SR4S and Road Safety in Nepalese Schools: Evaluating Risk Factors and Effective Interventions

Asmita POKHREl [a] , Hemant TIWARI [b] , Sanjay LUITEL[c]

[a] *Traffic and Transport Unlimited Solution, Nepal*
[b,c] *Society of Transport engineers Nepal (SOTEN), Nepal*
[a] *E-mail: Ashupokhrel02@gmail.com*
[b] *E-mail: hemu.ioe@gmail.com*
[c] *E-mail: sanjayluitel2074@gmail.com*

Abstract: Road traffic injury accounts for world's leading cause of death among the children and youths of aged 5-29 years. In Nepal there has been an escalating growth in RTI, in Kathmandu valley particularly. Going to school in Nepal is often accompanied by lack of basic road safety maneuvers around the road. SR4S web application has been used at two schools based on Kathmandu valley with more than 200 students. We first recorded the road condition based on the road geometric conditions, signage, speed limit, pedestrian crossing facilities etc. and coded them into the web application of SR4S. The initial rating and risk factor associated with them were known. Then school administration was coordinated for the application of the cost-effective interventions and the final rating and risk factors were identified using SR4S. Significant reduction in risk factors were seen resulting in 67% risk factor reduction at two schools of Kathmandu valley.

Keywords: SR4S, Road safety, School zone safety, Star rating

1) INTRODUCTION:

According to WHO, road traffic injuries are the leading cause of death among the children and youth aged 5 to 29 years while on Low and Middle-Income countries (LMICs) account for approximately 90% of global road traffic fatalities (WHO, 2023). Children are the most vulnerable age group in road crashes because of their physical and social development (WHO, 2023). Sustainable Development Goal (SDG), under goal 3, target 3.6 has targeted to reduce the number of global deaths and injuries from road traffic accidents (RTA) by halves (SDG, 2023). This takes account for maintaining the school zone safety as it is evident that children are vulnerable to traffic accidents. There is a sharp escalation of road crashes in Nepal, in the Fiscal year 2078/79 which the number of road accidents recorded was 10733 while it was only was 4672 in FY 2070/071 (Gautam & Joshi, 2024). A report published by Asian Transport Observatory states that around 23% of the total road traffic fatalities (RTF) are pedestrian and 4% of them are cyclist (ATO). This represents a large percentage of school goings students in Nepal, posing a risk to them. Going to school in Nepal is often accompanied by no proper pedestrian crossing, no footpath, over speeding vehicles, distracted drivers and Lack of basic road safety maneuvers around the road. This puts the children in Nepalese road more at risk.

Star rating for Schools (SR4S) is an evidence-based program of tools, designed to measure, manage and communicate the risk children are exposed to on a journey to school (SR4S, Star

rating for schools, n.d.). It is the tool to access the evidence-based scenario for the school zone safety. It ranks the safety condition from 1 star to 5 where 1 star means the least sage and 5 start means the safest. It has 39 checklists which needs to be recorded and coded into the application (SR4S, 2017). This can be used to identify the schools with high risk and cost-effective interventions could be suggested to enhance the safety around the school area. While SR4S provides the standard framework for safety assessment at schools, its application on Low and Middle-Income countries remains unexplored. In low- and Middle-income countries, road safety has been a critical aspect and students / children's safety has been compromised.

This study aims at offering the data-driven methodology to prioritize low-cost interventions and accessing the road safety assessment in Nepal. Through a case study of two schools in Kathmandu valley, this paper evaluates SR4S's application in Nepal, identifies critical risk factors, and proposes actionable recommendations

2) STUDY AREA:

Two schools within Kathmandu Valley have been taken for this Study; Apple international School and Jaya Multiple College. Both of these schools are located alongside the roadways and has more than 200 students. Jaya Multiple College offers classes from higher secondary level to master's and comprises of around 1600 students out of which 850 are male and 750 are female whereas Apple International School offers classes up to higher secondary level and comprises of around 300 students out of which 180 are male and 120 are female. High number of students and lack of basic road safety facilities makes this school specific at risk.

