Motorcycle Safety: Best Practices and Promising Interventions in Malaysia

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Malaysian Institute of Road Safety Research (MIROS)
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Fatality Rates (per 100,000 population) for Malaysia

- Total fatalities/100,000 pop, 22.8
- Motorcycle fatalities/100,000 pop, 13.23
- Other than motorcycle/100,000 pop, 9.57
## Accident Data (2006 and 2008)

### Motorcycle Accidents

<table>
<thead>
<tr>
<th>Severity</th>
<th>2006</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>3,115 (4.54%)</td>
<td>3,476 (4.51%)</td>
</tr>
<tr>
<td>Serious</td>
<td>4,836 (7.05%)</td>
<td>4,683 (6.08%)</td>
</tr>
<tr>
<td>Slight</td>
<td>9,411 (13.1%)</td>
<td>8,955 (11.63%)</td>
</tr>
<tr>
<td>Damage only</td>
<td>51,280 (74.71%)</td>
<td>59,887 (77.77%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>68,642</strong></td>
<td><strong>77,001</strong></td>
</tr>
</tbody>
</table>
## Strategic Road Safety Intervention and Potential Fatality Reduction
### 2007 - 2010

<table>
<thead>
<tr>
<th>Programs</th>
<th>% Intervention Coverage</th>
<th>Potential Reduction %</th>
<th>No of Deaths Involved/yr</th>
<th>Expected No. of Fatality Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>AES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed Cameras</td>
<td>30</td>
<td>1400</td>
<td>84</td>
<td>252</td>
</tr>
<tr>
<td>Red Light Cameras</td>
<td>40</td>
<td>150</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>Lane Discipline</td>
<td>20</td>
<td>450</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Helmet Program</td>
<td>50</td>
<td>1500</td>
<td>225</td>
<td>488</td>
</tr>
<tr>
<td>Rear Seatbelts</td>
<td>30</td>
<td>350</td>
<td>21</td>
<td>42</td>
</tr>
<tr>
<td>Airbags</td>
<td>30</td>
<td>400</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Driver Training</td>
<td>10</td>
<td>300</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>RSE and CBP</td>
<td>20</td>
<td>400</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>M’cycle Lanes</td>
<td>80</td>
<td>500</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Blackspots</td>
<td>30</td>
<td>500</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Others</td>
<td>20</td>
<td>350</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Deaths/10,000 Vehicles:

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.45</td>
<td>2.94</td>
<td>2.45</td>
<td>2.21</td>
</tr>
</tbody>
</table>
Motorcycle Related Initiatives

- Safety helmets standards
  - Child helmet efficacy
- Community based programs (CBP)
  - Safety helmet
  - Visibility Enhancement Material (VEM)
- Motorcycle lane programs
Child Helmet Efficacy

SAFETY HELMET STANDARDIZATION
**Head Injuries (1500 fatalities/year)**

- Principal Cause of Death: 56.5 %
- Skull Fractures: 27.9 %
- Brain Injuries: 38.1 %
- Skull & Brain Injuries: 34.0 %

- Head Injuries by 2.7-fold
- 50 % Potential Reduction
### Accident Data (2006 and 2008)

Motorcycle Accidents Involving Kids (age 1-10)

<table>
<thead>
<tr>
<th>Severity</th>
<th>2006</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>68 (11.31%)</td>
<td>63 (22.99%)</td>
</tr>
<tr>
<td>Serious</td>
<td>197 (32.78%)</td>
<td>95 (34.67%)</td>
</tr>
<tr>
<td>Slight</td>
<td>316 (52.58%)</td>
<td>109 (39.78%)</td>
</tr>
<tr>
<td>Damage only</td>
<td>20 (3.33%)</td>
<td>7 (2.55%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>601</strong></td>
<td><strong>274</strong></td>
</tr>
</tbody>
</table>

Motorcycle accidents involving kids is 1% of total no. of accidents, however > 44% resulted in serious or fatal.
**Fatalities due to Head Injury (Motorcycles) in 2008**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>General population</td>
<td>1638</td>
</tr>
<tr>
<td>Children (1-10)</td>
<td>15</td>
</tr>
</tbody>
</table>
Children at Risk
Children at Risk

Children sitting in front of rider
Children at Risk

Helmets are not designed for children

Helmet size on the vertical are big until it’s resting on the shoulders
Typical Child Helmet Design Requirements

- Size(cm) - 50 – 57
- Outer Shell Thickness(mm) – 5
- Inner Shell Thickness(mm) -25
- Mass(g) – 500 – 1000
- Impact test performance – More than 200 g

Specifications

- MS1: 1996 Addresses general helmet construction and minimum performance criteria, similar to ECE R22
- Size available: min 50 ~ max 62 cm of head circumference
- Current Child helmet test with the same spec with adult
# Helmet Specifications Comparison

