

INTERVENTION MEASURES OF ENVIRONMENTAL HYGIENE FOR RAISING THE HEALTH QUALITY OF STUDENTS IN CHINESE RURAL AREAS

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ABSTRACT

For improving the health condition of school environment in Chinese rural areas, members of the co-operative group of the project first carried out investigation and evaluation of intervention measures of school environmental hygiene at twenty middle and primary schools in 5 counties and cities which were distributed over the South and North different areas. The results of this research were shown as following:

1. Before the implementation of intervention measures, the qualities of school environmental hygiene in demonstrative points and control points were at the same level. After the implementation of intervention measures, the health condition of school environment in the demonstrative points were evidently better than that of the control points.
2. Improving facilities of water supply in schools can help students in middle and primary school to culture good personal habits such as washing hand before eating and after defecating and not drink unboiled water.
3. Strengthening health education of personal health of students can raise the hygienic consciousness and health quality and can also raise the qualities of the environment of schoolyards and families.
4. The facilities of environmental hygiene were necessary facilities for students' life.

The comprehensive measures for environmental hygiene can really obtain a certain effectiveness of improving health and preventing diseases. For example, the density of flies in the demonstrative points was lower one fold than that of the control points, and the infectious rate of ascariasis of the students of middle and primary schools in the demonstrative points was lower 36.8% than that of the control points after 1 year through collective anthelmintic treatment. The incidence of diarrhoea in the summer and autumn was reduced by 42.5% as compared with control points. The incidence of trachoma was reduced by 2.25% as compared with control points. The rate of eligibility of the oral health of the students in middle and primary schools was higher one fold than the control points. The rate of eligibility of hand hygiene increased by 6.5 times as compared with that of the control points. The rate of students who have health knowledge was higher than that of the control points by 42.6%. The rate of health behaviour formation was also higher than that of the control points by 32%. The rate of class absence due to intestinal infectious diseases and parasitosis was reduced by 26.1%. Thus it can be seen that the comprehensive intervention measures for environmental hygiene were the effective method for controlling and blocking intestinal infectious disease and parasitosis, and were also the fundamental measures for raising health quality of the whole people.

Key Words: health facility, intervention measures, personal health education

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BACKGROUND

In China, there is a large part of the population in rural areas. There are great differences in natural condition among different areas. The weather is very hot and the humidity is high in the south areas. It is severely cold and dry in the North areas. The development of rural economic is unbalanced. Except for economic developed areas, most of the regions are still comparatively behind the time and was still in the state of "Wenbao type" (Only the eating and wearing can be satisfied). People lack the health consciousness, and do not recognise the objective and function of constructing environmental health facilities. In some regions, people have the money to build buildings, but have no money to build lavatories. The environmental hygiene for rural regions was still in the state of 'dirty, disordered and messy'. The incidences of intestinal infectious diseases and intestinal parasitosis are still very high.

The high incidences of the intestinal infectious diseases and parasitosis are associated with the bad local health condition and health education. It is important to initiate the health education from children.

With the reform and opening policy being established, the education conditions of middle and primary schools in countryside have been greatly improved in recent years. But the construction of health facilities is somewhat neglected. The lavatories in schools are very simple, and flies are pervasive. The students do not wash hands before dinner and after defecating, and they drink unboiled water. Due to these factors, the communicable chances of intestinal infectious diseases and parasitosis are high. With the present state of school hygiene in rural areas, the construction of environmental hygiene facilities in schools is an important and urgent project. In this study, we selected twenty schools as demonstrative points which were distributed in 5 counties in different regions of the nation.

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In the north region of the nation, we selected the suburban district of Baotou City in Inner Mongolia Autonomous Region and DaXing County in Beijing as the demonstrative points. In the South region, we selected the suburban district of Ma An Shan City in Anhui Province, Xinye county in Henan Province and Liuhe County in Jiangsu Province as the demonstrative points. The localities of twenty schools belong to the districts of local economically middle or low level. The 10 primary and 10 middle schools have 260 classes. The students totalled 12,622, among which man students were 6,902, about 54.7 percent of the total, girl students were 5,720, about 45.3 percent of the total. Each class had 48 students. Total number of teachers were 854. Each class had 3.3 teachers. 50 percent of the schools had dispensary (primary school 5, middle school 5) and total number of schools physician was 14, average number of each school less than 1. The course of health education for school was set up according to prescription of teaching outline. Although twenty schools had toilets, healthy toilets of schools (water-flushing type or free-lattice type) accounted only for one-fifth, simple type toilets accounted for four fifth. The non-hazardous treatment of night soil had not done and directly was use as fertiliser. The total number of men's toilets was 320. The average number of quating position was about one for 23 men. The total number of women's toilets was 326. The average number of quating position was about one for 18.6 women.

