2018 UAB Global Health Case Competition

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Road Traffic Injuries In Granada, Nicaragua: Prevention, Safety, and Emergency Response

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All characters and plots described within the case are considered fictional and bear no direct reflection of existing organizations or individuals. The case topic, however, is a true representation of circumstances in Nicaragua. The case scenario is complex and does not necessarily have an ideal solution, thus encouraging a discerning balance of creativity and knowledge. Provided are informative facts and figures within the case and appendices to help teams create a proposal. The data provided are derived from independent sources, may have been adapted for use in this case, and are clearly cited allowing teams to verify or contest them within their recommendations, if necessary. Teams are responsible for justifying the accuracy and validity of all data and calculations that are used in their presentations, as well as defending their assertions during judging.

Opening Scenario

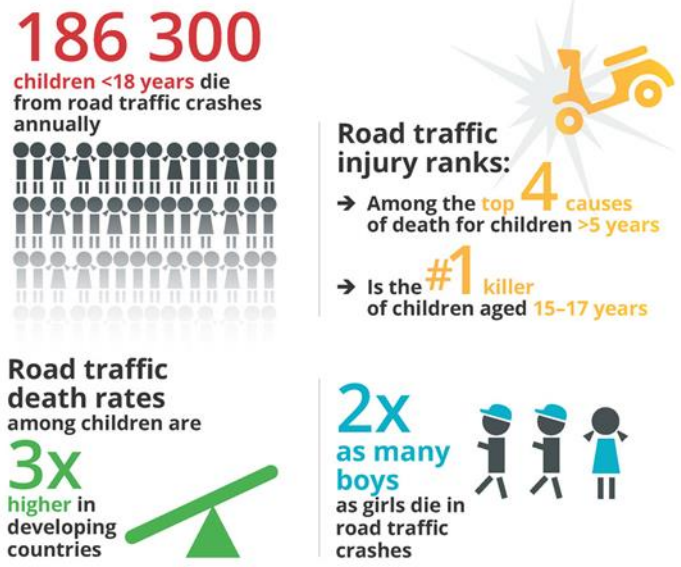
Miguel Jose Guerra is the new Program Manager for a non-profit organization called Nicaragua ALTO. Nicaragua ALTO, in collaboration with the Directorate of Security of National Transit (DSTN), aims to expand the efforts of the Nicaraguan national road safety program. The program seeks to raise awareness about the impact of road traffic accidents and decrease the number of fatalities and injuries pertaining to road traffic accidents in Granada, Nicaragua. Mr. Guerra has scheduled a meeting with the heads of the Nicaraguan National Police and emergency services to gauge the occurrence and severity of road traffic accidents in Nicaragua. Mr. Guerra will also collect data regarding the type of vehicle fatalities (vehicle, pedestrian, etc.), availability of medical services and road traffic injuries and mortality.

Upon meeting with the heads of the National Police, Mr. Guerra is dismayed to learn that as many as 716 accidents have been reported in one week. Commissioner Fredda Bermudez, the head of the Ambulance Center of the Ministry of Health (MINSA) in Managua, Nicaragua provides Mr. Guerra with data on the utilization of emergency services throughout Nicaragua. Although the government has increased the number of emergency vehicles throughout various municipalities, challenges still remain with decreasing the number of deaths due to road traffic accidents. Commissioner Bermudez, like so many other Nicaraguans, has personally been affected by the prevalence of road traffic accidents. Bermudez lost her husband and 6 year old son in a road traffic accident five years ago. In addition to her husband and son, 4 other individuals lost their lives in the accident, including the driver. The investigation determined the 19-year-old perpetrator of the incident was driving while intoxicated. Commissioner Bermudez’s passion for helping her fellow Nicaraguans stems from this personal tragedy. It is Bermudez’s desire to protect the lives of her family, friends and fellow Nicaraguans.

