

PAPER TITLE	CHANGES IN RISK AWARENESS AND DANGER AVOIDANCE BEHAVIOR ON SCHOOL ROAD THROUGH TRAFFIC SAFETY EDUCATION; CASE OF JAPAN, KIKUGAWA DISTRICT OF SHUNAN CITY		
TRACK	ROAD SAFETY, COMMUTING ROAD		
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ABSTRACT:

In Japan, we usually go to elementary school on foot and go to junior high school by foot or by bicycle. The existence of school buses is rare and the community is wide, so it is limited.

In the sources such as Japan Government, traffic accident casualties of children by age are prominent in seven years old. It seems that the fact that it became an elementary school student and that walking outside is routine led to such a result. In addition, among the 143,110 injured people accident during riding a bicycle, junior high school students and high school students accounted for 23%. Bicycle side negligence accounts for 70%, and compliance with bicycle side rules is a problem.

Our efforts are to promote traffic safety education for primary school and junior high school students and to promote compliance with traffic rules, and to grasp changes in awareness and behavior of children and students through preliminary and subsequent observation surveys and questionnaire surveys

In 2017, considering changes in the consciousness and behavior of pedestrians and bicycles in the efforts carried out in a district. This effort is the second year and we have also considered some improvements. At a certain point, things that keep junior high school students' pauses at intersections of school bicycles have increased from 14% to 72%.

Through the case of Japan, I would like to share worldwide experts that educational efforts on safety measures on school roads will increase road safety.

Changes in Risk Awareness and Danger Avoidance Behavior on School Road through Traffic Safety Education; Case of Japan, Kikugawa District of Shunan City

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1 INTRODUCTION

In Japan, commuting to elementary school is usually done by walking. Commuting to junior high school is on foot or by bicycle. This is because there are public schools within walking distance. Therefore, in Japan, the existence of school buses is rare and the use of buses is limited to cases where it is impossible to go to school on foot because the community is too wide.

According to the data of related organizations in the Japanese government, traffic accident casualties involving children are prominent in 7-year-old children (Figure 1.).

It seems that the fact that elementary school students walking outside is routine, has led to such a result. In addition, among the 143,110 people injured in accidents while riding a bicycle, junior high school students and high school students accounted for 23% of the total. It was found that in 70% of cases that there was negligence on the bicycle side, and compliance with bicycle side rules etc. can be said to be a problem.

Our efforts aim to promote traffic safety education for elementary and junior high school students and encourage compliance with traffic rules, and through preliminary and subsequent observation surveys and questionnaire surveys, changes in danger awareness and safety behavior of children and students.

In 2017, a survey considering changes in the consciousness and behavior of pedestrians and bicycles was carried out in two districts of Shunan City, in Yamaguchi Prefecture. This effort is in its second year, and we have also considered some improvements since 2015. At a certain point, instances of junior high school students' pausing at intersections while riding school bicycles have increased from 14% to 72%.

Through the case of Japan, I would like to share with the world experts that educational efforts regarding safety measures on school roads will increase road safety.

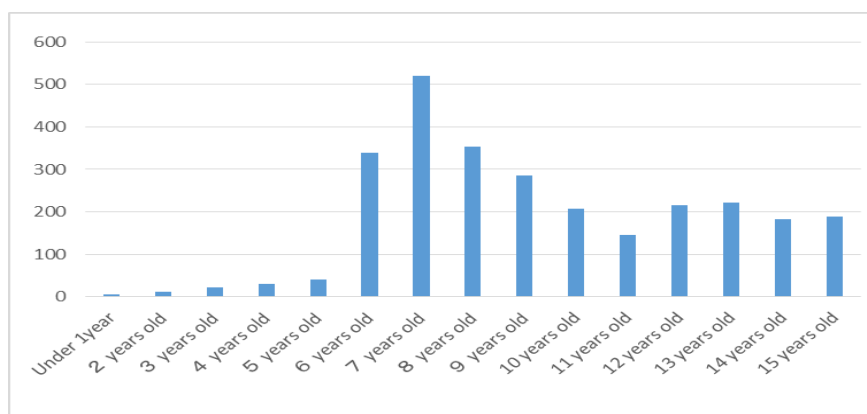


Figure 1. The Number of Casualties, Under 15 years old (2015) ;Unit people

2. CIRCUMSTANCES OF THE JAPANESE COMMUNITY AND SCHOOL ROUTES

2.1 Commuting to Japanese Community and Elementary School

The modern elementary school system in Japan was started based on the dissemination of the academic regulation in 1872. Under this Act, the whole country is divided into large, medium and small school districts and primary education institutions are arranged in the school district. In the whole country, eight college districts and one school district were divided into 32 middle school districts, 256 middle schools were divided, 1 middle secondary school divided into 210 primary school districts, and 53760 primary schools were to be placed.

The first elementary schools were quite varied, from those originating from Terakoya; Private Schools for those utilizing the samurai's educational institution facilities, such as the former clans. Through this history of consolidation and elimination, these elementary schools have been taken over to the elementary school facilities that followed.

