

## An assessment of the prevalence and contributing factors of road accidents in Bangladesh

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### Abstract

**Aim:** This study aims to assess the prevalence and contributing factors of road accidents in Bangladesh, discussing the data collection and documentation process, particularly the Accident Report Form (ARF). **Methods:** Utilizing secondary qualitative data, the study critically evaluates the ARF and associated procedures, identifying deficiencies and proposing criteria for improvement. **Findings:** The analysis reveals challenges in comprehending the ARF, leading to inaccuracies in data entry. Essential details are missing, contributing to incomplete reporting. Discrepancies between the ARF and other incident records highlight the need for a streamlined and accurate documentation process. **Conclusion:** The study emphasizes the importance of a reliable incident database for effective transportation risk management. Recommendations include enhancing the ARF, providing better training for personnel, and implementing a robust data entry system to ensure accurate reporting and promote road safety initiatives in Bangladesh.

**Keywords:** Road accidents, tracking, recording, data, Bangladesh.

## Introduction

Over the past 20 years, there has been an unprecedented increase in traffic accidents in the country of Bangladesh, which has resulted in multiple interpersonal and monetary damages due to injury and casualties (1). A thorough accident database may contribute to substantial advancements in incidence minimization. The gathering and execution of reliable and thorough data regarding traffic occurrences is an integral component of crucial significance in the supervisory role of roadway safety. The analysis of the results can allow us to measure the usefulness of highway safety initiatives, enhance the understanding of technical difficulties, and detect incident issues precisely (2). It additionally assists in determining the course of preventative measures. A detailed dataset is a fundamental requirement for the execution of any functional roadway security strategy. The origin, scope, and geographical distribution arrangement of the traffic accident issue should be recognized by any non-government or government organization engaged in transportation security initiatives.

The study addresses the prevalence and contracting factors of road accidents in Bangladesh while examining the dissemination and documenting procedure in the country.

According to the (3), there is a lack of data on the present Accident Report Form (ARF) to carry out an extensive investigation. The form contains 69 fields of data, of which only the incident attributes assessment can be conducted. In addition, the police personnel consider it challenging to comprehend the questionnaire and lack the capacity to fill out it precisely. Although there is no area on the form for this particular type of detail, still photographs are essential for post-accident inspections. Because the police departments lack webcams to record the incident, not even law enforcement has the capacity to take pictures of the accident location. Police utilize an outdated chainage registry that was established in 1996 to identify incident

places, but it is unfortunately unable to figure out the precise areas (4). Additionally, the police department only retains files of incidents for which a complaint has been lodged. However, for a great number of tragedies that happen every single day in the country, no criminal complaint is ever registered at police departments, meaning that no evidence is archived anywhere.

In our nation, an FIR can be submitted in the course of a serious incident. The ARF is subsequently filled out in the context of an accident while driving. When we evaluate these two compilations of information, we find inconsistencies, which signals that we have neglected a few significant incident information from the initial documenting period. The validity of the evidence and the accuracy of the details of the linkages process are crucial aspects of the rate of accidents (5). Insufficient reporting has led to discrepancies in the compilations of accident data in our nation, especially when compared to less-intensity incidents. The institution and duties involved in safeguarding a relevant incidents database, the determination and assessment of accident-related factors, probable causes of mistakes in gathering mishap data, and deficiencies of the present framework with a couple of recommendations for advancement (6).

## Methods

The study has used secondary data collected in qualitative form and conducted a critical evaluation of tracking traffic incidents in Bangladesh. Collecting data from multiple sources including previous research studies the study provides an analysis of the prevalence of traffic accidents in Bangladesh primary reasons and recommended interventions.

## Analysis

### **Prevalence and contributing factors of Traffic Accidents in Bangladesh**

Traffic accidents constitute a pressing global challenge, with developing nations facing a disproportionate burden. Bangladesh, as a densely populated South Asian country, grapples with a concerning prevalence of road accidents. This literature review aims to examine existing studies to comprehend the extent of traffic accidents in Bangladesh and explore the multifaceted reasons behind the alarming rates.