Introduction

According to the World Health Organization (WHO), road traffic injuries lead to 1.25 million deaths per year worldwide (World Health Organization [WHO], 2017). It is estimated that road traffic injuries are the ninth leading cause of death across all age groups globally and they are the leading cause of preventable death. Additionally, nonfatal injuries caused by road traffic accidents affect up to 50 million people every year (WHO, 2008). Road traffic injuries are predicted to be the seventh leading cause of death by the year 2030 (WHO, 2015b; WHO, 2014). Children are particularly vulnerable. According to WHO, every four minutes a child dies from a road traffic accident (United Nations [UN], 2015). Figure 1 displays the impact of road traffic accidents: it is the #1 killer of children ages 15-17 and the #4 cause of death for children over the age of 5. Underdeveloped pedestrian infrastructure places pedestrians at a greater risk of being hit by a vehicle, with few sidewalks and crosswalks in place. Motorcycles also play a large role in the roadway fatality rate (UN, 2015).

Figure 1. Key Facts: UN Save Kids Lives Campaign (United Nations, 2015)



Road traffic injuries in the Americas is a serious public health issue, with 154,089 deaths per year, which accounts for 12% of road traffic deaths globally (Pan American Health Organization [PAHO], 2016). Although the Latin Caribbean has a lower rate of motorization in comparison to North America, the Latin Caribbean still has a higher average road traffic death rate per 100,000 population (22.2 per 100,000 in comparison to 11.0 per 100,000) (PAHO & WHO, 2016). Some of the leading causes of road traffic accidents include rapid urbanization, motorization, unsafe road infrastructure, speeding, driving under the influence of alcohol and substances, and violating traffic laws (WHO, 2017; Borges et al., 2017).

Nicaragua is one of the countries with the highest threat to its citizens caused by road traffic accidents. The reported mortality rate caused by road traffic injuries in Nicaragua was 15 per 100,000 people as of 2015 (The World Bank, 2017) and 13.2 per 100,000 in 2016 (IHME, n.d.). There was also a report of 4,560 injured cases. (US Department of State Overseas Security Advisory Council [OSAC], 2017).

Road traffic injuries and fatalities cause an economic burden worldwide. According to WHO, road traffic deaths and injuries in low and middle-income countries are estimated to cause economic losses of up to 5% of gross domestic product (GDP) (WHO, 2017). Additional consequences of road traffic accidents include job loss, financial hardship, family malfunctioning, and psychological detriment of road traffic victims and their family. Due to these major impacts on personal safety, physical health, and financial stability, there is an urgent need to reduce the rate of road traffic accidents and injuries in this area.

Case Background

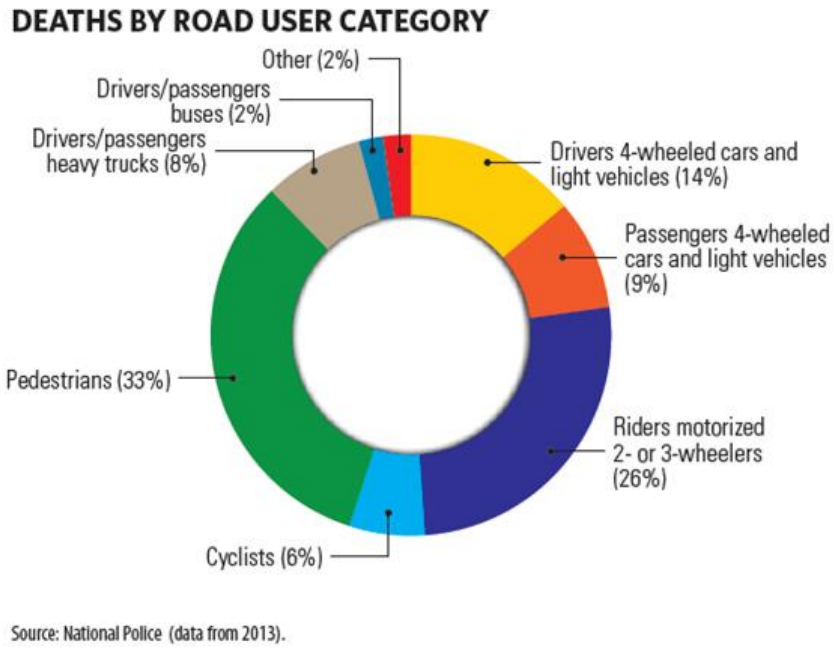
Nicaragua is a middle-income country located in Central America (see Appendix A). It is bounded by Honduras to the north and Caribbean Sea to the east with Costa Rica and the Pacific Ocean to the south and west. Nicaragua is the largest Central American country, known for its dramatic terrain of lakes, volcanoes and beaches, and unique history. Nicaragua was colonized by both the Spanish and British, and gained its independence from Spain in 1821. Its natural beauty, colonial architecture, rich cultural and historical background makes it a frequent tourist destination. Official language is Spanish. About 55% of Nicaragua's 6 million people reside in the urban areas, particularly in the capital city, Managua. About 89% of the population is 54 years or younger. Ethnically, 69% of Nicaraguans are Mestizo (mixed Amerindian and White), 17% are White, 9% are African Americans, and 5% are Amerindians. Approximately 86% are Christians, predominantly Roman Catholics (52%) and Evangelists (34%) (Central Intelligence Agency [CIA], n.d.). With a gross domestic product (GDP) of $12.69 billion, Nicaragua is ranked as the 117th largest economy in the world, and remains one of the least developed countries in Latin America. Despite the progress, poverty remains high. In 2014, 29.6% of population lived in poverty and 8.3% lived in extreme poverty. Public spending is limited and access to basic services is challenging (World Bank, n.d.). Major forms of transportation used include cars, boats and motorcycles. In 2007, the Pan American Health Organization (PAHO) reported 382,707 vehicles were registered in Nicaragua. The largest percentage of vehicle types included minibuses (39%), motorcars (31%) and motorized 2 and 3 wheeler vehicles (16%) (PAHO, 2016). According to the Institute for Health Metrics and Evaluation (IHME, n.d.), mortality rate due to the road injuries was 13.2 per 100,000 in 2016. Nicaragua ranks 63 in the world for age adjusted death rate (World Health Rankings, n.d.).