From the 1960s to the 1970s, Japan had a high economic growth period. In urban areas, with the rapid increase of the population, problems such as shortages of elementary school classrooms occurred. Meanwhile, in rural areas the number of children decreased with population decline, and elimination and consolidation of elementary schools were conducted. The Kikugawa Elementary School to be introduced this time is a collection of four elementary schools following the consolidation and closure of this period. Therefore, the elementary school has a wide range of school attractions.

In Japan, population peaked in 2008. After 2008, there is been a decline in Japan's population. As a result, both in urban areas and rural areas, the number of children is decreasing due to this overall decline. In Shunan City(Figure 2 and 3) . Kikugawa district and Katsuma district, which were studied here, are all located in the suburbs of local cities. In these schools, the number of children has stabilized and no significant phenomenon in declining student numbers is seen, but compared with the number of children in the 1980s, it is about half that level.

Next, I would like to explain about commuting to elementary school. In elementary school districts, there are several community units. These have long been used as a unit of community-based athletic meetings, festivals and other community activities.

Commuting routes to elementary schools are sent out by members of the community for every road crossing, and they are watching over when the children go to school. In school units, you can see examples of these people who are reading under designations such as the 'Guardian Guard Corps'.

In addition, school districts of elementary schools are often used as community units, as a unit for grouping communities, and residents have a mechanism to participate in community activities on a community basis.

As they originated 150 years ago, many modern elementary schools originated from the Terakoya within temples and shrine precincts, since these were also used as community units from the Edo period until modern times.

From the above, in Japan, elementary schools and the community are deeply involved, and the elementary school district functions as a community unit. Members of the community, especially the elderly who retired from work and those aged 65 years and over, have contributed to watching the school routes.

2.2 Commuting to elementary school and individual school commuting

In Japan, children are usually instructed to go through a prescribed school route. At that time, those who live in the neighborhood and decide to go to school together are called "collective school".

In group commuting, regardless of grade level, we gather together with neighboring people and walk along the route to school together. In doing so, children in the upper grades try to lead the children of lower grades.

Elementary school students go to school by group commuting in the two districts targeted in this research.

Meanwhile, in areas where city distances are short, such as schools in the center of the city center, there are cases where children do not go to school and go to school route individually.



Figure 2. Location of Yamaguchi Prefecture

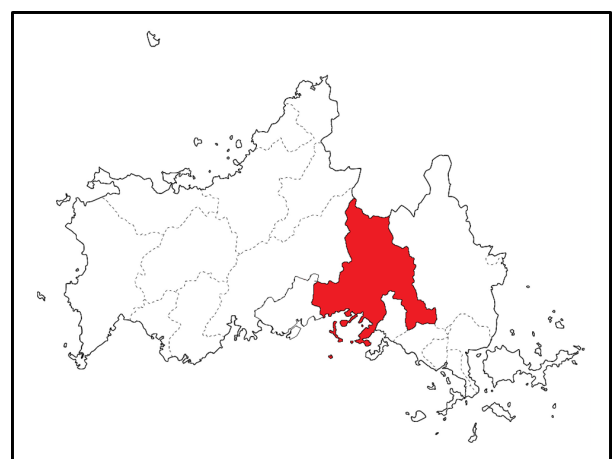


Figure 3. Location of Sunan City in Yamaguchi Pref.

2.3 For junior high school students, bicycle school and walking school

For junior high school students, there are two forms of commuting to school. One is to go to school on foot, and the other is to go to school by bicycle. In public schools, although it is very rare, there are cases where school buses for school commuting are used.

For junior high school establishment, there are cases where one junior high school is arranged in one elementary school or one junior high school is arranged in multiple elementary schools. In this research, the one-to-one correspondence is the Kikugawa district.

Junior high school districts are often composed of several elementary school districts, and in general the school district is wide. Therefore, many junior high schools commute to school by bicycle as well as walking.

However, in Japan's current situation, there are few cases where bicycle traffic spaces are being maintained along the route from home to junior high school, even though bicycle parks are prepared at junior high school.

In this research, we conducted traffic safety education in instances where the bicycle passage space is not well developed, and trying to find changes in danger awareness and safety behavior of bicycle school students. students commuting to school by bicycle.

2.4 Definition of school roads

In Japan, elementary school routes are defined as routes that roughly 40 children pass through for school commuting. Therefore, in many cases, school routes that less than 40 people use are not designated as school routes. In this research, less than 40 school routes are also called "school road".

In this research, we define the space through which children and students travel when going to school as school roads.

3. CHARACTERISTICS OF TRAFFIC ACCIDENTS AT SCHOOLS IN JAPAN

3.1 The number of casualties and injuries of seven-year-old children is prominent in traffic accidents during walking

According to traffic accident statistics of 2015, the number of deaths due to traffic accidents for pedestrians was 1,453, and the number of injured was 56,692. The elderly who are 65 years old or over account for 70% of the dead and 32% of the casualties, so the importance of safety measures for the elderly is widely known.

