Ministry of Physical Infrastructure and Transport

National Road Safety Council

Singhadurbar, Kathmandu

A Report on Seat Belt Buckling Compliance Status on National Highways 2081

A study conducted by

National Road safety Council

Government of Nepal
Ministry of Physical Infrastructure & Transport
Nepal Road Safety Council
Singhadurbar, Kathmandu, Nepal

A

Final Report

on

Seat Belt Buckling Compliance Status on National Highways

Submitted by:

Research and Training Unit
Department of Civil Engineering
Pulchowk Campus
Institute of Engineering

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Acknowledgement

This study, entitled “Seat Belt Buckling Compliance Status on National Highways” conducted within the Road and Traffic Safety Project of the Ministry of Physical Infrastructure and Transport, has an objective to assess the level of seat belt compliance on National Highways of Nepal. In addition, the study aims to gain an understanding of the current level of awareness and willingness among drivers and other road users regarding road safety and the legal provisions related to seat belt usage in Nepal. This report is a part of contractual obligation between the Nepal Road Safety Council, Ministry of Physical Infrastructure and Transport (MoPIT), Kathmandu, Nepal as the client and Research and Training Unit (RTU), Department of Civil Engineering, Pulchowk Campus.

We extend our heartfelt appreciation to the experts namely, Mr. **Anil Marsani** (Team Leader), **Dr. Pradeep Kumar Shrestha** (Transportation Engineer), **Dr. Rojee Pradhananga** (Transportation Engineer), whose invaluable and timely contributions were pivotal to the successful execution of this project. We express our thanks and appreciation to all dedicated surveyors and the students of Bachelor in Civil Engineering, Pulchowk Campus, namely, Aaswan Tamang, Aniket Sharma, Dipak Kattel, Janak K.C. Khem Raj Shah, Mukesh Thakur, Prabin Gajurel, Prakrit Devkota, Prashant Aryal, Rabin Paudel, Safal Katwal, Sandesh Giri, Shaishav Acharya, Sitaram Aryal. Their untiring and careful efforts during the survey provided precise information on seat belt buckling features, which significantly enriched the overall outcomes of the project.

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Research and Training Unit

Department of Civil Engineering

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Abbreviation

DoR	:	Department of Roads
MoF	:	Ministry of Finance
MoPIT	:	Ministry of Physical Infrastructure and Transport
MoUD	:	Ministry of Urban Development
MVTMA	:	Motor Vehicle and Transport Management Act
MVTMR	:	Motor Vehicle and Transport Management Rule
NH	:	National Highway
NRSC	:	Nepal Road Safety Council
RTU	:	Research and Training Unit
UN	:	United Nations
UNECE	:	United Nations Economic Commission for Europe
WHO	:	World Health Organization

EXECUTIVE SUMMARY

Road traffic crashes continue to be a major cause of death and injuries worldwide, and Nepal, too, is facing considerable challenges in this regard. According to the World Health Organization (WHO), Nepal had an estimated road traffic death rate of 16.27 per 100,000 population in the year 2019 (WHO, 2021). As reported by the traffic police, Nepal witnessed approximately 23597 road traffic crashes in the year 2021–2022, resulting 2376 deaths, 5738 serious injuries, and 24488 serious injuries (Nepal Traffic Police, 2023). Road conditions, drivers' behavior, and vehicle characteristic are the main contributing elements to these crashes. Unrestrained vehicle occupants, particularly drivers, are more susceptible to injuries in the head, chest, and abdomen, resulting in fatalities. Restraining vehicle occupants by the use of seat belts can significantly reduce the severity of injuries. Past studies show wearing seat belts reduces the risk of fatalities among drivers and front seat occupants by 45 – 50% and decreases the risk of fatalities and serious injuries among rear seat occupants by 25%. In Nepal, Motor Vehicles and Transport Management Act, 2049 (1993) mandates that both the driver and the person seated in the front seat of a motor vehicle must use the seat belts while driving.

This study was conducted to examine the level of seat belt use compliance on various National Highways in Nepal using an observational approach. Furthermore, interviews were conducted to evaluate the seat belt system in the vehicles, comprehend the drivers and passengers' understanding of the legal provision, and to identify the factors influencing their willingness to comply. A total of 7397 vehicles across 20 locations situated on five major national highways (Rapti highway, Karnali highway, Prithvi highway, East West highway, and BP highway) were observed to evaluate seat belt use compliance of drivers and front seat passengers. Additionally, a questionnaire survey was administered to drivers and front seat passengers of 6882 vehicles at these designated locations.

The results of the observation survey reveal that in Nepalese national highways, the average compliance rates for seat belt usage among drivers and front passengers are 37.72% and 6.34%, respectively. Across the 20 locations studied, standard deviations of 15.11% and 4.6% were observed for drivers and front passengers, respectively. Among the five highways studied, the highest compliance rate for drivers' seat belt usage was recorded on the Prithvi national highway at 54.8%, while the lowest was on the Rapti national highway at 18.7%. Similarly, front seat passenger compliance rates were highest (13.8%) on the Prithvi highway and lowest (2.9%) on the Karnali national highway. When considering different vehicle types, the highest compliance rates among

drivers were observed for cars (car/jeep/van) at 69.3%, whereas the lowest was found to be 4.1% for buses, which is slightly different from the 5.9% observed for trucks. Front passenger compliance was highest at 16.8% for car/jeep/van and almost negligible at 0.1% for trucks.

The questionnaire survey uncovered that about 60% of the respondents were unaware about the seat belt law. Additionally, discomfort (20%) and frequent stops (15.2%) were identified as the primary reasons for not using seat belts, while safety awareness (81.2%) emerged as the primary motivator for seat belt usage. Furthermore, the survey revealed that around 20% of vehicles operating on Nepalese highways lack seat belt provisions for drivers, and approximately 32.5% do not have seat belt provisions for front passengers. Additionally, 73.1% of vehicles do not include seat belt alarm systems, and only about 5% of vehicles utilize child restraint systems. These results provide some valuable insights on seat belt usage in Nepal and can serve as a foundation for recommendations aimed at improving seat belt compliance in the country. Ultimately, these efforts can contribute to enhance road safety on the country`s national highways.

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1 INTRODUCTION

1.1 Background

Road traffic crashes continue to be a major cause of death and injuries worldwide. In 2016, it was estimated that approximately 1.35 million people lost their lives in road traffic crashes, and this number has continued to rise (WHO, 2018). Road traffic crashes rank as the eighth leading cause of mortality worldwide and the primary cause of the death among individuals aged 15 to 29. Dealing with the consequences of these crashes incurs expenses amounting to billions of dollars. In fact, road traffic crashes exceed the combined fatalities caused by HIV/AIDS, tuberculosis, and diarrheal diseases.

As part of the economic development process, the road infrastructure in Nepal has undergone significant expansion. Presently, the country boasts over 25,000 kilometers of all-weather roads (black-topped and gravel roads) and more than 46,000 kilometers of fair-weather roads (earthen). Figure 1.1 illustrates the progression of the strategic road network from fiscal year 2064/65 to 2066/67 BS (DoR, 2018). Similarly, Figure 1.2 depicts the growth of roads constructed or expanded by the federal, provincial, and local levels from fiscal year 2070/71 to 2078/79 BS (MoF, 2018; 2022; 2023). Over these years, the road length has shown an average annual growth rate of 3%-3.75%. Notably, more than 25% of the roads constructed or expanded by federal level, and more than 70% of the roads constructed by the provincial and local levels are fair weathered roads. Concurrently, the number of registered vehicles in the country has also increased rapidly as shown in Figure 1.3 (MoF, 2023). The average annual growth rate from 2070/71 to 2078/79 BS is 14.2%. These growths in the road infrastructures and vehicles are reflected in the escalating rates of road crashes and fatalities. Figure 1.4 presents the trend of road crashes and fatalities in the country from fiscal year 2064/65 BS to 2079/80 BS. Despite significant road safety interventions, road fatalities and road traffic crashes continue to rise at an annual growth rate of 5.8% and more than 25 % respectively. According to the World Health Organization (WHO), Nepal had an estimated road traffic death rate of 16.27 per 100,000 population in the year 2019 (WHO, 2021). As reported by the traffic police, Nepal witnessed approximately 23597 road traffic crashes in the year 2021–2022, resulting 2376 deaths, 5738 major injuries, and 24488 serious injuries (Nepal Traffic Police, 2023). More than 50% of the victims were occupants of cars, buses and trucks. Shockingly, over half of the individuals who lost their lives in car crashes were found to not be wearing restraints i.e. seat belts at the time of the crash. The most effective measure to prevent death and serious injuries in a crash is always to buckle up.

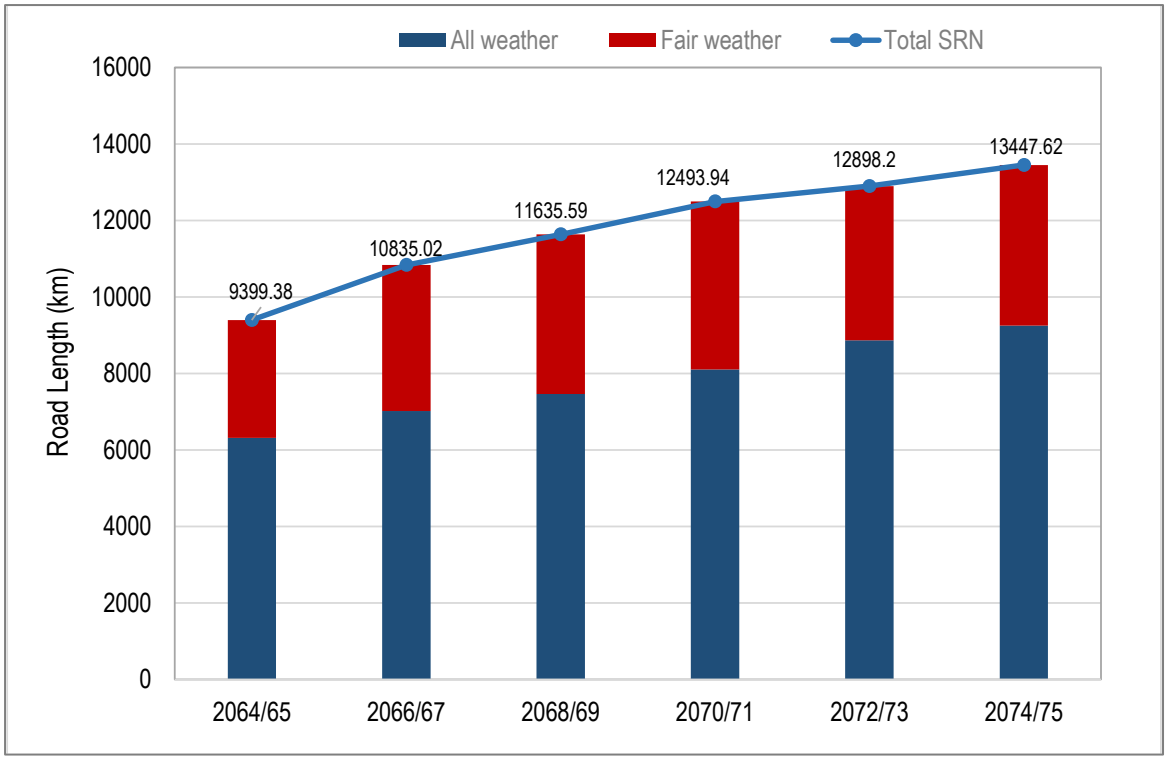

Figure 1-1 Statistics of strategic road network

(Source: DoR, 2018)

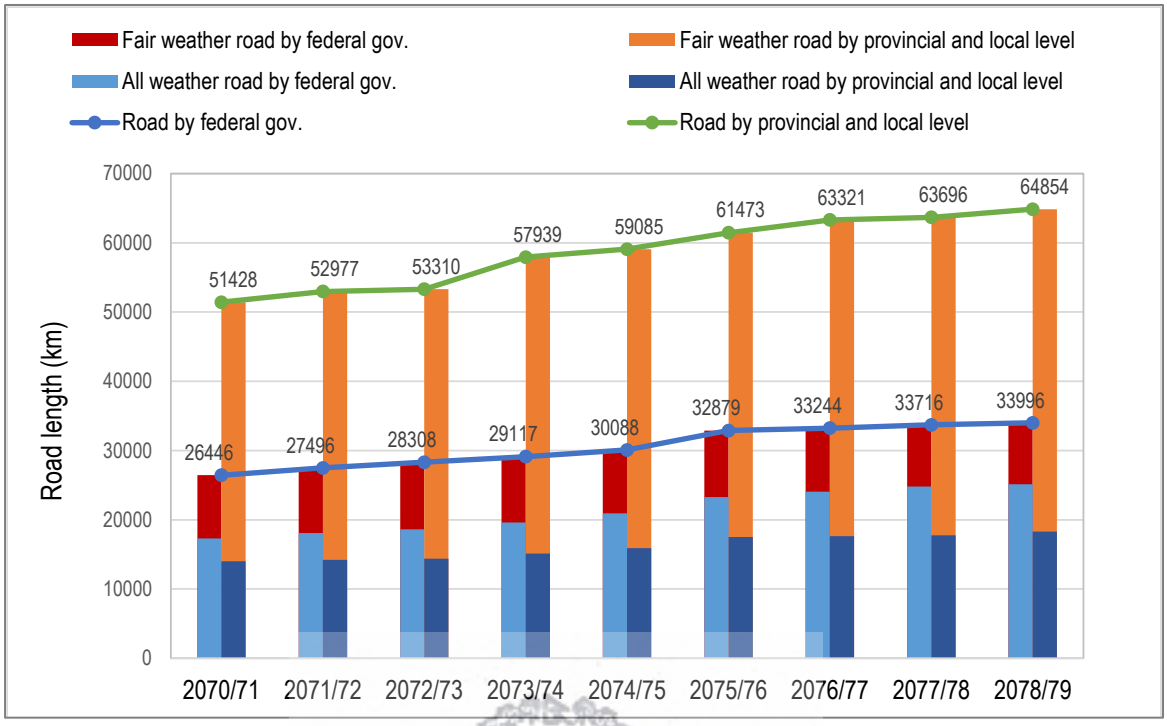

Figure 1-2 Statistics of roads constructed/expanded by federal, provincial and local levels

(Source: MoF, 2018; 2022; 2023)