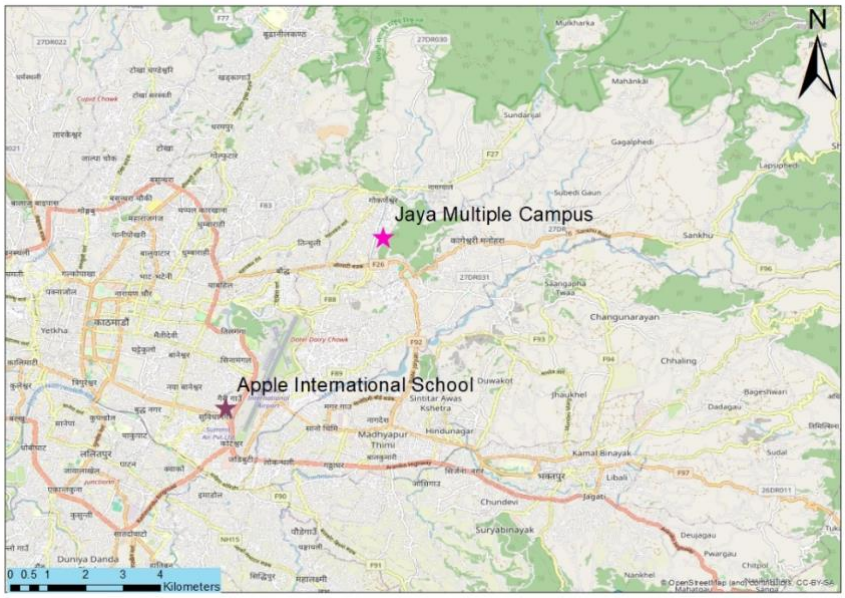

Figure 1 Study Area Map

3) LITERATURE REVIEW:

Star Rating for school (SR4S) is a widely used tool and it has been used by many researchers to access the safety assessment of the school. Road safety scenario in 41 schools of Venezuela and 39 schools of Zamboanga in Philippines were evaluated using SR4S web application. Out of 41 schools, only 12% of the schools got 3 and 4 rating while most of the school got 5 rating and out of 39 schools in Zamboanga around 37% got 3 and 4 stars while more than 40% got 5-star rating. This study suggests SR4S as a quick and reliable application (Kamid, LATONERO, SIGUA, & REGIDOR, 2022). Likewise, a study conducted in Khorasan Razavi Province, Iran where seven schools were selected for Star Rating assessment and interventions for improvement have been done in three schools. After the interventions on these three school the star rating changed from 1 to 3, 4 and 2. (Zayerzadeha & Zavareh, 2019).

In Nepal only limited study have been conducted using SR4S. The safety scenario of two schools in Dang and Damak, Nepal has been analyzed by (Luitel & Tiwari, 448 Star rating for schools (SR4S): a new approach in enhancing road safety infrastructure in Nepal, 2024). Their rating was found to be less than 3. So, interventions were proposed to bring the star rating to 5. They concluded that SR4S is a useful tool for safety assessment. Likewise similar study has been conducted by (Tiwari & Luitel, 2024) where eight schools of Kathmandu valley were selected for safety assessment where before and after star rating based on the 39 checklists were obtained and they were compared. They found out that the rating improved after the application of the interventions in all cases. A study conducted in Nuwakot district of Nepal concluded on the reduction of risk factor even though the star rating for the school before and after the interventions were same (Pokhrel, Luitel, & Tiwari, 2025). Another study focusing in four schools where three schools were from Kathmandu and one school was from Nuwakot, Nepal was analyzed using SR4S. Among the four schools, after interventions the previous ration of 3, 1, 2 and 4 of Gateway, Chamunda, Souvenir and Joshep respectively was increased to 4,3,4 and 5 respectively (Luitel, Tiwari, Gautam, & Bhattarai, 2023).

While SR4S is widely used, in 2018, a reliability study was conducted on the George Washington University for SR4S mobile application. 9 child injury experts participated in data collection at 10 different road section. The result showed that both Inter-rater reliability (IRR) and test-retest reliability (TRR) ranged from moderate to high this shows a good agreement and consistency between SR4S users (Hunt, Mackay, & Roess, 2018).