On the other hand, looking at the age of 19 or less, the death toll is as small as 3%, but the number of injured people is 18%. In traffic accidents during walking, the number one in age-specific casualties protrudes by more than 1,400 at age seven.

In the data in increments of 5 years, the group with the highest number of casualties is not the elderly, The group ranging from 5 to 9 years old had, 4,853 casualties. Looking at the data in increments of one year, the number of 7 year-old children is as high as 1,400.

The characteristics of traffic accidents while a 7 years old child is walking are a 73% occurrence during the day, and when it is combined with the litter character before and after sunset it becomes 93%. The rate of traffic accident for adults (16 to 60 years old) is greatly different, from half the number of accidents, both daytime and night time.

Focusing on the purpose of walking by pedestrians who were involved in accidents, the number of schools decreasing impacts children the most in 6 to 15 years old age range. Accidents during schooling increase from 6 - year - old children entering elementary school.

3.2 Bicycle traffic accidents are heavily damaged by middle and high school students

Meanwhile, according to traffic accident data of Japanese government agencies in 2002, of the 179,582 persons who were injured riding bicycles 40,661 were classified as between 13 and 19 years old. It is characterized by many junior high school students and high school student generation damage..

3.3 Many elementary school students are utilizing sidewalk in local cities

According to the road traffic census figures for 2010, schoolchildren accounted for 80% of the sidewalk users of national highway 2 in this target area, and the sidewalk users of the prefectural road Shinnanyo-Tsuwano line also roughly at the same level.

In local cities, it is a fact that elementary school students occupy most of those using sidewalks. Therefore, traffic safety measures on highways such as national highways and prefectural highways will directly lead to safety measures on school roads.

4. OUTLINE OF OUR EFFORTS

4-1 Location of target area

The position of Shunan City in Yamaguchi Prefecture and the location of Kikugawa district are shown in Figure 3. Yamaguchi Prefecture Shunan City has a population of 150,000 people, an agglomeration center of Japan's leading chemical industry, and is an important port city.

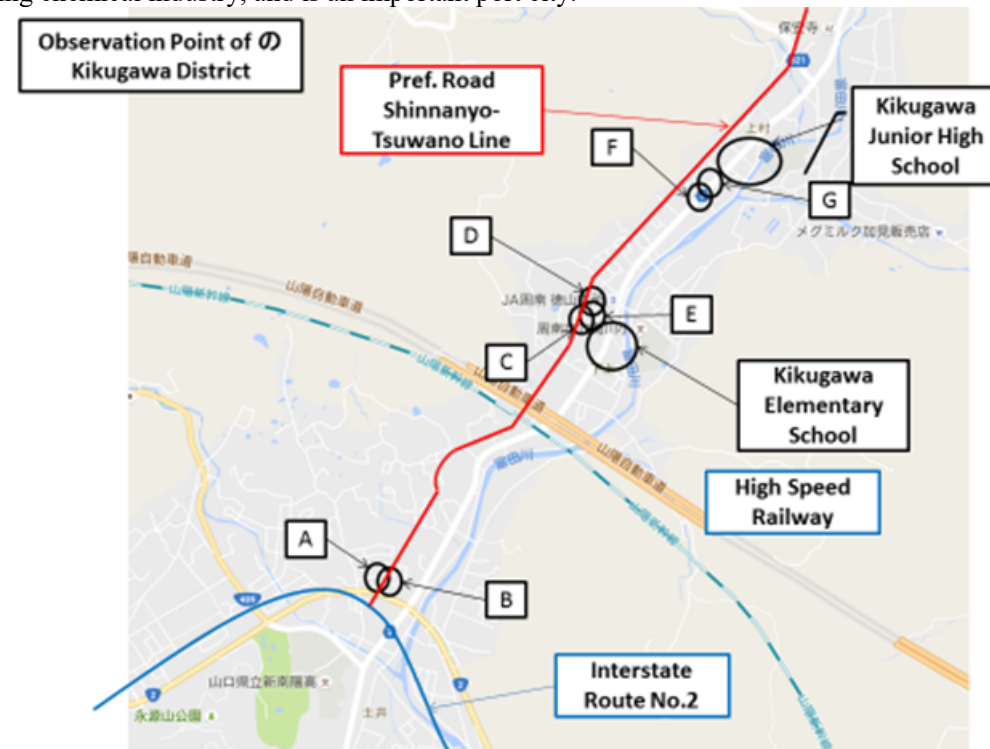


Figure 3. Map of Kikugawa District, Observation Point A to G



Picture 1. Point A and B



Picture 2. Point C



Picture 3. Point D



Picture 5. Point F and G



Picture 4. Point E

4-2 Efforts by Shunan City, Kikugawa District

In the Kikugawa district, both elementary and junior high school students use the city road along the Tonda River as a school road. A sidewalk of 3.5 m in width is being developed on the same line, along the road improvement of the prefectural road Shinnanyo-Tsuwano line, and a bicycle passage zone is installed through the maintenance section. In the future, bicycle commuters are planning to change so that they go through the Shinnanyo-Tsuwano line, but now during the transitional period, bicycles and pedestrians are mixed in a narrow road space along the river, and traffic between them is maintained by adherence to manners.

