



IMPROVING FIRE SAFETY POLICIES FOR A SAFER INDIA

A UL Safety Index Case Study

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BACKGROUND

Standing as the second-most populous country in the world, India adds more to the world's growing population than any other nation, and it is estimated that India will replace China as the most populous country by 2025¹.

The rising population presents significant safety challenges, however. Demands critical to sustaining human life such as water, food, and housing all compound as the population rises, and the increasing demand puts mounting pressure on India's government, charged with the responsibility of maintaining public health and safety².

To augment efforts made by policy stakeholders in creating safe working and living environments, UL scientists have created a tool called the UL Safety Index™. The UL Safety Index uses data-driven algorithms to lay out a blueprint for the exploration of areas related to safety, which can be used by change agents to identify priorities for policies and programs.

In this paper, we focus our attention on fire safety in India as a case study to show how the UL Safety Index can facilitate public health and safety policy analysis. Data shows that India had the highest per capita rate of injuries and deaths due to fires, heat and hot substances in the world (based on 2013 data³). Utilizing these quantitative measures, we will demonstrate how the UL Safety Index assisted in the development of two policy recommendations.

INDIA AND FIRE SAFETY

As a member of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), India has proactively advocated safety standards by sitting on technical committees and participating in various regional standards organizations.^{4,5}

And, there is no doubt about India having distinguishable fire safety policies. For instance, India's constitution outlines the government's role in fire services, which underscores the country's commitment in protecting its citizens from fire related events.

Furthermore, the Indian government spells out fire safety standards at the national level⁶. The National Building Code of India provides detailed fire safety provisions from the ground to roof. Despite these efforts, India has poor fire outcomes, measured in injuries, disability and death, when compared to other countries around the world.^{7,8}

According to the Indian Ministry of Home Affairs, 17,700 people died due to a fire in 2015. However, others have estimated that this number may not capture the severity of the fire situation in India. The Global Burden of Disease study, which also estimates deaths from injuries, estimates that 29,808 people died due to fires, heat and hot substances in 2015.⁹ Other reports estimate the number to be much higher, particularly when including suicides involving fire.

These figures are alarming, and they are only conservative estimates.¹⁰ So, we cannot help but to wonder, what is going on here? Why is there a gap between safety policies and fire outcomes? What recommendations can be made to improve the effectiveness of the policies and reduce the burden of fires in India?



METHODS

The UL Safety Index measures the relative level of safety for a given country based on three drivers - Institutions and Resources, Safety Frameworks and Safety Outcomes. The UL Safety Index is based on a scale of 0-100, with 100 being best. The three drivers are computed by combining sixteen indicators, each indicator representing a unique safety aspect.

THE DRIVERS AND THEIR COMPONENTS:

The Institutions and Resources driver uses four indicators to paint a picture of how well-equipped a nation is in broad, socioeconomic terms. These are Wealth, Education, Government Effectiveness, and Technology.

Wealth, measured as GDP per capita, reflects a given nation's financial capacity in mitigating safety issues. Whether it's building new fire stations or hiring more public safety enforcers, financial resources can greatly amplify efforts promoting public safety.

Education was measured using the United Nation's Development Programme Index. Education is crucial in creating safety awareness. At some point in our lives, we all had to learn about safety precautions like how water is conductive to electricity.

Government Effectiveness was gauged using the Government Effectiveness indicator from the World Bank's Worldwide Governance Indicator Project. Governments can play a vital role in reducing unintentional injuries through laws and regulations such as requiring the installation of smoke detectors in residences.

Technology, in this context, refers to the ability to collect, analyze, and share information. Some examples include safety announcements like flood warning systems or product recall

mechanisms. This was measured using the Network Readiness Index developed by the World Economic Forum. Collectively, these four indicators make up the Institutions & Resources Driver.

The Safety Frameworks driver uses three indicators - Codes and Standards, Consumer Protections, and Labor Protections - to capture a snapshot of public policies addressing safety concerns. These are legislative and systematic safety intervention mechanisms working in the best interest of people's well-being.

Codes and Standards, for example, allows people to live and work in safely-built structures that respect construction requirements for building materials, safety inspections, and precautionary safety systems like fire alarms.

We also looked at consumer protection systems that function in the commercial market. For instance, the Consumer Protection indicator was measured using the Consumer Protection Survey developed by the Consumers International. Some examples include clear product labeling practices and defective product recall systems.

Finally, the Labor Protections indicator was created using the International Labour Organization's data. The indicator looks at the ability of workers to organize to address labor practices and policies. The ILO data is combined with data from social responsibility audits for compliance with local labor and occupational safety regulations.

