Nonmotorized-Motorized Traffic Accidents and Conflicts on Delhi Streets

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The city of Delhi had more than 1,900 traffic fatalities in 1993. Delhi police firsthand information reports show that most of these fatalities involved heavy vehicles striking pedestrians and bicyclists at midblock locations. Results reveal that Delhi has many nonmotorized traffic entity fatalities given its degree of traffic homogeneity and total traffic fatalities as compared with other places in the world. To find heterogeneous traffic characteristics that may significantly enhance traffic safety and operations, a heterogeneous traffic conflict study for 14 Delhi midblock sites followed. The sites ranged from ones with many fatalities to one with none. To evaluate the association between heterogeneous conflict rates at each site and respective site fatalities, a Spearman rank correlation produced a measure. A positive correlation of 0.14 exists between conflict rates and fatalities for all traffic entities.

In 1993 the city of Delhi had approximately 1,900 reported traffic fatalities, more than twice that of all other major Indian cities combined (*1*). Most of these traffic fatalities involved collisions between motorized vehicles and nonmotorized traffic. A newspaper article reported that heavy vehicles caused approximately 70 percent of the 1993 Delhi fatalities (*1*). Another study showed that buses and trucks struck 58 percent of Delhi's 1985 traffic fatalities (*2*). For instance, buses struck and killed 41 percent of the 222 motorized two-wheeler fatalities; trucks, 28 percent; cars, 9 percent; and other vehicles, 21 percent (*2*).

The goal of this paper is to explore the reason that Delhi has so many nonmotorized victims in its total traffic fatalities. One objective is to see how nonmotorized fatality percentage varies by traffic homogeneity as a function of location. Doing so allows a comparison between Delhi and other places in the world. The second objective is to measure the impacts of microdesign elements. Measuring impacts occurs by conducting midblock heterogeneous conflict studies at 14 sites varying from 28 to 0 fatalities.

Automobiles, buses, trucks, tempos, autorickshaws, motorcycles, motorscooters, mopeds, and other vehicles propelled by internal combustion engines or motors compose one group: motor vehicles (MVs). Nonmotorized vehicles (NMVs) or entities primarily include pedestrians, bicycles, pedal/cycle rickshaws, animals, animal-drawn carts, and human-powered push/pull carts. Average peak-period traffic composition (excluding pedestrian traffic) on an urban arterial or major street defines heterogeneous traffic. This traffic composition has less than 85 percent automobiles or less than 90 percent automobiles, trucks, and buses. In 12 of the 14 sites in Delhi, motorized two-wheeled vehicles composed the greatest percentage of traffic. The Defense Colony site had the highest degree of motorization, with 95 percent MVs. However, cars accounted for only 47 percent of traffic entities at this site; buses and trucks, only 2 percent.

Victims of urban heterogeneous traffic crashes are usually pedestrians and bicyclists. Of 358 pedestrian fatalities, buses struck approximately 43 percent of them, trucks, 28 percent; cars, 8 percent, three-wheeled taxis, 6 percent; and some other vehicle, 14 percent (*2*). For 116 bicyclist fatalities, buses killed 36 percent of the bicyclists; trucks, 43 percent; cars 5 percent; and others, 15 percent (*2*). Concerning MVs and NMVs, MVs striking NMVs (MV-NMV) resulted in 43.4 percent of Delhi's 1,114 fatalities; of the total, 27.6 percent had fatalities related to MVs striking MVs (MV-MV) (*3*). The NMV-MV collisions accounted for 8.9 percent of Delhi's roadway fatalities, whereas NMV-NMV fatalities were 4.3 percent (*3*). The remaining 15.8 percent fatalities involved "unknown" striking "unknown" (*3*).