Table 1. summarizes the efforts by the year 2017 in the Kikugawa district

Fiscal Year	Month	Effort contents
Expansion to other districts; Kikugawa district and others		
2016	July	July 14th Pre-observation
	Sep.	Traffic safety lecture was given to Kikugawa elementary school 3rd-6th graders
		Traffic safety lecture is given to all grain-level junior high school grade Pre- and post-questionnaire surveys conducted before and after the lecture
	Oct.	October 4th Post-observation
2017	Sep.	September 14th Pre-observation,
		Traffic safety lecture is given to all grain-level junior high school grade
		Pre- and post-questionnaire surveys conducted before and after the lecture
		Traffic safety lecture was given to Katsuma elementary school 3-6th graders Pre- and post-questionnaire surveys conducted before and after the lecture
	Oct.	October 5th Post-observation

Table 2. Questionnaire survey status, Kikugawa district until 2017

Schools	Survey	2016	2017
Kikugawa E. S. children	Pre	452	485
	Post	452	485
Kikugawa J. H. S. students	Pre	208	164
	Post	208	164

The issues of the school road in the Kikugawa district as follows.

As a feature of bicycle school students, there are so many that do not stop at intersections, and it is necessary to re-recognize traffic rules and manners in order to improve traffic safety.

Here, using the community school of the junior high school, we confirmed the difference in the consciousness of traffic safety between the student and the guardian and local residents.

4-3 Outline of Initiatives

4-3-1 Survey system

Traffic safety education focusing on traffic space on a common school road was conducted for Elementary School children (3rd – 6th graders) and junior high school students (1st – 3rd graders) in the target area, questionnaire surveys were conducted before and after that, in order to understand changes in danger consciousness and changes in behavior intention.(Figure 4.)

The system of investigation in the target area is shown below.

STEP 1 Preliminary observation of target area, questionnaire survey in advance

STEP 2 Implementation of traffic safety lecture Author serves as lecturer

STEP 3 Follow-up observation of the target area, post-questionnaire survey

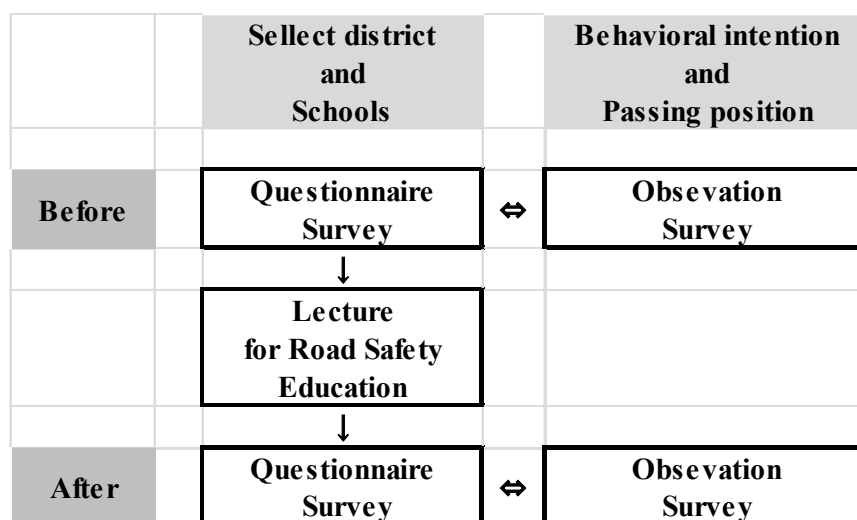


Figure 4. Structure of the Survey .

4-3-2 Content of traffic safety lecture

The author gives a traffic safety lecture for about one hour at each school and makes the students recognize the correct traffic rules. The contents explain the situation of the dangerous part of the school road using actual photographs of the site, the seven rules of traffic safety and the five rules of bicycle safe use.

4-3-3 Survey on the current situation of traffic volume etc. on the school road in Katsuma district

We set up video cameras at each major point of school road in school time zone and observed traffic conditions. At the same time, we measured the number of passing cars, bicycles and pedestrians passing through the observation site. We also checked whether change of passage position is seen before and after.

4-3-4 Pre / post questionnaire

We asked each school to take a questionnaire before and after the traffic safety education lecture. After that, we compiled the questionnaire to grasp the understanding before and after the course attendance and the resulting intention of behavioral change. These questionnaire items for elementary school students are shown in Table 3. And Table 4. shows additional items for junior high school students.