Studies conducted in Bangladesh highlight a consistent increase in road traffic accidents over the past decade. One study reported this upward trend, attributing it to factors such as rapid urbanization, population growth, and inadequate infrastructure development (4). Utilizing data from the Bangladesh Road Transport Authority (BRTA), their findings underscore the urgent need for effective interventions to mitigate the escalating accident rates.

Furthermore, another study conducted a comprehensive analysis revealing a pronounced difference in accident frequency between urban and rural areas (6). Urban regions, characterized by congested traffic, experience a higher incidence of accidents. This distinction emphasizes the importance of tailored interventions that consider the specific challenges posed by both urban and rural road environments.

Inadequate road infrastructure emerges as a significant contributor to traffic accidents in Bangladesh, as highlighted by multiple studies (4,7,16). Insufficient road maintenance, the absence of proper signage, and poorly designed intersections collectively heighten the risks for motorists and pedestrians alike (10). Additionally, high traffic density in urban areas has been linked to increased accident rates, with the incessant flow of vehicles

and limited road space creating conducive conditions for collisions (11). Moreover, the role of driver behavior cannot be understated. Some studies emphasize factors such as reckless driving, disregard for traffic rules, and a lack of adherence to speed limits as significant contributors to the elevated incidence of accidents in Bangladesh (15).

The prevalence of traffic accidents in Bangladesh poses a critical challenge, necessitating a comprehensive understanding of contributing factors. The interplay of urbanization, population growth, inadequate infrastructure, and driver behavior underscores the complexity of the issue. Effective interventions must address these multifaceted challenges to mitigate the alarming rates of traffic accidents in the country (7).

The high prevalence of traffic accidents in Bangladesh is intricately linked to the inadequacy of its road infrastructure. Poorly maintained roads, lack of proper signage, and inadequately designed intersections contribute significantly to the heightened risks faced by motorists and pedestrians alike. The lack of maintenance exacerbates existing road hazards, while unclear signage and poorly designed intersections create confusion, further increasing the likelihood of accidents (11). Addressing these infrastructure deficiencies emerges as a pivotal component in any strategy aimed at enhancing road safety and mitigating the alarming rates of traffic accidents (10).

Moreover, the impact of high traffic density, particularly in urban areas, cannot be overstated. Bangladesh's rapid urbanization and population growth have led to an upsurge in vehicular traffic, resulting in chronic congestion on its roadways. The relentless flow of vehicles, constrained by limited road space, establishes

a conducive environment for accidents (18). Effectively managing this traffic congestion and expanding infrastructure to accommodate the growing number of vehicles are imperative measures to alleviate the burden of traffic accidents in the country. Beyond physical infrastructure, tackling the socioeconomic factors contributing to the overwhelming number of vehicles on the roads is equally crucial for fostering a safer and more sustainable road environment in Bangladesh.

### Requirement of Accident Database

Reliable and detailed recording and utilization of traffic incidents is a fundamental element of the utmost significance in transportation risk administration. The analysis of the results will assist us in assessing the impact of highway safety initiatives, strengthening our knowledge of technical difficulties, and determining incident concerns promptly. It can also aid in the formulation of remedial actions (7). Incident record is analyzed by multiple individuals and institutions for a wide range of objectives, thus it's critical that the data gathering be done in a methodical, consistent manner using accepted forms. The following organizations are engaged in accessing information regarding traffic incidents:

- Road security professional
- Law enforcement personnel
- Layers
- Insurance companies
- Those in charge of publicity or training concerning safety on the roads
- Investigators
- Security Supervisor
- Suppliers of vehicles or their related parts, as well as distributors of roadway resources.

The accident-related information registry must be revised as precisely as practicable to prevent the loss of its usefulness due to a lack of credible information, which would have

significant consequences on the formulation of remedial measures, projections of hazard expenditures, overall incident situation, and investments assessment. Different organizations and groups need traffic accident data for different kinds of purposes that are described below (8).

