encarnación	72.5%	3.1%	40.0%	0.8%
Caaguazú	6.15	0.6%	8.6%	1.9%
Dominican Republic				
La Vega - Concepción de la Vega	2.6%	2.9%	23.3%	1.2%
Salvaleón de Higüey	7.3%	8.3%	28.2%	1.1%
San Cristóbal	12.9%	9.0%	6.1%	0.4%
Santiago de los Caballeros	21.5%	13.8%	6.5%	0.7%
Santo Domingo	35.8%	17.0%	9.4%	1.3%
Colombia				
Bogotá	99.2%	35.0%	80.0%	3.8%
Cali	90.1%	24.1%	39.0%	2.0%
Galapa	20.6%	5.9%	13.0%	2.2%
Riohacha	33.3%	4.4%	10.6%	3.9%
Santa Marta	88.7%	19.3%	16.0%	3.4%
Brazil				
Rio De Janeiro	99.1%	8.5%	88.1%	0.3%
Fortaleza	94.1%	8.3%	95.0%	1.4%
Recife	99.1%	4.8%	93.3%	1.1%
Belem	59.7%	11.1%	68.3%	2.8%

Developed by author

Generally speaking, the following could be stated:

In Uruguay, Paysandú is the city with the highest helmet use and Cerro Largo is the one with the lowest. Regarding the use of visible clothing, Florida is the one with the highest use, while in Paysandú it is very low. Regarding the use of lights on at all times, the highest use, although being low, occurs in Montevideo. However, the lowest use occurs in Florida. It is worth highlighting that the use of mobile phones is low in all cities. Florida and Cerro Largo are the ones with the highest use.

In Argentina, the Autonomous City of Buenos Aires (CABA) leads the use of helmets in contrast to Tucumán where use is very low. The other cities also show a relatively low use of helmets. The use of high visibility clothing is nearly zero. The highest use occurs in Jujuy with only 6%. The use of lights on is low in all cities. CABA shows 20% more in lights use than La Plata which is in the second position. There is a notorious use of mobile phones in CABA and Tucumán.

In Paraguay, in general, the use of helmets is low but the information from Caaguazú is alarming where barely anyone of those observed wear them. The use of visible clothing is also low in all cities. There is a high use of mobile phones in Caaguazú.

Dominican Republic is the country which shows the worst general performance. The use of helmet is extremely low in all the cities, even in Santo Domingo which is the city with the highest use where only 35% of people use them. As it happens with the low use of the helmet, the use of visible clothing is very low in general terms. Santo Domingo shows the highest use, but it is still low. Both indicators have a very poor performance in Concepción and in Salvaleón. However, these cities are the ones which show the highest use of lights on, still, it is very low. The use of mobile phones is a common practice in all places observed.

In Colombia, Bogotá shows an excellent performance in the use of helmet. It is the capital city with the highest use of helmets. All of these capitals, except for Montevideo, are the cities with the highest use of helmets. Galapa and Riohacha have a very low use of helmets. The use of visible clothing is low in all cities. However, Bogotá is again the one with the best performance while Galapa and Riohacha have the worst. The same happens with the use of headlights. Bogotá shows an acceptable level for this indicator. All cities in Colombia show a worrying use of the cell phone while riding motorcycles.

Generally speaking, Bogotá shows the highest implementation of safety measures while Galapa and Riohacha show the worst.

In Brazil, the use of helmets is very high in Rio de Janeiro and Recife. On the contrary, it is very low in Belem. However, the use of visible clothing is low in Rio, in Recife and in Fortaleza, while in Belem there is a higher record which is still low. The use of headlights on during circulation is important in Fortaleza and Recife but not in Belem. Likewise, the use of mobile phones while riding a motorcycle is very high and relatively high in Fortaleza and Recife. Generally speaking, Belem shows a bad performance regarding the use of safety measures on motorcycles.