Twenty schools had deployed water supply facilities (providing deep well for self) but the facilities of washing hand were insufficient. The teachers of schools had boiling water to drink. Only 50 percent of middle schools had been supplied with boiling water. Most students generally drank unboiled water or tap water.

In view of the present state for school environmental hygiene in rural areas, the contents of our research were as following: to improve environmental hygiene and health facilities of schools at the demonstrative points, to prevent the commonly encountered intestinal infectious diseases, parasitic diseases and trachoma of students of middle and primary schools. The investigation and evaluation of this project were carried out from 1995 to 1996.

STUDY DESIGN

1. The selection of demonstrative points:

5 counties from the South and North in our nation were selected as demonstrative points which were economically undeveloped and representative. Then, a primary school and a middle school was selected in each of the 5 counties as demonstrative points, and another primary school and another middle school as control points. (Figure 1 was the distribution diagram of the demonstrative points of environmental hygiene in countryside).

2. The main contents of intervention measures of environmental hygiene in schools:

- a. To reform and repair the school toilet, build the system of hygienic management and night soil non-hazardous treatment according to the standard of hygienic toilet (Wall, roof, closet pit and septic tank must not be leaching; closet must be clean; there must be no flies and maggots; night soil must be regularly cleared away and be applied non-hazardous treatment).
- b. To increase facilities for washing hand(hand washing bowl, bibcock of tap water).
- c. To increase facilities for boiled water supply (bibcocks to supply boiled water, buckets to supply boiled water); to call for students to bring boiled water by themselves.
- d. To build refuse pit, strengthen refuse management and treatment.
- e. To improve environment quality of school yard; to plant trees, to build the green belt and to beautify school environment. The road and campus of the school were required to be hard. The environments of school were required to maintain clean.
- f. To compile the teaching materials which main contents were about personal hygiene for health education of middle and primary schools.
- g. To carry out training for health education and health technique of teachers in demonstrative points to raise teaching capacity.
- h. To give lectures according to the requirements of the outline for health education.

3. To survey the density of flies in school yard: observation periods were arranged at summer and autumn from 1995 to 1996. To survey two times before and after of the implementation of intervention measures according to the unified method.

4. The rate of infectious ascariasis of students of middle and primary schools. To examine individually night soil two times before and after one year of taking medicine. To examine ascarid eggs with improved Kato's method.
5. The attack rate of diarrhoea of students in middle and primary schools at summer and autumn. The period of observation was arranged at summer and autumn in the year 1996 (May to September). Any person of infectious diarrhoea---suffering acute diarrhoea for three times or more than three times in one day in this period was registered in registering table.
6. The investigation of oral health (dental bacteria plague) was carried out according to the examination standard of index of soft dental calculus and the Standard of Scoring Evaluation of the comprehensive prophylactic-therapeutic scheme and the norm of commonly encountered diseases of students all over the nation.
7. The investigation of hand hygiene. If any dirt existed in the finger, finger nail and finger groove, it could be judged to be not eligible for hand hygiene.
8. The investigation of the health knowledge understanding. To survey two times before and after the implementation of intervention measures according to ways of unified questionnaire and scoring method (The score above 60 was considered to be eligible).
9. The rate of health behaviour formation. The standard of healthy city in our nation was referenced to design the health behaviour questionnaire.
10. To examine trachoma two times before and after the implementation of intervention measures with the examination method in the comprehensive prophylactic-therapeutic scheme and norm of technique of commonly encountered diseases of students all over the nation.
11. The rate of class absence due to illness. The data of the rate of class absence due to illness was gathered at the end of each semester.

IMPLEMENTATION

A lot of investigations have been conducted since the initiation of this project of intervention measures, i.e. April 1995. Follows are summaries of the recent 2 years' work.