4) METHODOLOGY:

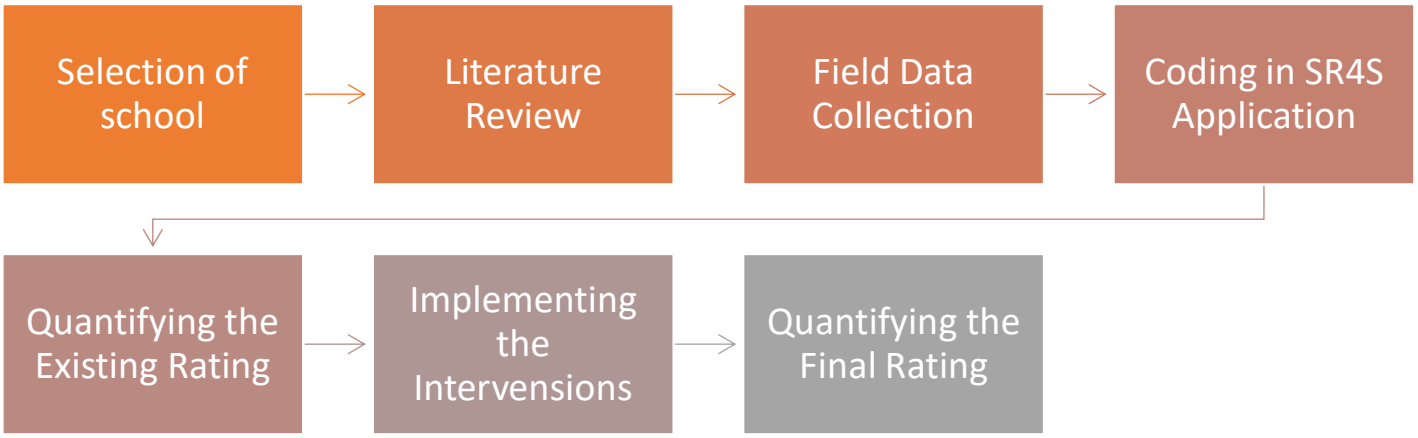

Figure 2 Methodology Chart

4.1.Selection of Schools:

Based on the consultation from the school administration and their willingness to apply the interventions, two schools were selected for the star rating program. Apple International, Gairigaun and Jaya Multiple College, Jorpati . The number of students in all the schools were high.

4.2.Literature Review:

First the star rating for school checklists were studied. There are a total of 39 parameters for the checklist. Numerous research papers were studies to understand the usability of SR4S application.

4.3.Field Data Collection:

Mostly three major data were collected from the field traffic volume, speed, and pedestrian volume to identify the traffic condition around the school area. Apart from these data road environment, road type, road characteristics, school zone, sidewalks, crossings, traffic flow, intersections, curves, and speed were observed and recorded for each school during the fieldwork.

4.4.Coding in SR4S:

Data collected on the 39 parameters for each school were entered into the SR4S web application to calculate their current star rating and risk factor. The checklist for the application is shown below:

Figure 3 Checklist in SR4S

4.5.Quantifying the existing Rating:

The existing site condition was accessed in the SR4S application and based on the checklist, the initial star rating and risk factor of two schools were evaluated. The initial rating of Apple International and Jaya Multiple were three. Based on the initial observation following results were obtained.

Table 1 Initial rating of the schools

Name of the school	Location	Initial Rating	Risk Factor
Apple International School	Gairigaun, Kathmandu Valley	★★★	27.64
Jaya Multiple College	Jorpati,Kathmandu Valley	★★★	33.86

4.6.Implementing the Interventions:

After analyzing the existing condition of the school, required interventions were suggested to the school administration. The suggested interventions were cost effective. Speed limit of 30Kmph was suggested at all the schools as per the requirement. Similarly, zebra crossings with stop line were recommended at all the location to ensure the safety of students on the school.

Table 2 Suggested interventions

S.N.	Name of the School	speed limit	child-crossing with school sign	pedestrian-crossing with school sign	Total	Zebra crossing with Stop line
1	Jaya Multiple Campus	2	0	1	3	2
2	Apple International School	2	2	-	4	1

4.7.Quantifying and comparing the Final Rating:

All the post implementation parameters were updated and input on SR4S system to access the final star rating and corresponding the risk factors. All the ratings were improved from 3 to 4 and the risk factors decreased which shows that the implemented interventions were helpful.

Table 3 Final Rating

S. N	Name of School	Star Rating (Final)	Risk Factor (Final)
1	Jaya Multiple Campus	4	11.12
2	Apple International School	4	9.18

5) RESULTS:

The interventions recommended were implemented by the respective school's administration and this resulted in the decrease in the risk factor by 67% in Jaya Multiple campus and Apple International school. This shows that the interventions were highly effective in addressing the safety concerns in these schools while further interventions could also be implemented to enhance the safety concern in these school.