Table Nº10 Rate of children traveling by motorcycle

Country	Up to 12 y.o.	Up to 17 y.o.
Uruguay		
Montevideo	3.2%	4.5%
Paysandú	7.7%	10.2%
Maldonado	5.4%	7.7%
Colonia	3.7%	4.7%
Cerro Largo	6.3%	7.3%
Florida	4.5%	6.6%
Argentina		
CABA	5.9%	8.0%
La Plata	5.6%	8.1%
Córdoba	5.0%	7.5%
Jujuy	4.4%	5.4%
Tucumán	4.9%	6.7%
Paraguay		
Asunción	5.3%	8.0%
Ciudad del Este	8.8%	12.0%
Encarnación	5.3%	7.7%
Caaguazú	11.7%	14.0%
Dominican Republic		
La Vega - Concepción de la Vega	10.9%	16.3%
Salvaleón de Higüey	10.1%	15.6%
San Cristóbal	11.6%	17.7%
Santiago de los Caballeros	10.9%	16.5%
Santo Domingo	11.4%	16.2%
Colombia		
Bogotá	3.1%	6.2%
Cali	8.0%	11.4%
Galapa	26.1%	37.0%
Riohacha	13.3%	32.8%
Santa Marta	11.9%	22.4%
Brazil		
Rio De Janeiro	2.3%	4.3%
Fortaleza	2.4%	4.3%
Recife	3.3%	5.6%
Belem	3.6%	6.4%

Developed by author

In the case of Uruguay, Montevideo has the lowest rate of children and teenagers up to 17 years old traveling by motorcycle. However, Paysandú shows the highest rate.

In Argentina, there is a surprising piece of information; CABA shows the highest rate of children under 12 traveling by motorcycle in comparison with other observed cities. Jujuy has the lowest rate. When children under 17 are observed, La Plata is the city with the highest rate of circulation, however, the low proportion in Jujuy is whithin this range.

In Paraguay, Caaguazú, which is the city with the worst performance in the use of safety elements, is the city which has more children and teenagers traveling by motorcycle.

In República Dominicana, San Cristóbal is the city were more children aged 12-17 were observed traveling by motorcycle. However, it is worth mentioning that the use of motorcycles among children under 17 is higher than a 15% in all cities.

In Colombia, Galapa is one of the cities which also showed a poor performance regarding safety measures. It shows the highest number of children aged 12-17 traveling by motorcycle and it has the highest rate of all the cities under study. Bogotá is the city with the lowest number of children traveling by motorcycle.

In Brazil, Belem is the city with the lowest use safety measures and it is, at the same time, the city where the highest number of children aged 12-17 travel by motorcycle. On the other hand, Rio and Fortaleza show a similar proportion of children under 12 and under 17 traveling by motorcycle. However, these cities register the lowest proportion of children traveling by motorcycle within the cities under study.

Table Nº11 Use of safety measures-Helmet (Yes)