1. To strengthen the leadership and the co-ordination between organisations

With the intention to strengthen the role of leadership and make sure that the project would be conducted successfully, the co-operative group on this project was established timely. In April 1995, the co-operative group held a meeting in Beijing. The attendees which came from the areas of education, health administration and health research discussed the feasibility of the project and made the work plan more perfect. Since the support from the authorities and the participation of the communities were critical to the construction of demonstrative points of school hygiene. The leaders from both the central and local departments have paid great attention to the project. The Office of National Patriotic Committee, the Health Inspection Office of the Ministry of Health and the Physical Education and Health Office of the National Education Committee have jointly put into effect the document 95(27) on this project. Ad hoc meetings were convened and special group of leadership were made up to make out work plans within different co-operative departments respectively.

2. To improve the environmental health facilities

The hygienic lavatory and clean water supply are critical to the health of the primary and middle school students and to the improvement of environmental quality. The hygienic condition of the lavatory and the campus of a school can be an index of the degree of the school's refinement. The popularised rate of hygienic lavatory was very low in that the leaders of the schools and the communities attached less importance to the construction of hygienic lavatory. Another difficulty was scarce fund of the schools due to the low economic levels of rural areas. However, it is still possible to rebuild the old lavatory and better the hygienic conditions. Four measures were applied to improve the hygienic conditions of the lavatories. The first is administrative intervention measure in which propaganda about the objective, perspective, and disease prevention effect of hygienic lavatory construction was involved. The second was to revitalise the communities and the families of students to provide building materials, such as stones, cement and bricks. The third was to provide technical guidance and strengthen the supervision of the hygienic lavatory construction. The fourth was to seek more funds from different areas, such as education department, the local authorities, the communities, and the families of the students.

a. Lavatory rebuilding in the demonstrative schools

10 of the demonstrative schools have reached the demand for hygienic lavatory. Hygienic lavatories of the water-flushing type were constructed in the school of the suburb in Ma An Shan City (See figure 2. Hygienic lavatory of the water-flushing type), which was a demonstrative primary school in rural areas. The old lavatories were pulled down and hygienic lavatories of the water-flushing and three-vault type were built, with 8 holes added, water tap and 2 washing-hand pools provided. Wastebaskets were provided for each hole in lavatories for females (See figure 3. Newly-built lavatories). In demonstrative primary and middle schools in Xing Ye County, hygienic lavatories of the three-vault type and facilities for washing hand were rebuilt (See figure 4. Newly-built hygienic lavatory of the three-vault type). In demonstrative primary and middle schools in DaXing County, repairs were made to the old lavatories. The problem of excrement exposure was solved by applying cover board on manure pit and its holes. Excrement was treated with non-hazardous measures such as high-temperature-piling method. In demonstrative primary and middle schools in the suburb of Bao Tou City, the old lavatories were repaired and rebuilt, with doors and flying prevention screen windows added (See figure 5. Hygienic lavatories of the demonstrative schools). In demonstrative primary and middle schools in Liu He County, funds were raised to repair the old lavatories and roads, to apply cover board on the manure pits, and to practice non-hazardous treatment to the excrement. But there was not enough funds to set up new lavatories as yet. Other measures such as lavatory sanitation, hygiene management, and flying intensity control were applied (See figure 7).

b. Water reforming

Due to the policy of reform and opening and the economic development in the rural areas, people were more and more ready to accept the measures for improving the quality of water supply. All the 20 demonstrative schools were provided with centralised water supply system, with deep wells and water towers built. However, the results of microbiological examination showed that it was not clean enough to be drunk unboiled. The underlying problems with water supply were: 1) the scarce of water taps and pools for washing hands; and 2) the scarce of boiled drinking water to provide with the students. In order to count these problems, water taps and washing pools were increased for the convenience of students' washing hands before eating and after defecating in the demonstrative schools. Several hundred of water taps and

washing pools were increased in 10 of the demonstrative schools. For example, Feng Qiao Middle School, the demonstrative school in the suburb of Ma An Shan City, increased its water taps from 11 to 45 (See figure 8. Water supply systems and hand washing facilities in the demonstrative schools). Due to the economic and energy limitation, the problem of the boiled water supply has not been solved as yet. The cooperative group asked 5 of the demonstrative middle schools to provide with boiled water to the students, some of which lived in schools. The actual measure was to repair the old boilers and provide with the temperature-sustaining bucket and thermoses in every class (See figure 9. Boilers, temperature-sustaining buckets and thermoses). Some demonstrative primary schools with better economic conditions were also asked to provide with boiled water to the pupils. As for the schools which had no enough funds, the pupils were required to bring boiled water by themselves. The students were prohibited to drink unboiled water.

c. Strengthen the environmental hygiene supervision and the afforestation and beautification of campuses.