Figure 1 shows the distribution of the percentage of NMV fatalities versus the percentage of MV trips composing the location's modal split. Modal split information may include or exclude pedestrian trips; Figure 1 includes only information that includes such trips. Theoretically, no nonmotorized fatalities can result from a striking MV at the origin on the graph because no MVs exist in the traffic stream at this point. When MVs account for 100 percent of the trips, no NMV fatalities occur because of the absence of NMVs in the traffic. Data points below 50 percent MV trips are difficult to find, perhaps because prevailing socioeconomic conditions do not allow accurate fatal accident reporting systems. Surprising is the general symmetry of the predicted curve and its height. The curve shows that Delhi, with an MV trip split of 47 percent, is near the area of the highest percentage of NMV fatalities. This graph's curve does not imply that having homogeneous MV traffic is safer than having heterogeneous traffic. The curve shows the distribution of percentage NMV fatalities (most of these deaths result from being struck by MVs) with respect to the degree of MV homogeneity as a transportation mode.

Nonmotorized and motorized traffic mix on the streets of Delhi, forming heterogeneous traffic. Some interactions in heterogeneous traffic unfortunately involve traffic crashes between MVs and NMVs, and a few crashes result in death. Figure 1 plots Delhi and other non-Indian places where heterogeneous traffic prevails. The figure also shows places with a high degree of MV homogeneity. Delhi's plot occurs where the percentage of NMV fatalities is maximum on the predicted curve.

Many interactions in heterogeneous traffic result in motorized-nonmotorized traffic conflicts. These conflicts are partly due to the various design elements existing at midblock. Traffic conflicts involve driver or pedestrian responses such as decelerating or changing direction to avoid a collision. A traffic conflict is a poten-

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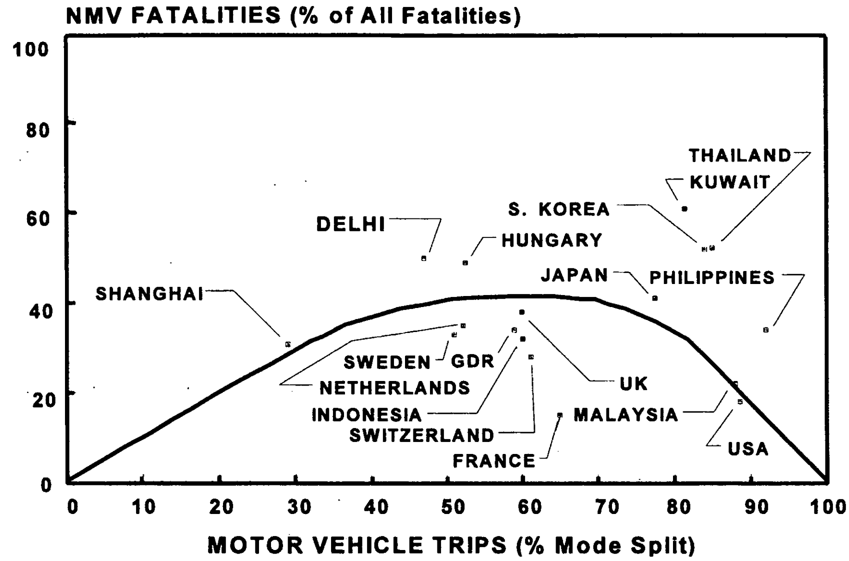

FIGURE 1 Degree of traffic homogeneity on percentage NMV fatalities (*8–27*).

tial traffic accident (*4*). For instance, when a bus is traveling behind a bicycle, a bus-bicycle, rear-end conflict occurs if the bus driver applies the brakes or steers to avoid colliding with the bicycle and successfully avoids a collision. If the bus driver is unsuccessful, a bus-bicycle, rear-end crash occurs. To change this example, reverse the position of the bus and bicycle. If the bicyclist must brake or steer to avoid colliding with the rear end of the bus, then a bicycle-bus, rear-end conflict happens. Obviously, conflicts may propagate into similar or other types of upstream conflicts. For example, one midblock conflict in heterogeneous traffic may create a bicycle-bicycle, rear-end conflict, and a truck-bicycle change direction conflict.