Granada, Nicaragua at a Glance:

Granada, with a population of 120,000, is located in southwest Nicaragua. It is one of the oldest settlements in Central America and it is the headquarters of the conservative party (Aurora Beach Front, n.d.; Encyclopedia Britannica, 2018). Granada is a popular tourist destination and it is the economic headquarter of Nicaragua. The majority of the transportation system is located in the western part of the country. In 2014, 1,110 deaths were related to road traffic accidents.

Figure 2 below displays the number of deaths in Nicaragua by road user category: pedestrians (33%), riders motorized 2 or 3 wheelers (26%), drivers 4 wheeled cars and light vehicles (14%) (PAHO, 2015). Several factors play into the characteristically dangerous roadway conditions in Granada and Nicaragua in general. Drivers in Nicaragua traverse on the right side of the road, and the country has major highways comparable to the United States (OSAC, 2017). Beyond major highways, however, torrential seasonal rains have a detrimental impact on the condition of connector and less-traversed roadways. Some dangerous roadway hazards common in Nicaragua are potholes, narrow or lack of shoulders, and poor illumination (US Department of State, 2017).

Figure 2. Death by road traffic user category (PAHO, 2015)



Current Strategies

Global Call to Action:

In 2015, based on the 2000 Millennium Development Goals (MDG), WHO established the 2030 Sustainable Development Goals (SDGs). The SDGs consist of seventeen target goals that seek to address and reduce the biggest threats to health and well-being worldwide. Amongst the seventeen SDGs, Goal 3 Target 3.6, aims to reduce the number of deaths and injuries due to road traffic accidents by fifty percent (WHO, 2015b). SDG Goal 11 seeks to improve road safety, increase public transportation and provide sustainable transport systems (PAHO, 2016). There are numerous factors in relation to road traffic safety that would improve or decrease the number of road traffic injuries and fatalities in developing countries. These factors include reducing speed limits, reducing drunk-driving, improving motorcycle helmet use, increasing seat belt use and increasing child restraint use (PAHO, 2016).

The PAHO publishes the Global Status on Road Safety Report, which documents country profiles on the enforcement of legislation (on a ranking scale of one to ten). In terms of legislative enforcement, Nicaragua scored nine out of ten, nine for drink-driving, nine for motorcycle helmet use, no data was collected for child restraint, and nine for seat belt enforcement (PAHO, 2015). GSRRS 2015 provides statistics on road traffic safety globally and further expounds road safety regulations that member states can modify and enforce.