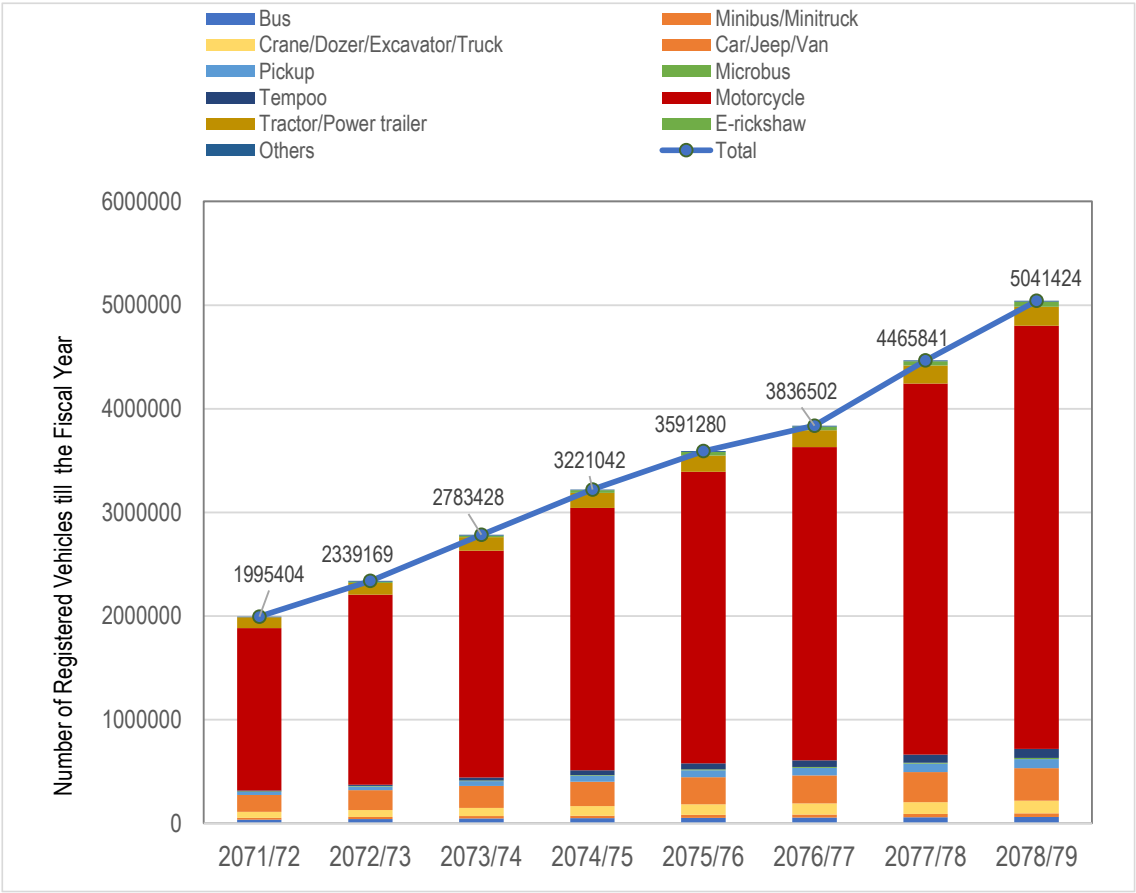

Figure 1-3 Statistics of total registered vehicles

(Source: MoF, 2023)

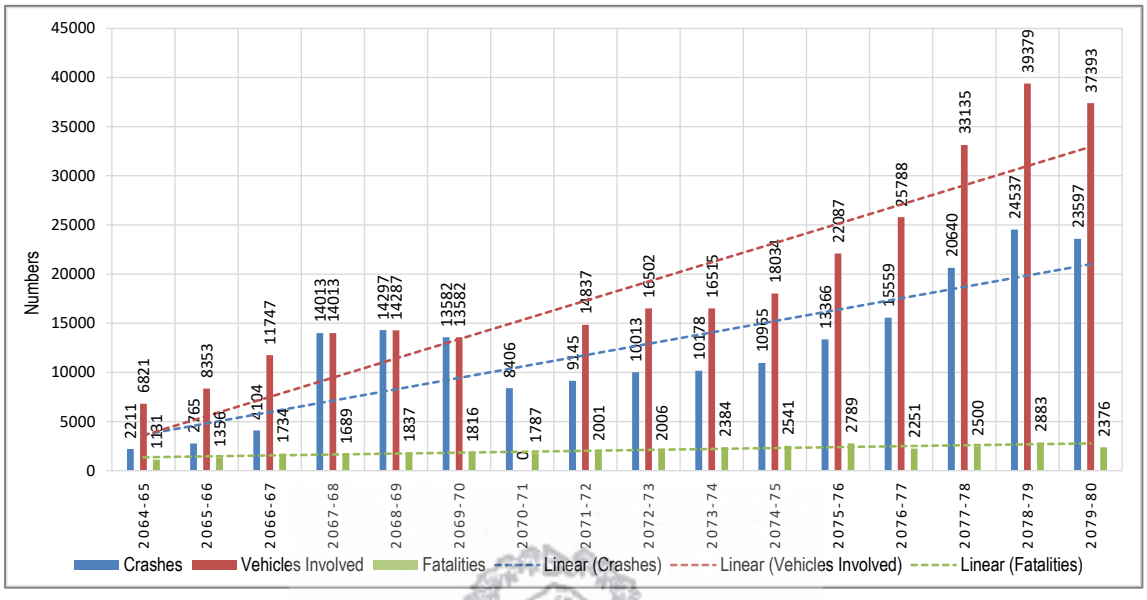

Figure 1-4 Road crash statistics

(Source: Crash Data Analysis Report 2079/80 (Draft), NRSC, MoPIT)

In 2010, the United Nations (UN) General Assembly unanimously passed a resolution endorsing a Decade of Action for Road Safety 2011–2020. The resolution called for the development of Global status reports on road safety to assess the progress of the decade at both national and global levels. Subsequently, in September 2020, the UN General Assembly adopted the Decade of Action for Road Safety 2021-2030, with the ambitious goal of reducing road traffic deaths and injuries by at least 50% by 2030. Recognizing the importance of this initiative, Nepal has developed the Road Safety Action Plan (2013 -2020). Furthermore, the country has recently formulated the Nepal Road Safety Action Plan 2020 – 2030 (MoPIT, 2021). This showcases Nepal's commitment to enhancing road safety measures and addressing the challenges in the specified timeframe.

The main causes of road traffic crashes include poor road conditions, reckless driving, and vehicle characteristics. Similarly, the enforcement of traffic laws and promoting road safety awareness play a crucial role in improving road safety. In Nepal, the challenging mountainous terrain and winding river valleys contribute to a high mortality rate resulting from road crashes. The installation of appropriate road safety equipment, including crash barriers, markings, and signs, is generally considered the most effective approach to reduce both the frequency and severity of fatalities. Wearing seat belts by drivers and other vehicle occupants can help to prevent injuries or reduce their severity. Studies have shown that mandatory seat belt regulations, coupled with their enforcement and effective public awareness campaigns, significantly help in improving safety by increasing seat belt usage rates.

UN Regulation No. 16 is the primary internationally recognized requirement concerning seat belts. As stated in UN Regulation No. 16, a belt assembly refers to a configuration of straps with a securing buckle, adjusting devices and attachments that can be anchored to the interior of a motorized vehicle (United Nations Economic Commission for Europe UNECE, 2018). Its purpose is to minimize the risk of injury to the wearer, in the event of a collision or sudden deceleration, by restricting the mobility of the wearer's body. The term "belt assembly" also encompasses any device that absorbs energy or retracts the belt.

Seat belts are primarily designed to retain occupants inside the vehicle and maintain them in their original seating positions. This is achieved through a ride-down mechanism that facilitates a gradual deceleration of the occupant as the vehicle deforms and absorbs energy. Additionally, seat belts minimize the risk of occupants coming into contact with hazardous interior surfaces or colliding with each other. Kahane (2015) noted that seat belts have been the most significant safety technology

saving over 50% of lives in the United States from 1960 to 2012. According to Elvik et al. (2009), wearing seat belts reduces the risk of fatalities among drivers and front seat occupants by 45 – 50% and decreases the risk of fatalities and serious injuries among rear seat occupants by 25%.

According to WHO (2018), a country is considered to have a comprehensive seat-belt law when it mandates seat belt usage for all occupants, including drivers, front seat passengers, and rear seat passengers, at all times and on all roads. However, if seat-belt laws only apply under certain conditions or on certain roads, it is interpreted as having a national seat belt law not covering all occupants. In the case of Nepal, Motor Vehicles and Transport Management Act, 2049 (1993) (Nepal Law Commission, 1993) requires the driver and the person seated in the front seat of a motor vehicle to use the seat-belt, while driving. However, this law does not extend to rear seat occupants, and there is currently no national child restraint law in place. Moreover, the prevailing road standards: Nepal Road Standard 2070 (Department of Roads DoR, 2013), Nepal Urban Road Standard 2076 (Ministry of Urban Development MoUD, 2019), and Road Safety Notes (DoR, 1997) do not specify its requirements. Despite the mandate for seat belt usage for driver and passenger in front seat is well stated in MVTMA (1993), there are doubts regarding their actual usage. Moreover, data on seat belt usage in Nepal is currently unavailable, making it difficult to assess its actual extent of compliance in field.

To address this issue and promote awareness and enforcement of the seat belt law, the Nepal Road Safety Council (NRSC) has planned a study called "Seat Belt Buckling Compliance Status on National Highways" in collaboration with Pulchowk Campus, Institute of Engineering. The study establishes the baseline compliance status of seat belt usage on National Highways NH1, NH13, NH17, NH55 and NH58 in Nepal. Additionally, the study assesses the driver's and passenger's understanding of legal provisions, willingness to comply, safety awareness, and other factors related to seat belt usage.

1.2 Objectives

The main objective of the study is to establish the baseline compliance status of seat belt usage on National Highways in Nepal. The specific objectives are:

- To examine the road safety status related to 4-wheeler vehicles.
- To examine the level of seat belt compliance on selected National Highways in Nepal.

- To assess the driver's and passenger's understanding of legal provision, willingness to comply, safety awareness, and other factors related to seat belt usage.

1.3 Scope of Work

The scope of the service is, but not limited to:

- Review the road crash safety status related to 4-wheeler vehicles.
- Develop a set of questions to assess the driver's and passenger's understanding of legal provision, willingness to comply, safety awareness, and other factors related to seat belt usage.
- Conduct survey to examine compliance of seat belt usage on NH1 (at least major 7 locations, one for each province).
- Conduct survey to examine compliance of seat belt usage on NH13 (at least major 3 locations).
- Conduct survey to examine compliance of seat belt usage on NH17 (at least major 4 locations).
- Conduct survey to examine compliance of seat belt usage on NH55 (at least major 3 locations).
- Conduct survey to examine compliance of seat belt usage on NH58 (at least major 3 locations).
- Data analysis and compilation of the study.
- Prepare an elaborated report on the baseline compliance status of seat belt usage on National Highways.

2 LITERATURE REVIEW

2.1 Motor Vehicle and Transport Management Act 2049 (1993)

2.1.1 Review on Classification of Passenger Motor Vehicles

A motor vehicle that has been issued a certificate of registration to provide transportation services is known as a public motor vehicle. The public motor vehicles are divided into two types namely, the passenger motor vehicles and the cargo motor vehicles. The standards and capacity of passenger motor vehicles as defined by the Motor Vehicles and Transport Management Rules 2054 (Nepal Law Commission, 1997) exercised in accordance with the Motor Vehicle and Transport Management Act 2049 are as follows:

- Bus: the seating capacity of 26 to 56 passengers including the driver,
- Minibus: the seating capacity of 15 to 25 passengers including the driver,
- Jeep, Van, Pick-up and Microbus: the seating capacity of a maximum of 14 passengers including the driver,
- Car and taxi: the seating capacity of a maximum of five passengers including the driver,
- Tempo: A meter installed tempo with the seating capacity of a maximum of 4 passengers, and in the case of a tempo other than a meter installed one, the seating capacity of a maximum of 13 passengers including the driver.

2.1.2 Review on Classification of Cargo Motor Vehicles

The standards and capacity of cargo motor vehicles as defined by Motor Vehicles and Transport Management Rules 2054 (Nepal Law Commission, 1997) are as follows:

- Truck and tanker: On the front side, three seats including the driver, and on the rear side, with the load bearing capacity of a maximum of 10.2 tons per axle and a space accommodating a maximum loader of five persons on a slipper,
- Mini truck: On the front side, three seats including the driver, and on the rear side, with the load bearing capacity of a maximum of five tons and a space accommodating a maximum loader of four persons on a slipper,
- Power tiller: With the capacity of a maximum of one seat including the driver and the load bearing capacity of a maximum of one ton,

- Pick-up: With the capacity of a maximum of five seats including the driver and the load bearing capacity of a maximum of one ton.

2.1.3 Act on Seat Belt Use

In Nepal, the Motor Vehicle and Transport Management Act 2049 (Nepal Law Commission, 1993) mandates that the driver and a person seated on the front seat of a motor vehicle shall use the seat belts while driving. However, the Motor Vehicle and Transport Management Rule 2054 (Nepal Law Commission, 1997) describes different types of passenger and cargo vehicles as discussed in above sections without specifying seat belt usage regulations for each type. Moreover, the prevailing standards: Nepal Road Standard 2070 (Department of Roads DoR, 2013), Nepal Urban Road Standard 2076 (Ministry of Urban Development MoUD, 2019), and Road Safety Notes (DoR, 1997) do not specify its standard requirements in vehicles. Consequently, according to the MVTMA 2049, only the driver and front passenger are required to use seat belts, while rear passengers in cars and bus passengers are not obligated to do so. As a result, rear passengers and bus passengers typically do not wear seat belts, and many cars and buses may not be even be equipped with seat belts in the rear seats. Additionally, the drivers and helpers of cargo vehicles may also neglect the use of seat belts. Recognising this situation, the Nepal Road Safety Action Plan 2013-2020 (MoPIT, 2013) and Nepal Road Safety Action Plan 2021-2030 (MoPIT, 2021) have included development of a national standard for vehicle accessories such as seat belt, and strict enforcement of seat belt regulations as immediate action items in their plans.

2.2 Seat Belt Laws Worldwide

The effectiveness of seat belt usage depends on the presence of seat belt laws and their enforcement. Many high-income countries, such as Australia, Canada, United Kingdom and most states in United States, have implemented legislation mandating use of seat belts by all vehicle occupants. In contrast, seat belt use rates tend to be lower in many low-income countries, where seat belt usage is not legally required. Table 2-1 shows the status of national seat belt laws and their application to drivers, front seat passengers and rear seat passengers in various South Asian countries. As per Motor Vehicles (Amendment) Act 2019 (Indian Ministry of Law and Justice, 2019), all drivers and passengers in India are required to wear seat belts. Similar requirement has been in place in Bhutan (WHO, 2018).

Table 2-1 Seat belt laws by country in South Asia

Country	National Seat Belt Law	Seat belt Applies to		
		Drivers	Front Seat Passenger	Rear Seat Passengers
Afghanistan	No	-	-	-
Bangladesh	No	-	-	-
Bhutan	Yes	Yes	Yes	Yes
India	Yes	Yes	Yes	Yes
Maldives	Yes	No	No	No
Nepal	Yes	Yes	Yes	No
Pakistan	Yes	Yes	No	No
Sri lanka	Yes	Yes	Yes	No

(Source: WHO, 2018)

2.3 Seat Belt Use Compliance

The increase in the seat belt usage can be attributed to to the enforcement of mandatory seat belt laws. The significant increase in seat belt usage in the United States and other countries has primarily been linked to the implementation of legislation mandating seat belt use (Dee, 1998; Rivara et al., 1999). A study conducted by Eustace et al. (2002) revealed that the compliance rate of the seat belt usage in Kansas, United States was 60%, while the national average of the compliance rate was 71%.

2.4 Seat Belt Compliance Study

The rate of seat belt usage in a country is largely influenced by the presence of seat belt laws and the level of enforcement. In many low-income countries, the rates of seat belt usage tend to be low compared to high-income countries. High rates of seat belt usage are observed in the majority of European nations and the United States, where it is mandated by law. For instance, in Norway and the United Kingdom, where the seat belt usage became mandatory in 1993, approximately 70% and 90% of drivers of light vehicles respectively were observed to be using seat belts on urban highways in 1995. (Elvik & Vaa, 2004; Evans, 1991). According to the national statistics from the United States and Ohio City, the overall seat belt usage rate exceeded 82% in 2006. However, the data on seat belt usage in outh Asian region, except for India and Sri Lanka is not available as shown in Table 2-2. While Sri lanka has a good compliance of 75% rate, the rate in India particularly for front seat passengers is as low as 3.5% to 11%.