The Safety Outcomes driver examines nine types of unintentional injuries: transport injuries, falls, drowning, fires, poisoning, mechanical forces, foreign bodies, forces of nature, and other unintentional injuries. UL uses the Disability Adjust Life Years (DALY) from the Institute for Health Metrics and Evaluation to measure the number of years of life lost due to premature death or disability.



RESULTS

This section details how we utilized the UL Safety Index, using the calculation process detailed above, to identify problem areas and derive policy recommendations for a safer India. The scores in the UL Safety Index confirm the findings of our qualitative assessment. For example, India stands easily above the global average in **SAFETY FRAMEWORKS** with the score of 79, achieving high scores in Codes and Standards and Consumer Protections indicators. However, we see that **LABOR PROTECTIONS** indicator has room for improvement with the score of 36.

The **SAFETY OUTCOMES** score, again, reaffirms our qualitative findings. India ranks below the global average among 187 countries in **SAFETY OUTCOMES** with a driver score of 70 and indicator scores ranging from 0 to 91, showing the lowest performance in outcomes related to fire while achieving the best outcomes in events related to foreign bodies. In other words, fire-related outcomes significantly reduce the overall driver score downward. Therefore, unintentional injury outcomes related to fire incidents may need special attention in the policy arena.

INSTITUTIONS AND RESOURCES falls within normal ranges of the global average, but the **INSTITUTIONS AND RESOURCES** is also where we find the most areas of potential for improvement compared to other drivers. The indicator scores range from 29 to 46, with **WEALTH** representing the lowest performance while **GOVERNMENT EFFECTIVENESS** produced the best measure. The scores indicate that India has the institutional and technological resources to mitigate unintentional injury outcomes but lacks in financial and education resources.

Overall, with a UL safety score of 60, India's performance on a global level is average, and ranks second-best in the South Asia region. India's score indicates that the country has developing socioeconomic conditions and preventative safety measures.



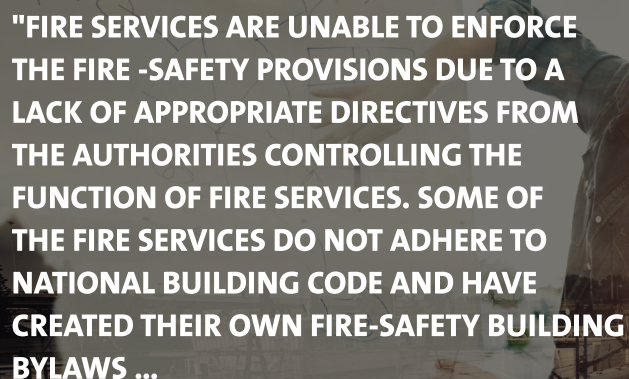
DISCUSSION

During the early stages of the policy analysis, we found that India has attempted to address fire safety challenges by creating policy guidelines in the National Building Code. India's active engagement in developing safety standards reflects the nation's commitment to protecting its citizens from fire events. However, fire safety is still a substantial concern for India. The UL Safety Index was created with these kinds of situations in mind. We see the significance of creating a tool that allows individuals to identify areas of improvement for creating safety policies and programs. And, as this case study shows, the UL Safety Index can function as a policy aid.

First, the quantitative scores measured by the UL Safety Index support the qualitative findings and vice versa. For example, the qualitative analysis has found that India has outstanding fire safety policies while the Codes and Standards indicator produced a score of 100. Both qualitative and quantitative assessments are consistent in their implications such that both are demonstrating that India has adopted a set of building codes, life safety, fire and electrical codes that meet or exceed international standards. Similarly, we found consistent findings between qualitative and quantitative assessments for fire safety outcomes, both pointing to a significant burden of fire related injuries. Furthermore, we have found evidence suggesting that the Indian government has underestimated a large number of fire-related deaths^{11, 12} and, correspondingly, India scores 0 on the fire indicator in the UL Safety Index.

Second, the quantitative measures produced from the UL Safety Index have led to a qualitative finding. For instance, during the process of analyzing the UL Safety Index, we found that India had government effectiveness score of 46, and this allowed us to better understand the gap between outstanding fire safety policies and poor fire outcomes.

Because policies are a set of rules and guidelines, they are ineffective without implementation and enforcement. Thus, for India's outstanding building and safety codes to become effective, they must be enforced in practice. Our research uncovered the following statement mentioned in the Executive Summary of the Indian Fire Hazard and Risk Analysis Report:



"FIRE SERVICES ARE UNABLE TO ENFORCE THE FIRE -SAFETY PROVISIONS DUE TO A LACK OF APPROPRIATE DIRECTIVES FROM THE AUTHORITIES CONTROLLING THE FUNCTION OF FIRE SERVICES. SOME OF THE FIRE SERVICES DO NOT ADHERE TO NATIONAL BUILDING CODE AND HAVE CREATED THEIR OWN FIRE-SAFETY BUILDING BYLAWS ...