Table 3. 7 Safety Road Rules, JAPAN

7 Safety Road Rules	
1	Use the sidewalk or stay within the line marked
2	Keep to the right side of the road
3	Cross the street using the traffic light intersection
4	Proceed to cross the street at green light on
5	Should never cross a street that no pedestrian crossing
6	Before crossing the street, stop and look in both directions
7	Keep to the right side of walkway

Table 4. 5 Rules for Safe Use of Bicycle, JAPAN

5 Rules for Safe Use of Bicycle	
1	Cyclists should ride on road, as vehicle
2	Should ride on walkway, when only allowance
3	Ride only the left side of street
4	Must reduce speed on sidewalks and give pedestrians the right of way
	Light at night
	Riding double is prohibited
	Riding side by side is prohibited
5	Must obey traffic lights at intersections
	Check for safety after coming to a full stop at intersections
	Children must wear a bicycle helmet

5. CHANGES IN THE RISK AWARENESS OF CHILDREN AND STUDENTS IN KIKUGAWA DISTRICT

We conducted questionnaires before and after the traffic safety lecture for both Kikugawa Elementary School and Kikugawa Junior High School, and answered "I do not think so" on the question "Do you think that the school road is safe when you go to school?" On the question of danger consciousness, we asked about whether we recognized the items of traffic safety 7 rules and the 5 rules of safe bicycle safe use explained in the lecture, and conducted a survey on traffic safety concerns to confirm change in behavior intention.

Based on the results on the change in danger consciousness at Kikugawa Elementary School, it can be seen that the risk awareness after the lecture is increasing as the grade increases (Table 5. and Table 6.).

Table 5. Think a risk awareness of Kikugawa Elementary School Children, 2016

answer	3rd grade KIKUGAWA E.S.		4th grade KIKUGAWA E.S.		5th grade KIKUGAWA E.S.		6th grade KIKUGAWA E.S.	
	before	after	before	after	before	after	before	after
think	54.8%	56.0%	67.0%	60.2%	50.0%	42.9%	53.2%	37.7%
N/A	27.4%	22.6%	19.8%	16.1%	38.6%	32.9%	27.4%	32.8%
didn't think	14.3% → 20.2%		13.2% → 20.4%		11.4% → 24.3%		19.4% → 26.2%	

Table 6. Think a risk awareness of Kikugawa Elementary School Children, 2017

answer	3rd grade KIKUGAWA E.S.		4th grade KIKUGAWA E.S.		5th grade KIKUGAWA E.S.		6th grade KIKUGAWA E.S.	
	before	after	before	after	before	after	before	after
think	66.7%	62.7%	48.1%	44.6%	53.3%	27.2%	44.9%	36.2%
N/A	18.3%	20.3%	32.1%	36.1%	31.1%	59.8%	29.0%	33.3%
didn't think	15.0% → 16.9%		19.8% → 19.3%		15.6% → 13.0%		26.1% → 30.4%	

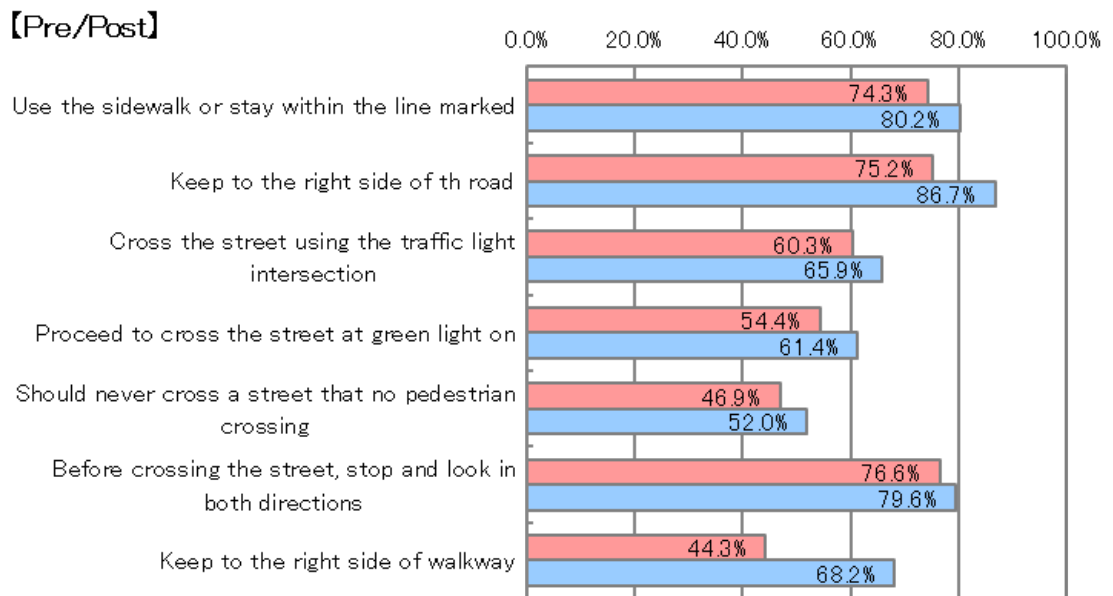


Figure 5. Compliance of Seven Road Safety Rules, Kikugawa Elementary School, 2016

Based on the results of Kikugawa Junior High School, since we can see that there is a difference in danger consciousness depending on the grade level, we believe that it is necessary to continually conduct traffic safety education and to investigate whether changes due to progress of the grade can be observed (Table 7. and Table 8.).