Table 4 Comparison of Risk Factor

S. N	Name of School	Initial Risk Factor	Final Risk Factor	% Decrease in Risk Factor
1	Jaya Multiple Campus	33.86	11.12	67%
2	Apple International School	27.64	9.18	67%

6) CONCLUSION:

Road safety is a major concern globally with high particularly high risk to children especially in low and middle- income countries like Nepal where lack of proper road safety infrastructures prevails. The SR4S toll can be very beneficial to conduct the safety assessments of the schools helping to identify the risk factors associated. In this study SR4S was used to identify the risk factors and ratings both before and after the interventions were applied. The initial star rating

improved and risk factors decreased significantly after the application of the interventions, showing practicality and reliability of the SR4S tool in assessing school zone safety and guiding necessary improvements. Simple interventions like road signage, markings, zebra crossings were suggested to make it cost friendly yet effective.

While the study's scope was limited to two schools, the findings underscore the SR4S tool's potential to systematically prioritize and address risks in resource-constrained settings. Scaling such assessments nationwide could inform evidence-based policy decisions, enabling authorities to allocate limited budgets toward high-impact infrastructure upgrades. Future efforts should focus on expanding SR4S implementation across Nepal, coupled with training programs for local stakeholders to ensure standardized data collection and sustained safety improvements.

7) LIMITATION:

This study has been conducted using the old method of star rating. As star rating was recently been updated in 2023, this study has been done using the old model.

ACKNOWLEDGEMENT:

The authors would like to acknowledge Nepal Automobile Sports Association, NASA Foundation and Safe & Sustainable Travel Nepal (SSTN) for their support in this study.

REFERENCES

ATO. (n.d.). *Asian Transport Outlook.* Retrieved from Nepal Road Safety Profile 2025: https://asiantransportobservatory.org/analytical-outputs/roadsafetyprofiles/nepal-road-safety-profile-2025/

Gautam, S., & Joshi, B. (2024). Road Traffic Accident and its Characteristics in Kathmandu Valley. *KEC Conference 2024*, (pp. 156-163). Lalitpur. doi:10.3126/injet.v1i2.66726

Hunt, A., Mackay, M., & Roess, A. (2018). Reliability Testing of the Star Rating for Schools (SR4S) Mobile Application: Results from a pilot study. *Milken Institute School of Public Health Poster Presentations*.

Kamid, S., LATONERO, G., SIGUA, R., & REGIDOR, J. (2022). Star Rating for Schools (SR4S): The Case of Zamboanga and Valenzuela Cities in the Philippines. *14*, pp. 2113-2132. Eastern Asia Society for Transportation Studies. doi:10.11175/easts.14.2113

Luitel, S., & Tiwari, H. (2024). 448 Star rating for schools (SR4S): a new approach in enhancing road safety infrastructure in Nepal. *15th World Conference on Injury Prevention and Safety Promotion (Safety 2024).* Injury Prevention. doi:10.1136/injuryprev-2024-SAFETY.220

Luitel, S., Tiwari, H., Gautam, S., & Bhattarai, S. (2023). Evaluating Road Safety Scenario of Four Schools Using Star Rating for Schools. *KEC Conference 2023* (pp. 144-145). Lalitpur: Kantipur Engineering College.

Pokhrel, A., Luitel, S., & Tiwari, H. (2025). School Road Safety Assessment in Nepal: A Case Study Using SR4S Ratings. *International Journal on Engineering Technology*, 51-57. doi:10.3126/injet.v2i2.78583

SR4S. (2017). *How it works*. Retrieved from Star Rating for School: https://starratingforschools.org/how-to/

SR4S. (n.d.). *Star rating for schools*. Retrieved from https://starratingforschools.org/

Tiwari, H., & Luitel, S. (2024). Evaluation of Enhancement of Star Rating and Risk Factor in Eight Schools of Kathmandu, Nepal. *15*, pp. 2964-2973. Journal of the Eastern Asia Society for Transportation Studies. doi:10.11175/easts.15.2964

United Nations. (2023). Retrieved from https://sdgs.un.org/goals

WHO. (2023). *Global Status Report on Road Safety.* Geneva: World Health Organization.

WHO. (2023). *Road traffic injuries: Children*. Retrieved from World Health Organization: https://www.who.int/news-room/questions-and-answers/item/road-traffic-injuries-children

Zayerzadeha, A., & Zavareh, M. F. (2019). School zone road safety assessment using the iRAP Star Rating for Schools (SR4S) methodology in Khorasan Razavi Province. *Injury & Voilence*.