Country	Helmet Use			Correct Use [7]			Use of Approved Helmets		
	1 through 5	6 - 12	13 - 17	1 through 5	6 - 12	13 - 17	1 through 5	6 - 12	13 - 17
Uruguay									
Montevideo	68.4%	81.1%	88.2%	84.6%	79.1%	60.0%	84.6%	79.1%	60.0%
Paysandú		100%	98.2%	8.3%	72.2%	76.0%	8.3%	72.2%	76.0%
Maldonado	89.7%	97.1%	93.1%	23.1%	73.5%	66.7%	23.1%	73.5%	66.7%
Colonia	65.5%	91.6%	92.5%	77.8%	100.0%	80.0%			
Cerro Largo	6.9%	6.3%			100.0%			100%	
Florida	66.7%	94.4%	93.3%	25.0%	38.2%	33.3%	25.0%	38.2%	33.3%
Argentina									
CABA	33.3%	80.5%	90.7%	100.0%	87.9%	89.7%	0%	15.2%	20.6%
La Plata	47.6%	68.8%	17.3%	30.0%	77.3%	83.3%			
Córdoba	10.0%	78.0%	58.5%	66.7%	92.3%	86.8%	33.3%	35.9%	21.1%
Jujuy	10.8%	28.0%	24.6%	75.0%	81.8%	79.3%	0%	9.1%	3.6%
Tucumán	7.3%	20.4%	17.3%	42.9%	68.8%	78.9%	28.6%	31.3%	31.6%
Paraguay									
Asunción	22.2%	46.4%	31.7%		76.9%	47.4%			
Ciudad del Este	6.5%	14.6%	21.7%		83.3%	50.0%			
Encarnación	30.3%	43.8%	20.0%		100%	100%			
Caaguazú	0.5%	1.2%			100%				
Dominican Republic									
La Vega - Concepción de la Vega		0.3%							
Salvaleón de Higüey									
San Cristóbal		1.9%	1.7%			57.1%			
Santiago de los Caballeros		3.2%	10.0%			75.0%			
Santo Domingo		1.4%	6.8%			60.0%			
Colombia									
Bogotá	36.7%	90.5%	99.6%	85.0%	90.6%	89.1%	62.5%	47.4%	58.0%
Cali	32.8%	73.6%	81.0%	91.6%	77.5%	80.4%	35.0%	48.4%	48.8%
Galapa		1.6%	7.6%		28.6%	50.6%			
Riohacha		1.4%	8.0%		35.5%	57.0%		100.0%	42.9%
Santa Marta	17.2%	59.2%	75.0%	93.1%	88.3%	76.0%	20.0%	58.6%	58.3%
Brazil									
Rio De Janeiro	100.0%	96.3%	100.0%	84.6%	72.7%	91.7%		34.6%	
Fortaleza	38.3%	88.8%	80.4%	99.2%	94.6%	93.4%	83.3%	86.6%	87.8%
Recife	100.0%	100.0%	93.2%	85.3%	69.1%	85.9%		76.5%	52.7%
Belem		25.9%	29.2%	66.7%	72.7%	74.1%		46.7%	48.5%

Developed by author

In the case of Uruguay, there is a low use in Cerro Largo, for all age ranges and a high rate of use in Paysandú.

[7] It is worth mentioning that the use of helmet does not indicate that it is the adequate one for the child´s size, it only shows whether the one being used is correctly fastened. The offer of approved helmets, depending on the regulation, is as from 52 cm of skull circumference (approximately 2 years old).

Generally speaking, there is a lower use among children aged 1-5. The use of helmets is relatively high among children aged 6-12, however, in Montevideo only 80% of children within that range use it. Besides, for children aged 13-17, Montevideo is one of the provinces with the lowest use, just higher than Cerro Largo where the poorest performance is observed.

The correct use of helmets is low in Uruguay for children aged 6-12 except in Colonia and Cerro Largo. Paysandú shows the worst performance for this variable within children aged 1-5 which is unusual given the performance in other variables.

In the cities under study in Uruguay, the use of approved helmets among children who travel by motorcycles is low in the range 1-5 years old.

In Argentina, in all the cities and in all the age ranges, the use of helmet in children under 17 is extremely low. Only CABA shows an acceptable performance for the last two age groups.

Córdoba, Jujuy and Tucumán show an extremely low use of helmets among children aged 1-5. Besides, La Plata and Tucumán show a very low use of helmets among teenagers aged 13-17 which is alarming.

On the other hand, when the helmet is used, most cases show it is used correctly. La Plata and Tucumán stand out for the low rate of correct use among children aged 1-5. CABA shows the best performance among children aged 1-5.

The use of approved helmets among children is very low. The highest amount is observed in Córdoba for children aged 6-12 in 4 every 10. In Jujuy none of the children aged 1-5 traveling by motorcycle was using a helmet.

In Colombia there is a heterogeneous situation. This is because although Bogotá shows a total use of helmets among teenagers aged 13-17, among children aged 1-5, helmet use does not reach 40%; a performance similar to Cali. Thus, it can be observed in both cities how the use of helmets increases with the age of the children.