Table 7. Think a risk awareness of Kikugawa Junior High School Student, 2016

answer	1st grade KIKUGAWA J.H.S		2nd grade KIKUGAWA J.H.S		3rd grade KIKUGAWA J.H.S	
	before	after	before	after	before	after
think	75.4%	63.2%	68.1%	67.6%	58.1%	45.9%
N/A	18.8%	26.5%	27.8%	27.9%	27.4%	32.8%
didn't think	4.3% →	10.3%	4.2% →	4.4%	11.3% →	18.0%

Table 8. Think a risk awareness of Kikugawa Junior High School Student, 2017

answer	1st grade KIKUGAWA J.H.S		2nd grade KIKUGAWA J.H.S		3rd grade KIKUGAWA J.H.S	
	before	after	before	after	before	after
think	58.1%	43.6%	73.9%	54.4%	58.9%	48.6%
N/A	36.4%	45.5%	18.8%	35.3%	27.4%	41.4%
didn't think	5.5% →	10.9%	7.2% →	10.3%	9.6% →	10.0%

As a result of questioning whether we are aware of the 7 rules of traffic safety as a safeguard to transport at Kikugawa Elementary School, "As a pedestrian, pedestrians pass the side opposite the roadway" increased by 23.9% , And there is a big change compared to other items (Figure 5.).

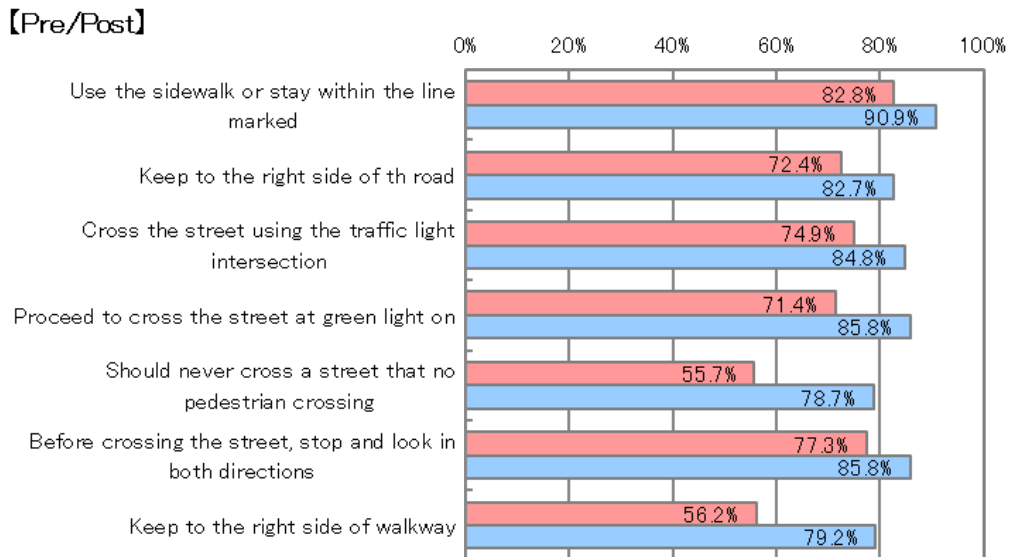


Figure 6. Compliance of Seven Road Safety Rules, Kikugawa Junior High School, 2016

As a result of Kikugawa Junior High School, "There are no crosswalks, we do not cross wide roads" and "In pedestrian walking pedestrians pass opposite side of roadway" increased by 23%, compared with other items. There is a big change (Figure 6.).

Also, as a result of asking whether the 5 rules of bicycle safety use are recognized as a thing to protect on the use of the bicycle for students at Kikugawa Junior High School, "Bicycles pass the road principle in principle" and " Only when it is exceptionally allowed to pass through the sidewalk "increased by 25%, 38% compared to the previous survey, and a big change was seen. After the incident, it is understood that there is more than 80% recognition in all items, and traffic awareness on bicycle use is high (Figure 7.).

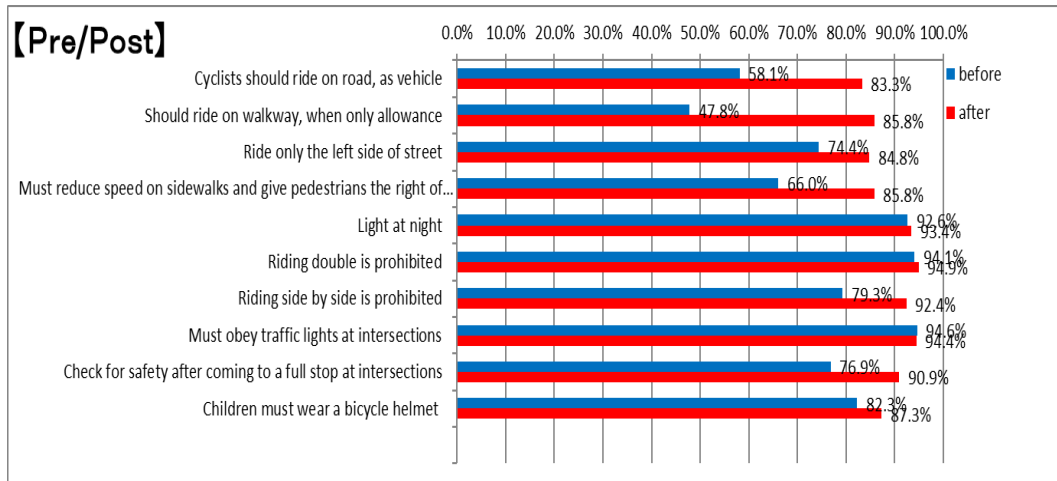


Figure 7. Compliance of Five Rules for Safe Use of Bicycle, Kikugawa Junior High School, 2016

