

ROAD TRAFFIC ACCIDENT SITUATION IN KHULNA CITY, BANGLADESH

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Abstract: This paper presents the various aspects of traffic accidents in Khulna city in Bangladesh. Data on accidents were collected from different police stations in the city for two years. It was found that a total 157 accidents occurred during this period. Almost 25% victims were between ages 30 to 39 years. Pedestrians are the worst victims of road accidents and accounted for 33% deceased and 34% injured. The vehicles liable for accidents are trucks (26%) and buses (23%). About 19% of fatalities are among the people who died in rickshaw accidents while 11% are among those using other non-motorized transports. Bus and truck accidents comprise 30% of deaths caused by city road accidents. The analysis results also show that four intersections and five mid-blocks are most hazardous locations where accidents occurred most frequently. Therefore, some safety measures and long term recommendations are made to improve the situation of Khulna city.

Key Words: traffic accidents, pedestrians, fatalities, hazardous intersections, hazardous mid-blocks.

1. INTRODUCTION

Each year more than 500000 people die in road accidents around the world (Mannan and Karim, 1998). The majority of these deaths (about 70%) occur in developing countries, 65% of deaths involve pedestrians and 35% of pedestrian deaths are children. About 15-20 million people suffer severe injuries. The "Study Global Burden of Disease" undertaken by the World Health Organization (WHO), Harvard University, and World Bank, showed that traffic accidents were the world's ninth biggest cause of deaths during 1990. The study forecasts that by the year 2020, road accidents would move up to third place in the table of major causes of death and disability (Murry and Lopez, 1994). This problem draws significant attention in Bangladesh where road accidents are extremely high and still increasing.

Bangladesh is a South Asian country that ranks one of the poorest in the world in terms of per capita income. It has a land size of 144116 km² and is one of the most populated countries in the world with a population density of 800 people per km². Khulna is the industrial and divisional city of

Bangladesh. The land size of Khulna is 45.65 km² and population density is 26287 per km² (KDA, 1999). The road network is about 1231 km in metropolitan Khulna of which 302 km is bituminous road, 84 km is Water Bound Macadam (WBM), 81 km is Herring Bone Bond (HBB), 95 km is Flat Brick Soling (FBS) and 669 km is earth road (KDA, 1999). The most common means of transport is the non-motorized vehicle. Traffic flows on roads of Khulna city are heterogeneous. In many parts of Khulna, rickshaw and other non-motorized transport (NMT) account for 60% or more of the overall traffic flow. The number of vehicles operating in Khulna city is more than 20990, comprising about 13360 non-motorized and 7630 motorized vehicles. The average annual growth rate of the motorized vehicles is about 15%. For motorized vehicles the average speed varies in the Central Business District (CBD) area between 24 km/h to 58 km/h depending on locations (Uddin and Sen, 2004).

In Khulna city, till to date, research works has not been carried out with a detailed spectrum of analysis of road accidents for a full understanding of accident problems and thereby developing effective countermeasures. In Bangladesh, the most scientific and modern research was conducted by Hoque (1981 to 1991), which provide some important and factual information about the extent and nature of accidents. In urban areas road fatalities involved with pedestrians is about 60%, while in rural area pedestrians accounted for about 40% of total accidents (Hoque, 1991).

In Bangladesh fatality rates per 10,000 vehicles are about 86 persons (Ross, 1998), which is 33% higher than India and over three times greater than Thailand. The traffic accident situation in Khulna city as well as Bangladesh is really alarming and the loss of lives and property damages are expected to continue if suitable corrective measures are not taken accordingly by applying proper engineering measures through extensive research and investigations. This situation is very dangerous particularly in metropolitan cities. About 20 percent of road accident occurred in metropolitan cities viz. Dhaka, Chittagong, Khulna and Rajshahi (Hoque, 1991). Therefore, it is important that accident studies should be carried out for these cities on a priority basis. The major objectives of this study are to provide information on characteristics of accidents (types, distribution and location of accidents), the location of most hazardous intersections and mid-blocks, and provide recommendations to improve traffic safety in Khulna city.

