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The problem of the pillion rider: India's helmet law and New Delhi's exemption

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ABSTRACT

Background: In India, motorized two-wheeler (MTW) road traffic accidents injure or kill 72,000 women annually. Before the Motor Vehicle Act of 1988, which required mandatory helmet use for MTW riders, a study found 0.6% of all MTW pillions (backseat passengers) were helmeted. Citing religious protests to the legislation, Delhi's high court exempted the city's 12 million women from the law. We hypothesize that currently male pillions use helmets more frequently than females, and that overall pillion helmet usage has increased over the last 20 y.

Methods: Continuous video was recorded in half-hour blocks at four locations in Delhi on separate days, totaling 8 hours of high- and low-volume traffic. Videos were reviewed with at least two reviewers extracting the number of MTW pillions, as well as their gender, approximate age, and helmet usage.

Results: Of 4010 pillions identified, 63.8% were male, 32.4% female, and 3.3% children. Among males, there were significantly more helmeted pillions (88.4%, $P < 0.001$); among females, there were significantly more unhelmeted pillions (99.4%, $P < 0.001$). Among unhelmeted pillions, significantly more were female (81.4%) than male ($P < 0.001$). Current overall pillion helmet use is significantly higher than historical rate ($P < 0.001$).

Conclusions: The significantly higher male pillion helmet usage compared with females indicates Delhi's helmet law is associated with increased compliance among those who fall under its jurisdiction. This augments the growing body of evidence that mandatory helmet laws are efficacious, thus repealing the exemption of women is an important step in increasing female pillion helmet usage.

1. Introduction

In the United States, where many mandatory helmet laws have been repealed for infringing on motorcyclists' freedoms, head injury–associated mortality, and overall mortality rates in motor vehicle collisions rose to their prehelmet law levels [1]. India is currently facing a similar situation. India's Motor Vehicle Act of 1988 made helmet use mandatory for motorized two-wheeler riders (MTWs), including drivers and pillions (backseat passengers) [2]. The capital city, New Delhi, implemented this law in 1997. Two years later, the New Delhi High Court exempted all women

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Table 1 – Pillion rider gender differentiation cues.

Men pillions	Women pillions	Children pillions
Short hair (unhelmeted only)	Long hair (unhelmeted/seen out of helmet)	Seating position (between driver and handle bars)
Seated straddle-style	Seated side-saddle	Held by another pillion
Turban/topi cap	Headscarf	Smaller stature
Suit/tie apparel	Sari/skirt apparel	
Masculine body habitus	Feminine body habitus	

pillions and Sikhs wearing turbans from mandatory helmet use after opponents argued the requirement infringed on religious expression, particularly headscarf and turban use [3]. It was argued that according to Sikh religious practices, no further head coverings may be placed over turbans or scarves.

Before federal helmet laws, Mohan *et al.* [4] conducted a study of helmet use patterns among MTW users in New Delhi. They found pillion riders had a helmet use rate of 0.6% without consideration of gender or age. This metropolis of nearly 22 million persons saw traffic volume grow by approximately 8% per year since 1984, with MTWs consistently comprising one-third of vehicular traffic in that time period [5]. Until late 2012, the fine for violation of the helmet law for those to whom it is applicable was 100 Indian rupees (INR; $1.8 USD), in a city where the average annual *per capita* income is 201,000 INR ($3715 USD) [6,7]. Despite recent attempts by the transport department to require helmets for women pillions on MTWs, the government of New Delhi declined to reconsider the law [8]. Notably, the government did increase the fine for helmet disuse among men to 500 INR ($9 USD) indicating a willingness to take steps to further helmet use among men MTW users.

More than 500,000 Indians were reported injured or killed in motor vehicle collisions in 2011, including at least 72,000 women. MTWs comprised the majority of vehicles involved in fatal accidents [9]. We sought to identify the current patterns of MTW pillion helmet use. We hypothesized that adult male pillion helmet use would be higher than the historical rate, whereas the female pillion helmet use rate would be unchanged. We further hypothesized that male pillion helmet usage would be higher than female pillion helmet use and that female pillions were more likely to be unhelmeted than helmeted.

2. Methods

Thirty minutes of continuous video was filmed at four different intersections in New Delhi totaling 8 h of recorded traffic during the month of May 2011. Intersections were selected for empirically noted and transport department documentation of high traffic volume [5]. Recordings were made each on a different day at distinct times of day to capture morning and evening rush periods along with routine daytime traffic. Permission was obtained from both the local and home institutions' Ethics Board and Internal Review Board, respectively, and we verified that obtaining video recordings would not violate any local statutes.

Locations selected for recording were (Appendix 1; [10]):

1. The Rajiv Chawk Circle and Barakhamba Road intersection: a popular primarily shopping and commerce area
2. The AIIMS Trauma Center Road and Mahatma Gandhi Road intersection: a primarily business area adjacent to a main inlet of the Outer Ring Road Highway
3. The India Gate C Hexagon: a central tourist and business area
4. The Safdarjung Hospital Road and Mahatma Gandhi Road intersection: a primarily business and residential area

Two reviewers with extensive familiarity of South Asian male and female attire screened the video recorded traffic. Reviewers noted all observed MTWs carrying pillions extracting number of pillions, their gender, approximate age, and helmet use status (see Table 1). When one of these extracted data points was discordant between reviewers, video was slowed and/or replayed up to five times and if discordance was still present, that entry was not included in analysis. Where MTWs were noted to be present but extraction of pillion rider data was unobtainable due to poor visibility on the video, such as nighttime or an obstructing vehicle, those MTWs were entered as a single entry in an "obscured" count for each video and were excluded from analysis.

All data extracted were entered into Microsoft Excel (Redmond, WA) for pooling across the videos and for data analysis. Fisher exact test was used for determinations of statistical significance.

For a historical control rate of helmet use, we critically reviewed the observational study of MTW drivers and passengers conducted by Dinesh Mohan [4]. In that study, 3774 MTWs were observed with pillion passengers, constituting approximately one-third of all MTWs observed on the roadways at that time. Of those 377 pillions, 0.6% was helmeted. In the reported data, these pillions were not categorized by gender.

3. Results

A total of 3874 MTWs with pillion passengers were observed. From those, 4010 pillion riders were identified with 3868 adults identifiable by gender (Table 2). The gender of 11 pillions was unable to be determined by two reviewers, and these were excluded from analysis. There were 414 MTWs where the passenger load was obscured by traffic conditions and unable to be extracted.

Adult males represented 63.8% of the total observed pillions, adult females represented 32.4% of total observed pillions, and children represented 3.3% (Table 2).