Child Safety:

The use of restraints reduces the number of fatalities for young children between 54% and 80% (WHO, 2017). Legislation not only must be mandated in relation to seat belt use and child restraints, but the legislation must coincide with public campaigns, child restraint loan schemes and incentives supporting the use of child restraints. In addition to recommending the use of child restraints, the

United Nations recommends educating families on the use of child restraints, implementing international standards for child restraints, children wearing light colored attire (including retro reflective strips on attire and school backpacks), and adult community volunteers to accompany children along designated routes (United Nations 2015).

Reducing Speed Limit:

GSRRS recommends countries decrease the maximum urban speed limit to 50 km/h to reduce the number of fatalities (PAHO, 2015). According to the GSRRS, pedestrians have a 20% chance of dying if hit by a motorist traveling no more than 50 km/h (31mph). The chances of dying increases to 60% if a pedestrian is hit by a motorist traveling a minimum of 80 km/h (50 mph) (PAHO, 2015).

In terms of public policy, Nicaraguan transit officials have considered various methods to decrease the number of road traffic occurrences. The National Police has proposed and implemented road safety changes that include reevaluating the speed limits and imposing a fine for excess speed (exceed 90 km/h or 56 mph) (Romero, 2017). The urban speed limit in Nicaragua is 45 km/h (28 mph), the rural speed limit is 100 km/h (62 mph) and the motorway speed limit is 60 km/h (37 mph) (WHO, 2015a). Since adolescents are significantly impacted by road traffic accidents, the United Nations recommends lowering the speed limit specifically for young drivers (United Nations, 2015).

There is a national helmet law in Nicaragua for drivers and passengers of motorcycles, which include two- and three-wheeled vehicles; however, it is not sufficiently adhered to or enforced.

Drink-Driving:

According to WHO, a blood alcohol concentration above 0.05 g/dl for adults and 0.02 g/dl for youth increases the likelihood of accident (see Appendix B). The enforcement of drink-driving laws can decrease the number of possible fatalities by 20%. Globally, countries have varying legislation in relation to the age at which an individual can legally purchase alcohol and how they define BAC. The

legal age in which a citizen of Nicaragua can purchase alcohol is 19 (WHO, 2004). Article 51 of Law 431 Numeral 1 designates how BAC is defined by Nicaraguan transit officials:

> *"A person is considered to be driving while intoxicated when the blood alcohol level test performed with the Breathalyzer or another type of laboratory analysis, with a written report, indicates that the driver has a blood alcohol level greater than or equal to 0.50 grams of alcohol per liter of blood (≥ 0.50 g/L blood). This infraction is punishable with the temporary suspension of the driver's license. For any quantity of alcohol less than 0.50 grams of alcohol per liter of blood, this shall mean that the person is driving with alcoholic breath, but not while intoxicated, and the driver shall be assessed the fine set forth in numeral 38 of the Art. 26 of Law 431."* (WHO, 2010).

Emergency Services:

Rosario Murillo, Coordinator of the Communication and Citizenship Council, announced in January 2015 that the Nicaraguan government would seek to acquire 189 new ambulances for the entire country (Solorzano, 2015). Murillo's aim was to have at least one ambulance in each municipality; the long term goal was to have a least one ambulance within every district in each municipality; Nicaragua currently has 153 municipalities. Although Nicaragua has suffered a deficit in relation to emergency ambulance services, the government has taken steps to increase the availability of ambulance services. The Sandinista Government, in collaboration with the Ministry of Health (MINSA), increased the number of emergency vehicles by 48 in 2017 (The Government, 2017). Nicaragua's government has taken action to improve the accessibility of ambulances. However, the lack of sufficient physicians and hospital beds could thwart their plans. Nation Master reports that Nicaragua ranks 47th out of 53 in terms of the number of physicians, with 0.37 per 1,000 people (NationMaster, 2018). In terms of the number of hospital beds, Nicaragua ranks 59th out of 60, with 0.9 hospital beds per 1,000.

Education and Public Campaign:

Commissioner Vilma Reyes, Chief of the Directorate of Security of National Transit (DSTN), believes road traffic safety education is the key to decreasing the number of accidents and fatalities in Nicaragua. Nicaraguan transit officials are promoting school educational programs, such as the national *Saving Lives (Salvando Vidas)* initiative and training across all sectors of Nicaragua (Alvarez, 2018). *Saving Lives* is a national government program implemented in partnership with other community entities (i.e. Evangelical church) to educate the public on the importance of road traffic safety and accident prevention (The Voice, 2017a). The program consists of road safety and accident prevention seminars, house-to-house visitations, community marches through targeted departments, campaign stickers, etc. (The Voice, 2017b).