2. DATA COLLECTION

Data on traffic accidents in Khulna city were collected from First Information Report (FIR) of five police stations in the city for two years. The data included accident date, time, location, collision type, number of vehicles involved, number of deaths and cost of property damage pertaining to each accident during the year 2001-2002. The only official source of accident data in Khulna is the traffic division of the Khulna Metropolitan Police (KMP). In Khulna very few accidents between non-motorized vehicles are reported to police. This is because damage form the accidents are usually minor and compensation costs are settled immediately. So, it is likely that many accidents are not in police records.

3. RESULTS AND DISCUSSIONS

The data were analyzed for the characteristics of accidents and location of most hazardous intersections and mid-blocks.

3.1 Characteristics of Accidents

3.1.1 Age Distribution of Traffic Fatalities and Injuries

The age distributions of fatalities and injuries among various road user groups are shown in Figure 1. The age groups 30-39 years account for 25% of fatalities and injuries for all road users group (total sample, Figure-1a). There are significant differences of fatalities and injuries age distributions among different road user groups. The age groups 20-29 years account around 34% of fatality and injuries for pedestrian road user group (Figure-1b). While the age groups 40-49 years and 30-39 years account around 31% and 40% of fatality and injuries for motorized (Figure-1c) and non-motorized (Figure-1d) road user groups, respectively.

