The Impact of Road Traffic in Mauritius & Proposed Research Avenues for Sustainable Transport

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Mauritius Research Council

(TMRSU, 2011)
Structure of Presentation:

- Context, Objectives & Rationale of the Report by the NRG-RT
- Guiding Framework & Consultative Process
- Recommended Areas for Research & E.g of Research Themes
- Recommended Research Projects for Sustainable Transport
Context, Objectives & Rationale of the Report by the NRG-RT
The NRG-Report in Context:

- Outcome of a process started in June 2011 in collaboration with MoTERST and facilitated by the MRC.
- Opportunity for the Research Community to extend its network, collaborate & innovate.

Objectives of Report:

- To act as a Needs Assessment for Road Traffic Research
- To summarize the views of experts, the public and the research community
- To identify areas of research and projects with a view to inform local policy decisions in Road Traffic
Rationale for the Report

Road Traffic in Mauritius at a glance

- Our total road network is >2028 Km (TMRSU, 2013)
- 421,926 vehicles on our roads in 2011 (NTA, 2012)

Impact of Road Traffic

- Pollution is caused by Road Traffic via noxious gases and noise
- Inhaling noxious gases has a negative impact on health
- Direct Impact on Health and (Society) is undocumented
- Poor traffic affects the economy and businesses
Consultative Process & Guiding Framework
Role of the National Research Group

- Acted as a Cross-Sectoral Steering Group
- Took stock of the situation and studies done previously.
- Determined course of action and expected outcome(s).
- Vetted research projects of the report

Role of the MRC

- Identified members of the NRG-RT
- Guided the focus and outputs of the needs assessment
- Provided secretarial support to the NRG and drafted report
Consultative Process

- **NRG Title identified:**

- **Research Framework adopted by the NRG:**

- **8 Meetings and 2 Consultative Sessions were organised.**
Examples of Projects, Studies & Reports Encountered: 1999-2010

- Baichoo et al (1999): “An automatic road pricing system to reduce traffic congestion in Mauritius”
- Rughooputh, S; “Transport Panacea for Mauritius!!! Free transport for All & Congestion buster solutions”
Impact of Road Traffic in Mauritius
## Impact of Road Traffic on Health

<table>
<thead>
<tr>
<th>Environmental Pollution: Air</th>
<th>Health Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Particulate Matter (PM)</strong></td>
<td><strong>Chronic exposure</strong> contributes to risk of developing:</td>
</tr>
<tr>
<td></td>
<td>1. Cardiovascular diseases</td>
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<td></td>
<td>2. Respiratory diseases</td>
</tr>
<tr>
<td></td>
<td>3. Lung cancer</td>
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<tr>
<td><strong>Nitrogen dioxide</strong></td>
<td>At concentrations &gt; 2000 µg/m³ = a toxic gas = acute inflammation of airways</td>
</tr>
<tr>
<td><strong>Sulphur dioxide</strong></td>
<td><strong>Respiratory system:</strong></td>
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<tr>
<td></td>
<td>• Airways inflammation</td>
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<tr>
<td></td>
<td>• Bronchitis, Bronchial asthma</td>
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<td></td>
<td>• Infections</td>
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<td></td>
<td>• Reduced lung functions</td>
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<td></td>
<td>It may also be the cause of:</td>
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<tr>
<td></td>
<td>• Increase in admissions for cardiac disease</td>
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<td></td>
<td>• Irritation of eyes</td>
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<tr>
<td></td>
<td>• Increased mortality on days with higher SO2 levels</td>
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<tr>
<td><strong>Ozone</strong></td>
<td><strong>Health effects:</strong></td>
</tr>
<tr>
<td></td>
<td>• Breathing problems (asthma) and lung diseases.</td>
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<td></td>
<td>• One of the air pollutants causing the most concern in Europe</td>
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<tr>
<td></td>
<td>• Daily mortality rises by 0.3% and that for heart diseases by 0.4% per 10µg/m³ increase in Ozone</td>
</tr>
</tbody>
</table>

