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School Road Safety Assessment in Nepal: A Case Study Using SR4S Ratings

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Abstract

Road Safety has been a concerning issue in the world. The number of road traffic fatalities is escalating, especially in Low-Middle income countries and among the age group of people between 5-29. The case has been similar in Nepal as well. Children are particularly more at risk in Nepalese road due to the lack of road safety furniture on roads more specifically around the school areas. Most Children are forced to navigate their ways to school using roads with no road safety infrastructures like speed limit, speed calming devices, pedestrian crossways etc. In this study, Star Rating for School (SR4S) application was used to assess the road safety condition of a public school based on Nuwakot district of Nepal. The school facilitates more than 1300 students and is very near to the Pasang Lhamu highway. The data collected through the survey for the checklist provided by SR4S tool, was coded in the application and the rating was accessed. Interventions were suggested and implemented by school's administration and was again accessed for rating.

Keywords: Star Rating, School zone safety, Road safety

1. Introduction

While there is 5% reduction on overall road traffic fatalities (RTI), the reason of death among the age groups of 5-29 prevails to be road traffic accidents. More than 50% of the death are among the vulnerable road users (VRU) which includes pedestrian, bicyclist and motorcyclist (WHO, 2023). Children under 16 are the most vulnerable during any crash. Hence, school areas are at more risk and their safety assessment needs to be ensured to prevent any casualties. The escalating number of road traffic fatalities in Nepalese road raises the serious concern about road safety. The total number of road traffic fatalities in Nepal rose from 1,131 in 2008 to 2,883 in 2022 with an increase of 155% (WHO, 2023). These crashes have also burdened the country's economic. The total cost of road crashes in Kathmandu Valley for the fiscal year 2020 was calculated a NRs. 1827.67 million (Rizal & Tiwari, 2023). Although school are highly sensitive areas and caution to prevent any casualties must be prioritize, the school areas in Nepal are mostly not equipped with road safety furniture, increasing the exposure of risk to the children.

The flow in and out of the school area increases during the peak hour and the roads are generally busy during those time. This increases the risk of accident if road safety is not encouraged. It has been estimated that implementation of 30Kmph speed limit could reduce the child fatality and pedestrian injury by 70% (UNICEF, 2022). Such cost-effective interventions such as speed calming devices, traffic signs, etc., could be beneficial to provide a safe road environment to children, consequently promoting safer school zone moto. In Nepal, strict implementations of road safety infrastructures around school are not enforced yet. Little to no safety concerns can be seen around the school area, risking the life of hundreds of students. Some guideless can be found for students to navigate their way safely to school, however, the safety furniture are still not implemented compulsorily.

Star Rating for schools (SR4S) is an award-winning assessment tool that helps us identify the exposure of risk to the children during their journey to school (SR4S, n.d.). The iRAP Star Ratings measure the risk of road and provides the assessment in terms of rating where 1 star being the least safe and the safest as 5 stars and a minimum of 3 star is preferred (Tiwari & Luitel, 2023). The Star Rating for Schools uses the pedestrian

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component of Star Ratings to provide a measure of the contribution of road design to the risk of each pedestrian (SR4S, n.d.). Understanding the critical situation of schools in terms of road safety in Nepal, SR4S application was used for this study to assess the safety condition of the school.

1.1. Study Area:

Shree Sahid Jung Prakash Shah Sanskrit secondary School is a public school situated at Devighat, Nuwakot. It offers classes from 1 to 10 and comprises of approximately 1300 students and lies just 30 m away from the Pasang Lambhu Highway. Considering the large number of students and the school lying just alongside the highway, makes it necessary to identify the safety rating around this school. While studies have already been conducted on the schools located around the Kathmandu Valley, this study is focused on analyzing the school area safety scenarios, apart from Kathmandu Valley.

Figure 1. Study Area

1.2. Research Objective:

The major objective of this paper is to identify the star rating before and after the interventions are applied and compare them with the updated rating system of SR4S application.