Table 2-2 Seat belt compliance by country in South Asia

Country	Seat belt Applies to		
	Drivers	Front Seat Passenger	Rear Seat Passengers
Afghanistan	-	-	-
Bangladesh	-	-	-
Bhutan	-	-	-
India	14 – 40	3.5 – 11	-
Maldives	-	-	-
Nepal	-	-	-
Pakistan	-	-	-
Sri lanka	75	75	75

(Source: WHO, 2018)

2.5 Effectiveness of Seat Belt in Crash Severity Reduction

Most of the deaths and injuries that occur in road crashes are caused by injuries to the head, chest and abdomen. In the event of a crash, occupants who are not wearing seat belts may collide with the dashboard or be ejected through the windscreen. These collisions between the unbelted occupants and the vehicle's interior, such as the driver's chest hitting the steering wheel or the driver's head hitting the windscreen can result severe injuries. The probability of long-term severe injuries or being killed is significantly increased when occupants are ejected from the vehicle (Elvik & Vaa, 2004). For instance, 75% of occupants who are ejected from a vehicle during a crash do not survive (NHSTA, 2005. Seat belt usage is estimated to be approximately 50% effective in preventing fatalities in situations where motorists would otherwise die. It is estimated that seat belt use prevented about 15,200 deaths in the United States in 2004 (NHSTA, 2005). Moreover, Kahane (2015) estimated that seat belts saved approximately 329,715 lives in United States between 1960 to 2012.

3 METHODOLOGY

3.1 Study Area

The proposed road sections run along the five national highways of Nepal spanning from terai in south to steep hilly terrain in the north and extending from the east to the west of of the country. The study area's network diagram is shown in Figure 3-1. While drivers in urban area in general adhere to seat belt usage, their compliance with seat belt usage in rural areas of the highways are doubtful. Therefore, it is crucial to conduct observational surveys to assess the seat-belt compliance at different locations in the highways.

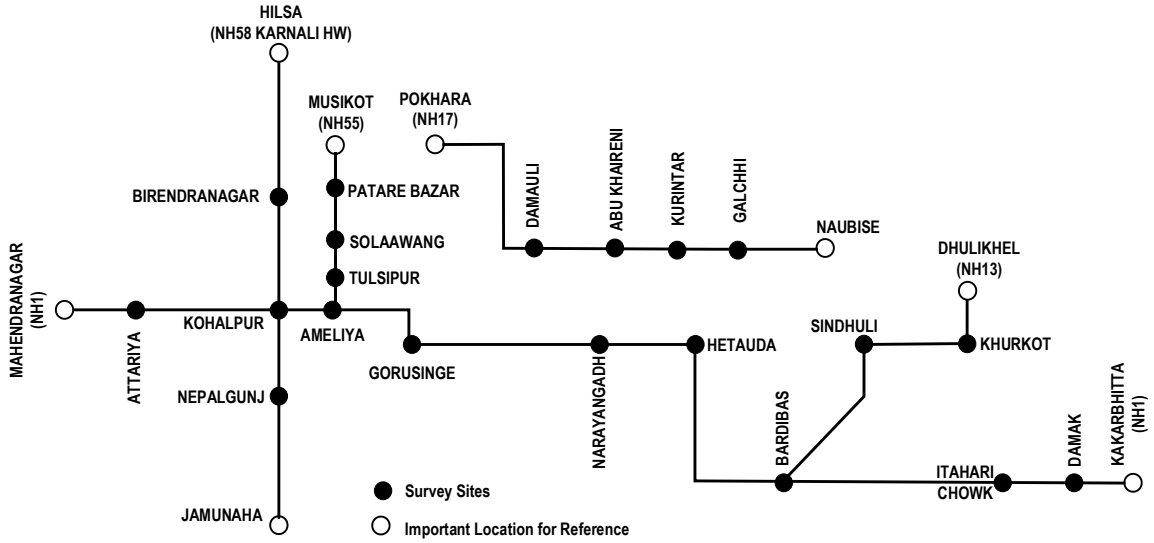

Figure 3-1 Project road network

NH01 – Mahendra Highway (East West Highway): The East West highway stretching from Kakarbhitta in Jhapa to Kanchanpur, has a total length of 1028 km. This highway is of great significance as it connects the major cities across Nepal. For the seat belt compliance study, at least 7 locations (Damak, Itahari, Hetauda, Narayangarh, Gorusinge, Amelia, and Attariya) along the highway, one from each province, were selected for observational survey and analysis.

NH13 – B.P. Highway (Bardibas – Sindhuli – Khurkot – Dhulikhel): The B. P. Highway, which spans from Bardibas at East West higway to Dhulikhel in Kavrepalanchowk, has a total length of 160 km. For the seat belt compliance study, 3 locations (Bardibas, Shindhuli, and Khurkot) along this highway were selected for observational survey and analysis. While the study initially planned to

survey three locations along NH13 according to the Terms of Reference (ToR), the first two survey stations, Khurkot and Sindhuli, are conveniently situated along the highway. However, the location of the third survey station was relocated to Barbibas, near the East West Highway. This adjustment was made because there are limited access roads available for diverting traffic to the Sindhuli-Bardibas section of NH 13. This modification not only had no adverse effects on the study along NH 13 but also improved it by achieving a more balanced distribution of survey stations along the East West Highway.

NH17 – Prithvi Highway (Naubise – Muglin – Pokhara): The Prithvi highway, spanning from Naubise to Pokhara, has a total length of 173 km. For the seat belt compliance study, 4 major locations (Damauli, Abu Khaireni, Kurintar, and Galchhi) along this highway were selected for observational survey and analysis.

NH55 – Rapti Highway (Amelia – Tulsipur – Shitalpti – Tharmare – Musikot Highway): The Rapti Highway, located in western Nepal, traverses the districts of Dang, Salyan and West Rukum in a south to north direction. The 169 km highway branches off from the Mahendra Highway in Amile, heading towards Tulsipur in the north, and extending to Musikot Khalanga, the district headquarter of West Rukum District, where it terminates. For the seat belt compliance study, 3 major locations (Tulsipur, Solaawang, Pattare Bazar) along this highway were selected for observational survey and analysis.

NH58 – Karnali Highway (Jamunaha – Nepalgunj – Kohalpur – Surkhet – Khulalu – Hilsa): The Karnali highway serves as a crucial transport link connecting two regions in Nepal. This highway links the towns of Jumla, the Karnali capital Birendranagar, and border town of Jamunah in the south. For the seat belt compliance study, 3 major locations (Birendranagar, Nepalgunj and Kohalpur) along this highway were selected for observational survey and analysis.

3.2 Research Methodology

This study adopted mixed methods, incorporating both qualitative and quantitative techniques. The objective of employing mixed method is to evaluate the existing situation and propose the appropriate future action. The quantitative method in this study involves an observational survey to assess the seat belt usage. On the other hand, the qualitative method entails a questionnaire survey designed to uncover the major causes of not using seat belts.

3.2.1 Desk Study

Office work for this project entails collection of relevant study report, secondary data related to roads, road functions, road standards, traffic volume, crash data, and other relevant information. Table 3-1 shows average motorized traffic volume (excluding motorcycles and three wheelers) and its composition near the selected study locations along the national highways for year 2021 as per DoR, HMIS unit. The nearby study locations and minimum sample size required for study of the highways are also mentioned. The minimum sample size for finite population can be determined using equation (3.1).

$$n = \frac{z_{\alpha/2}^2 Np(1-p)}{(N-1)E^2 + z_{\alpha/2}^2 p(1-p)} \quad (3.1)$$

Table 3-1 Average motorized traffic volume excluding motorcycles and three wheelers in 2021 at relevant locations in the highways

S.No.	Traffic Station	Average Daily Motorized Traffic (Excluding Motorcycles and three wheelers)	Minimum Sample Size	Relevant Observation Location
1	NH01-005	8174	367	Amelia, Attaria, Damak, Gorusinge, Hetauda, Itahari, Narayangadh
2	NH01-008	9446	370	
3	NH01-029	6837	364	
4	NH01-051	4484	354	
5	NH01-058	2293	330	
6	NH13-001	2905	340	Bardibas, Shindhuli, Khurkot
7	NH17-004	7999	367	Damauli, Abu Khaireni, Kurintar, Galchhi
8	NH17-011	5527	360	
9	NH55-001	524	222	Tulsipur, Solaawang, Pattare Bazar
10	NH55-006	390	194	
11	NH58-005	2033	324	Birendranagar, Nepalgunj, Kohalpur
12	NH58-008	1294	297	
		51906	*3889*	

(Source: DoR, HMIS Unit)

Minimum sample size required for the highways were determined for 95% confidence level, using ADT as the finite population, with estimated sample proportion of 50% as it keeps the sample size calculation in conservative side giving largest sample. Additionally, as part of the desk study phase, the study team had conducted a thorough review of relevant literature and documents pertaining to road safety. Based on these and other practical information, the team had prepared the questionnaire and field observation sheets.

3.2.2 Observational Survey

The data collection was carried out by direct observations at selected locations of the highways. A one-day observation was made at each location to assess the usage of seat belts by front occupants (the driver and the passengers). The observed data were classified based on various factors, including person type (driver or passenger), vehicles types (such as passenger cars, pickup trucks, utility vehicles, buses and vans), gender of the driver and passenger (male or female), seat belt usage. Data collectors made the observations between 7:00 A.M. and 7:00 P.M. covering different times of the day (i.e., morning, afternoon, and evening), including weekdays and weekends. To record the information, specially designed datasheets were used. Each datasheet was designed to capture the date and time of observation, vehicle type, and driver and passenger information. Additionally, the datasheets captured variables for seat belt usage by the driver and front passenger. The sample data collection sheet is shown in Annex I.

Steps:

i. The number of observation sites to be included in the survey: Observation of at least 3 locations were made for each National Highway. The numbers of observation sites were increased for highways of larger length.
ii. Location of observation site: The possible places where an observer could stand to survey seat belt usage was determined based on the prevailing traffic volume.
iii. Time and days for the observations: The scheduling involved prearranging a specific day and time for an observer to be stationed at an intersection to conduct observations on safety belt usage. Data collectors made observations between 7:00 A.M. and 7:00 P.M. for selected times of the day in morning, afternoon, and evening period, including weekdays and weekends with the assistance of traffic personnels.
iv. Training observers: The observers were trained before being deployed to the field to ensure

consistency in data collection and minimize potential errors. The training served the purpose of familiarizing the observers with the survey process, standardizing their practices, and enhancing their skills. As part of the training, the observers were guided to a mock site, where they practiced identifying suitable observation positions, accurately observing seat belt usage, and correctly completing the survey forms.

v. Deployment of observers: The observers were then deployed to the designated observation sites at the scheduled day and time to carry out the observational survey.
vi. Observation of Seat Belt Use Compliance: This was recorded by the data collectors after checking seat belt usage of both front passengers and drivers.
vii. Total number of occupants in the target vehicle: The total number of occupants in the surveyed target vehicles including the driver and passengers were counted and noted regardless of whether they were belted or not.

3.2.3 Questionnaire Design

The study team developed a questionnaire to carry out the questionnaire survey. The structured questionnaire was prepared based on the information gained through the literature study. The questionnaire consists of respondents' demography, driving history, seat belt system in the vehicle, seat belt use and respondents' knowledge on legal provisions on the seat-belt use. It also covers the respondents`s perspective on motivators/reasons for using or not using the seat belts. Sample questionnaire has been shown in Annex II.

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3.2.4 Questionnaire Survey

Sample road side surveys were conducted at the selected locations of the highways mentioned in Section 3.1. The survey began with obtaining informed consent from the participants, followed by asking a series of questions relating to participants' demographics, driving history, and seat belt use; seat belt system in the vehicle; and factors motivating/discouraging the participant for the seat belt use. Each participant completed either a self-administered questionnaire or were interviewed by a surveyor under the assistance of traffic personnels. The questionnaire also included inquires about the drivers' frequency of seat belt use, knowledge of seat belt regulations and awareness of penalty for not using the seat belts while driving.

3.2.5 Data Analysis

- For each observation site, the completed data and site forms were used to count the total number of drivers and front passengers of different highways and vehicle types that were belted and their gender.
- The data analysis was conducted to get the parameters like the seat belt use rate by highways, vehicle types and gender; and their variances.
- Seat belt use compliance rate: The seat belt use compliance rate is the estimate of the percentage of drivers and front window-seat passengers in the observed vehicle types that were using the seat belt in the survey area during the duration of the survey.
- Variance: The variance/standard deviation measure shows how similar the belt use rates were between each of the observation sites. The larger the variance the more dissimilar the observation sites are. The standard deviation is computed statistically.
- Standard error: The standard error is measure of accuracy or precision of the sample estimate of the compliance rate. The higher the value, less meaningful is the compliance rate.
- The data from questionnaire were coded and analysis were performed to find out seat belt condition in the vehicle in Nepal, drivers and passengers' awareness to the seat belt law in Nepal, and to identify the motivators/reasons for seat belt use/not use.

4 RESULTS AND DISCUSSION

4.1 Sample Size and Distribution

An observational survey and a questionnaire-based survey were conducted at 20 observation stations across the five national highways (East West Highway, B.P. Highway, Prithvi Hivhway, Rapti Higway and Karnali Highway). The observational survey includes sample observations of a total of 7397 vehicles, while the questionnaire survey involved collecting sample responses to a prepared set of questionnaires from drivers and front passengers of 6882 vehicles. The number of samples collected for each highway exceeds the minimum sample size required mentioned in Table 3.1. The distributions of these samples across the survey locations is shown in Table 4-1. The observation and questionnaire survey covers more than 40% of average daily motorized traffic volume (excluding motorcycles and three wheelers) in the highways given in Table 3-1.

Table 4-1 Locationwise observation number

S.No.	Location	Highway	Sample Size in	
			Observational Survey	Questionnaire Survey
1	Abu Khaireni	Prithvi	401	352
2	Ameliya	East West	360	323
3	Attaria	East West	360	320
4	Bardibas	BP	458	400
5	Birendranagar	Karnali	367	317
6	Damak	East West	432	400
7	Damauli	Prithvi	424	389
8	Galchhi	Prithvi	406	408
9	Gorusinge	East West	487	422
10	Hetauda	East West	419	410
11	Itahari	East West	432	406
12	Khurkot	BP	432	407
13	Kohalpur	Karnali	308	260
14	Kurintar	Prithvi	404	392
15	Narayangadh	East West	400	394
16	Nepalgunj	Karnali	416	373
17	Pattare Bazar	Rapti	93	102
18	Sindhuli	BP	400	400
19	Solaawang	Rapti	101	97
20	Tulsipur	Rapti	297	310
	Grand Total		7397	6882

Vehicles for the observational and questionnaire surveys were selected randomly but efforts were made to keep the proportion of different vehicle types as per the composition of motorized vehicle (excluding mortorcycles and three wheelers) at the nearby traffic station given in Table 3.1. Sample filled observational and questionnaire surveys and field photographs are available in the Annex III, Annex IV, Annex V, respectively. Table 4-2 and Table 4-3 show the distribution of the samples in the observational and the questionnaire survey, respectively categorized by vehicle types.