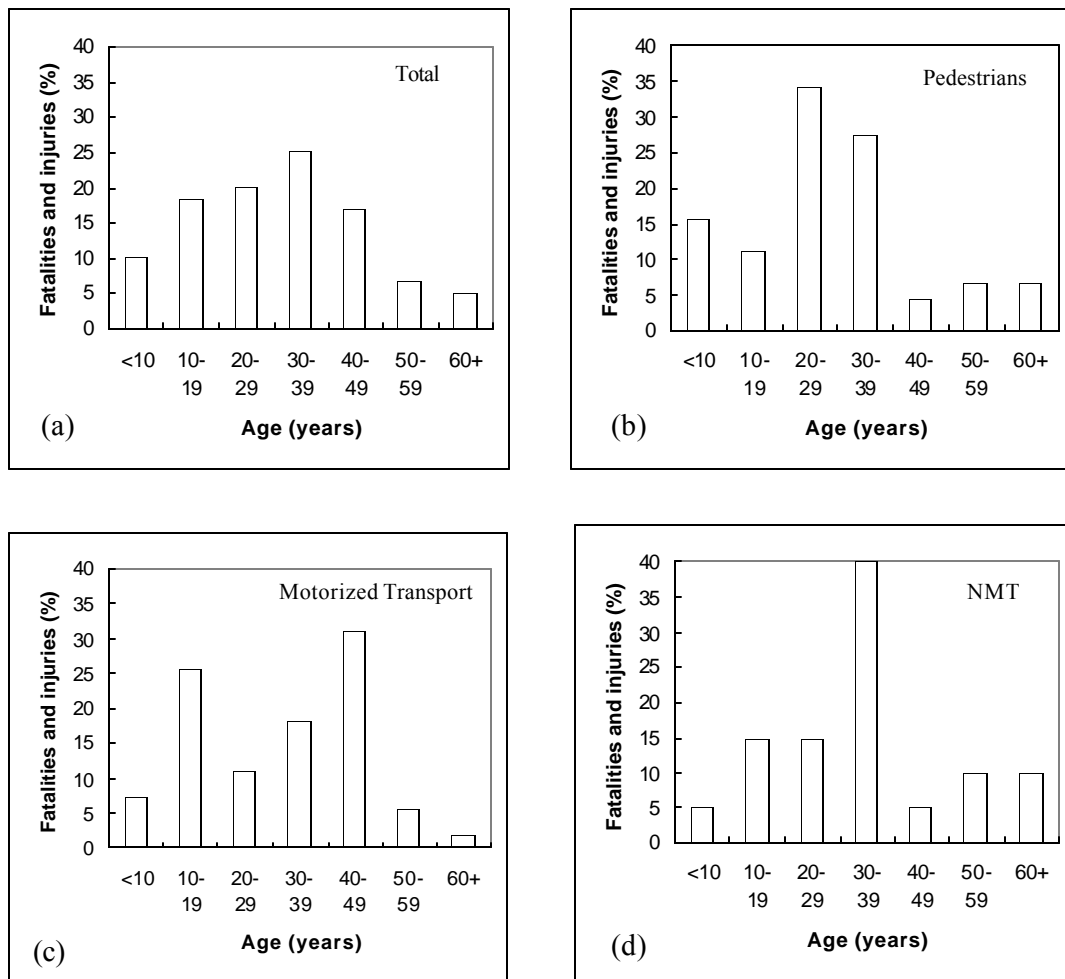


Figure 1. Age Distribution of Road Users

3.1.2 Hourly Distribution of Accidents

Figure 2 shows the hourly distribution of accidents in Khulna city. Examining traffic crashes by time shows that about 66% of the accidents take place during daytime (6:00 am to 6:00 pm). Accident frequency increased over the morning hours and stayed high from 7:00 am to 10:00 am. Another high

accident frequency is observed in the evening peak at 7:00 pm to 8:00 pm. Almost 34% of all accidents occurred at night time and over 50% of all night time accidents took place before 12:00 pm. For both motorized and non-motorized traffic, night time accidents occurred when traffic flows were very low.

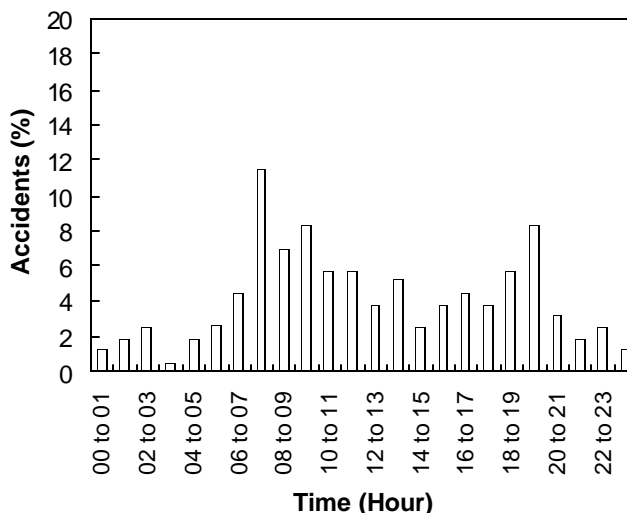


Figure 2. Hourly Distribution of Accidents

3.1.3 Number of Accidents Recorded in Different Police Stations

Numbers of accidents at different police stations are shown in Table 1. These accidents include the fatalities, injuries, property damages and motor collisions. It is seen that the percentage of fatalities is high in Khanjahan Ali police station and the proportion is around 37%. The reasons identified are excess operating speed, overtaking attitude because of absence of road divider. Moreover, the industrial activities are more in this area. The proportion of total accidents in Sonadanga police station is low (14%). The reason is that there is no remarkable industry here.

Table 1. Traffic Accidents in Different Police Station (%)

Police Station	Fatality	Injury	Property damage	Motor collision	Total
Khanjahan Ali	37.2	34.9	23.3	4.6	100
Khulna Sadar	29.7	33.3	33.3	3.7	100
Khalishpur	34.5	34.5	31.0	0	100
Daulatpur	24.3	40.5	35.2	0	100
Sonadanga	14.3	57.2	19.0	9.5	100

3.1.4 Accident Distribution by Modes for Individual Police Station

Modal accident breakdown of different police station of Khulna city area are shown in Figure 3 to Figure 7. It is shown that in Khulna Sadar police station rickshaws are more frequently (22%, Figure-4) involved in traffic accidents compared to other Non-motorized Transport (NMT).

Because this police station is located in city center where people use rickshaw rather than other NMT accident rates are higher compared to other areas in Khulna.

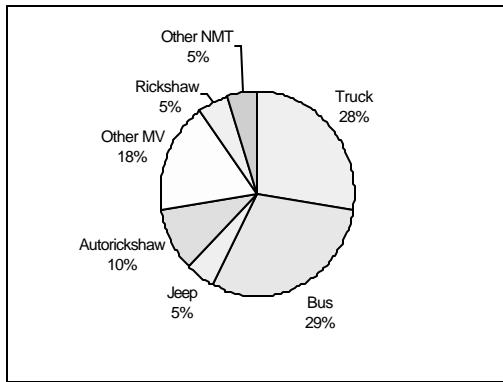


Figure 3. Modal Distribution of Traffic Accidents in Khanjahan Ali Police Station