In denoting a midblock conflict in heterogeneous traffic, three items of information are essential:

1. The MV or NMV that is causing the conflict,
2. The MV or NMV reacting to avoid collision with the unit in item 1, and
3. The type of conflict.

Seven types of midblock conflicts manifested themselves for heterogeneous traffic: rear-end, change direction, sideswipe, fixed object, head-on, angle, and traverse angle. Each type of conflict has a corresponding collision type coded on Delhi accident report forms. For example, rear-end and change direction conflicts correspond to rear-end (back) and "hit bicyclist" collisions. Sideswipe conflicts correspond to angle (left or right side) collisions. Head-on conflicts form an association with head-on (front) collisions. Angle and traverse angle conflicts create an affiliation with "hit pedestrian" collisions. Fixed object conflicts relate to fixed object collisions.

Traffic engineers conduct conflict studies when conflicts occur at their greatest frequency, usually during peak periods before the onset of any forced-flow operations. Tallying conflicts at 15-min intervals is usually standard procedure. Midblock sections where one counts conflicts for the study of crash-conflict relationships are those segments where crashes cluster and where they do not cluster. One may also tally at those midblock sites that the public perceives as safe or hazardous. One finds out exact midblock locations where crashes cluster (or not) from computer data bases that have accident report form records of known crash sites, or from street maps that show crash locations.

In high-income countries (HICs), traffic engineers usually conduct traffic conflict studies at intersections (*5*). These studies quickly assess the safety of a newly designed intersection facility or evaluate the safety impact of design changes in existing facilities. Traffic engineers do these conflict studies without waiting years for a significant crash history to develop. Most crashes occur at intersections in HICs, which is primarily why engineers conduct conflict studies in HICs. In other words, traffic conflict studies are most effective when done at intersections in HICs.

In low-income countries (LICs) and middle-income countries (MICs), heterogeneous traffic dominates. The predominate MV-MV crashes in HICs are generally replaced by MV striking NMV (MV-NMV) crashes in LICs, as shown in Figure 1. Not shown in Figure 1 is the shift in crash locations. Although HIC traffic crashes happen mostly at intersections, LIC crashes generally occur at midblock locations (at straight sections). In Delhi 72 percent of traffic crashes happened on midblock locations (*2*). Since most traffic crashes occur midblock in Delhi, midblock traffic conflict studies were conducted. After that, the relationships between reported MV-NMV crashes and their corresponding MV-NMV conflict rate derived from field data were examined. This examination involved sites where fatalities clustered or not.

The analyses included four comparisons between combinations of collision types and conflict types for two groups of traffic entities (i.e., NMV and/or MV.) The NMV-MV crash comparison (e.g., bicycle striking a car, or bicycle-car), and the NMV-NMV crash comparison did not take place because of the small sample size and low kinetic energy in NMV-NMV collisions. Most NMV-NMV crashes go unreported.

DATA

The determination of which Delhi streets to select for traffic conflict studies followed a flexible procedure. A first step involved grouping the streets into three levels of reported fatalities—high, moderate, and low. Streets with an average of more than 80 fatalities a year had a high level; those with a fatality rate between 40 and 60 were moderate; and those between 0 and 20, fatalities low. By averaging fatality counts over the years 1989 through 1992, the level for each street was determined. Color coding the three levels on a street map of Delhi gave a good perspective. Additionally, exact traffic fatality locations were marked on this street map. These locations came from police first-hand information reports (FIRs) between June 1992 and July 1993. The Delhi police provided the fatality count by street and FIRs. When the color code of a particular site corresponded to the density of fatality points on the map, the site was designated as a "potential" site. Prescreening potential sites in each category reduced the sample size further. Sites were eliminated usually when the mounting angle of the video camera proved infeasible. Crash data from a FIR data base decided the exact directional locations on midblock sections for filming, a process that reduced the sample size to 14.