The Department of Road Safety and Prevention is responsible for developing road traffic safety education strategies. The department has established a partnership with the Ministry of Education to promote road safety awareness at the initial, primary and secondary teaching levels (National Police Traffic Safety Directorate, 2018). Schools have created brigades for students in order to teach the meaning of traffic signals and how to cross the street at points of entry and exit from classes (Bermudez, 2011). The program aims to improve road culture by highlighting the importance of adhering to traffic signals and the safety of pedestrians. Pedestrians are significantly vulnerable in relation to road traffic accidents, representing 33% of deaths due to road traffic accidents (PAHO, 2015). Pedestrians are encouraged to adhere to road safety measures by utilizing pedestrian bridges (Alvarez, 2017).

Better Managua (*Managua Mejor*):

The Traffic Directorate of the National Policy of Nicaragua and the Mayor's Office of Managua implemented the *Better Managua (Managua Mejor)* plan in 2015 to improve vehicular fluidity in the capital of Nicaragua (El Nuevo Diario, 2015a). *Better Managua* was initially designed for drivers to receive entry and exit traffic flow assistance from transit agents during traffic peak hours in the country's capital. Over 1,000 transit agents were dispatched to assist drivers Monday-Friday from 6:30

AM to 8:30 AM and from 4:00 PM to 7:00 PM. Although the program was initially implemented in Managua, the Coordinator of the Council of Communication and Citizenship of the Government announced the extension of the plan to 15 additional municipalities (El Nuevo Diario, 2015b).

In addition to decreasing traffic delays, government officials hope to reduce road traffic accidents, improve the response time to road traffic accidents and increase the involvement of police agents in traffic regulation during emergencies (El Nuevo Diario, June 2015b). The national police have also implemented "The Ten Commandments of the Road" Initiative, executed by the Vatican in 2007, in order to appeal to the religious and predominantly Christian population. The Pontifical Council for the Pastoral Care of Migrants and Itinerant People's *Ten Commandments of the Road* include:

I. You shall not kill.
II. The road shall be for you a means of communion between people and not of mortal harm.
III. Courtesy, uprightness and prudence will help you deal with unforeseen events.
IV. Be charitable and help your neighbor in need, especially victims of accidents.
V. Cars shall not be for you an expression of power and domination, and an occasion of sin.
VI. Charitably convince the young and not so young not to drive when they are not in a fitting condition to do so.
VII. Support the families of accident victims.
VIII. Bring guilty motorists and their victims together, at the appropriate time, so that they can undergo the freedom of forgiveness.
IX. On the road, protect those who are more vulnerable.
X. Behave responsibly in relation to others.

Summary of Team Assignments

The lack of road traffic signage, poor enforcement of traffic laws and UN road safety recommendations by local law enforcement and member states, crumbling road infrastructure, and inadequate emergency medical services are all factors that must be addressed to decrease the number of traffic injuries and fatalities globally. Although developing countries lack the proper financial resources to conduct a complete overhaul of their roadway systems and structures, there are small-scale changes that can be implemented to ensure the safety of their citizens based on the UN's road safety recommendations.

You have been tasked with submitting a proposal for the development and implementation of a program that is effective, culturally appropriate, and feasible. It may include interventions incorporating educational, policy, social, and/or other strategies that involve important stakeholders from local government, the community, non-governmental organizations, universities, and other partners. Mr. Guerra has been given a timeframe to develop and implement an effective road traffic injuries and fatality intervention program over a period of five years. The maximum amount you are permitted to request is $2,000,000 USD for the duration of the program. Your team must present your plan to a panel of local and global experts on February 3, 2018. You will need to justify your decisions concerning the development of your final strategies and be prepared to explain the details of your plans.

Important Considerations

- Choice of Target Population: Who is the target population and why did the team choose to target them?
- Who will you develop partnerships with to leverage resources and expertise?
- Who are the stakeholders and decision makers?