6. CHANGES IN BEHAVIORAL INTENT AND BEHAVIOR OF CHILDREN AND STUDENTS IN KIKUGAWA DISTRICT

In order to observe the current situation of the traffic environment in the Kikugawa district in the school time zone, we designated seven observation points (Figure 8. and Figure 9.) along the prefectural road Shinnanayo-Tsuwano line and the Tonda River which children and students pass as a school road. A traffic volume survey at these seven conducted from 7-9 AM.

The Kikugawa district has one elementary school vs. one junior high school in the same school district, and many school students pass the same school road even if they go from elementary to junior high school. In particular, the Shinkikugawa bridge side intersection has three observation points because a lot of elementary school students and junior high school students travel from the three directions on the north side and the south side along the Tonda River and the prefectural road side.

Photographs of the observation points are shown in Figure. 18 to Figure. 22 below. Observation points A and B are along the Shinnanayo-Tsuwano line of the prefectural road, and in Figure. 4, the back side (upward direction) is point A and the opposite front side (downward direction) is point B. Observation points C · D · E are located at the crossing of the Shinkikugawa bridge at the river crossing, where the south side along the Tonda River is Point C, the north side is Point D, the side along the Shikikugawa bridge is Point E . The observation points F and G are at an intersection near Kikugawa Junior High School, the Point F side is the right side and the straight side is the Point G.

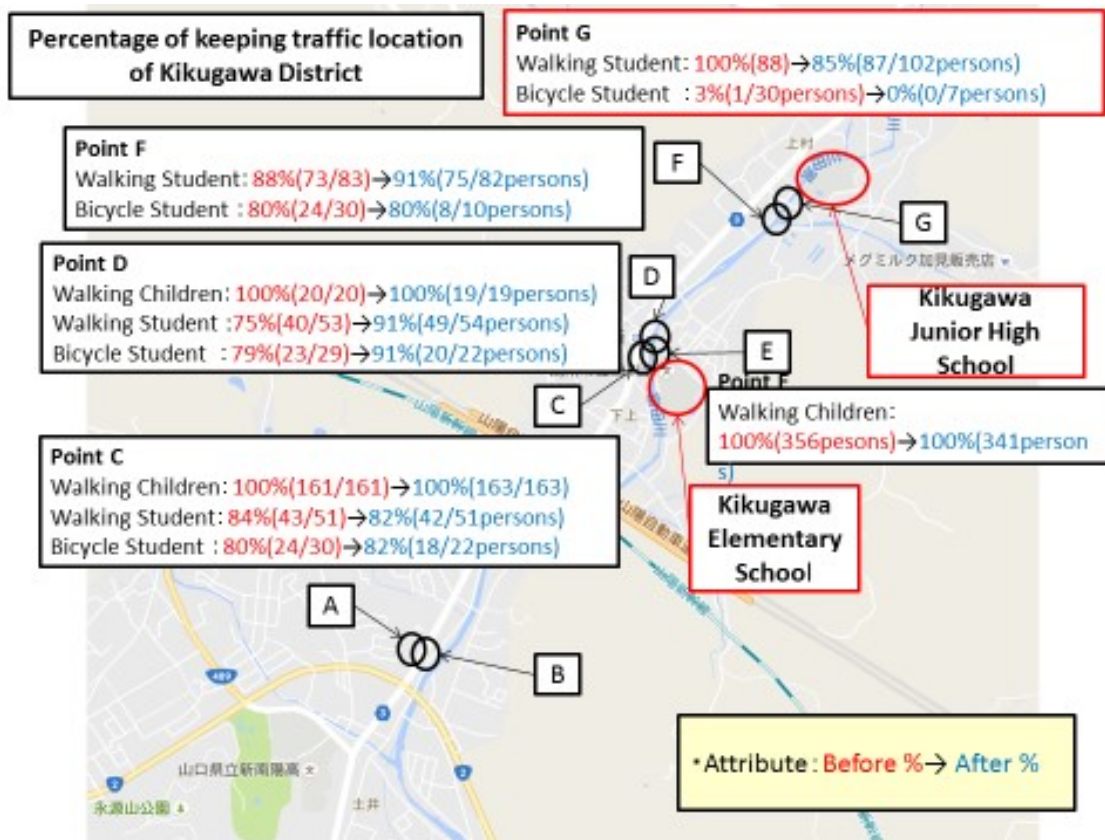


Figure 8. Percentage of keeping traffic location of Kikugawa District, 2016

7. RESULTS OF INITIATIVES IN KIKUGAWA DISTRICT

Kikugawa elementary school students go to school, and all seem to pass along the right side river which is the correct passage position, as shown in "7 narrow roads pass right" in Traffic Safety 7 Law.