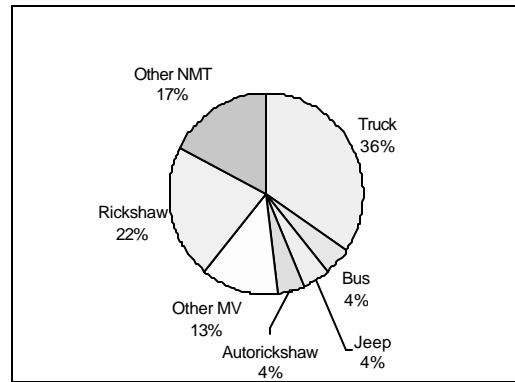


Figure 4. Modal Distribution of Traffic Accidents in Khulna Sadar Police Station

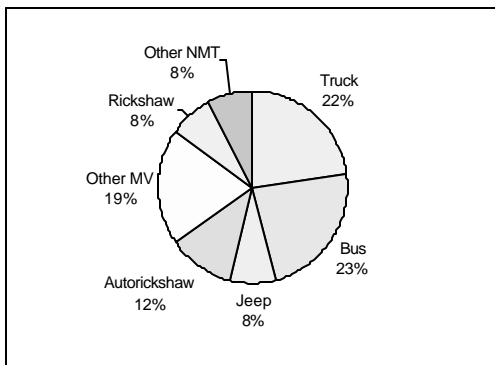


Figure 5. Modal Distribution of Traffic Accidents in Khalishpur Police Station

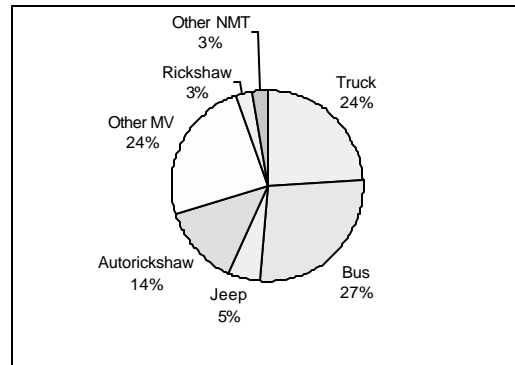


Figure 6. Modal Distribution of Traffic Accidents in Daulatpur Police Station

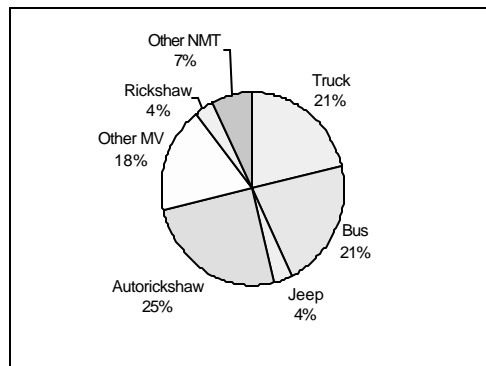


Figure 7. Modal Distribution of Traffic Accidents in Sonadanga Police Station

When all modes of transport (viz. motorized and non-motorized) are considered rickshaws

involvement in traffic accident becomes less compared to motorized modes such as truck, bus, jeep and autorickshaws (Figure-3,4,5,6,7). Data of Daulatpur police stations shows that rickshaw and other NMT modes are rarely involved in accidents (around 5%, Figure-6) whereas a higher percentage (around 39%, Figure-4) in Khulna Sadar police station. This may be due to presence of higher number of NMT modes on the streets of Khulna Sadar police station or it could be due to higher speed of traffic stream.

3.1.5 Modal Distribution Total Traffic Accidents in Five Police Stations

Modal distribution of accidents in Khulna city is shown in Figure 8. From the figure it is evident that rickshaws share of accidents in Khulna is only 7% compared to 26% truck, 23% bus, 13% autorickshaw, and 5% jeeps. Other non-motorized (NMT) except rickshaws are involved in only 7% of the total accidents. Bus and truck accidents are predominant as they play a major role in carrying both goods and peoples on Khulna-Jessore highway.