2. Literature Review

SR4S has been used in many countries for the road safety assessment around the schools. On the joint efforts of Government of Haryana, MG Motor and TRAX (India), at the Government High School Sahupura in Sector 65 Faridabad, SR4S has been used to identify the ratings of the school. The school zone has been upgraded with a marked pedestrian crossing, speed humps, delineation improvement and school zone warning signage, resulting in pedestrian safety has increased from 2- to 3-stars ensuring a safer journey to and from school for local children (IndiaRAP, 2022). Similar study has been conducted in a large scale in 25 and 41 schools of Zamboanga and Venezuela cities, Philippines respectively. Only the initial rating has been identified and the interventions were suggested to get the desired rating. Most of the schools in Venezuela got high ratings while many schools in Zamboanga got low ratings for which they recommended the interventions (Kamid, et al., 2022). In Indonesia, the impact of flyover construction around the Junior High school was access using SR4S along with the identification of critical locations. The rating which was found to below three in all key seven locations were improved to 1 after the implementation of intervention. SR4S was concluded to be a helpful tool for accessing the road safety by the authors (Ellizar, et al., 2023) . In the year 2019, 8 schools in Tehran & Mashhad, Iran were accesses and three of them were found to have rating of 1 using SR4S. After the application of several interventions like speed limit sign, speed calming devices, pedestrian crossings, the rating improved to 4 and 5 stars (SR4S, 2018). Further it has also been found that operating speed is an important role to determine the rating and scores in star rating application (Ayuningtyas, et al., 2024). Hence it is important that the speed is controlled to achieve higher speed. A study claims that the speed at which a vehicle travels directly influences the risk of a crash as well as the severity of injuries sustained, and the likelihood of death resulting from that crash (Bista & Tiwari, 2024).

Two schools in Nepal from eastern and western part of Nepal analyzed for safety assessment. The initial assessment indicates that Guru Jajur School has a 1-star rating with a 94.15 risk score, while Shree Saraswati Higher School has 2 stars with a 59.94 risk score. Various interventions are proposed on those schools for uplifting the rating and reducing the risk factors (Luitel & Tiwari, 2024). Similar studies have been conducted at eight schools across the Kathmandu valley. The proposed road safety interventions were implemented, and the safety scenario increased to 3-star, 4-star, and 5-star at two, four and two schools respectively and the operating speed due to the implementation of speed limit was more than 20% (Tiwari & Luitel, 2024). Another study based on four schools of Nepal was done which concludes on significant reduction of risk factors and improvement on rating with one school with the rating of 5, after the intervention was applied (Luitel, et al., 2023).

3. Methodology

Star Rating for School (SR4S) web application was used to conduct the safety assessment of the school following the methodology as below.

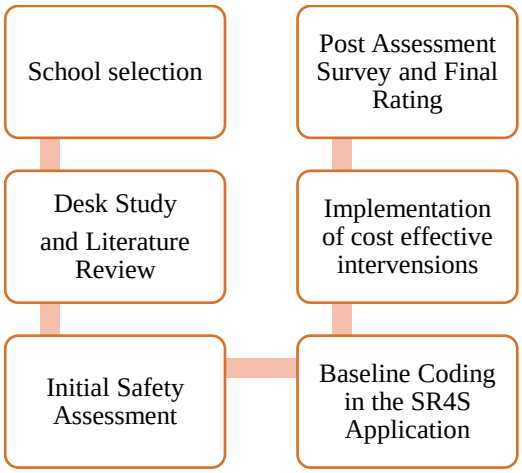

Figure 2. Methodological Framework

Star rating for school (SR4S) is widely used for the safety assessment around the school area. In this study, one school was selected, located on Nuwakot district of Nepal. The school facilities more than 1300 students and is located very near to a national highway. However, the road safety status around the school was unknown. After the coordination with the school's administration and their commitment of adapting the interventions to enhance the road safety, this school was finalized.

The 40-checklist parameter of SR4S application was studied thoroughly along with the various literature related to star rating and their relevance. The checklist has been shown in the Figure 3. The checklist includes geometric parameters of the road, availability of traffic furniture around the school area, traffic volume count etc. Traffic and pedestrian volume count was done manually and speed study of the section was done. All these data were recorded and coded in the application. SR4S has recently updated their rating system, where the initial rating system would provide the rating in whole number from 1 to 5, one being the worst and 5 being the best, the new rating system provided the rating system in decimal units (iRAP, 2023). This study was conducted using the old rating system. Initial rating and Risk factors of the school was identified. To enhance the safety status of the school and reduce the risk factors, interventions were suggested to the school. After the necessary interventions were adopted, the survey was repeated and the final rating was obtained.

Figure 3. Checklist in SR4S

4. Analysis

All the checklists were recorded. The data collected from the initial assessment of the school was tabulated as in Table 1. The table includes various parameter such as location, Land use, Road Type, Road features etc.