<table>
<thead>
<tr>
<th></th>
<th>Snell STD (Child Motorsport)</th>
<th>Malaysian</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size (cm)</strong></td>
<td>49 - 59</td>
<td>50 - 62</td>
<td>&lt;50, 50-52, &gt;52</td>
</tr>
<tr>
<td><strong>Mass (g)</strong></td>
<td>1000 - 1300</td>
<td>No mention (random check result)</td>
<td>Full face</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Child OF 800-900</td>
<td>L &lt;1500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adult OF 1200-1400</td>
<td>M&amp;S &lt;1200</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Impact test, m/s</td>
<td>6.0 - 7.75</td>
<td>5.8 – 6.5</td>
<td>4.8 - 6</td>
</tr>
<tr>
<td></td>
<td>HIC</td>
<td>&lt; 300g</td>
<td>&lt;225g (for &lt;50cm circ)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 290g</td>
<td>&lt;300g (for ≥50cm circ)</td>
</tr>
<tr>
<td>ii. penetration drop height, mm</td>
<td>3000</td>
<td>2000</td>
<td>2500</td>
</tr>
<tr>
<td></td>
<td>mass of striker, kg</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5</td>
<td></td>
</tr>
</tbody>
</table>
Standard Child Helmet

Size 54cm

Approval sticker

Approval sticker, behind comfort liner
Toy/Game Helmet (Non-standard)
Child Helmet Campaign
Malaysian Effort

Direct

• Paper media
• Soft media, i.e. www.panducermat.gov.my
• Advertisement and TV commercials

Indirect

• Addressing children to wear helmets
• Instill safety habits from young age, carry over to adulthood
Child Helmet Campaign

Malaysian Effort

Advertisement and TV commercials

Protect Your Child
With SIRIM Approved Child Helmets
Child Helmet Campaign
Malaysian Effort
Advertisement and TV commercials

Tak ada topi keledar, tak boleh ikut.

Sayang, pakai yang ini baru betul.

Anda Mampu Mengubahnya.
Child Helmet Campaign
Malaysian Effort
TV News
Child Helmet Campaign
Malaysian Effort

Poster

Topi keledar kanak-kanak bukan aksesori. Ianya satu keperluan.

Tiada gunanya kalau tidak diikat ketat.

Lindungi diri anda dengan topi keledar yang disahkan oleh SIRIM. Bagaimana?
Safety Helmets

COMMUNITY BASED PROGRAM
Safety Helmet: Community Based Program (CBP)

Key Players

- Political leaders
- Local authority and agencies
- NGOs
- Private sectors
- Community leaders
- Religious leaders
- Individuals
The Programs

- Give away helmets
- Crash prevention advocacy
- Injury control advocacy
- Sermons/talks/seminars
- Youth activities
- Campaigns
- Ops Nasihat (Advice)
Minister of Transport Popularizing the Motorcycle Child Helmet
Advocacy of SIRIM Approved Helmets
Safety Demonstration to School Children in Progress

29 July 2009
Roadside Advocacy
Kuang & Ijok Helmet Wearing Compliance

WEARING HELMET

PERCENTAGE (%)

WEEK

Beginning of CBP

Kuang
Ijok
Trendline Kuang
Trendline Ijok

29 July 2009
## Kuang & Ijok: Results

<table>
<thead>
<tr>
<th>All Motorcycle Accidents</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuang</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Ijok</td>
<td>29</td>
<td>36</td>
</tr>
</tbody>
</table>
### Kuang & Ijok: Results

<table>
<thead>
<tr>
<th>All Motorcycle Casualties</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuang</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Ijok</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

29 July 2009
Visibility Enhancement Material (VEM)

COMMUNITY BASED PROGRAM
Visibility Enhancement
Material CBP: Why?

1. Luminance contrast

2. Position in other driver’s field of vision

3. Other factors affecting perceptual processes
Luminance Contrast

How Many Lines?

Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
Luminance Contrast

How Many Lines?

Line 1
Line 2
Line 3
Line 4
Line 5
Line 6
Line 7
How do VEMs work?

No VEM

VEM
The Programs

- Coordination and Management

- Distribution:
  - Friday prayers
  - Night markets
  - Factories
  - Repair workshops/outlets

- Advocacy
- Seminar/talks
- Youth Activities
- Ops *Nasihat* (Advice)
VEM Distributions
Ops Nasihat PDRM
Police have also participated by using routine road blocks to distribute VEMS
MOTORCYCLE LANE PROGRAMS
Malaysian Motorcycle Lanes

- Basis
  - Segregation
  - Conflicts
- Features
  - Special standards
  - Capacity and level of service
  - Special warrants
Previous Findings

- 39% less Accidents
- 83% less Fatality
- Benefit:Cost = 5

Source: RURS
Motorcycle Speed-Flow Curve (Space Concept)
Flow Rate, Lane Width and Level of Service
Motorcycle Lane Programs

- Exclusive motorcycle lanes
- Non-exclusive motorcycle lanes
  - Marked
  - Unmarked
Exclusive motorcycle lane in Putrajaya
Exclusive motorcycle lane along Federal Highway
Exclusive motorcycle lane along Federal Highway

01/01/2003
Non-exclusive Motorcycle Lanes

- Paved shoulder programs
- Motorcycle accident models at junctions and link
- Junction treatment measures
Marked non-exclusive motorcycle lane
Marked non-exclusive motorcycle lane
Terminal treatment of non-exclusive motorcycle lanes
IS IT WORKING?

- Not really?
- We need a safe system approach
- MIROS is tackling it through a safe system approach and through research cluster approach
THE CLUSTER APPROACH

- Law and enforcement
  - Legislation
  - Enforcement
- Engineering
  - Vehicle
  - Protection gear
  - Performance
  - Crash reconstruction
- Environment
  - Riding environment
  - Visibility
  - Protection
- Education
  - Road safety education
  - Community based programmes
  - Advocacy programmes
  - Riding training
  - Behavioural analysis
- Health
  - Injury
  - Fatigue
- Global perspectives
THANK YOU

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