Table 4-4 shows the gender wise distribution of the drivers and front passengers in the observational survey. It is clear from the table that almost all of the drivers are male and very few are female. During the observational survey, certain observations were classified as "others" in terms of gender, as it was not feasible to determine their specific gender. The % female front passengers (22.2%) is higher compared to % female drivers (0.18%) but are still much lower when compared with % male front passenger (77.8%). Gender wise distribution of the drivers and front passengers in the questionnaire survey was also similar.

Table 4-2 Distribution of samples in the observational survey based on vehicle types

S.No.	Location	Vehicle Type					
		Bus	Car/Jeep/Van	Microbus	Truck	Utility	Grand Total
1	Abu Khaireni	45	198	60	44	54	401
2	Ameliya	50	122	32	132	24	360
3	Attaria	78	111	65	83	23	360
4	Bardibas	25	180	135	59	59	458
5	Birendranagar	50	74	82	104	57	367
6	Damak	121	174	1	82	54	432
7	Damauli	43	213	77	26	65	424
8	Galchhi	32	190	80	40	64	406
9	Gorusinge	35	189	109	95	59	487
10	Hetauda	48	95	1	244	31	419
11	Itahari	46	217	5	98	66	432
12	Khurkot	99	127	129		77	432
13	Kohalpur	32	50	96	94	36	308
14	Kurintar	33	195	70	32	74	404
15	Narayangadh	47	148	12	134	59	400
16	Nepalgunj	68	160	95	49	44	416
17	Pattare Bazar	30	26	1	19	17	93
18	Sindhuli	56	113	128	51	52	400
19	Solaawang	20	19	16	26	20	101
20	Tulsipur	89	80	5	52	71	297
Grand Total		1047	2681	1199	1464	1006	7397

Table 4-3 Distribution of samples in the questionnaire survey based on vehicle types

S.No.	Location	Vehicle Type					
		Bus	Car/Jeep/Van	Microbus	Truck	Utility	Grand Total
1	Abu Khaireni	38	175	38	18	83	352
2	Ameliya	67	105	17	103	31	323
3	Attaria	67	78	42	80	53	320
4	Bardibas	49	109	135	53	54	400
5	Birendranagar	29	55	108	75	50	317
6	Damak	113	157	1	77	52	400
7	Damauli	12	213	83	15	66	389
8	Galchhi	22	192	92	28	74	408
9	Gorusinge	82	145	81	59	55	422
10	Hetauda	62	140	6	132	70	410
11	Itahari	43	179	11	89	84	406
12	Khurkot	56	141	158	6	46	407
13	Kohalpur	42	24	78	93	23	260
14	Kurintar	13	197	73	18	91	392
15	Narayangadh	51	160	3	90	90	394
16	Nepalgunj	54	115	87	58	59	373
17	Pattare Bazar	26	23	2	30	21	102
18	Sindhuli	51	96	165	37	51	400
19	Solaawang	17	23	15	19	23	97
20	Tulsipur	104	70	5	53	78	310
	Grand Total	998	2397	1200	1133	1154	6882

Table 4-4 Gender wise distribution of drivers and front passengers in observational survey

S.No.	Location	Driver				Front Passenger		
		Female	Male	Others	Grand Total	Female	Male	Grand Total
1	Abu Khaireni	2	399		401	81	212	293
2	Ameliya		360		360	45	202	247
3	Attaria		360		360	18	169	187
4	Bardibas	2	454	2	458	91	271	362
5	Birendranagar		367		367	36	155	191
6	Damak	2	430		432	66	181	247
7	Damauli		424		424	85	236	321
8	Galchhi		406		406	87	267	354
9	Gorusinge		487		487	68	265	333
10	Hetauda		419		419	13	131	144
11	Itahari	2	430		432	63	208	271
12	Khurkot	1	431		432	102	246	348
13	Kohalpur		308		308	27	167	194
14	Kurintar		403	1	404	82	268	350
15	Narayangadh	2	398		400	34	138	172
16	Nepalgunj	2	414		416	29	137	166
17	Pattare Bazar		93		93	19	48	67
18	Sindhuli		400		400	90	233	323
19	Solaawang		100	1	101	14	58	72
20	Tulsipur		297		297	35	210	245
	Grand Total	13	7380		7397	1085	3801	4886

4.2 Seat Belt Use Compliance Rate

Table 4-5 shows the mean seat belt use compliance rates of drivers and front passengers in Nepalese highways. The average seat belt use compliance rates of drivers and front passengers are found to be 37.72% and 6.34% with standard deviations of 15.11% and 4.6% respectively which is very much similar to the compliance rate of the neighboring country India (WHO, 2018). The standard errors range between 1.03% to 3.38% which is below the recommended 5%.

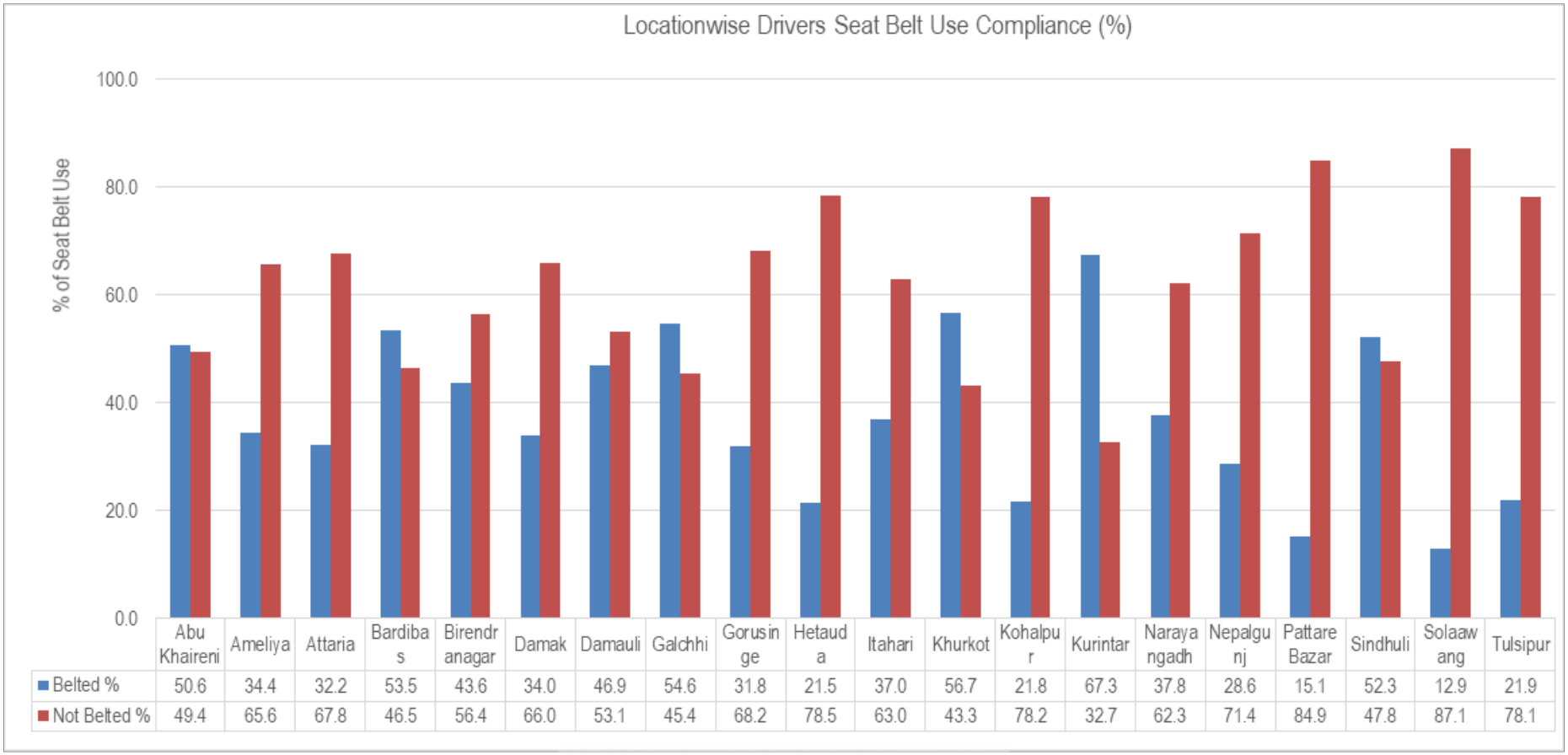
Table 4-5 Seat belt compliance rates in Nepalese national highways

	Seat belt compliance rate		
	Mean (%)	**Standard deviation (%)**	**Standard error (%)**
Driver	37.72	15.11	3.38
Front passenger	6.34	4.61	1.03

Figures 4-1 and 4-2 detail out the drivers and passengers' seat belt use compliance at the selected 20 observational sites. The drivers' compliance rate is observed to be highest (56.7%) at Khurkot in B. P. Highway and minimum (12.9%) at Solaawang in Rapti Highway. As compared to the drivers' compliance to seat belt, the front passengers' compliance to seat belt is quite low. The reported highest and lowest front passenger compliance rates are 18.3% and 1.4% at Kuringtar, Prithvi highway and Solaawang, Rapti highway, respectively.

Figure 4-3 to Figure 4-6 provide detail drivers and front passengers' compliance rates by national highways and vehicle types. Prithvi Highway and B.P. Highway and are observed to have higher drivers and front passengers' compliance rates compared to other three national highways under the study. The drivers' seat belt use compliance rate is observed to be highest 54.8% for Prithvi national highway and lowest 18.7% for Rapti national highway. Similarly, the front seat passenger`s compliance rate is highest (13.8 %) in Prithvi highway and lowest (2.9%) in Karnali national highway.

Figures 4-5 and 4-6 show that the compliance rates vary widely among different vehicle types. The drivers' compliance rates are observed to be highest (69.3%) for car (car/jeep/van) vehicle type followed by utility vehicles and microbus, while the compliance rates are observed to be as low as 4.1% and 5.9% for bus and trucks, respectively. The compliance of front passengers is poorer. The observed highest front passengers' compliance is 16.8% for car/jeep/van and the compliance is negligible 0.1% for trucks.



	Abu Khaireni	Ameliya	Attaria	Bardibas	Birendranagar	Damak	Damauli	Galchhi	Gorusinge	Hetauda	Itahari	Khurkot	Kohalpur	Kurintar	Narayangadh	Nepalgunj	Pattare Bazar	Sindhuli	Solaawang	Tulsipur
Belted %	50.6	34.4	32.2	53.5	43.6	34.0	46.9	54.6	31.8	21.5	37.0	56.7	21.8	67.3	37.8	28.6	15.1	52.3	12.9	21.9
Not Belted %	49.4	65.6	67.8	46.5	56.4	66.0	53.1	45.4	68.2	78.5	63.0	43.3	78.2	32.7	62.3	71.4	84.9	47.8	87.1	78.1

Figure 4-1 Drivers' seat belt use compliance rates at the 20 observation sites

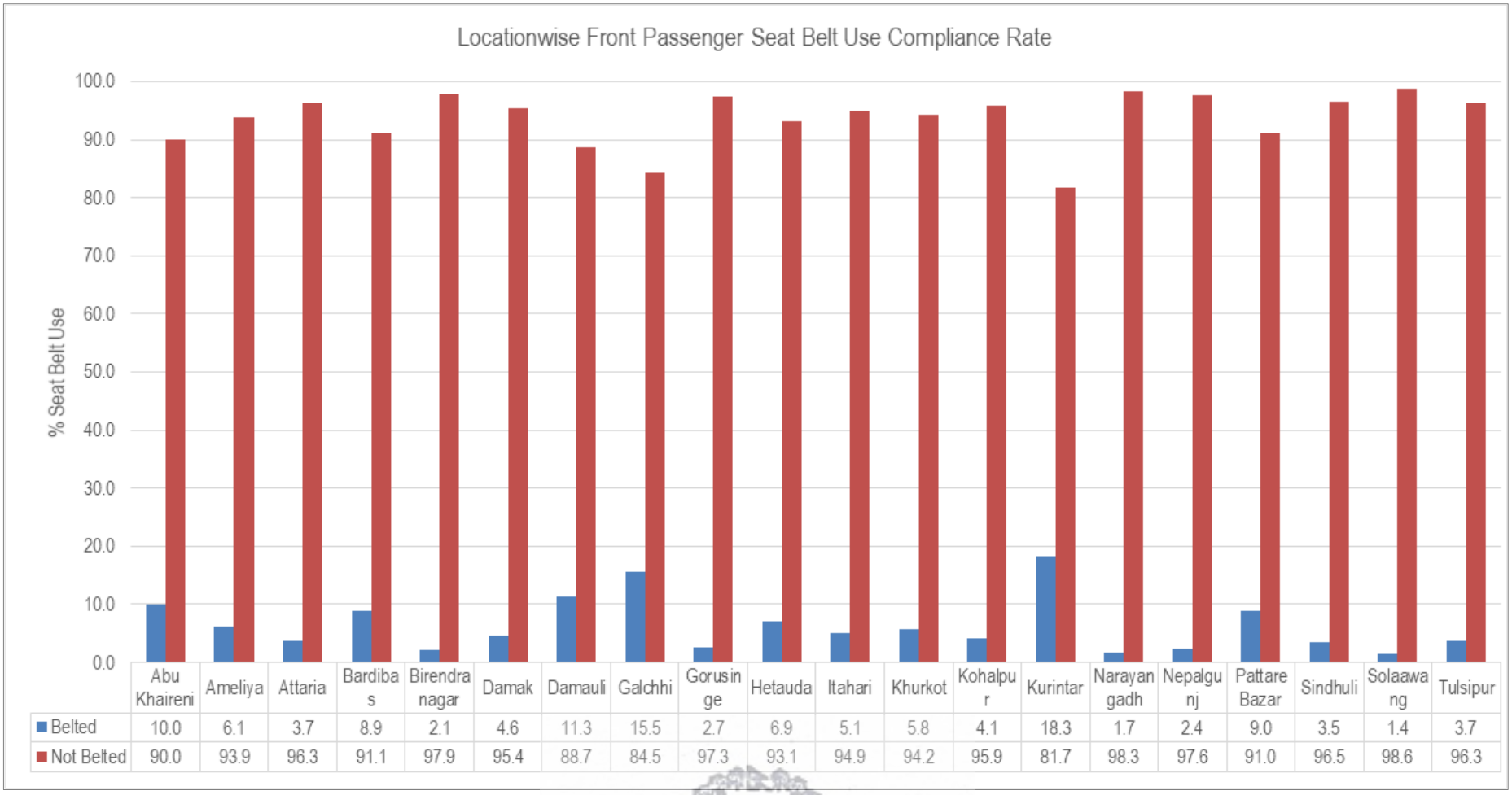


Figure 4-2 Front passengers' seat belt use compliance rates at the 20 observation sites