In Galapa, Riohacha and at a lower scale in Santa Marta, the use of helmets in children is extremely low.

In Colombia the same situation can be observed since it shows the same performance than in previous indicators where Bogotá has the best records while Galapa and Riohacha have the worst.

In this aspect Bogotá shows the worst performance, where approximately half of the children aged 6-12 use approved helmets. In Cali and Santa Marta helmet use is very low among children aged 1-5.

The use of helmets in children is very low in Fortaleza among children aged 1-5. As low as in Recife for children aged 6-17.

The correct use is relatively low in Belem by all age groups. Fortaleza is the city with the highest use in the three age groups.

The situation for the use of approved helmets is the same compared to the correct helmet, where Fortaleza shows the best performance and Belem the worst one together with Rio de Janeiro.

In Paraguay the situation is even worse than in Argentina. In Caaguazú almost no child uses a helmet. The greatest number of children aged 6-12 using helmets was found in Asunción and it was just one every two, followed by Encarnación. In the age group 13-17, the use of helmet is very low in all cities.

In Paraguay and in Argentina, the use of helmets is the correct one in the cases where they are used.

In Dominican Republic observations are more alarming. The highest use of helmets is observed in Santiago among teenagers aged 13-17 but by only one in ten.

Table N°12: Other safety measures

Country	Reaches footrest			High-visibility clothing		
	1 through 5	6 to 12	13 to 17	1 through 5	6 to 12	13 to 17
Uruguay						
Montevideo		71.7%	100%	15.8%	20.8%	26.5%
Paysandú		76.4%	100%		1.8%	
Maldonado		77.1%	96.6%	3.4%		6.9%
Colonia		79.5%	100%			18.8%
Cerro Largo		56.3%	100%		18.1%	17.7%
Florida		33.3%	97.8%	16.7%	66.7%	48.9%
Argentina						
CABA		56.1%	97.3%		2.4%	2.3%
La Plata		65.6%	91.3%			
Córdoba		74.0%	96.2%			
Jujuy		31.3%	85.3%	2.7%	4.9%	2.5%
Tucumán		59.9%	90.5%		0.6%	
Paraguay						
Asunción		67.9%	96.4%			
Ciudad del Este		46.3%	93.2%			
Encarnación		54.2%	91.9%		2.1%	2.2%
Caaguazú		26.2%	78.4%			1.0%
Dominican Republic						
La Vega - Concepción de la Vega		83.5%	97.2%	0.5%	0.5%	1.5%
Salvaleón de Higüey		61.4%	97.0%	0.9%	0.4%	1.9%
San Cristóbal		48.8%	94.6%		0.2%	2.6%
Santiago de los Caballeros		76.2%	98.4%	1.6%	3.2%	2.7%
Santo Domingo		53.2%	86.1%	1.5%	2.3%	2.9%
Colombia						
Bogotá		72.1%	97.2%	6.7%	19.0%	40.4%
Cali		70.3%	89.8%		15.5%	24.3%
Galapa		23.8%	76.1%			1.1%
Riohacha		18.9%	27.2%			1.0%
Santa Marta		61.2%	94.5%	3.4%	8.2%	18.8%
Brazil						
Rio De Janeiro		63.0%	100%			
Fortaleza		73.1%	99.3%	2.1%	3.0%	1.1%
Recife		73.5%	86.0%		2.9%	
Belem		48.3%	94.0%			

Developed by author

Apart from the helmet other elements and measures can be used to provide better safety to children who travel by motorcycle. Among them, it is worth mentioning the child reaching the footrest and the use of high visibility clothings by at least one of the motorcycle passengers.

In Uruguay, where both issues are considered by the National Act, there is no evidence of the good use of these safety measures. Forida is the city which shows the best performance for children aged 6-17 in terms of visible clothing, but the worst performance in the number of children reaching the footrest. On the other hand, the low use of high visibility clothing negatively impacts Maldonado for teenagers aged 12-17.

