

The effectiveness of uncertified motorcycle helmets in low- and middle-income countries

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Abstract

Motorcycle use is growing rapidly worldwide, especially in low- and middle-income countries. While a parallel campaign is growing for the use of motorcycle helmets, many helmets sold and worn in low- and middle-income countries have not been certified by any safety standard. Certified helmets are typically two to three times more expensive than the uncertified helmets and helmet laws are often not enforced, providing little incentive for riders in these countries to purchase them. While uncertified helmets are generally seen as unable to provide adequate protection against serious brain injury, no study to date has compared the performance of certified and uncertified helmets from multiple developing countries.

This study compared 69 helmets purchased in the United States, China, Colombia, India, Indonesia, Iran, Malaysia, Russia, Thailand, Kenya and Uganda, and examined their performance with respect to their certification and country of origin. Tests were conducted using a helmeted Hybrid-III head and neck mounted to a drop tower. The dummy and helmet impacted a steel anvil at a speed of 6 m/s. Each helmet was impacted six times total, twice on the front, twice on the rear, and twice on the side. Linear accelerations and angular rates of the head at the center of gravity were measured, as well as impact speed and impact forces. These values were used to calculate peak linear acceleration, HIC15, peak rotational velocity, and BrIC in order to compare the helmets with respect to their country of origin, certification, and impact location.

Preliminary results of 14 helmets purchased in the United States, India, and Kenya showed that the Indian and Kenyan helmets had accelerations twice as large as the United States helmets. Their HIC values were more than twice as large. Additionally, the uncertified helmets resulted in accelerations more than twice as large as the certified helmets and HIC values were 2.5 times as large. In other words, the uncertified helmets were about three times more likely to result in an AIS3+ and AIS4+ head injury than the certified helmets in a crash of the severity evaluated.

These results illustrate the value of helmet certifications regardless of the country of origin.. These preliminary results also show that high-income country helmets may be more protective than those sold in low- and middle-income countries, however a more in depth analysis of all the helmets could shed more light into the differences between countries.