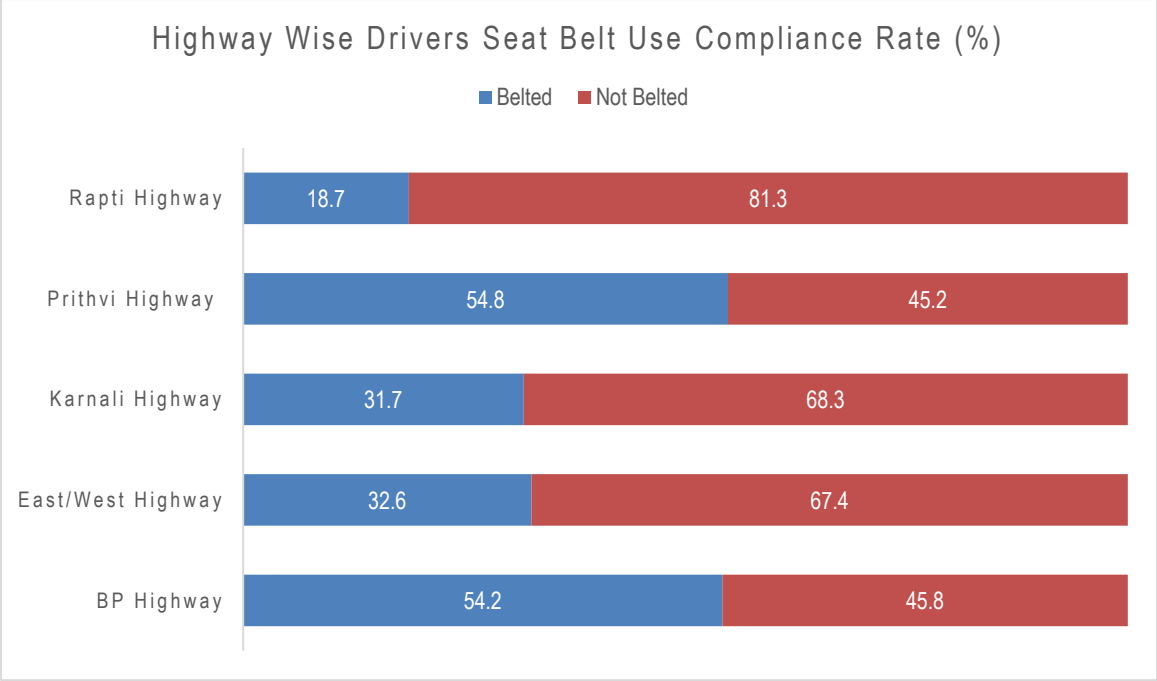


Figure 4-3 Drivers seat belt use compliance rates by national highways

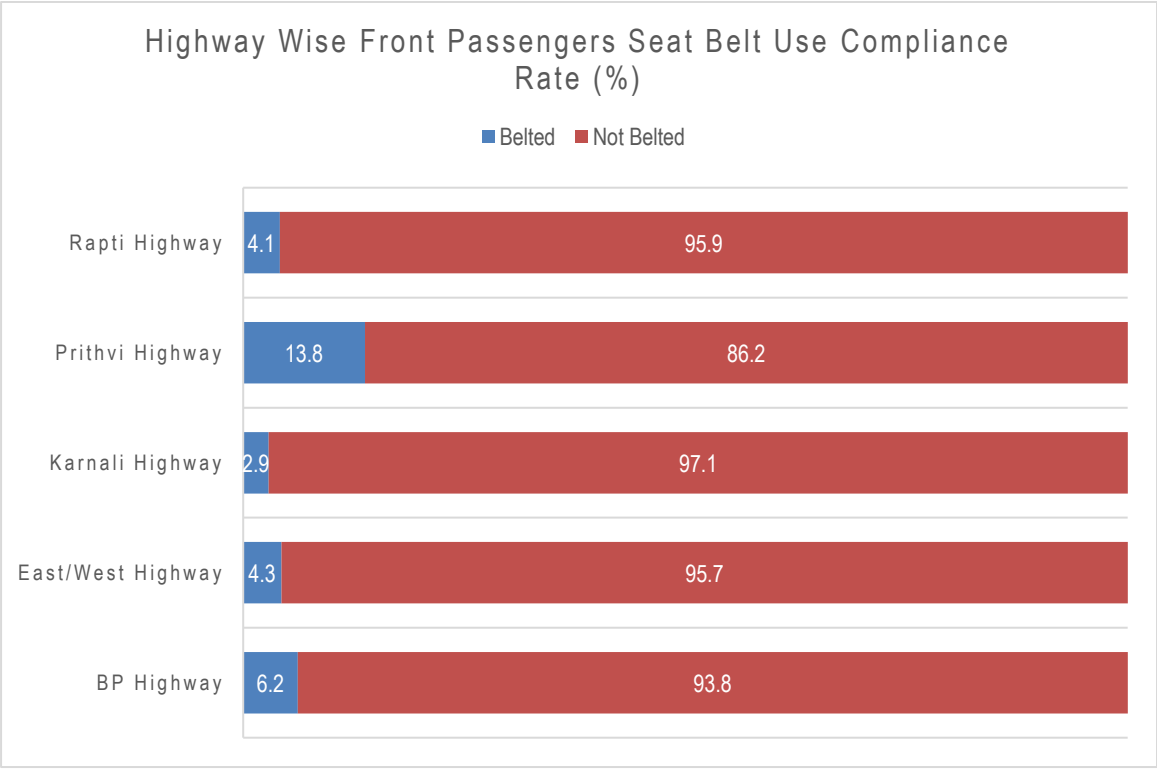


Figure 4-4 Front passengers seat belt use compliance rates by national highways

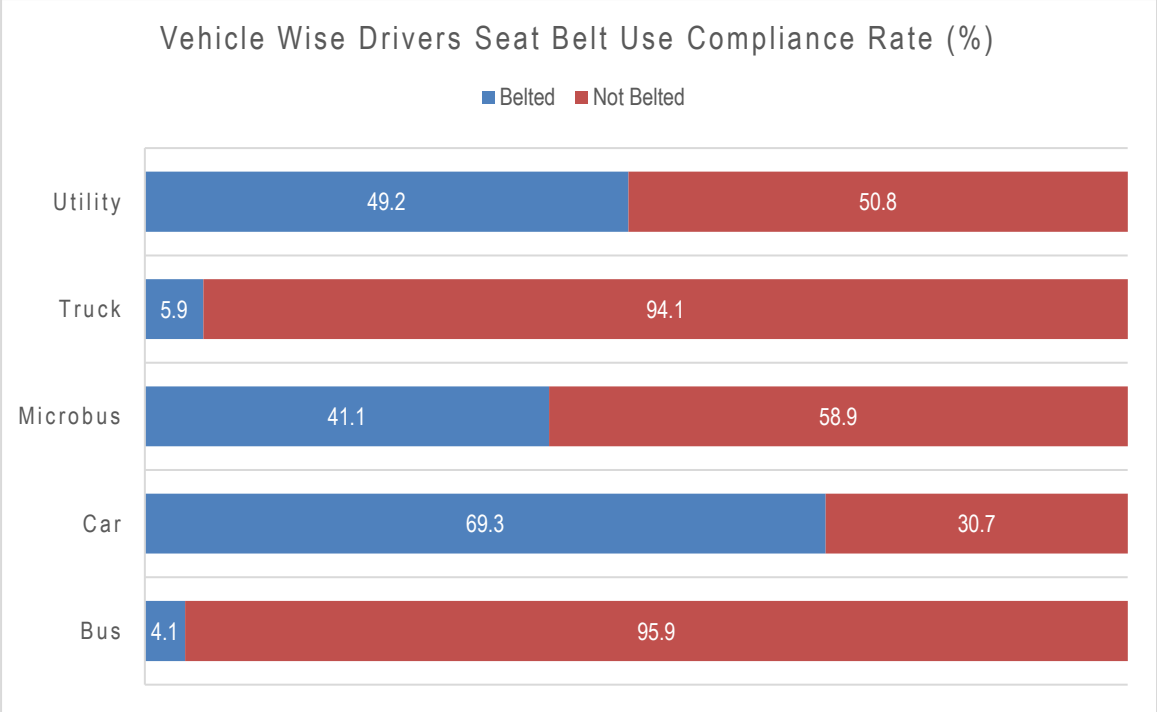


Figure 4-5 Drivers seat belt use compliance rates by vehicle type

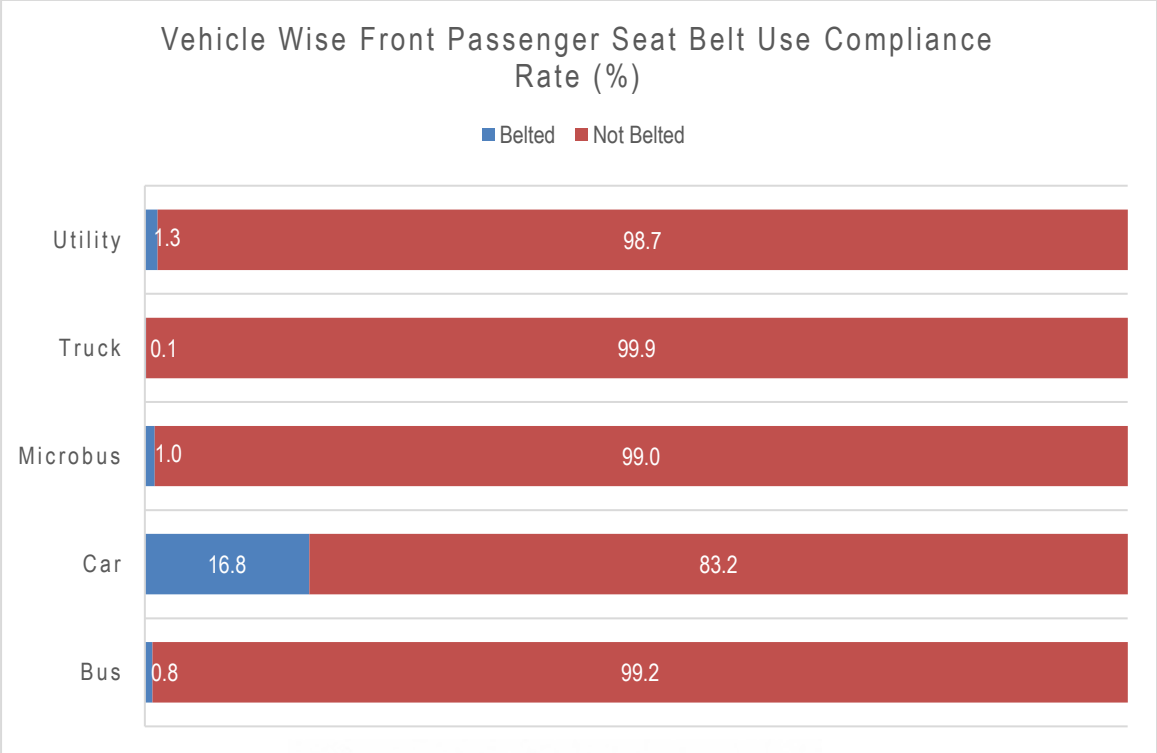


Figure 4-6 Front passengers' seat belt compliance rates by vehicle type

4.3 Drivers' Knowledge of Seat Belt Law in Nepal

When inquired about the existing seat belt law, approximately 60% (as shown in Figure 4-7) of all respondents in the questionnaire survey conducted on the selected national highways were aware of the seat belt law. This highlights a pressing requirement for intensified awareness initiatives aimed at educating vehicle users about the seat belt law and promoting the consistent use of seat belts during travel in motor vehicles.

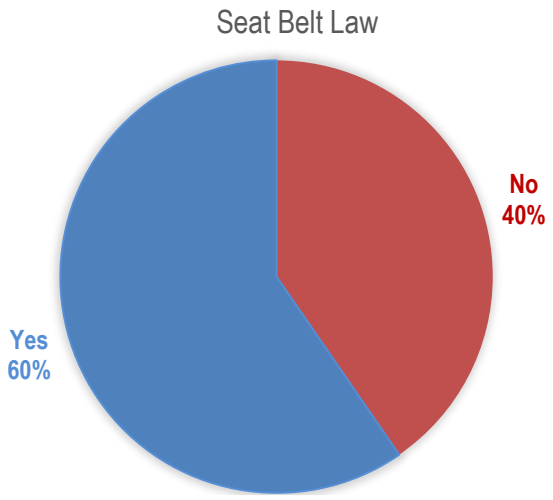


Figure 4-7 Knowledge on seat belt law

4.4 Seat Belt System in Vehicles

Four questions related to seat belts were presented to the respondents. The initial question inquired about the presence of seat belts for drivers within their vehicles. The findings indicate that approximately 80% of vehicles are equipped with driver seat belts. However, it is noteworthy that there are still vehicles operating on our roads that lack seat belt provisions, even for the drivers. This disparity is more pronounced on the Rapti highway, where the percentage reaches 32.6%, followed by the East West highway at 27.5%, as depicted in Figure 4-8.

The second query pertained to the presence of seat belts for front passengers. In contrast to the availability of driver seat belts in vehicles, the situation concerning front passenger seat belt provision is notably more concerning. Approximately 32.5% of vehicles lack seat belts for front seat passengers, as depicted in Figure 4.9. This issue is more pronounced on the Rapti highway, where the percentage rises to 45.8%. Furthermore, the situation is particularly severe on the Karnali highway at 43.3%, followed closely by the East-West Highway at 39.5%.