In Argentina there is a low proportion of children aged 6-12 reaching the footrest. Jujuy is stands out negatively.

The use of high visibility clothing is considerably low in all cities, but it should be mentioned mentioned that it is not mandatory.

In Paraguay and in Dominican Republic, its use is not mandatory in the latter, is lower than in Argentina. Caaguazú and San Cristóbal respectively are the cities with the lowest number of children reaching the motorcycle´s footrest. The use of high visibility clothing is zero.

Bogotá in Colombia shows once more the best performance in the use of high visibility clothing for teenagers aged 13-17, but only 4 every 10 used them. Galapa and Riohacha are the cities with the worst performance regarding the use of safety measures. They show a low tendency to use high visibility clothing and children reaching the footrest.

Generally speaking, the use of high visibility clothing in Colombia is very low and many children travel by motorbike without reaching the footrest.

In Brazil, Belem is again the city with the worst performance. Only 43% of children reach the footrest and the use of high visibility clothing is extremely low in all cities.

Table N° X: Position in which children travel

Country	Position 0[8]	Position 2	Position 3	Other[9]
Uruguay				
Montevideo	14.3%	80.8%	4.9%	
Paysandú	3.8%	86.5%	9.6%	
Maldonado	17.5%	76.2%	4.8%	
Colonia	27.3%	63.6%	9.1%	
Cerro Largo	29.8%	63.2%	7.9%	
Florida	57.1%	38.1%	4.8%	
Argentina				
CABA		100%		
La Plata	13.8%	82.8%	3.4%	
Córdoba	9.8%	85.4%	4.9%	
Jujuy	27.3%	72.7%		
Tucumán	23.2%	73.5%	3.4%	
Paraguay				
Asunción	20.5%	71.8%	6.0%	1.7%
Ciudad del Este	22.1%	67.5%	10.4%	
Encarnación	26.2%	67.2%	6.6%	
Caaguazú	31.7%	63.5%	4.8%	
Dominican Republic				
La Vega - Concepción de la Vega	41.1%	43.3%	5.3%	10.3%
Salvaleón de Higüey	30.1%	53.9%	8.7%	7.3%
San Cristóbal	17.3%	50.7%	7.1%	24.9%
Santiago de los Caba-lleros	33.0%	50.0%	6.9%	10.1%
Santo Domingo	20.4%	59.0%	9.9%	10.7%
Colombia				
Bogotá	5.6%	93.4%	1.0%	
Cali	27.8%	53.9%	1.3%	17.0%
Galapa	20.0%	50.0%	20.0%	10.0%
Riohacha	4.8%	85.7%	9.5%	
Santa Marta	8.9%	86.7%	2.2%	2.2%
Brazil				
Rio De Janeiro		100%		
Fortaleza	7.8%	90.7%	1.6%	
Recife	4.8%	95.2%		
Belem		91.5%	8.5%	

Generally speaking, in the Uruguayan cities, children are transported in the correct position; except for Florida where the majority travel in front.

In Argentina, the worst situation was observed in Tucumán and Jujuy due to the transport of children in position 0.

In Paraguay, a significant number of children travel in front of the driver which is an important risk.

[8] Position 0 is in front of the driver, Position 2 is behind the driver.

[9] It includes positions 00, 4, side 1 and side 2

Children traveling in dangerous positions were recorded in Dominican Republic; the percentage is quite high if we add up all the positions where a child should not travel. In this sense, only half of the children travel in the correct position.

In Colombia, although most of the children are correctly placed, in Cali and Galapa there is a significant use of the other positions.

In Brazil, however, only a few children travel in least safe positions.

Generally speaking, an observational study represents a photo of the current situation. In this sense and regarding the status of children traveling by motorcycle, it is possible to see that in Dominican Republic and in Colombia, there are a significant number of children being transported by motorcycle.

It is also worth mentioning that the situation in the cities is heterogeneous but in general the use of helmets is low in all age groups. The use of visible clothing is very low in almost all the cities.