Strict hygienic duty system was established and the hygienic tasks was divided up by specific individuals and groups. Systems of evaluation and awarding were also established to revitalise the students to maintain the cleanness of the environment, to heighten the health quality of themselves, and to replace the 'dirty, disordered and messy' environment.

In the 10 demonstrative schools, thousands of trees and several thousand square meters' flowers and grasses were planted. Environmental quality of the schools was greatly improved: on the other hand, the better environmental quality could help to improve the students' health consciousness. (See figure 10. A glimpse of the environmental hygiene in the demonstrative schools).

d. Strengthen the rubbish management

Rubbish pools were set up in campuses and wastebins were set up in the roadside. The rubbish was piled up in the fixed points and treated regularly (See figure 11. Rubbish treatment in the demonstrative schools).

e. The implementation of health education

The health education project was initiated and gradually developed only in recent years in our nation. Because of the lack of teachers on health education, there were not study courses of health education in many rural areas. Implementing health education, popularising health knowledge, and heightening the students' health consciousness were the essential measures to prevent the intestinally infectious diseases and parasitic diseases. In order for the students to foster the good habits since childhood, the personal health and the prevention of infectious diseases were strengthened. Through health education, the students' health knowledge and health consciousness were improved. In order to promote the environmental health condition of the families and communities, we, the co-operative group, have done a lot of work such as follows.

- (1) We have collected domestic and foreign materials on health education and collected health education books from every province.
- (2) We have edited and translated some materials on health education.
- (3) We held a training course on health education on August 21-25, 1995 at Bao Tou City of Inner Mongolia. The main contents and essential teaching techniques were taught. Discussions were held to exchange experiences between the trainees.
- (4) In September, 1995, special training courses were held in each demonstrative point to train the teachers on health education and improve their teaching techniques.
- (5) All the demonstrative points have initiated the health education activities. In the view of 'knowledge, attitude and behaviour', we popularised the health knowledge by giving the students regular courses of health knowledge (See figure 12. Blackboard magazines on health education). Extracurricular activities were held for the students. For example, we had the students observe roundworm spawns and bacteria through microscopes and made them understand the excrement, the fly's role in disease spreading, and the importance of washing hands before eating and after defecating.

RESULTS AND ANALYSES

1. The effect of non-hazardous treatment of the excrement
 - a. The old lavatories in the demonstrative points were repaired or rebuilt according to the standard of hygienic lavatories. There were mainly three types of hygienic lavatories: the water-flushing type, the three-vault type,

and the single-cell dry lavatory type. The former two types' non-hazardous effect were better than the latter.

- b. The effect of preventing fly breeding was shown in Table 1 and Table 2. Before the intervention measures were implemented, both the fly density of the demonstrative point and that of the control group point were very high. After the intervention measures were implemented, the fly density of the demonstrative point decreased significantly by 1 fold.

2. Investigation of the students' round worm infection rates

The results were shown in Table 3. 9586 students from the demonstrative points and the control points were investigated. The round worm infection rates were similar between the two groups before taking the anthelmintic medicines, within the range of 12.88-19.54 percent. One year later, the rates of the primary and middle schools in demonstrative points were 3.44 percent and 2.16 percent respectively, and those in the control points were 11.42 percent and 7.02 percent respectively. The overall infection rate of the demonstrative points were lower than that of the control points by 36.8 percent ($P < 0.001$). It indicated that the prevention effect was not good when implementing the anthelmintic treatment alone. The intervention measures in environmental hygiene could reduce the chances to be infected once again after taking the medicine.

3. Investigation of the students' diarrhoea incidence rates

Table 4 and Table 5 showed the incidence rates of diarrhoea. The rates before the implementing of intervention measures were 9.32 percent and 11.22 percent respectively, and those after the intervention were 7.44 percent and 18.40 percent respectively. The rates decreased by 42.5 percent, indicating that the intervention measures had significant effect in disease prevention.