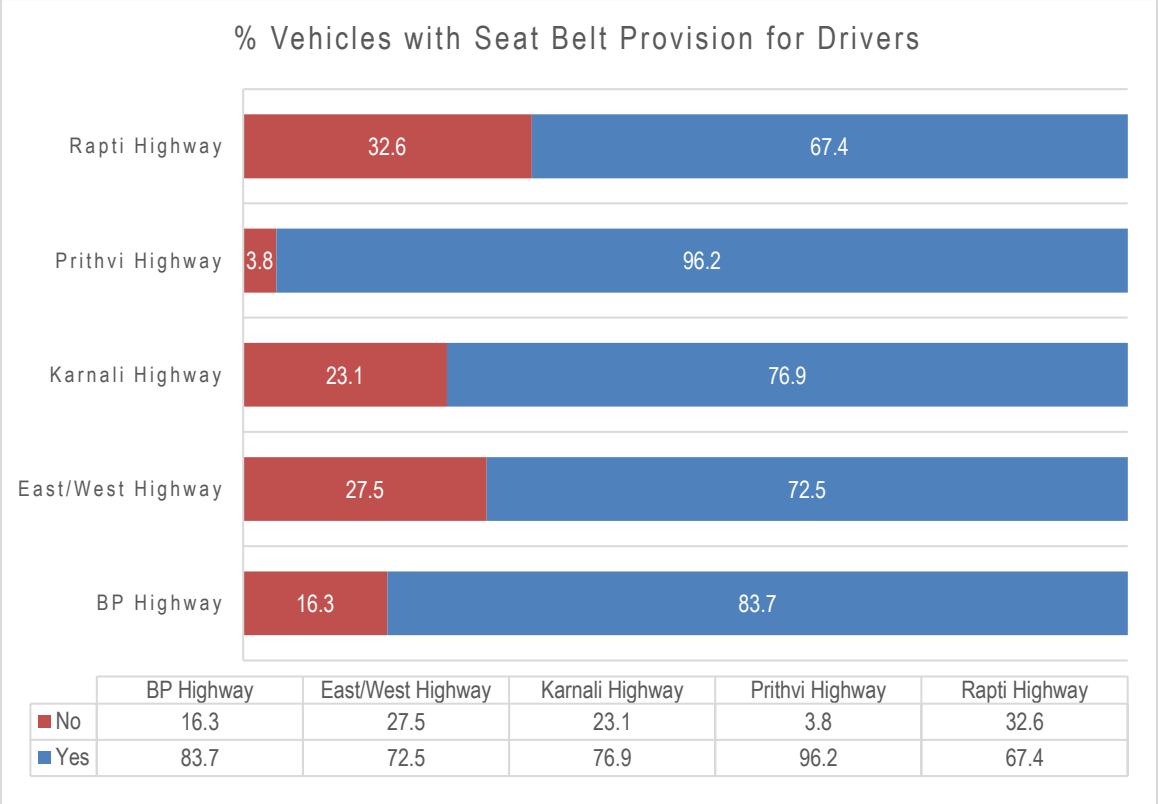


Figure 4-8 Seat belt provision for drivers

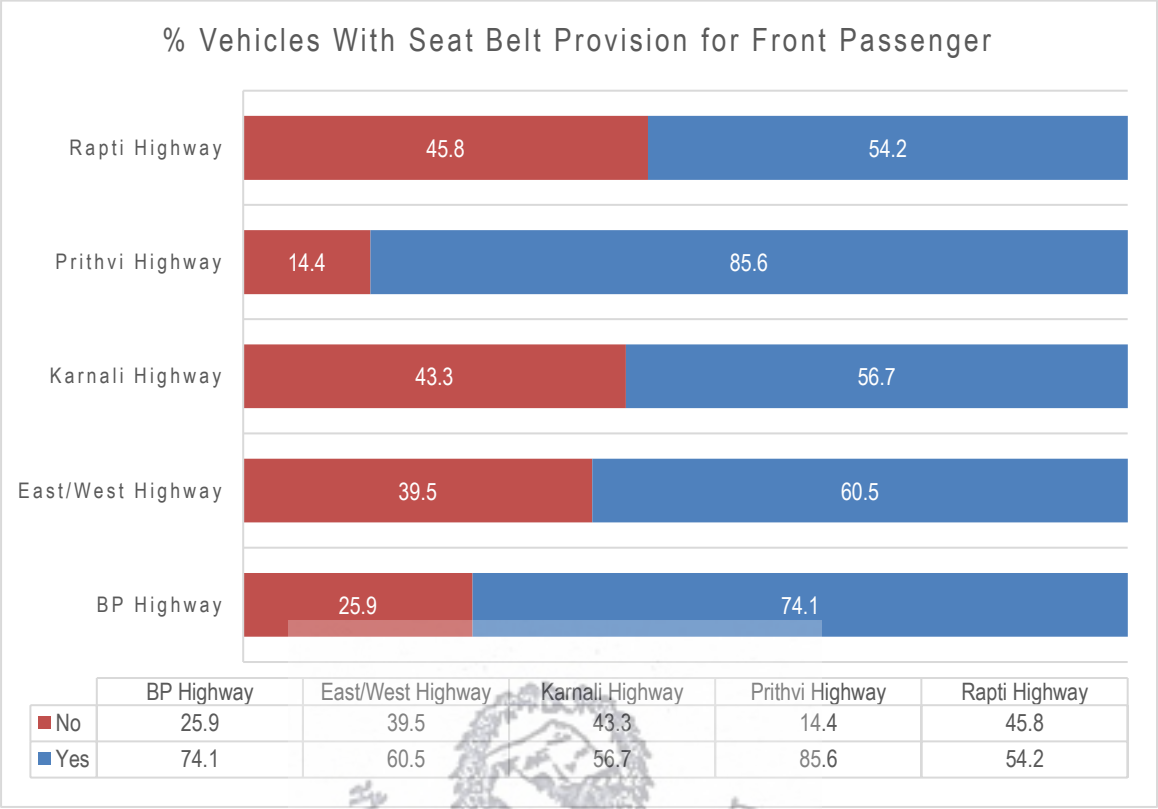
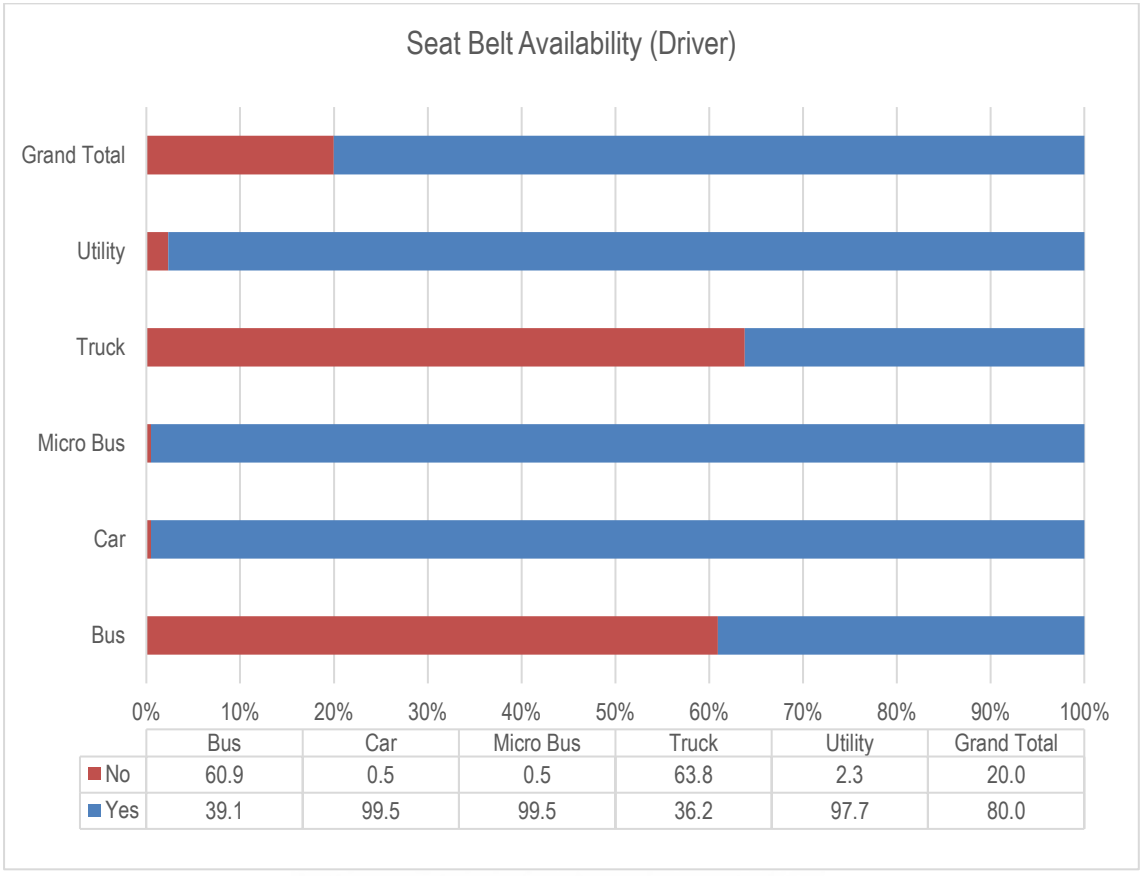


Figure 4-9 Seat belt provision for front passenger

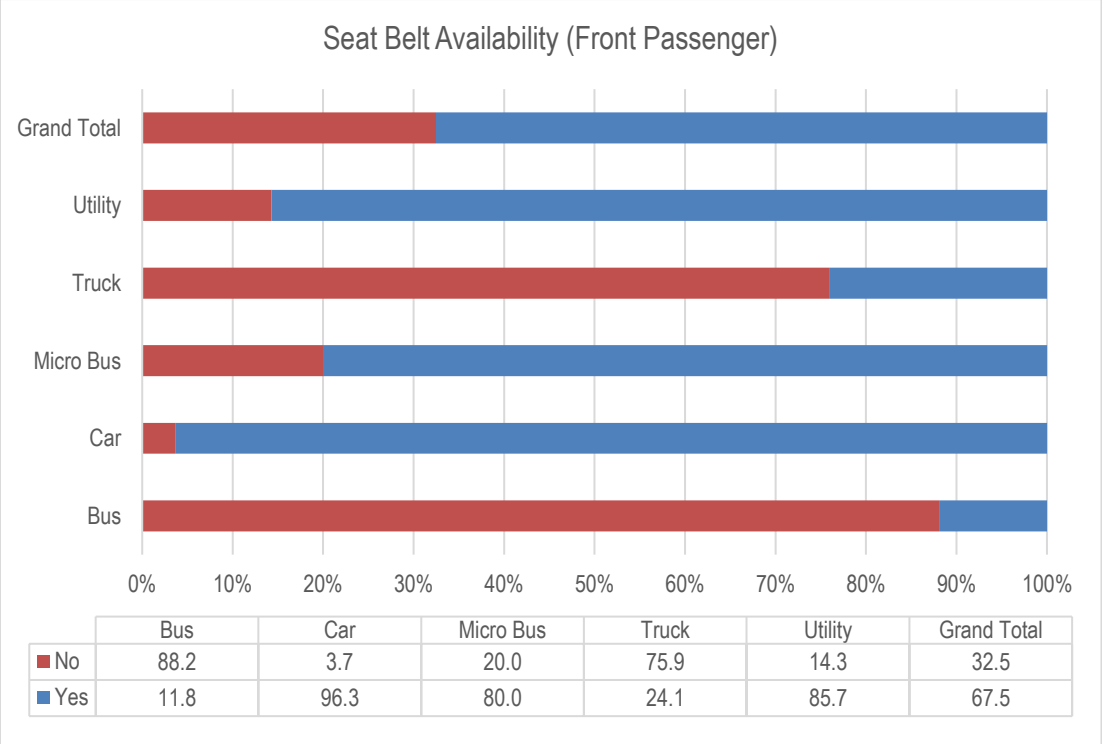
The in-depth analysis of seat belt provision by vehicle category (Figure 4-10 and Figure 4-11) indicated that 95% of cars feature seat belt provisions for both drivers and front seat passengers, with a similar provision found in over 85% of utility vehicles. The survey further uncovered that over 95% of microbuses have seat belt provisions for drivers, but only around 80% have the same provision for front seat passengers. Notably, more than 60% of trucks and buses lack seat belt provisions, even for the drivers.

The third inquiry revolved around the existence of a seat belt alarm system within vehicles, designed to alert vehicle users about the importance of fastening their seat belts. Regrettably, over two-thirds of vehicles (73.1%) lack this crucial system, as illustrated in Figure 4-12. A striking 84% of vehicles on the Rapti highway are devoid of this system, making it the highest percentage, followed by the BP highway at 80.6% and the East West Highway at 74.8%.



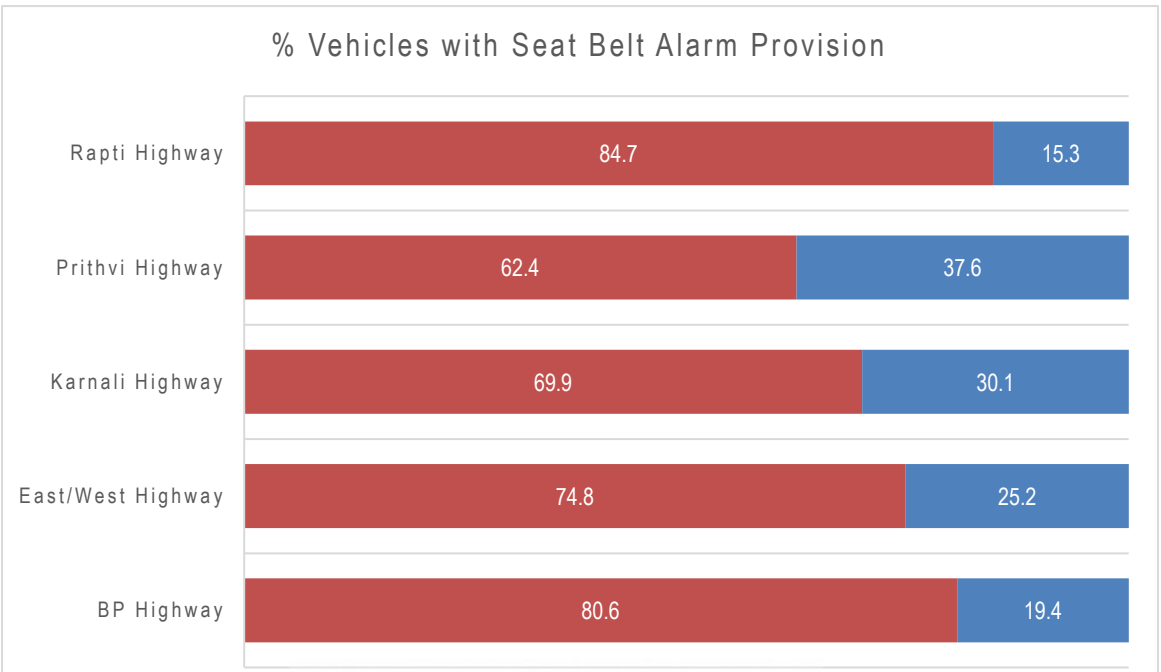
	Bus	Car	Micro Bus	Truck	Utility	Grand Total
No	60.9	0.5	0.5	63.8	2.3	20.0
Yes	39.1	99.5	99.5	36.2	97.7	80.0

Figure 4-10 Seat belt provision for driver by vehicle type



	Bus	Car	Micro Bus	Truck	Utility	Grand Total
No	88.2	3.7	20.0	75.9	14.3	32.5
Yes	11.8	96.3	80.0	24.1	85.7	67.5

Figure 4-11 Seat belt provision for front passenger by vehicle type



	BP Highway	East/West Highway	Karnali Highway	Prithvi Highway	Rapti Highway
No	80.6	74.8	69.9	62.4	84.7
Yes	19.4	25.2	30.1	37.6	15.3

Figure 4-12 Seat belt alarm system in the vehicle

The fourth investigation centered on the presence of a child restraint system within vehicles, aimed at safeguarding children in the event of a collision. Unfortunately, the majority of vehicles, accounting for over 95% (95.7%), lack this essential safety feature, as depicted in Figure 4-13. Notably, the East West Highway has the highest percentage of vehicles with child restraint systems installed, which stands at a mere 7.2%.