Considering these users´ vulnerability plus these vehicles´ vulnerability, the use of safety measures is crucial for the children´s lives.

6. Main survey results

The table below summarizes the main data collected from a survey among adults who usually transport children by motorcycle.

Table N°12: Survey´s General Results

Country	All the occupants always use helmet	Uses safety measures for children (helmet, visible clothing, position)	Children travel safely or quite safely	Knowledge on the regulation to travel by motorcycle.
Uruguay				
Montevideo	73.9%	92.5%	57.5%	66.0%
Paysandú	100.0%	100.0%	50.0%	63.2%
Maldonado	97.4%	100.0%	74.4%	87.9%
Colonia	60.7%	96.3%	85.2%	87.9%
Cerro Largo	16.7%	55.6%	72.2%	87.9%
Florida	84.6%	100.0%	78.6%	87.9%
Argentina				
CABA	73%	88%	70%	90%
La Plata	74%	99%	64%	78%
Córdoba	48%	97%	44%	96%
Jujuy	17%	57%	67%	78%
Tucumán	37%	80%	82%	90%
Paraguay				
Asunción	56%	73%	27%	60%
Ciudad del Este	51%	72%	38%	67%
Encarnación	75%	98%	28%	69%
Caaguazú	23%	46%	42%	75%
Dominican Republic				
La Vega - Concepción de la Vega	10%	41%	66%	66%
Salvaleón de Higüey	17%	72%	39%	79%
San Cristóbal	37%	68%	63%	72%
Santiago de los Caballeros	30%	34%	40%	43%
Santo Domingo	58%	61%	78%	73%
Colombia				
Bogotá	96%	97%	77%	86%
Cali	88%	96%	65%	86%
Galapa	100%	100%	100%	100%
Riohacha	71%	88%	50%	88%
Santa Marta	96%	96%	78%	83%
Brazil				
Rio De Janeiro	85%	99%	81%	98%
Fortaleza	90%	95%	77%	94%
Recife	81%	97%	46%	90%
Belem	59%	95%	74%	92%

Developed by author

In Uruguay, statements on helmet use are similar to the ones observed. It agrees with the fact that Paysandú is the city with the highest helmet use and Cerro Largo the one with the least helmet use.

Regarding the use of other safety measures, people who travel with children state that they use them a lot more than what was observed.

In relation to the motorcycle safety perception, it is low in Paysandú where a greater use of the helmet and other safety measures is observed.

Most cities state to have good knowledge of current regulations; however this does not match the observation results, where there is a low use of elements/safety measures detailed in the regulation. However, in Montevideo and Paysandú, two provinces which show a good performance in general terms, less knowledge of the regulation is stated.

In Argentina, there is a coincidence between what it is observed and stated in CABA. In the case of Jujuy, the declaration of use is lower compared to observations. However, regarding the use of other safety measures, generally speaking, statements are higher than observations.

Regarding the safety perception of children transport by motorcycle, Córdoba shows the lowest levels in comparison with the rest of the cities, and Jujuy shows the highest.

The number of people stating to know regulations knowledge is very high. In Córdoba, La Plata and Jujuy the reults are lower but are nearly 80%.

In Paraguay, regarding the use of helmets and other safety measures, Caaguazú is where people report the lowest use. This agrees with the observational result. In Asunción and Encarnación the motorcycle is perceived as not so safe for children transport.

The knowledge on regulations is relatively low and similar in all cities.

In Dominican Republic, helmet use is overstated when compared to real values. Only in Santo Domingo the relationship is more even.

Regarding the perception of children traveling safely or pretty safely by motorcycle, 78% of adults who transport children in Santo Domingo state to feel safe or pretty safe while doing so. In Salvaleón and Santiago is where people feel unsafe when traveling by motorcycle.

Regarding knowledge of regulations, the cities show a relatively diverse situation. Salvaleón and Santo Domingo are the city where people state to know the most, while in Santiago shows the lowest rate.