- Incident data is examined by highway experts to evaluate and come up with recommendations for improvement.
- For reasons of law, the data may be needed by authorities and prosecutors.
- In order to handle insurance claims, insurers need the data.
- To formulate and disseminate security awareness, learners require the details.
- For operational and statistical analysis, safety officials needed the data being provided.
- Scholars and investigators need knowledge for diagnostic and investigation objectives. For improved planning purposes, the producers and vendors of relevant parts desire the expertise.

### The process for tracking and documenting incidents

#### 1. Origins and context of the accident report form (ARF)

In Bangladesh, the idea of an Accident Report Form (ARF) was first suggested in the early 1990s. The World Bank and the government of Bangladesh agreed the following year. They posed a query concerning the country's accident records. In the country of Bangladesh, there were no such figures earlier than 1995 (9). There are numerous assessments of individuals, food production, etc., but there is no concrete documentation regarding tragedies in Bangladesh. The World Bank then adopted an agreement to set up a mishap record in Bangladesh.

The World Bank subsequently looked at

adopting a Data Form to preserve track of incident figures, categories, explanations, as well as additional data. The World Bank then sent multiple state Language professionals to assist with the design of an accident data form. A questionnaire from the UK's Transport Research Lab (TRL) was presented. The form was international in dimension, having been implemented by TRL in approximately 32 different countries. Graham Elliott, a TRL consultant, gained incident data from Quazi Zakaria Islam and the Institutional Development Component (IDC) of the Second Road Rehabilitation and Maintenance Project (RRMP-2) for the Dhaka Metropolitan Police (DMP). The Department Responsible for International Development (DFID) of the British parliament grants financing to IDC.

Financing for the holistic development of the ii Road Rehabilitation and Maintenance Project (RRMP-2) was granted by the Department for International Development of the British State, which examines collisions on roadways in Bangladesh. An innovative form for documenting traffic accidents was established by IDC and Bangladeshi law enforcement, and it had its initial trial in DMP in the year 1995. When the DMP's law enforcement agencies were all linked through one computer network by the end of 1996, they were allowed to apply the knowledge to assess the traffic accidents that had taken place in the region surrounding the city. There have been a few beneficial improvements in tragic events as a result of the new accident examination approach.

Subsequently "Who is going to gather incident information?" is the issue to be addressed. The departments at the center of the government of a country usually handle these kinds of inputs. Union Parishad is a specific sort of organization that can be found in Bangladesh. However, union members are rather preoccupied with their corresponding duties. Therefore, it turned

out to delegate this role to the security department, as they had to turn in a First Information Report along with going to accident locations in the event anyone suffered injuries there. In June 1995, the law enforcement and IDC partnered to come up with the Traffic Accident Report Form (ARF), which later became prevalent in the DMP's northern region. All DMP units had implemented the Accident Report Form (ARF) by the end of January 1996. By the beginning of 1998, it had been made accessible throughout the country. The ARF began operating across the country in both English and Bangla languages. In order to integrate this form into the FIR for incident instances, measures have been undertaken.

The country's Ministry of Law of the State of Bangladesh determined to formulate guidelines for the security forces of Bangladesh, despite the fact that law enforcement is subject to them. The Ministry of Law required about twelve months to implement the rule into law. According to Directive 254, investigators must thereafter perform the ARF (B). Act 254 (A) relates to incident claimants. ARF initially began as an experimental operation at Gulshan, Uttara, and Cantonment Thana. The first instruction given to law enforcement officers was "How to complete up ARF" by Quazi Zakaria Islam, an IDC analyst. The ARF has been given to the Dhaka Metropolitan Police (DMP) to be passed on around the metropolitan region of Dhaka concluding the trial run and educational sessions. In 1998, the ARF had been successfully distributed throughout Bangladesh by the Law Enforcement Headquarters. The Transport Research Laboratory in the United Kingdom developed the MAAP5 programming package expressly for the maintenance and examination of data concerning collisions on the road. It has been implemented in many nations around the globe, particularly numerous in the Asian continent, and several British enforcement

agencies are currently implementing it. The DMP Headquarters has the MAAP5 technology put in place and a significant amount of this paperwork is made up of information from the device that has been updated with MS Office.