(MIH, 2011)
Environmental Pollution: Noise

Effects:
- Mental fatigue & stress
- Aural communication: speech, hearing
- Mental concentration
- Sleep

Research:
By engineering team of Malaviya N.I. of Technology, JAIPUR
- 60-85%: RT a main source of noise pollution; annoyance
- a mathematical correlation, direct proportionality
- 52%: Frequent irritation
- 67%: Suffering from common noise-related problems, like headache, loss of sleep

Impact of Road Traffic on Health

(MIH, 2011)
Impact of Road Traffic on the Economy

• Cost of Traffic Congestion to the Economy is MuRs 2.5 -3 billion (Menon, G et al,2004)

• According to an MEF survey, 97.1 % of enterprises surveyed were adversely affected by traffic congestion, with nearly 40 % reporting a very high adverse impact (MEF 2007).

• Other impacts observed included:
  - Higher vehicle operating costs and fuel expenses;
  - Increased transport/distribution costs:
  - Lateness and absenteeism;
  - Stress;
  - Uncertainty;
  - Disruption of planned activities and
  - Delayed deliveries;
  - Difficulties in serving customers:
  - Increased labour/overtime costs;
  - Lower quality of service;
  - Lower sales as a result
Impact of Road Traffic on Society

The following forecast on disease and injury illustrates the projected severity of Road Traffic Accidents in the years ahead, worldwide.

### WHO Forecasts for Diseases & Injuries in 2020.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Disease or injury</th>
<th>Rank</th>
<th>Disease or injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lower respiratory infections</td>
<td>1</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>2</td>
<td>Diarrhoeal diseases</td>
<td>2</td>
<td>Unipolar major depression</td>
</tr>
<tr>
<td>3</td>
<td>Perinatal conditions</td>
<td>3</td>
<td>Road traffic injuries</td>
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<tr>
<td>4</td>
<td>Unipolar major depression</td>
<td>4</td>
<td>Cerebrovascular disease</td>
</tr>
<tr>
<td>5</td>
<td>Ischaemic heart disease</td>
<td>5</td>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>6</td>
<td>Cerebrovascular disease</td>
<td>6</td>
<td>Lower respiratory infections</td>
</tr>
<tr>
<td>7</td>
<td>Tuberculosis</td>
<td>7</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>8</td>
<td>Measles</td>
<td>8</td>
<td>War</td>
</tr>
<tr>
<td>9</td>
<td>Road traffic injuries</td>
<td>9</td>
<td>Diarrhoeal diseases</td>
</tr>
<tr>
<td>10</td>
<td>Congenital abnormalities</td>
<td>10</td>
<td>HIV</td>
</tr>
</tbody>
</table>

- On average there are ≈ 20,000 road accidents ≈ 3050 casualties resulting in ≈ 145 deaths every year in Mauritius (MPF, 2010)
Impact of Road Traffic on Society

Impact on Public at Large (UTM 2012):

• Unsafe Living Environment

• Social Responsibilities affected
  • Less time spent with children and social obligations (early departures & late arrivals at home) and
  • Psychosocial diseases including stress.
  • Opportunity cost of travel time for students;
  • Traffic exposure has been shown to be associated with asthma risk and lung function in children; and
  • Psychosocial stress increases susceptibility to the detrimental effects of traffic exposure

• Impact on Children
  • Security Issues;
  • Sitting posture;
  • Confined space;
  • Road & travel safety;
  • Health issues such as Asthma; Wheezing; Coughing; Social issues
Recommended Cross-Cutting Areas for Research
Cross-Cutting Research Areas

- Costing the impact of road traffic: congestion & accidents
- Impact of Road Traffic on Health due to pollution
- Understanding the behavioural and psychosocial dimension of road use
- Sustainable modes of transport and efficient road use

Rationale

- Provide additional input for Resource Allocation
- Clarify health risks incurred by road users
- Understand how to trigger positive behaviour change in road users
- Reduction of RT and increase efficient use of resources

Impact of Road Traffic on Health due to pollution

Understanding the behavioural and psychosocial dimension of road use

Sustainable modes of transport and efficient road use
Understanding the behavioural and psychosocial dimension of road use

**Main Research Question:**
How can positive behavioural change be instigated in road users?

**E.g. of Research Themes:**
- Mapping commuters knowledge and attitudes
Costing the impact of road traffic: congestion & accidents

Main Research Question:
Do we know the current cost of road accidents and congestion in monetary terms?