- How will you monitor and evaluate your project?
- Are the proposed strategies feasible, effective and culturally appropriate?
- For your intervention program, what are the:
    - Objectives?
    - Strategies?
    - Settings?
    - Budget?
    - Timeline?
    - Sustainability?
- What are your specific plans to address:
    - Dissemination of information about road traffic injuries and fatalities
    - Enforcement of small scale regulations
    - Proper use of road traffic signage
    - Pedestrian awareness and safety
- What impact will this implementation have at the individual, family, community, and national level?
- Are there any long-term or short-term economic consequences?
- Can a socio-ecologic framework be used in assessing this problem and how will this be accomplished?

Important Aspects of Proposed Strategy

- Social Benefit/Social Return on Investment: Impact on health outcomes, economic improvement, and productivity at the personal, family, and community levels
- Feasibility: How well do the proposed strategies utilize and/or improve capacity of current health systems, training/education required to implement plan, what provisions for education, product, or service delivery?
- Economic Impact: Direct costs associated with proposed strategies; transportation and/or opportunity costs to stakeholders
- Cultural Acceptability: Cultural perceptions of the proposed strategies and the extent to which they have taken in local cultural context and technologies
- Legal and Ethical Issues: Strategies for how these will be addressed, if applicable
- Scalability: Application of recommendation to other communities or more extensive coverage beyond Uganda, provided there is evidence of success
- Sustainability: Plans for how the program will proceed once funding ends
- Monitoring and Evaluation: Comparison of baseline data, to data collected during and after proposed intervention(s) and how this information will be used to inform program improvements and demonstrate impact
- Risk Identification & Mitigation Strategies: Potential challenges/risks associated with recommendation(s) and how those will be addressed
- Innovation: Are there aspects of the proposal which could be considered particularly innovative or creative; novel application of existing technologies or new products/services proposed?

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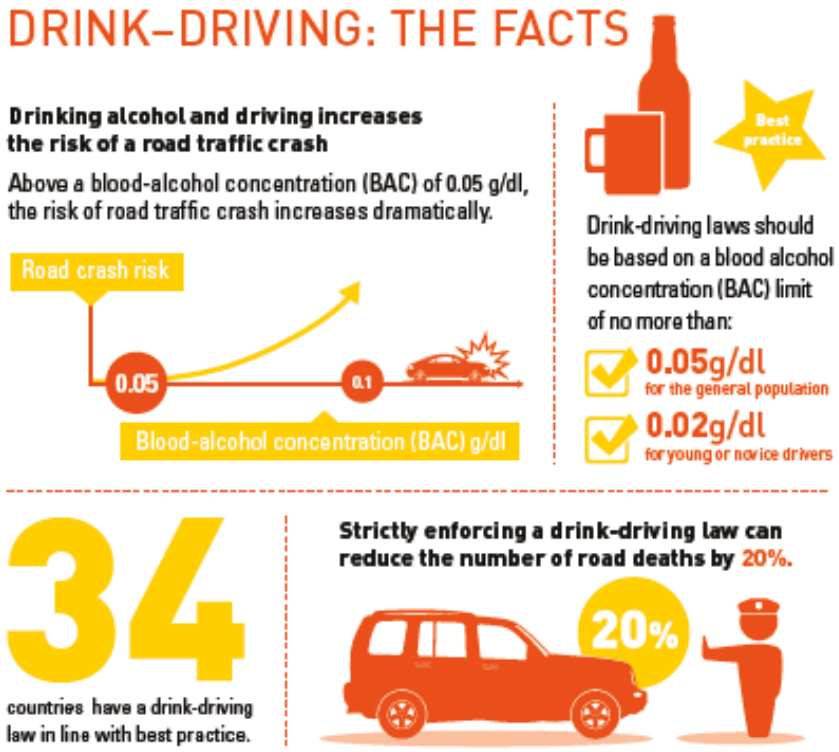
Source originally in Spanish. Source was translated to English in web browser. Translated source is available in zip file. You can also click "Translate to English" in web browser to translate source.

APPENDICES

Appendix A. Map of Nicaragua

Source: Nicaragua Physical Map - Nicaragua Maps. Retrieved from http://mapsof.net/nicaragua/nicaragua-physical-map

Appendix B. WHO Violence and Injury Prevention Drink-Driving Infographic



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