The location was videotaped in either the morning or evening peak period, depending on which side of the street the desired crash category occurred at the site. The fatality data base included only daylight fatalities because the conflicts were filmed in daylight. Videotaping at each site lasted for 1 to 2 hr so that the maximum 15-min conflict counts would be captured. NMV traffic usually peaks earlier than MVs in the weekday mornings and later in the evenings. Thus, 1 to 2 hr of videotaping ensured that the greatest interaction between NMV and MV traffic was captured. Length of the filmed midblock section is at least 25 m (*6*).

Data reduction involved the use of a video cassette player, a monitor, and trained observers. At 5-min intervals, the observers noted traffic composition at midblock, sampled space mean speeds of entities in the NMV and MV modes, and recorded conflicts by conflict type, reactor, and cause. Converting raw conflict counts into rates involved dividing the counts by the site's total observation time and midblock observation length.

The noted information was coded into a microcomputer file to carry out the analyses of the data using a statistical software application. Analyses reveal the strength of the association between specific collision types of midblock, daytime fatalities, and their corresponding conflict rates. Moreover, analyses reveal the association between midblock fatalities and midblock conflict rates.

RESULTS

Table 1 presents the results of the analyses for 14 Delhi sites. It contains correlations between crashes and conflicts by type of crash/conflict groups. A Spearman rank correlation of +0.14 exists between MV-NMV and NMV-MV conflicts and all fatalities. In the study of crash-conflict associations, +0.14 represents a weak correlation.

The ranking of site changes for different combinations of conflict types when one compares conflict data for various sites. Furthermore, the ranking also changes for the two groups of traffic entities. Of the two highly nonmotorized sites, Site 8 (Govindpuri) and Site 3 (Mahraul Badarpur Road) rank lowest and second lowest in the MV-MV sideswipe and traverse angle group. In the rear-end and change direction group, the two sites had moderate MV-MV conflict rates. Compared with the sites with a large MV share, the lack of MV-MV sideswipe, fixed object, angle, and traverse angle conflicts characterized these two sites.

Site 6 (Bhogal) ranks highest for MV-NMV and NMV-MV conflict rates for all conflict groups except the rear-end and change direction ones. A high share of MVs characterizes this site. Pedestrians crossing midblock significantly increase traverse angle conflicts. The high ranking reveals that the presence of a few NMVs is enough to cause an exponential increase in conflicts between MVs and NMVs.

CONCLUSIONS

The ranking of normalized conflict data and fatality data from police records for each site occurred from highest to lowest. Spearman correlations for various groups in Table 1 reveal weak and moderate associations between conflict rates and fatal crashes.

The analyses proved limiting in several aspects. One limitation is that the conflict-crash comparisons involved only traffic fatality counts, not all traffic crashes. Because of poor accident statistics in developing countries, traffic fatality reports are often more reliable and accurate than reports of minor traffic crashes (*7*). However, using total traffic crashes instead of fatalities probably would have resulted in more confidence in the correlation coefficients. Using a fatality or crash rate probably would have led to more confident correlations than raw counts.

Another limitation is the extent of the analyses. Aggregation of raw data fell into MV and NMV modes. Conducting detail analyses by vehicle/entity type would provide important insights. For example, comparing "bus striking bicyclist" fatalities with "bus driver avoiding collision with bicyclist" conflicts may produce higher correlations. In the midblock sites that had bus stops, the detailed conflict data base revealed that bicyclists reacted more with buses than with any other traffic entity in the heterogeneous traffic including other bicyclists, as presented in Table 2. Of the 14 sites, buses were the highest cause of conflicts for bicyclists in 7 sites, and pedestrians reacted more to motor vehicles in 9 of the sites. Bus operators interacted mostly with buses and trucks, and automobile drivers reacted more to other automobiles than any other traffic entity. As mentioned, most of the fatalities in Delhi involve a bus or truck striking a bicycle. Thus, further investigation into this association is desirable.