### 2. Development of the MAAP5 database by police

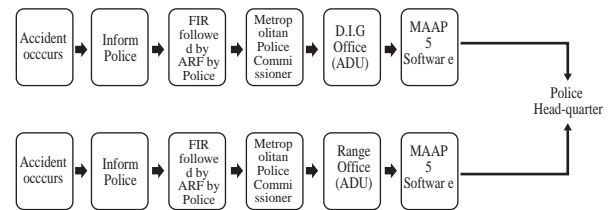
Law enforcement officers keep track of individual injury-related accident events, fatalities, and automobile details in First Information Reports. Upon the keeping of records of a collision, the officer in charge of investigating accomplishes the Accident Reporting Form after undertaking additional inquiries. Every station of law enforcement has a responsibility to archive a confidential register of accidents. Investigators have a duty to document all incidents in that file with a distinctive number. Below is an instance of such an accident record:

**Table 1:** Format of accident register to be maintained in all police stations.

Serial No. of the Ac-cident	FIR No.	Date of Accident	Investigation Officer	Submitting Date to the HQ--
***	***	***	***	***
***	***	***	***	***
***	***	***	***	***

The Accident Report Form is then sent by the officer investigating the Superintendent of Police office. All Police Units within his area of responsibility provide Accident Reporting Forms, which the Superintendent of Police compiles and transmits to the Deputy Inspector General of Police (DIG) of the corresponding Area. The Accident Data Units (ADU) set up in DIG locations are where all of the incident evidence retrieved will be entered into systems. The Microcomputer Accident Analysis Package, or MAAP5, was the tool used to enter and evaluate all of the data (Fig.1). Every month, this assignment is sent

by Floppy Disk to enforcement offices.



**Figure 1.** Accident Data Collection System

### 3. Other associated agencies

During an incident document, law enforcement may file it as a First Information Report or add it to the General Diary. Investigators obtained information at ARF by conducting an FIR. This paperwork is encrypted and provides distinctive numbers. The Superintendent of Police's office and the related Deputy General Police's office get the findings after that. Using MAAP programming, all of these facts have to be entered into an electronic device and examined. In basic terms, BUET's Accident Research Institute (ARI) applies the MAAP software. The roadway Safety Cell (RSC) of the BRTA and the Police Department collaborate to deliver the gathered data to ARI (13).

Some additional factors should be included, and the ones currently present that have been extracted from the ARF should be acknowledged, in order to strengthen the repository of data. The Road User Movement (RUM) identifier and additional info have been filled in by the Accident Research Institute by authenticating all ARFs that obtain it from Accident Data Units (ADU) with the objective of developing an accurate Incident Registry database [10]. Accident report forms are primarily assembled and studied and any adjustments that are required are done at ARI. After designating an RUM identifier for every single kind of incident, the MAAP5 repository obtains the data being supplied.

As previously mentioned, law enforcement

personnel in Bangladesh are in responsible for registering incidents. Because they are not sufficiently educated, a great deal of the documentation cannot be filled out accurately. However, ARF is barely lengthy in Bangladesh. In this nation, almost all of the incidents with lesser seriousness go undetected. Since there is a possibility of discrimination, most people have no intention of registering an official claim. Therefore, the majority of fatalities are not registered. Even documented mishaps are frequently not published precisely. Inadequate supervision of duty personnel may be demonstrated by findings.

### Mistakes during Data entry

For investigation, 275 ARFs were picked randomly with the goal of exploring the current state of the accident registry in Bangladesh. There are 69 distinct fields in an ARF. Almost every aspect was thoroughly investigated, and certain fields for instance the total number of automobiles involved, the frequency of passenger fatalities, the moment of the incident, the roadway the lesson, etc. were determined that the officers conducting the investigation usually misinterpreted. There are still multiple subjects that need to be investigated, but there was not sufficient opportunity to accomplish so. Authorities continue to commit those mistakes because they are not accurately instructed. The Accident Research Institute, BUET, undertook this examination (12). Due to a lack of reporting and maintaining records, data on accidents in Bangladesh were unable to be obtained with any reliability. Additionally, there are inconsistencies as a result of the Investigating Officer's improper ARF completion. There are undoubtedly adequate explanations for why there are limited documentation and evaluations. The following section includes the explanations for lacking information or not lodging Accident Report Forms:

- Insufficient guidance on submitting the Accident Report Form (ARF).
- Provision of personnel with education or expertise.
- Additional duty from other employees' obligations.