In Colombia, the survey results conform what was observed in Bogotá: the strong tendency to use the helmet and other safety measures. However, in Galapa, where the use of helmet and other safety measures is very

low, people state that they always use a helmet and other safety measures. This is clearly inconsistent with the observation.

In this city, surveyed people state that children travel safely or pretty safely by motorcycle. However, in Riohacha, where similar values were observed regarding the use of helmets and other safety measures, just half of the people expressed feeling children were safe when traveling by motorcycle.

In all the cities a high knowledge of regulations was declared. Again, in Galapa, all the people stated to know the regulations regarding motorcycle transport. All the rest are close to the 90%.

In Brazil statements about helmet use do not coincide in all cases since the observation in Rio presents the best performance, but according to statements, Fortaleza is the one that has the highest use. However, the case of Belem is highlighted where observations and declarations coincide. Anyway, real use is higher than statements in all cities, being the only country where this happens.

Regarding the use of safety measures when traveling with children, affirmative answers exceed the 90%, which coincides with observations in Rio and Recife.

Regarding safety perception, only 46% of those surveyed in Recife consider that children travel safely or pretty safely by motorcycle. The perception is higher in Rio.

All cities show a wide knowledge of motorcycles regulations, exceeding 90% in all cases.

Aiming to deepen results of the survey in each country, profiles of those interviewed are shown below together with information on the use they give to motorcycles, use of safety measures, and safety perceptions and other issues of great relevance to understand the subject and the problem, as well as for decision making.

THIRD PART

7. Challenges and Recommendations

This study raises some challenges regarding the safety of children in motorcycles. In this sense, there is an observed low use of authorized helmets by younger children, in part because there are no authorized helmets for children younger than 2-3 years old, but also because they are not included in regulations or enforced.

Also, the use of other safety measures, such as high-visibility clothing, even in countries were their use is mandatory, is very low. Regarding children, one fundamental safety aspect is that they reach the foot rest; results regarding this aspect are worrisome, even in Uruguay where it has been regulated. Another aspect providing safety to children on motorcycles is occupant location; observations of children were worrisome since most of them travel on non-authorized positions. This is confirmed by the survey, there is a lack of information regarding this aspect as a safety measure.

The motorcycle is the chosen means of transport due to its affordability and quickness; these two aspects are mentioned in the first places in all countries. Also, the perception of safety of children on motorcycles is relatively high in all countries. Cities with the highest number of children traveling on motorcycles are the ones with the lowest use of safety measures. This has to do with perception of safety and also the lack of information.

Generally speaking, there are differences between main cities and capitals and the rest of the country. This shows the importance of local measures when dealing with road safety.

Given the results of data collection, certain recommendations which can contribute to a safer transport of children by motorcycle can be provided:

Recommendations for countries and cities where transport of children by motorcycle is not included in their traffic regulations: Argentina, Colombia and Dominican Republic

- To work hard together with governments to regulate the transport of children by motorcycle and explicitly include within national regulations safety measures and elements needed for the children´s safety in this type of vehicles. Make compliance mandatory through strict enforcement. This would enable homogenization in children transport conditions.
- Also, it is advisable to require the use of approved helmets, a crucial safety element, by all passengers. However, it must be taken into consideration the lack of availability of these elements for children. Thus, if UN regulations for helmets are considered, the minimal skull circumference is approximately 52 cm, therefore, children under 2 should not travel by motorcycle in any case.
- These elements should be available at reasonable prices.
- Since there is no convention regarding the minimum age or height required to travel by motorcycle, the footrest should be another safety element to be taken as a reference. Thus, it would be convenient to require children to be tall enough to use it as a complementary safety element.