IT IS, THEREFORE, NECESSARY TO ENFORCE THE FIRE-SAFETY PROVISIONS THROUGH APPROPRIATE DIRECTIVES TO ALL THE STATES/UTS BY THE MINISTRY OF HOME AFFAIRS (MHA) DIRECTLY OR THROUGH DG, NDRF & CD OFFICE."

Directorate General, National Disaster Response Force & Civil Defense (Fire), Ministry of Home Affairs (2011)

The statement made by the Directorate General shows that lack of enforcement – an element of government effectiveness – is an identified issue, and the UL Safety Index clearly captured this qualitative element in numeric terms.

Additionally, the UL Safety Index demonstrated again that it can be used to identify policy strategies through the Wealth indicator.

In 2016, the Ministry of Home Affairs convened a special fire advisory council to tackle the fire issues surfacing across the country. The members of the fire advisory council included representatives from all states. Based on the needs of their states, the fire advisory council recommended that the

country needs about 8,500 fire stations¹³. Unfortunately, India currently has about one-third of the recommended number, and budgetary limitations are a barrier against constructing more fire stations. In the UL Safety Index, India scores the lowest of Institutions and Resources driver in the Wealth indicator with the score of 29, which reflects the financial limitations in constructing the recommended number of fire stations.

Taking both the qualitative and quantitative findings in mind, we have made two recommendations. First is the preventative measure, and that is to give building inspectors appropriate enforcement

authority at the state and union territories level, and hold building owners accountable for deficiencies. This recommendation is consistent with the official statement made by the Directorate General of NDRF & Civil Defense in 2011.

The second recommendation is a long-term measure: begin constructing fire stations in areas where they are most needed. This recommendation also aligns with the recommendation put forth by the special fire advisory council in 2016. These two policy actions, together, should reduce the number of fire events while increasing the nation's ability to mitigate fire-related events.





LIMITATIONS

Like every scientific study, the UL Safety Index has limitations. Although the UL Safety Index can provide data for 187 countries, the indicator components are linked by a correlation, and so it cannot provide a causal inference. So, users should consider that the UL Safety Index aids the process of identifying areas of possible improvements rather than drawing a direct causal association.

Another aspect that every user should have in mind when using the UL Safety Index is that the UL Safety Index is a global comparison, and it does not compare the indicator scores within a given country. Using India as an example, India scores the lowest in the fires, heat and hot substances indicator. However, this does not mean that fire-related outcomes pose the greatest safety hazard in India; having the lowest performance score in the fire, heat and hot substances indicator means that India performs the lowest in fire-related events compared to the rest of the world. Other safety hazards may be more prevalent within India itself. That said, India can leverage this information to review and enhance its own fire safety practices, and may choose to explore other existing fire-safety framework models to better mitigate the fire risks.

Lastly, the policy recommendations in this case study lack validation from government officials, so the policy recommendations derived from the UL Safety Index should be utilized as means to an end, not an end of itself. In other words, our policy recommendations can either augment the efforts made by Indian government officials or it can serve as a discussion topic for opening safety policy dialogues with the best interest of India in mind.

CONCLUSION

The UL Safety Index is the first of its kind. It is a data-driven tool that identifies priorities for investment in safety policies and programs. Our objective is to open safety policy dialogues among governments, safety professionals, policymakers, and other stakeholders, consequently increasing safety awareness as a public health issue and promoting safe working and living environments. This case study illustrated an example of how the UL Safety Index can achieve these goals by examining India through the lens of the UL Safety Index.

The case study revealed two substantive findings. One, the quantitative measurements produced from the UL Safety Index correspond with the qualitative findings made in the policy analysis. The significance of such findings is that quantitative values capturing the qualitative data becomes a validation process. It allows the collection of explored qualitative results to draw a bigger picture of safety issues for a given country. Two, the quantitative measures provided us with a direction to discover the missing gap between policies and outcomes, which functions as a strategy that enables a researcher or stakeholder to find and focus on specific information across multiple domains of interest. Therefore, the UL Safety Index has successfully demonstrated the ability to function as a useful tool for developing safety policy strategies.

BUILDING A SAFER WORLD THROUGH BETTER ACCESS TO SAFETY DATA

To increase the number of safe countries around the world, we must address societal influences of safety and invest in specific interventions to hazards. The UL Safety Index is a data science initiative that seeks to address gaps in knowledge and information about health and safety by providing a country safety index for 187 nations. Advancing knowledge to address important and emerging safety challenges is central to the UL mission. The UL Safety Index is a significant step towards our commitment of providing better safety statistics to create better safety outcomes. The UL Safety Index will grow to further address worldwide safety in a comprehensive manner by including historical data and adapting it to specific geographic and community levels.

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END NOTES



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