Figure 1 clearly shows that Delhi has a higher proportion of NMV traffic fatalities than most other international locations. Given that total trips include walking ones, Delhi's unique MV trip percentage maximizes the proportion of NMV traffic fatalities. Shanghai, with a lower percentage of MV trips than Delhi, has a lower percentage of NMV fatalities. The curve in Figure 1 suggests two options for the people of Delhi if they want to reduce their percentage of NMV fatalities. One option is to encourage MV users to substitute many of their short trips with NMVs. The other option is to encourage NMV users to make more trips using MVs. These two options are mutually exclusive. Delhi NMV users usually have limited access to at-capacity public transportation. This system is at

TABLE 1 Comparison of Crashes and Conflict Rates

a. All conflict types						
Duration (minute)	Length (hectometer)	Site ID	Conflicts/ 15 min.-hm		Fatalities	
			MV-NMV NMV-MV	MV-MV	MV-NMV	MV-MV
80	0.6475	1	5.8	18.2	9	4
75	0.4061	2	591.5	341.8	17	2
120	0.4760	3	100.8	157.3	0	0
75	0.2941	4	185.6	469.2	1	0
60	0.4258	5	29.9	200.8	20	8
70	0.4140	6	1040.9	153.7	7	0
75	0.6077	7	44.4	144.8	8	0
60	0.3495	8	17.9	101.6	8	4
80	0.4208	9	35.2	89.6	10	0
95	0.6891	10	50.4	78.1	5	0
80	0.2681	11	363.0	193.7	13	4
70	0.6374	12	7.7	43.0	4	2
85	0.6012	13	15.3	109.8	3	4
90	0.4382	14	27.0	219.8	0	0
	RCC(MV-NMV)	=	0.1417			
	RCC(MV-MV)	=	-0.0944			

b. Rear End + Change Direction Conflicts and Crashes						
Duration (minute)	Length (hectometer)	Site ID	Conflicts/15 min.-hm		Fatalities	
			NMV-MV MV-NMV	MV-MV	MV-NMV	MV-MV
80	0.6475	1	0.3	40.0	6	7
75	0.4061	2	28.1	327.0	12	7
120	0.4760	3	23.4	153.4	0	0
75	0.2941	4	380.8	412.1	0	1
60	0.4258	5	11.2	183.8	6	22
70	0.4140	6	29.5	135.1	2	5
75	0.6077	7	4.3	134.3	4	4
60	0.3495	8	14.3	98.7	2	10
80	0.4208	9	3.6	75.3	8	2
95	0.6891	10	36.4	59.8	0	5
80	0.2681	11	17.5	141.3	4	13
70	0.6374	12	6.7	36.0	1	5
85	0.6012	13	8.2	81.9	2	5
90	0.4382	14	29.7	155.6	0	0
	RCC(MV-NMV)	=	-0.5485			
	RCC(MV-MV)	=	-0.1252			

(continued on next page)

TABLE 1 (*continued*)

c. Side Swipe and Traverse Angle Conflicts and Crashes						
Duration (minute)	Length (hectometer)	Site ID	Conflicts/ 15 min.-hm		Fatalities	
			MV-NMV NMV-MV	MV-MV	MV-NMV	MV-MV
80	0.6475	1	5.5	7.2	0	13
75	0.4061	2	562.4	12.3	4	15
120	0.4760	3	73.3	4.7	0	0
75	0.2941	4	121.0	55.8	1	0
60	0.4258	5	14.7	17.0	15	13
70	0.4140	6	942.6	16.0	4	3
75	0.6077	7	38.8	10.2	2	6
60	0.3495	8	1.4	2.9	4	8
80	0.4208	9	26.7	14.3	1	9
95	0.6891	10	14.9	15.1	1	4
80	0.2681	11	344.1	51.8	8	9
70	0.6374	12	1.3	6.7	3	3
85	0.6012	13	2.6	27.9	1	6
90	0.4382	14	7.6	46.4	0	0
	RCC(MV-NMV)	=	0.2006			
	RCC(MV-MV)	=	-0.1231			