Table 1. Initial Data Assessment

SN	Parameters	Current Coding
1	Location	Devighat.Nuwakot
2	Road Name	Pasang Lambhu Highway
3	Section of Road	In front of School
4	Assessor	School Main Gate
5	Land Usage	
5.1	Left	School
5.2	Right	Residential
6	School Area Type	Urban
7	Vehicle Parking	None
8	Road Type	
8.1	Road Width	7.3 m

SN	Parameters	Current Coding
8.2	Number of Lanes	1&1
8.3	Lane Width	3.65 m/ Medium
8.4	Road Condition	Good
8.5	Road Grip	Good
8.6	Shoulder Rumble	Not Present
8.7	Grade	7.5%-10%
8.8	Carriageway	One
9	Road Features	
9.1	Middle of the Road	Center Line
9.2	Lines and Signs	Adequate
9.3	Street Lighting	Not Present
9.4	Sight Distance	Adequate
10	Sidewalk	
10.1	Left	Present
10.2	Right	Present
10.3	Left Pedestrian Volume (Peak hr)	218
10.4	Right Pedestrian Volume (Peak hr)	69
11	Road Edge	
11.1	Left	Present at 0-1 m away from road
11.2	Right	Present at 0-1 m away from road
12	Pedestrian Crossing	None
12.1	Crossing Quality	N/A
12.2	Crossing Volume (Peak hr)	51
12.3	Crossing Supervisor	Not Present
13	Intersection	
13.1	Type	N/A
13.2	Quality	N/A
13.3	Channelization	Not Present
13.4	Volume	N/A
14	Extra Features	None
15	Curves	Moderate
15.1	Curve Quality	Poor
16	Driveways	N/A
17	Traffic Volume	3551 veh/day
18	Speed Limit	40 Kmph
19	Operating Speed	50 Kmph
20	Speed Management	None
21	School Zone Sign	Not Present

5. Results

After coding the parameters in the web application of SR4S, the initial rating of the school was found to be 4 and a risk factor of 6.41. The intervention applied along with their cost is mentioned in tables below. The interventions were applied to the school area and the star rating was still 4 but the risk factor was reduced to 5.75. Although no changes were seen on the rating, risk factor is seen to be reduced by 0.66, suggesting that the adopted interventions assisted to uplift the risk factor to some extent. However, no significant improvement was seen on the rating suggesting further interventions to be applied in the school area.

Table 2. Interventions applied

SN	Traffic sign (Num)		Total (Num)	Markings (Sq.m)		Total (Sq.m)
1	speed limit	2	4	Zebra Crossing	10.5	14
2	pedestrian-crossing with school sign	2		Stop Line	3.5	

Table 3. Cost estimation

S.N.	Name of the School	Road Marking		Traffic Sign		Total Amount (NRs)
1	Sahid Jagat Prakash Jung Shah School	14	1000	4	6500	40,000.00

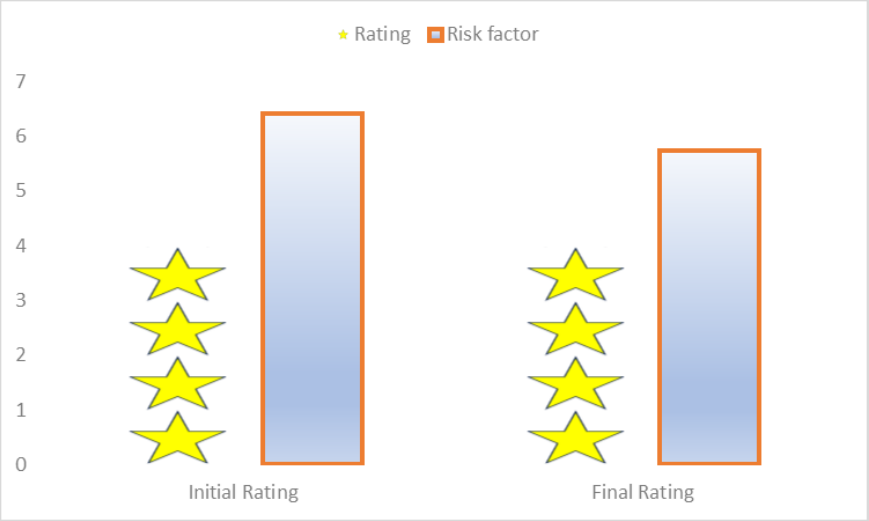

Figure 4. Comparison between initial and final rating

6. Conclusion

Assessment of School Zone Security using a Star Rating for School (SR4S) has emphasized the significant need for better traffic safety measures around educational institutions. Despite the first 4-star assessment, the risk factor remained the subject. Applied interventions, including speed limit signs, pedestrian crossings and stop lines, contributed to a reduction in risk factor, but they were not sufficient to increase the school assessment to 5 stars. This indicates that strong, more extensive interventions like additional cool measures, increase speed limits and better pedestrian infrastructure - are necessary to ensure a safe environment for students.

The findings from this study outline the immediate need for compulsory implementation of traffic safety measures around school areas in Nepal. Politicians, school administration and local authorities should work together to implement strict security protocols and increase the infrastructure to reduce the risk of young pedestrians. Future studies should detect the long -term efficiency of different interventions and continuous enforcement effects on traffic safety assessments. When we prioritize traffic safety around schools, we can reduce accidents and create a safe commuting experience for children.

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