The subsequent table illustrates the extent of discrepancies and inaccurate information caused by law enforcement personnel. This section contains specific information that law enforcement quite frequently completes out mistakenly.

**Table 2.** Accident Data reporting Situation by analyzing 275 forms of Dhaka Range (2009)

Item name	Police Data	ARF Edited Data	% Reporting	% Missing Data
No. of vehicles in-volved	376	396	96%	4%
No. of driver casual-ties	90	100	90%	10%
No. of passenger Casualties	152	222	68%	32%
No. of pedestrian ca-sualties	87	73	84%	16%

Due to time constraints, information obtained from a review of 275 Accident Report Forms (ARF) has been presented in this table. It should be emphasized that the authorities constantly make blunders with not only these objects but also a variety of others. After the submissions were reviewed, it turned out that 52 forms (about 19%) had in error moments areas, 68 forms (about 25%) had false connection categories, 57 forms (about 21%) had erroneously traffic regulation fields, 66 forms (about 24%) had mistaken accident types, 40 forms (about 15%) had erroneous transportation flow fields, 35 forms (about 13%) had erroneously split fields, and 34 forms (about 12%) had erroneously road lessons fields [14]. The detective always writes these sections out inaccurately. Data neglecting to report to the MAAP application is the consequence of this. It ultimately results in faulty investigation of accidents (11).

### Other associated agencies

The only source of data on traffic accidents in the country is the Incident Database, which depends on the Accident Report Form (ARF) and MAAP5. A report of an incident template serves the purpose of tracking incidents that take place over a few decades. However, there are a few drawbacks to this application.

- The Bangladesh ARF does not contain details related to the manufacturer and sort of automobiles. These sections should be incorporated since it would make it less difficult for investigators to identify the person who is the person who owns the automobile.
- We may assess a variety of features of incidents using the ARF and MAAP5 resources. These merely offer us tangible and clearly understandable details. They are incapable of delivering an extensive investigation that is capable of providing a certain level of detail (16).
- There ought to be a space for the type of car in the ARF. However, a vehicle's structure is an essential aspect to take into account since a truck may resemble an emergency vehicle and a passenger car might come with two or four entrances.
- Bangladesh's ARF merely comprises an object-type screening for alcoholic beverages. However, as the majority of Bangladeshis do not consume alcohol, this usually has an undesirable consequence. The findings of any illicit substance tests should be publicized because using substances among adolescents can be an ongoing fashion statement and lead to disasters.
- The ARF does not contain an area for transportation. It would be quicker for the ARF operator to make changes to the submission form if he knew if the path was entirely, partially, or not approachable at all.

- Any time there is a collision, the car owner is not completely accountable. The main root cause of an incident could be an external factor, a pedestrian's erroneous or an imperfection in the automobile. Thus, this requires to be addressed extremely apparent.
- A significant number of car incidents go undetected. The level of regional and geographical inaccuracy of concealing could result in asset misuse and inadequate safeguards planning. The BUET Accident Research Institute (ARI) investigated the Dhaka-Aricha journey to figure out how much understatement there is. In accordance with the table, the Dhamrai Police Station has upwards of a 60% insufficient reporting frequency. Furthermore, an extensive review of publications demonstrated that there is a notable possibility of hiding casualty statistics.

**Table 3.** Extent of Underreporting of Road Traffic Accident (2003-2004)

Thana	Accident case filed in Thana	Accident in MAAP Data-base	% of Under-Recording
Savar	159	107	33
Dhamrai	58	23	60
Saturia	20	9	55
Manikgonj	47	25	47
Ghior	28	25	11
Shibalay	66	59	11

- Even during instances where incidents are documented, discrepancies may come up due to inaccurate interpretation of the Incident Report Sheet. There are noticeable differences between the monitored replication of ARF at Accident Research Institute and the MAAP facts, according to an examination. Correct information transcribing should be accomplished frequently to address the matter.