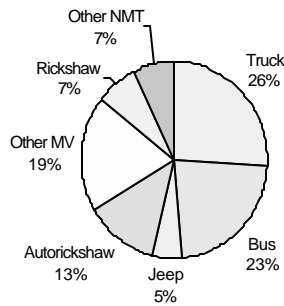


Figure 8. Modal Distribution of Total Traffic Accidents in Five Police Stations

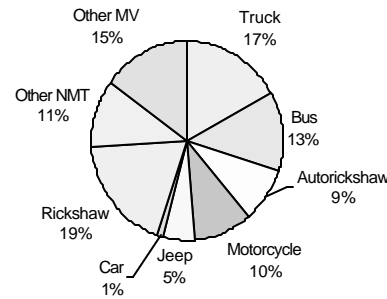


Figure 9. Modal Distribution of Traffic Fatalities

3.1.6 Modal Distribution of Traffic Fatalities

During 2001-2002 a total of 57 fatalities took place in Khulna city area excluding pedestrians. Modal distribution of fatalities is shown in Figure 9. The figure shows that rickshaw share of fatalities is the highest (19%), which is much higher than that of other motorized modes such as truck (17%), bus (13%), motorcycle (10%), autorickshaw (9%) and car (1%). But while fatality rates of different transport modes are considered it is seen that rickshaws and other NMT's fatality rates are much lower than the fatality rates of most of the motorized transports (Figure-9).

3.1.7 Modal Distribution of Pedestrian Fatalities

Pedestrian fatality by type of vehicle involvement is presented in Table 2. According to Greater Dhaka Metropolitan Area Integrated Transport Study (DITS), pedestrians constitute the large single victim group of road traffic accident fatalities and injuries. The lives of pedestrians are therefore at great risk from road traffic accidents. The official statistics reveal only a small proportion of the threat to pedestrians in Khulna. Buses (26%) and trucks (47%) are the major contributor to pedestrian fatalities.

Table 2. Pedestrian Fatalities by Type of Vehicle Involved (%)

Vehicle mode	Accidents	
	Fatal	Non-fatal
Bus	26	29
Truck	47	46
Car/Jeep	11	10
Other	16	15
Total	100	100

As mentioned earlier, the roads of Khulna city are used by both motorized and non-motorized traffic. Such a traffic mix creates a high probability of conflict that could easily lead to a road traffic accident (Fazio, *et al.*, 1998). Also due to deficiencies of transport planning, pedestrians often become victims of road traffic accidents.

3.2 Accidents at Intersections and Mid-blocks

3.2.1 Distribution of Accidents at Intersection and Mid-blocks

During 2001-2002, a total of 157 accidents, considering all types of accidents, took place in Khulna city. The distribution of accidents in different locations (e.g. intersections and mid-blocks) in all of the five police stations in Khulna city is shown in Table 3. From the Table it is evident that around 42% accidents take place in intersections and rest 58% accidents take place in mid-blocks. It can also be seen that higher percent (around 12%) of accidents take place at intersection in Khanjahan Ali police station. The higher percentage of mid-block accidents (around 15%) are found to occur in Daulatpur and Khanjahan Ali police stations, the Khulna-Jessore highway passes through this area.

Table 3. Distribution of Accidents at Intersections and Mid-blocks in Different Police Stations (%)

Police station	Accidents		Total
	Intersection	Mid-block	
Khanjahan Ali	12	15	27
Khulna Sadar	8	10	18
Khalishpur	8	10	18
Daulatpur	9	15	24
Sonadanga	5	8	13
Total	42	58	100

3.2.2 Type of Traffic Accidents at Intersections and Mid-blocks

Almost 26 percent of all accidents at intersections could not be identified by type due to lack of details. Accident distribution by types according to 'Definitions for Classifying Accidents (DCA)' code is given in Table 4. Rickshaws travel more on the side of the road and must wait for an

opening, whereas pedestrians tend to cross the street whenever and wherever possible irrespective of road sections. Vehicles with pedestrian accidents are frequent occurrences (38% at intersections and 41% at mid-blocks). It is also seen that the rear end collision at intersections and mid-blocks are 12% and 16%, respectively, whereas the head on collision at intersections and mid-blocks are almost same. Overtaking accidents represented only 1% and 7% at intersections and mid-blocks, respectively of all total accidents.