- It is advisable to include other safety elements such as the use of high visibility clothing and lights on at all times in the regulations.
- It is advisable to make the theoretical and practical training courses mandatory and to include these issues in the exam to obtain the license. Also, drivers should carry the license with them, and this should be enforced.
- Actions should be developed to raise awareness on the subject, working from different areas such as health, education and media.
- It is recommended that countries present accident rates according to location, type of user and vehicle, type of consequences (injury or death) and victims´age in order to be able to develop actions focused on greater risk points.
- It is worth mentioning that detailed information on the type of injury and age group would promote the understanding of accident consequences and it would strongly contribute to the possible improvement of prevention public policies in victims´ health and treatment. In this sense, it would be desirable to include the health sector.

Recommendations for countries and cities where children transport on motorcycles is considered in traffic regulations, but there are still other safety measures that may be included: Paraguay, Brazil and Uruguay

- Strongly work with governments to include safety measures and elements which are still not considered in the current regulation and which are needed for the children´s safety in this type of vehicles. Make compliance mandatory through strict enforcement. This would enable homogenization in children transport conditions.
- Also, it is advisable to require the use of approved helmets, a crucial safety element, by all passengers. However, it must be taken into consideration the lack of availability of these elements for children. Thus, if UN regulations for helmets are considered, the minimal skull circumference is approximately 52 cm, therefore, children under 2 should not travel by motorcycle in any case.
- These elements should be available at reasonable prices.
- Since there is no convention regarding the minimum age or height required to travel by motorcycle, the footrest should be another safety element to be taken as a reference. Thus, it would be convenient to require children to be tall enough to use it as a complementary safety element.
- It is advisable to include other safety elements such as the use of high visibility clothing and lights on at all times in the regulations.
- It is advisable to make the theoretical and practical training courses mandatory and to include these issues in the exam to obtain the license. Also, drivers should carry the license with them, and this should be enforced.
- Actions should be developed to raise awareness on the subject, working from different areas such as health, education and media.
- It is recommended that countries present accident rates according to location, type of user and vehicle, type of consequences (injury or death) and victims´ age in order to be able to develop actions focused on greater risk points.
- It is worth mentioning that detailed information on the type of injury and age group would promote the understanding of accident consequences and it would strongly contribute to the possible

improvement of prevention public policies in victims´ health and treatment. In this sense, it would be desirable to include the health sector.

8. General Conclusions

Data presented in this study allows us to understand the conditions of children transport by motorcycle and also the ideas adults who transport children by motorcycle have in this respect.

This way, one of these study´s main strengths is that it provides a great amount of information which is systematized, contrastive and new for countries in Latin America and the Caribbean.

As well, this study allows us to compare the situation of large and important cities with smaller ones. This enables the visualization of existing differences between cities within a country and provides specific input to work on each of them taking them as an example to make progress in this area.

The study has faced some difficulties which are also challenges for the region. It has been mentioned in several opportunities that the information and data on road accidents in Latin America and the Caribbean is insufficient. Several efforts have been made from OISEVI which led to progress; continuing promoting this line of work is crucial. In this sense, it is necessary to continue working to have available information on road crashes discriminated by age group, type of user and vehicle involved.

Additionally, there are weaknesses resulting from the availability of resources. Ultimately, the number of cities per country depends on the resources available. Taking this into account, only some cities were measured, national representativeness was not achieved. Also, cities were not randomly, but deliberately selected.

There are limitations related to methodology and stratification used for this type of studies in the region that go beyond this study.

This first direct approach to the problem aims to create the basic knowledge required to promote, in the medium-term, the improvement of children transport by motorcycle and that measures can be taken in the medium and long-term to reduce deaths and injuries as a consequence of road crashes.

The study is a first direct approximation to the problem and it aims at the creation of a knowledge base that promotes the improvement, in the medium term, of conditions for children transportation on motorcycles, and the contribution by medium and long-term measures to the reduction of deaths and injuries caused by road crashes.

This study will not have accomplished its essential objective of improving transport conditions of children until governments and organizations show the will to incorporate, implement and demand minimum requirements to contribute to the reduction of deaths and injuries as consequence of road crashes.

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FUNDACION
GONZALO RODRIGUEZ