Site ID Legend: 1=Noida Link Marg 2=Aurobindo Marg
3=Mahrauli Badarpur Road 4=Vikas Marg
5=Nanakpura 6=Bhogal
7=Sundar Nagar 8=Govindpuri
9=Panchsheel Marg 10=Moolchand Hospital
11=A.I.I.M.S. Hospital 12=Mahrauli Road-Vasant Ku
13=Defence Colony 14=Sarojini Nagar

crush occupancy during peak periods; it cannot handle more users. Delhi NMV users usually cannot afford to make daily private MV trips. People in Delhi are increasingly exposed to poor air quality. Given these factors, the first option is more economically and socially feasible than the second option.

The data points of Kuwait, South Korea, Thailand, and the Philippines in Figure 1 do not concur with the predicted curve and appear to define a subtrend. This subtrend may result from something unique about Kuwait, South Korea, Thailand, and the Philippines or something inherent in their data collection procedures.

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TABLE 2 Causes of Turbulence in Heterogeneous Traffic

			Top Three Causes of Conflicts (%)						Top Three Causes of Conflicts (%)		
Site	Reactor	n	1st	2nd	3rd	Site	Reactor	n	1st	2nd	3rd
SEB Noida	G1	47	G1 (75)	G2 (23)	G4 (2)	NWB	G1	88	G1 (64)	G2 (15)	G4 (8)
Link Marg,	G2	38	G1 (50)	G2 (26)	G4 (13)	Ashram	G2	55	G2 (45)	G1 (20)	G4 (13)
Mayur Vihar	G3	30	G1 (57)	G3 (23)	G2 (17)	Road,	G3	60	G3 (38)	G2 (30)	G1 (20)
	G4	49	G4 (45)	G1 (24)	G3 (18)	Bhogal	G4	130	G1 (34)	G2 (25)	G3 (18)
	G5	50	G5 (60)	G3 (22)	G4 (14)		G5	59	G2 (53)	G6 (17)	G1 (10)
	G6	0	---	---	---		G6	1995	MV (97)	G6 (2)	G5 (1)
NB	G1	302	G1 (72)	G4 (11)	G2 (10)	EB	G1	181	G1 (36)	G2 (34)	G4 (12)
Aurobindo	G2	71	G2 (39)	G1 (32)	G3 (15)	Mahrauli	G2	65	G2 (34)	G3 (22)	G1 (18)
Marg,	G3	85	G3 (33)	G2 (22)	G1 (20)	Badarpur	G3	105	G1 (31)*	G2 (31)*	G4 (14)
Hauz Khas	G4	129	G1 (43)	G2 (20)	G4 (17)	Road,	G4	286	G2 (44)	G1 (36)	G3 (13)
Enclave	G5	107	G2 (37)	G5 (36)	G6 (17)	Khanpur	G5	221	G6 (35)	G5 (32)	G2 (11)*
	G6	1142	MV (100)	---	---		G6	320	MV (86)	G6 (14)	---
NWB Ring	G1	130	G2 (44)	G1 (43)	G4 (8)	WB	G1	127	G1 (71)	G2 (12)	G4 (9)
Road,	G2	75	G2 (48)	G1 (25)	G3 (16)	Panchsheel	G2	10	G1 (60)	G3 (20)	G4 (10)*
Nanakpura	G3	50	G2 (50)	G4 (20)	G3 (16)	Marg,	G3	37	G3 (59)	G1 (19)	G2 (8)*