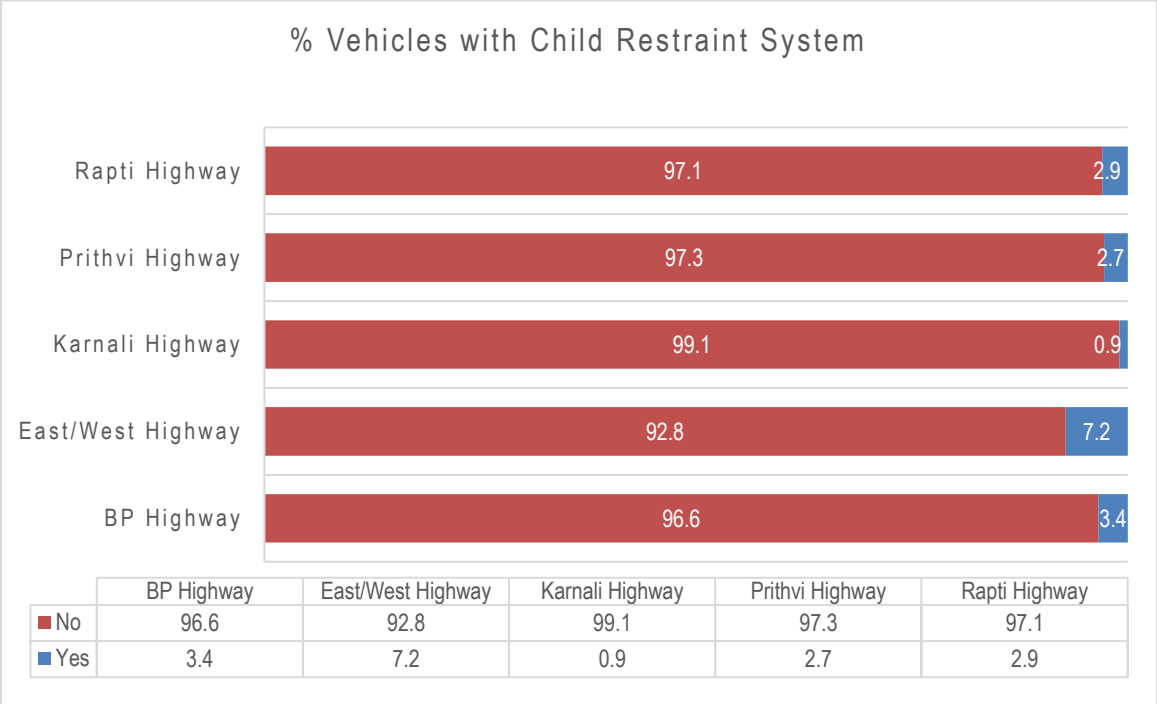


Figure 4-13 Child restraint system in the vehicle

4.5 Factors Influencing and Discouraging Seat Belt Utilization

The questionnaire was also prepared to find out the reasons for not using seat belt and motivation of using the seat belt. Discomfort (20%) and frequent stop (15.2%) are the major reported causes (Figure 4-14) for not using seat belt whereas safety awareness (81.2%) was the major motivation for using seat belt (Figure 4-15). Over 30% of respondents indicated that the question about not wearing a seat belt is not relevant to them, as they consistently use one and hence, they are put under the not applicable category.

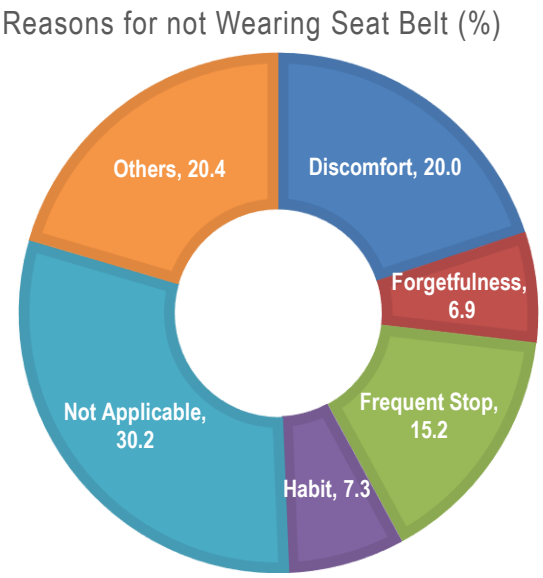


Figure 4-14 Causes for not wearing seat belt

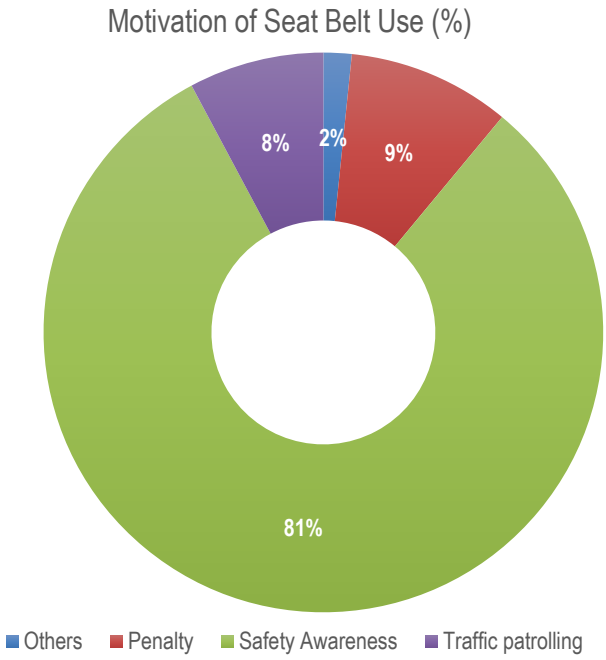


Figure 4-15 Motivation for seat belt use

4.6 Seat Belt Compliance with respect to Eduation Level and Experience

The questionnaire survey included inquiries about education level and years of driving experience. Among the respondents, over 50% reported having primary level education, while more than 25% had secondary level education. Just slightly above 10% indicated an education level of undergraduate or higher, as illustrated in Figure 4-16.

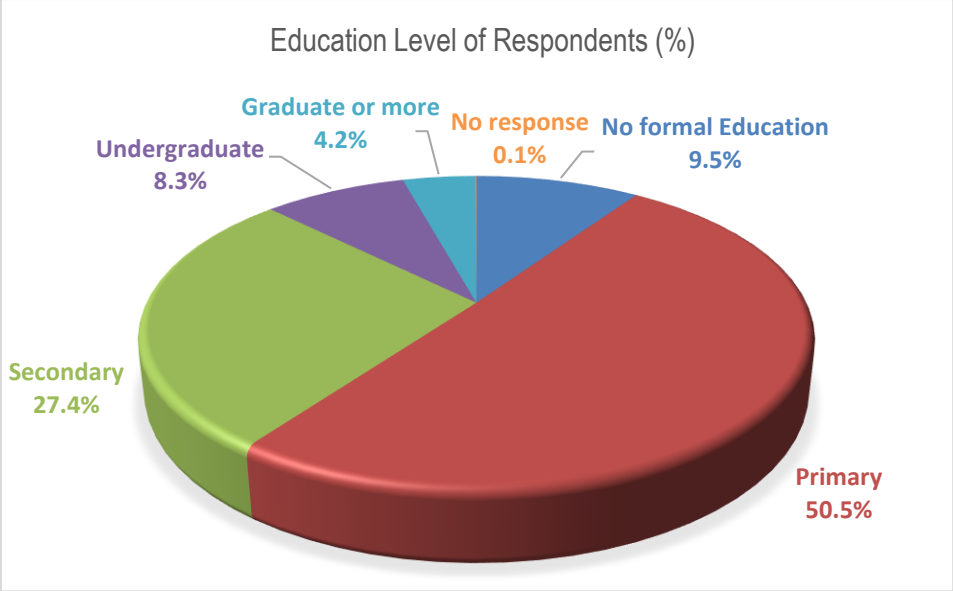


Figure 4-16 Education level of respondents

Upon closer examination of the data correlating seat belt usage with education levels, it was observed that individuals with higher education levels tend to use seat belts more frequently while driving (Figure 4-17).

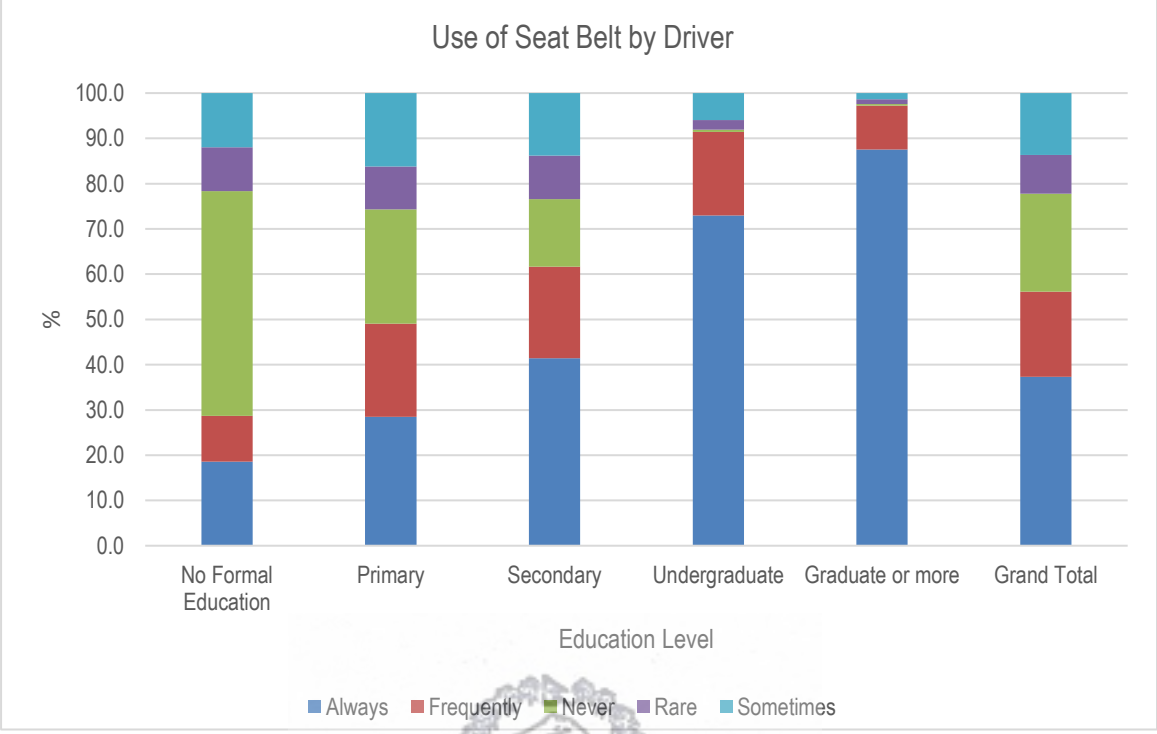


Figure 4-17 Seat belt use and education level

The questionnaire survey included inquiries about education level and years of driving experience. Among the respondents, just more than 30% reported having driving experience of 5 to 10 years, while just more than 25% had driving experience of 10 to 15 years. Just slightly above 10% indicated of having driving experience of more than 20 years as illustrated in Figure 4-18. Upon a detailed analysis of the data linking seat belt usage with the number of years of driving experience, no clear direct correlation is evident. Interestingly, as the experience increases, the proportion of respondents of always wearing a seatbelt first slightly decreases and then increases. Meanwhile, the proportion of frequently wearing a seatbelt shows a slight decrease with experience (Figure 4-19). Two respondents did not provide answers regarding their experience (indicated by "No response" in Figure 4-19), but they did mention that they always use the seat belt.

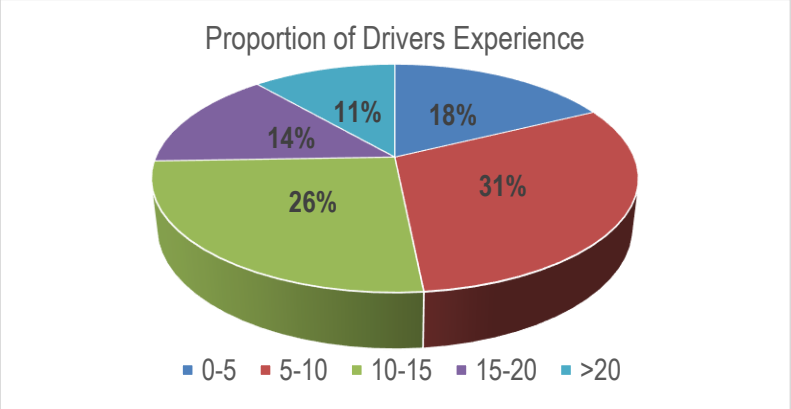


Figure 4-18 Driver experience (years)

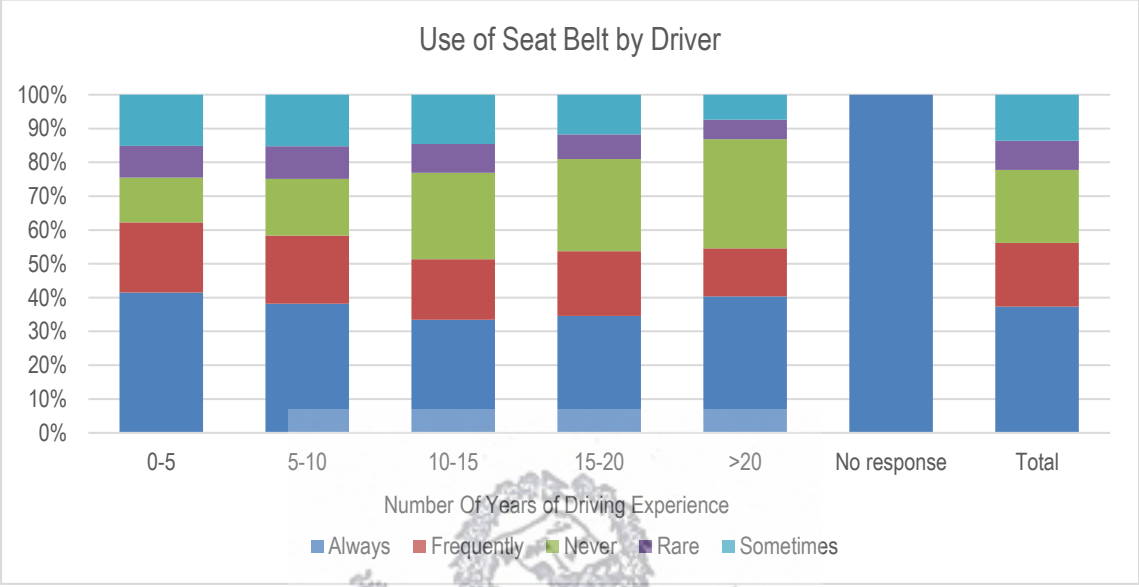


Figure 4-19 Seat belt use by driver with respect to number of years of driving experience

5 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study assesses the level of compliance with seat belt usage on various national highways in Nepal through an observational approach. Additionally, interviews were conducted to assess the seat belt systems in the vehicles, figure out the awareness of legal regulations among drivers and passengers, and identify the factors influencing their willingness to use the seat belt. A total of 7397 vehicles were observed across 20 different locations on five major national highways (Rapti Highway, Karnali Highway, Prithvi Highway, East West Highway, and BP Highway) to evaluate compliance with seat belt usage among drivers and front seat passengers. Furthermore, a questionnaire survey was administered to drivers and front seat passengers of 6882 vehicles at these locations. The combined findings from the observational study and questionnaire survey indicate:

- The average compliance rates for seat belt usage among drivers and front passengers on Nepalese national highways are 37.72% and 6.34%, respectively, with standard deviations of 15.11% and 4.6%, respectively, observed across the 20 surveyed locations. The fluctuation in seat belt compliance rates across chosen highways resulting 15.11% standard deviation may be attributed to differences in specific site conditions, policy interventions, and the extent of enforcement—factors that were not taken into account in this study. Among the five highways studied, the highest rate of seat belt use compliance among drivers is 54.8% on Prithvi national highway, while the lowest is 18.7% on Rapti national highway.
- Similarly, among the front seat passengers, the highest compliance rate (13.8%) is found on Prithvi highway, while the lowest (2.9%) is on Karnali national highway.
- Regarding different vehicle types, the drivers of car (car/jeep/van) vehicles exhibit the highest compliance rates at 69.3%, while buses have the lowest compliance at 4.1%, slightly differing from trucks at 5.9%. The compliance of front passengers is highest for car/jeep/van vehicles at 16.8% and negligible at 0.1% for trucks.
- Approximately, 60% of the respondents were unaware about the seat belt law.
- Discomfort (20%)) and frequent stop (15.2%) were reported as the major reasons for not using seat belts, while safety awareness (81.2%) was identified as the main motivator for seat belt usage.
- The survey also unveiled that about 20% of vehicles on Nepalese highways are without seat

belt provision even for drivers. Furthermore, approximately 32.5% of vehicles do not include seat belt provisions for front passengers, 73.1% lack seat belt alarm systems, and only about 5% of vehicles use child restraint system.