The proportion of Kikugawa junior high school students who are passing through the right side is decreasing which is the correct passage position, as stated in "Five passages on the side of the road" of the bicycle safety use during post observation at Points C and G, more than 80% are being protected.

Many junior high school bicycle students are increasing in number after the incident, but only at point G do they not pass at the correct passage position. As a cause, we think that the width of the road is so narrow that only one car can pass through, and the bicycles can not pass through the correct traffic roadway point, so we think that the bicycle traffic infrastructure is insufficient (Figure. 23). The compliance situation of the correct traffic location is shown in Figure.17.

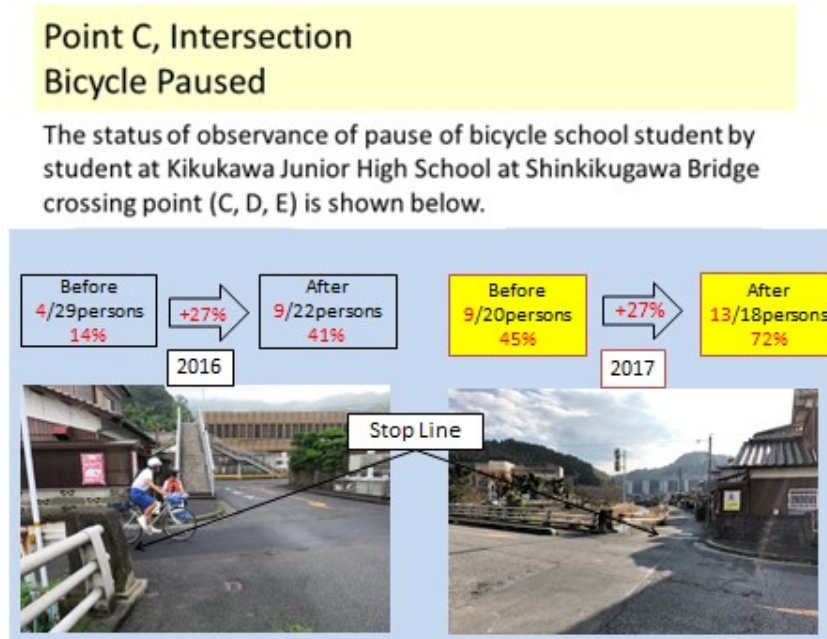


Figure 9. Point C, Pause the bicycle at the intersection, 2016 and 2017

As a problem of traffic behavior on traffic safety, we observed the situation of compliance with temporary suspension of bicycle school students at Kikugawa Junior High School based on video observation at seven observation points, and as a result of the preliminary survey at the Shinkugawa Bridge side crossing point.

Only the percentage was protected, but in the post-survey the protection increased by 14% to 41%. And then, the percentage was protected, but in the post-survey the protection increased by 45% to 72% (Figure 9.).

Based on this, it was effective to reflect the traffic safety lecture to the actual traffic behavior, but half or more bicycle students have not been making stops at intersections, so to continue to pause in the future.

We believe that it will be necessary to continue traffic safety education on traffic safety measures and to establish traffic signs such as temporary stop signs.

8. INFORMATION SHARING AT SCHOOL MANAGEMENT COUNCIL

The Kikugawa Junior High School Management Council was held twice in July 2017 and February 2018, the first time the questionnaire surveyed up to the graduation research interim presentation and the results report of the observation findings were made. The second time we exchanged opinions on 'dangers on the school road' and 'what seems to be a problem in relation to the bicycle and other transport entities' and group opinions from children / students and local people.

The result summarized by KJ Law, the opinion of children and students was that it felt dangerous at the time of commuting to school, there was also a request such as "I want you to turn on street lights" as a measure. The opinions of local residents were transport manners of children and students, and there were opinions on road development of Shinanyo-Tsuwano Line on the prefectural road.

9. RESOLVED ISSUES

The results obtained from the 2-year survey results in the Kikugawa district are summarized below.

First, as a result of conducting questionnaire surveys and observation surveys before and after implementing traffic safety lectures, we were able to observe changes in danger consciousness and behavior intention. However, junior high school students' temporary stops by bicycles and improvements in traffic conditions have not been made. The students have not complied with the desired behavior. For this reason, it is necessary to continually carry out traffic safety education in the future.

Secondly, at the school management council of Kikugawa junior high school, as a result of report on initiatives on traffic safety education and exchange of opinions, there was a clear difference in opinion between the students and local residents. Through exchanging opinions between them, it is necessary to improve the traffic environment.

Based on the above, we will continue to conduct road safety education, encourage students and children to adopt appropriate traffic behavior, and incorporate a network of bicycle traffic spaces corresponding to the improvement progress of the prefectural road Shinnanyo-Tsuwano line. It is necessary to comprehensively restructure the school roads of the Kikugawa district.

10. ACKNOWLEDGEMENTS

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