	G4	90	G2 (36)	G1 (31)	G4 (17)	Malviya	G4	36	G2 (39)	G1 (28)	G3 (19)
	G5	22	G2 (36)	G5 (32)	G1 (14)	Nagar	G5	46	G5 (70)	G6 (20)	G2 (11)
	G6	67	G5 (27)	G6 (21)	G3 (16)		G6	64	MV (86)	G6 (8)	G5 (6)
SWB Vikas	G1	194	G1 (43)	G2 (30)	G3 (9)	NWB	G1	62	G2 (35)	G1 (32)	G4 (24)
Marg,	G2	102	G2 (41)	G1 (20)	G4 (18)	Mahrauli	G2	17	G2 (41)	G1 (29)	G3 (18)
Shakarpur	G3	139	G2 (31)	G3 (26)	G4 (20)	Road,	G3	9	G5 (44)	G3 (22)	G1 (11)+
	G4	290	G4 (27)	G2 (26)	G1 (25)	Vasant	G4	58	G1 (34)	G4 (21)	G5 (17)
	G5	100	G2 (55)	G5 (19)	G6 (15)	Kunj	G5	26	G5 (69)	G6 (19)	G1 (12)
	G6	251	MV (69)	G6 (31)	---		G6	4	G1 (50)*	G6 (50)*	---
NB road,	G1	42	G3 (31)	G4 (29)	G1 (21)	NB	G1	270	G1 (76)	G2 (12)	G4 (7)
Govindpuri	G2	10	G3 (40)	G2 (30)*	G4 (30)*	Mathura	G2	60	G1 (42)	G2 (23)	G4 (20)
	G3	25	G3 (36)	G4 (24)	G2 (20)	Road,	G3	50	G4 (32)	G3 (26)	G2 (20)
	G4	79	G4 (24)	G3 (23)	G2 (22)	Sundar	G4	63	G2 (33)	G1 (32)	G3 (21)
	G5	113	G5 (96)	G3 (2)*	G6 (2)*	Nagar	G5	48	G5 (46)	G6 (23)	G1 (17)
	G6	19	G6 (47)	G3 (42)	G5 (5)		G6	125	MV (94)	G5 (6)	---
EB Ring Rd,	G1	101	G1 (67)	G3 (15)	G2 (11)	NB Lal	G1	125	G1 (63)	G4 (19)	G3 (10)
Moolchand	G2	35	G2 (83)	G1 (11)	G3 (6)	Lajpat	G2	19	G2 (47)	G1 (42)	G3 (11)
Khairati	G3	74	G3 (39)	G1 (32)	G2 (24)	Raj Path,	G3	104	G3 (44)	G2 (30)	G1 (21)
Ram Hosp.,	G4	153	G1 (33)	G2 (27)	G3 (16)	Defence	G4	126	G1 (47)	G3 (25)	G2 (17)
Lajpat	G5	206	G2 (63)	G6 (14)	G3 (12)	Colony	G5	23	G2 (83)	G3 (9)	G1 (4)*
Nagar	G6	44	G1 (32)*	G4 (32)*	G5 (20)		G6	69	G6 (58)	MV (42)	---
SB	G1	63	G1 (56)	G2 (24)	G3 (11)	EB	G1	193	G4 (33)	G2 (27)	G1 (23)
Aurobindo	G2	23	G2 (35)	G3 (30)	G1 (26)	Ring Road,	G2	148	G2 (39)	G4 (24)	G1 (23)
Marg,	G3	45	G2 (49)	G3 (47)	G5 (2)	Sarojini	G3	112	G3 (32)*	G4 (32)*	G2 (21)
AIIMS,	G4	156	G1 (39)	G2 (21)	G4 (17)*	Nagar	G4	129	G1 (36)	G4 (22)*	G2 (22)*
Yusuf	G5	105	G5 (73)	G2 (16)	G5 (6)		G5	75	G2 (41)	G5 (37)	G3 (16)
Sarai	G6	490	MV (100)	---	---		G6	22	MV (95)	G6 (5)	---

Legend: G1=cars/vans/minivans/jeeps G2=trucks/buses/minibuses/minitrucks G3=motorized three wheelers G4=motorized two wheelers G5=nonmotorized two and three wheelers G6=other nonmotorized traffic entities MV=G1+G2+G3+G4+unknown motor vehicles.

* = two-way tie + = three-way tie

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