Only the vehicle's seat seatbelt demand in

the ARF is deemed problematic. More hindering initiatives, such as infant restraints and neck and waist belts, ought to be introduced.

- Drivers do not constantly operate an automobile transport. Users of automobiles often drive vehicles. Another time, the one who drives could find employment in another industry. Thus, it is of the utmost importance to incorporate this subject matter.
- Occasionally, inspectors lack the ability to determine the precise location of the vehicle's destruction. An ARF automobile layout will assist the law enforcement officer in precisely determining the kind of vehicle and place of the incident (17).
- Analyzing the automobile's functionality after an incident is crucial. The location of the incident should be documented in the ARF for any subsequent examination, regardless of where the automobile ended up after the collision with the driver, the storage facility, or a repair facility.
- Although the ARF contains highway class, the road's component is not configurable. It is unable to ascertain whether the incident happened on the flyover, at the steps, or in the main street.
- ARF erroneous capture is one of the primary challenges brought on by an abundance of time and assets. This type of mistake is repeated on numerous occasions, leading to false statistical analysis. Typically, a large number of matters are found to be entirely unoccupied. Accurately completed out areas such as address and road distance lead to misinterpretation with additional data.
- Database instability is one of its main challenges. This section's responses can be altered throughout the years by individuals in the midst of that encoding and documenting, making it impractical to assess data

from one single time frame to another. Worse yet, the person using the data might not be mindful of uncertainty, which would result in an insufficient assessment. The road safety investigator is truly required to be vigilant to find out if there are any inconsistencies of this kind. A dramatic shift in the frequency of accidents at an exact spot should also encourage the analyst to look for any statistical irregularities or other discrepancies (20).

- The heading of the Kilometer Post Catalogue is a further problem. The officer who is in charge of documenting an accident is frequently unable to complete elements 32 through 37 (Route, KM, 100 m, NODE MAP, NODE 1, and NODE 2). This kilometer post inventory also has some other issues. The inventory's kilometer figures were actually written in 1998.
- Although photographic evidence is crucial for post-accident examinations, there is no capacity on the form for this kind of data. Since there is no webcam in the police department for capturing the incident at the exact location or in the region that was impacted, officers can't manage to capture shots of what happened (18).

#### **Developing Criteria's**

- A system for occurrence spot recording has to be devised.
- Incorporating the image element in the Accident Report Form (ARF) must be included.
- A campaign to educate the public about the worth of information databases ought to be conducted.
- The MAAP5 program needs to be converted from the DOS to the Windows version.
- The officers in charge of the investigation who carry out the ARF ought to have received sufficient training.

Sub-inspectors ought to have comprehensive ARF knowledge.

- The instruction program's course outline ought to include the necessary resources.
- Enhanced interaction should be maintained between the BRTA Road Safety Cell, Police the main office, and ADUs (19).

### Conclusion

In conclusion, an extensive analysis of contributing factors to the prevalence of traffic accidents in Bangladesh reveals a web of interconnected elements. Inadequate road infrastructure, traffic congestion, driver behavior, and economic-social factors collectively contribute to the challenge. Mitigating this complex issue necessitates a multifaceted approach that encompasses infrastructure development, traffic management strategies, behavioral interventions, and broader socio-economic considerations. Such a holistic approach is crucial for fostering a safer and more sustainable road environment in Bangladesh. The article has highlighted the normative protocol for registering and documenting accidents, along with the inaccuracies and boundaries of the party in charge of investigating and documenting. It also underlines how crucial the growth of databases is to Dhaka. Preserving precise archives of all mishap data is vital because they may inform subsequent efforts to prevent accidents. In Bangladesh, police accident reports are the sole point of information for the incident database. To combat this, personnel must get adequate education, and promoting consciousness is key. In order to address the possibilities associated with a lack of reporting, the collision information should be substantially extensive and trustworthy.

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