Table 4. Type of Traffic Accidents at Intersections and Mid-blocks (%)

DCA Code	Type	Intersections	Mid-blocks
100	Rear side (Pedestrians)	38	41
110	Right angle collision	9	15
120	Head-on collision	14	13
130	Rear end collision	12	16
133	Overtaking	1	7
	Others	26	7
	Total	100	100

3.2.3 Most Hazardous Intersections and Mid-blocks

In order to evaluate the proper countermeasures, it is necessary to locate the hazardous intersections and mid-blocks. In general, locations in urban area where there are more than four casualties within a year is the most hazardous (Adhikary & Bala, 2003). Table 5 shows the most hazardous locations of intersections of different police stations in Khulna city. Approximately 58% of traffic accidents occurred in Khulna city at mid-blocks and 42% at intersections. It is evident that the highest hazardous locations of intersection is Jahanabad Cantonment and the frequency is 9 (14%) followed by Shiromoni intersections (frequency, 6), Goalkhali intersections (frequency, 6) and Nutun Rashta intersections (frequency, 5). Accidents occurs frequently in these intersections because of the absence of central islands, lack of pedestrian crossing facilities, presence of lot of non-motorized transports on the road and the absence of signal system.

Table 5. Most Hazardous Intersections of Different Police Stations (Numbers)

Police Station	Location	Accident Frequency
Khanjahan Ali	Jahanabad cantonment	9
	Shiromoni	8
Khalishpur	Goalkhali	6
Daulatpur	Natun Rashta	5
Khulna Sadar	N/A	--
Sonadanga	N/A	--

Table 6 shows the most hazardous mid-blocks of different police stations in Khulna city. In this study five mid-blocks (i.e. roadway sections) having more than five accidents are observed as potentially hazardous. The highest frequency are accounted to about 13 accidents (about 14%) occurring on

Jahanabad to Fulbarigate mid-blocks at Khanjahan Ali police stations and Fulbarigate to Rail gate mid-blocks in Daulatpur police station. The second, third, and fourth hazardous mid-block locations are Eastern Jute mill to Jahanabad cantonment (frequency, 10) in Khanjahan Ali police station, Goalkhali intersection to Baikali (frequency, 9) in Khalishpur police station, Nutun rashta to Khulna central bus terminal (frequency, 6) in Sonadanga police station, respectively. In mid-block sections the average running speed is higher, which causes accidents.

Table 6. Most hazardous mid - blocks of different police stations

Police station	Location	Frequency
Daulatpur	Fulbarigate to Rail gate	13
Khanjahan Ali	Jahanabad cantonment to Fulbarigate	13
Khanjahan Ali	Eastern Jute Mill to Jahanabad cantonment	10
Khalishpur	Goalkhali intersecton to Baikali	9
Sonadanga	Nutun Rashta to Sonadanga	6

4. CONCLUSIONS

Data on road traffic accidents in Khulna city are very poor. Police records are the only source of information on road accidents although there is substantial under-reporting as many accidents are settled privately. However, the fewer data on accident reports at police station are an indicative of lack of awareness of accident reporting. Based on police data it is not possible to make routine analysis and impossible to implement safety measure. This is primarily because police have no incentive to collect data accurately, and there is no standard accident-reporting format.

The analysis revealed that pedestrians are the largest victim group of fatalities and injuries. They are even in danger at zebra crossings particularly from motorists. The increasing vulnerability of pedestrians to road traffic accidents is largely due to the conflicts between pedestrian and vehicles, excess speed, careless driving and poor road visibility. The key to solving pedestrian safety in Khulna city is to remove the conflicts, enforce the limiting speed and improve the road visibility. From the analysis it is concluded that many contributing factors are associated with different type of accidents at hazardous intersections and mid-blocks. These accident problems can be minimized to a greater extent by providing round hump to slow down the fast moving vehicle, installing good signal system, preventing the U-turn, eliminating the irregular stopping of autorickshaw at intersections and installing road divider to prevent lane changing activities, introducing raised hump with vertical post, sidewalk for pedestrians and control of road side parking.

Accident data from different police station suggests that there is a lack of proper enforcement and education to roadway safety. These weaknesses can be minimized through comprehensive corrective measures. Local community initiatives to improve the conditions are very sparse and it is also concluded that much greater effort, desirably with the support from international agencies and specialized institutes is needed in combating the problem. Importantly, such efforts would require considerable resources particularly trained local personnel, safety specialists and researchers so as to build up indigenous capacity and attain sustainable safety program.

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