E.g. of Research Themes:
Quantifying:
• Medical Costs
• Loss of Quality of Life
• Commuting time and production loss
• Property Damage

(MPF, 2011)
Impact of Road Traffic on Health due to pollution

Main Research Questions:

1. What is the prevalence and resulting cost of diseases caused by road traffic?
2. What are the costs and benefits of Active Transportation i.e. walking, cycling?

E.g. of Research Themes:

- Quantifying the cost of the burden of illness from Road Traffic to the Health System due to Traffic pollution
- Assessing Health Benefits of Active Transportation
Recommended Research Projects for Sustainable Transport
Sustainable modes of transport and efficient road use

Main Research Question:
How to investigate reducing RT and its impacts?

Research Themes:
• Investigating Intelligent Transport Systems & Solutions (ICT & RT)

• Studies:
  ▫ Less car-intensive lifestyle;
  ▫ Collective passenger transport e.g.: car pooling, accessibility and comfort of (public) transport;

• Modelling cost of enhancing the mass transport system in comparison to new road infrastructures (To include both economic and environmental costs);

• Holistic (Green) transport management and planning in congested areas to decrease traffic;

• Investigating changes in fuel composition to improve vehicle efficiency emission. Reviewing and updating the Road Infrastructure System Management Framework.
Conclusion:

Sustainable Transport
<table>
<thead>
<tr>
<th>Name of Group Member</th>
<th>Field of Expertise</th>
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<tbody>
<tr>
<td>Inspector G. Veerasami</td>
<td>Road Safety</td>
</tr>
<tr>
<td>Mrs T. Vaghjee-Rajiah</td>
<td>Human Resources</td>
</tr>
<tr>
<td>Mrs. S. Bhiwajee</td>
<td>Society &amp; Sustainable Development</td>
</tr>
<tr>
<td>Mr. P. Gooljar</td>
<td>Engineering (Traffic Management &amp; Road Safety)</td>
</tr>
<tr>
<td>Mr. N. Veerapa</td>
<td>Road Development</td>
</tr>
<tr>
<td>Mr. D. Romooah</td>
<td>Transport</td>
</tr>
<tr>
<td>Dr. R. Ramyead</td>
<td>Health</td>
</tr>
<tr>
<td>Mr. C.F. Ho Fong</td>
<td>Standards</td>
</tr>
<tr>
<td>Mr. C. Ramnath</td>
<td>Statistics</td>
</tr>
<tr>
<td>Mr. R. Phoolchund</td>
<td>Trade &amp; Industry</td>
</tr>
<tr>
<td>Dr O. Gokhool</td>
<td>IT/Transportation /Engineering/Sustainable Development</td>
</tr>
<tr>
<td>Mr. R. Sungkur</td>
<td>Industry, Commerce &amp; Consumer Protections</td>
</tr>
<tr>
<td>Dr. V. Ragoobur</td>
<td>Economics &amp; Labour</td>
</tr>
<tr>
<td>Mr. M. A. Yadallee</td>
<td>Environment</td>
</tr>
<tr>
<td>Mr. D. Vithilingum</td>
<td>Environment &amp; Sustainable Development</td>
</tr>
<tr>
<td>Dr. B. Seetanah</td>
<td>Transport Economics</td>
</tr>
<tr>
<td>Mr. P. Gopaldu</td>
<td>Engineering (Road Safety Management)</td>
</tr>
<tr>
<td>Mrs. Munhurrun</td>
<td>Society &amp; Sustainable Development</td>
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</table>
Thank you.