- In terms of driver experience, the survey reveals no clear link between the driver's experience and the use of seat belts. However, concerning driver education, the survey indicates that a higher level of education is associated with an increased likelihood of using seat belts.

5.2 Recommendations

As previously determined, the seat belt compliance rates for both drivers and front seat passengers stand slightly above 37% and 6 %, respectively. These figures are comparable to those observed in India according to the World Health Organization (WHO) in 2018. In order to enhance seat belt compliance rates on the roads of Nepal, the following recommendations have been put forth.

- The compliance rate data reveals that there is a need for improved education among drivers concerning seat belt usage, as approximately 60% of respondents were found to be unaware of the laws pertaining to seat belt use. Since discomfort was reported as the primary reason for not using seat belts, it becomes imperative to raise awareness about the safety compromises associated with not wearing seat belts. The front seat passengers seat belt use compliance rate is even worst than the drivers which triggers the immediate need for effective awareness among the passengers as well.
- The survey also highlighted that over 20% of vehicles lack seat belt provisions for drivers. Consequently, it is crucial to consider mandating seat belts as essential accessories for vehicles during the importation process. Additionally, efforts should be made, where feasible, to retrofit existing vehicles with quality seat belts. These provisions should extend to passengers as well. Furthermore, the implementation of seat belt non-use alarm systems in new vehicles should be made a mandatory requirement.
- The use of child restraint systems should be mandated for vehicles transporting children, and this requirement should be consistently enforced during routine inspections.
- While the current crash recording and reporting system lacks specific information regarding seat belt provision and usage in fatal and serious injury crashes, it's worth considering the extent to which crash causes should be documented in detail. If such data were available,

it could facilitate the identification of deaths and serious injuries resulting from non-use or improper use of seat belts through in-depth crash investigations. This, in turn, would enable data-driven, targeted interventions to improve road safety.

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7 ANNEX

7.1 Annex I: Observation Sheet

Seat Belt Survey Observation Sheet

Name of Surveyor:	Date:
Day of Week:	Weather:
Site Type:	Site Name:
Start Time:	End Time:

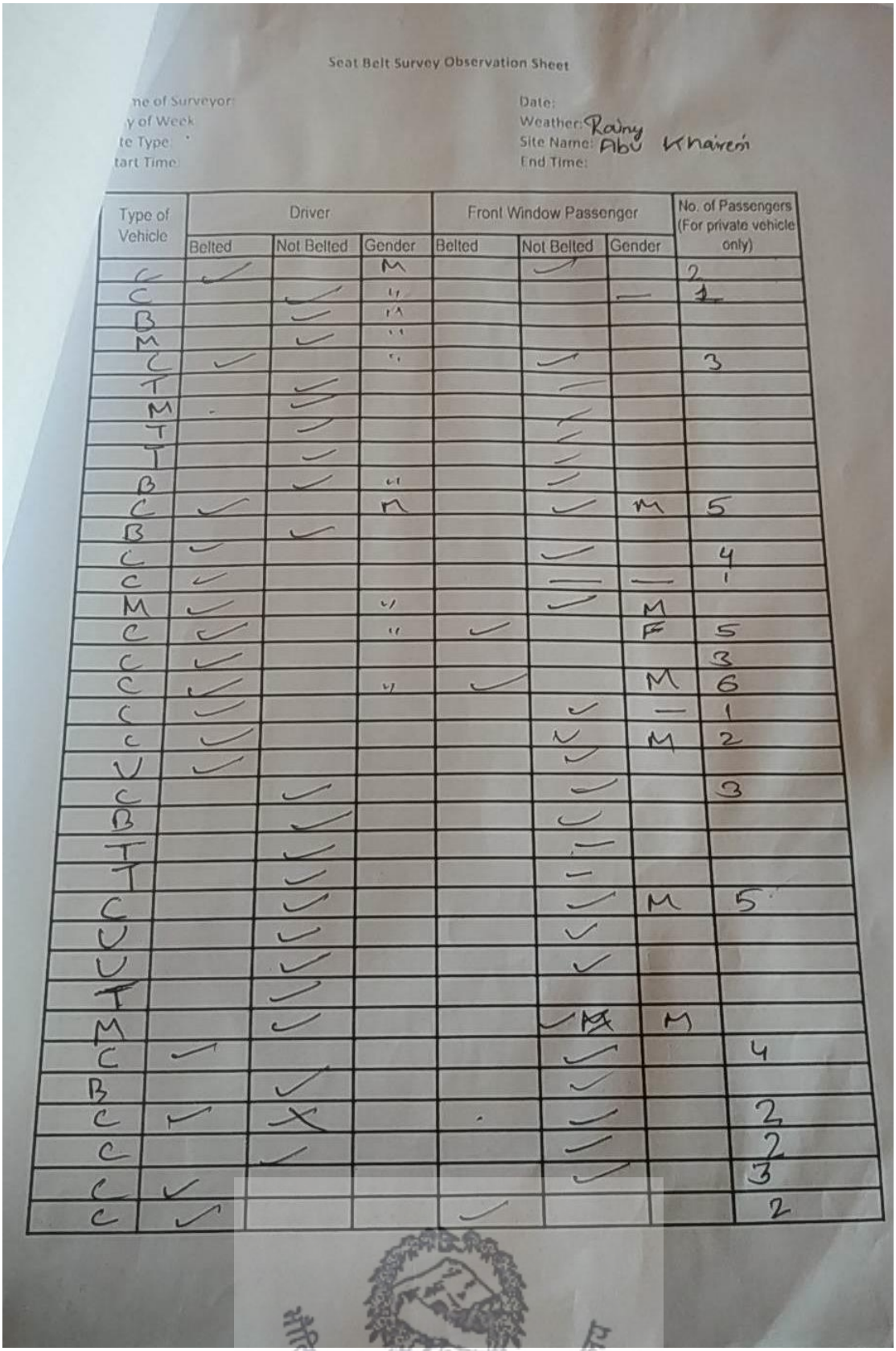
Type of Vehicle	Driver			Front Window Passenger			No. of Passengers (For private vehicle only)
	Belted	Not Belted	Gender	Belted	Not Belted	Gender	

7.2 Annex II: Questionnaire Sample

Seat Belt Survey Questionnaire Sheet

1. Vehicle type:
   a) Passenger car b) Utility vehicle c) Bus d) Truck e) Others
2. Age (years):
   a) 18-24 b) 25-34 c) 35-44 d) >45 years
3. Sex: a) Male b) Female
4. Marital Status a) Single b) Married c) Divorced/Widowed
5. Education a) No formal education b) Primary
   c) Secondary d) Undergraduate e) Graduate or more
6. Years driving a) 0 – 5 b) 5 – 10 c) 10 – 15 d) 15 – 20 e) > 20 years
7. Does Driver's seat of vehicle have a seat belt? a) No b) Yes
8. Does front passenger seat of vehicle have a seat belt? a) No b) Yes
9. Does the vehicle have seat belt alarms? a) No b) Yes
10. Does the vehicle have child restraint system? a) No b) Yes
11. Use of Seat-Belt by driver
    a) Always b) Frequently c) Sometimes
    d) Rare d) Never
12. Does the driver request the front passenger to wear seat belt? a) No b) Yes
13. Knowledge of seat belt law in Nepal. a) No b) Yes
14. Awareness of penalty for seat belt non- use. a) No b) Yes
15. Main reason for not using seat belt
    a) Discomfort b) Forgetfulness
    c) Habit d) Frequent stops e) Others ….
16. Motivators for drivers to use seat belts
    a) Safety awareness b) Penalties for non-compliance
    c) Increased traffic police patrols d) Others

7.3 Annex III: Sample Filled Observation Sheet



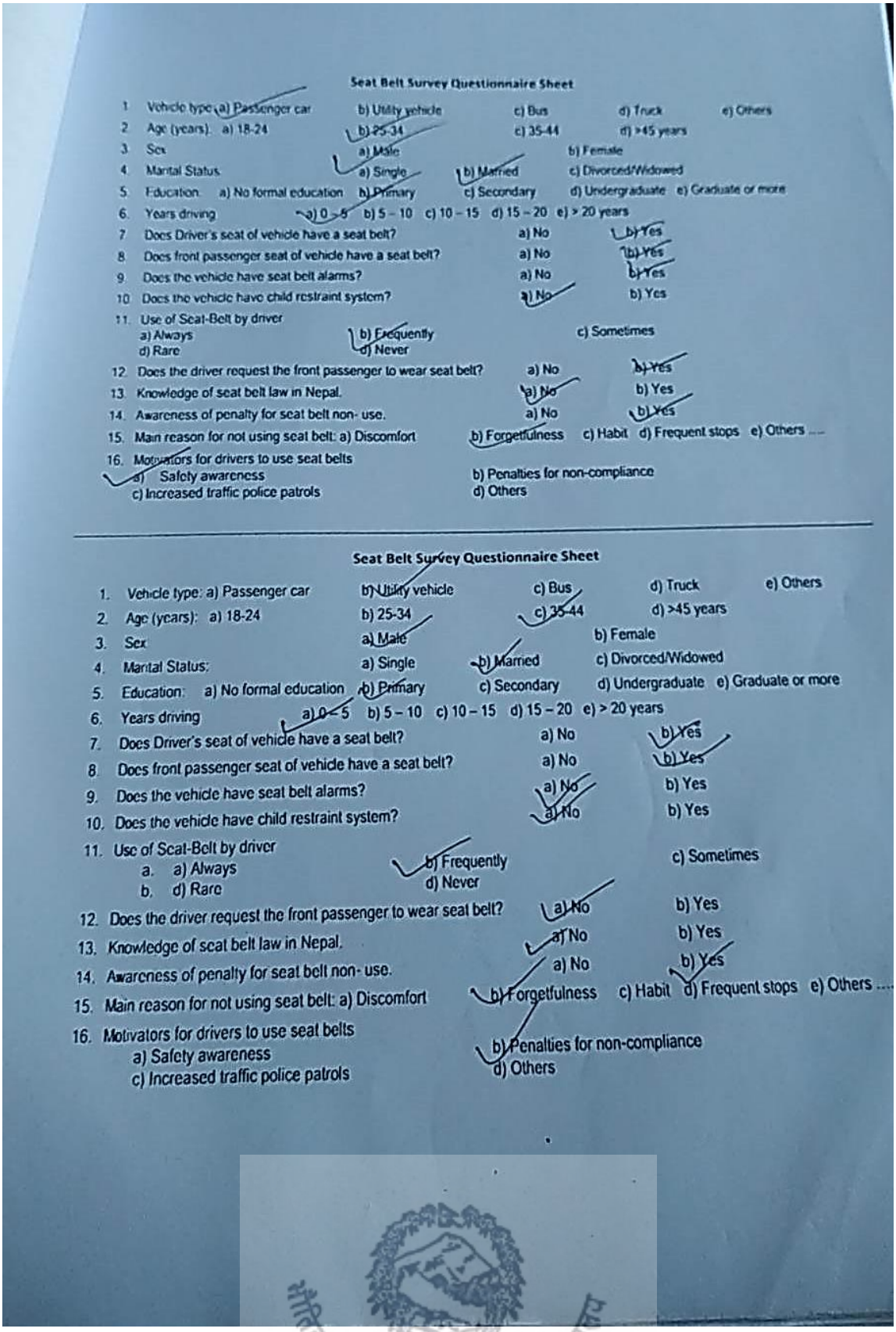
Seat Belt Survey Observation Sheet

ne of Surveyor:
y of Week
te Type
tart Time:

Date:
Weather: Rainy
Site Name: Abu Khairem
End Time:

Type of Vehicle	Driver			Front Window Passenger			No. of Passengers (For private vehicle only)
	Belted	Not Belted	Gender	Belted	Not Belted	Gender	
C	✓		M		✓		2
C		✓	"			—	1
B		✓	"				
M		✓	"				
C	✓		"		✓		3
T		✓			✓		
M		✓			✓		
T		✓			✓		
T		✓			✓		
B		✓	"		✓		
C	✓		M		✓	M	5
B		✓					
C	✓				✓		4
C	✓				—	—	1
M	✓		"		✓	M	
C	✓		"	✓		F	5
C	✓						3
C	✓		"	✓		M	6
C	✓				✓	—	1
C	✓				✓	M	2
V	✓				✓		
C		✓			✓		3
B		✓			✓		
T		✓			—		
T		✓			—		
C		✓			✓	M	5
V		✓			✓		
V		✓			✓		
T		✓					
M		✓			✓ M	M	
C	✓				✓		4
B		✓			✓		
C	✓	✗		.	✓		2
C		✓			✓		2
C	✓				✓		3
C	✓			✓			2

7.4 Annex IV: Sample Filled Questionnaire Sheet



Seat Belt Survey Questionnaire Sheet

1. Vehicle type: a) Passenger car b) Utility vehicle c) Bus d) Truck e) Others
2. Age (years): a) 18-24 b) 25-34 c) 35-44 d) >45 years
3. Sex a) Male b) Female
4. Marital Status: a) Single b) Married c) Divorced/Widowed
5. Education: a) No formal education b) Primary c) Secondary d) Undergraduate e) Graduate or more
6. Years driving a) 0 – 5 b) 5 – 10 c) 10 – 15 d) 15 – 20 e) > 20 years
7. Does Driver's seat of vehicle have a seat belt? a) No b) Yes
8. Does front passenger seat of vehicle have a seat belt? a) No b) Yes
9. Does the vehicle have seat belt alarms? a) No b) Yes
10. Does the vehicle have child restraint system? a) No b) Yes
11. Use of Seat-Belt by driver
    a) Always b) Frequently c) Sometimes
    d) Rare d) Never
12. Does the driver request the front passenger to wear seat belt? a) No b) Yes
13. Knowledge of seat belt law in Nepal. a) No b) Yes
14. Awareness of penalty for seat belt non- use. a) No b) Yes
15. Main reason for not using seat belt: a) Discomfort b) Forgetfulness c) Habit d) Frequent stops e) Others ....
16. Motivators for drivers to use seat belts
    a) Safety awareness b) Penalties for non-compliance
    c) Increased traffic police patrols d) Others

Seat Belt Survey Questionnaire Sheet

1. Vehicle type: a) Passenger car b) Utility vehicle c) Bus d) Truck e) Others
2. Age (years): a) 18-24 b) 25-34 c) 35-44 d) >45 years
3. Sex a) Male b) Female
4. Marital Status: a) Single b) Married c) Divorced/Widowed
5. Education: a) No formal education b) Primary c) Secondary d) Undergraduate e) Graduate or more
6. Years driving a) 0 – 5 b) 5 – 10 c) 10 – 15 d) 15 – 20 e) > 20 years
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11. Use of Seat-Belt by driver
    a. a) Always b) Frequently c) Sometimes
    b. d) Rare d) Never
12. Does the driver request the front passenger to wear seat belt? a) No b) Yes
13. Knowledge of seat belt law in Nepal. a) No b) Yes
14. Awareness of penalty for seat belt non- use. a) No b) Yes
15. Main reason for not using seat belt: a) Discomfort b) Forgetfulness c) Habit d) Frequent stops e) Others ....
16. Motivators for drivers to use seat belts
    a) Safety awareness b) Penalties for non-compliance
    c) Increased traffic police patrols d) Others

7.5 Annex IV: Sample Field Photographs