4. Dental health investigation

6,165 students took the dental bacteria plaque examination. The results were shown in Table 6 and Table 7. Before the intervention, the rate of eligibility (i.e. the percent of students who had no dental bacteria plaque) were similar between the demonstrative points and the control points, being 22.15 percent and 21.15 percent respectively. After the intervention, the rates of

the two groups were 58.40 percent and 27.73 percent respectively. The rate of eligibility increased more than one fold in the demonstrative points. It showed that even short period of health education could have significant hygienic effect.

5. Hand cleanness investigation

Table 8 and Table 9 showed the results of the hand cleanness investigation for 5,564 students. Before the intervention, there was no significant difference between the eligibility rate (i.e. the percent of the students who had their hands cleaned) of the demonstrative points and that of the control points, being 54.6 percent and 51.02 percent respectively. After the intervention, the rates of the two groups were 76.62 percent and 62.84 percent respectively. The eligibility rate of the demonstrative points increased by 6.57 percent ($P < 0.001$). The results suggested the importance of health education and providing with hand washing facilities.

6. Investigation of the health knowledge popularised rates

Table 10 and Table 11 showed the investigation results for 5,819 students. Questionnaires were applied in this investigation. Before the intervention, the popularised rates of the demonstrative points and the control points were 49.45 percent and 31.59 percent respectively. After the intervention, the rates were 84.7 percent and 41.96 percent respectively. The activities of health education increased the students' health knowledge and improved their health consciousness.

7. Investigation of the healthy behaviour changes

Before the intervention, the percents of the students who had healthy behaviour were 62.45 percent and 38.12 percent in the demonstrative points and the control points respectively. After the intervention, the percents were 86.26 and 44.45 percent respectively. The students had formed good health habits and improved their health consciousness.

8. Investigation of the class absence rates due to illness

The investigation rates was shown in Table 14 and Table 15. Before intervention, the rates were 23.71 percent and 26.74 percent for

demonstrative and control points respectively. After intervention, the rates became 11.16 percent and 19.25 percent respectively. The rate of the demonstrative points decreased by 26.1 percent.

9. Trachoma prevalence rates investigation

Table 16 and Table 17 showed the results of the investigation for 9,316 students. Before intervention, the prevalence rates for the demonstrative and control points were 35.51 percent and 34.77 percent respectively. After the intervention, the rates became 25.19 percent and 32.96 percent respectively. The rate of the demonstrative points decreased by 2.25 percent. It showed that hand washing facilities and personal health education could help to prevent the Trachoma.

DISCUSSION

1. Evaluation of the improved health facilities

a. Hygienic lavatories

The newly-built lavatories and newly-repaired ones in the demonstrative points all reached the standard of the office of the National Patriotic Health Campaign Committee. The newly built three-vault lavatory was eligible according to the standard of non-hazardous treatment of the excrement. The queuing positions of the lavatories reached the according standard, namely, every queuing position for 40 males and every queuing position for 20 females.

The existing problems still to be resolved are: 1) No lavatory was constructed inside the teaching buildings (in the third floor and above) (See figure 14); 2) The teachers shared the same lavatories with the students. Thus the time to use the lavatories should be staggered; 3) The design and construction of the lavatories did not reach the construction standard.

b. Water supply facilities

Water taps for hand washing were increased in the demonstrative points, having reached the standard of 90 students per washing basin or a 600-millimeter-long pool. The old boilers were repaired and the temperature-sustaining bucket and thermoses were provided in 5 demonstrative middle

schools which had better economic conditions. As for the schools which had no enough funds, the pupils were required to bring boiled water by themselves. The students were prohibited to drink unboiled water.

c. The importance of constructing health facilities

The hygienic lavatories and water supply facilities for drinking and hand washing are the necessary facilities in the schools. Health facility should be considered as one main item of the school infrastructure.

2. The health effect of the improved facilities

Health facility improvement and non-hazardous treatment of the excrement are the principal tasks of environmental hygiene in rural areas. It can reduce the environmental pollution caused by excrement, increase the level of environmental quality and prevent the epidemic of intestinal infectious diseases and parasitosis. The comparison between the 10 demonstrative points and the 10 control points showed that health facility improvement had a significant effect in preventing the epidemic of intestinal infectious diseases and parasitosis. Besides, health facility improvement can help to improve the effect of health education and the cultivation of health consciousness of the students. The condition of environmental hygiene outside school can also have influence on students' health and health behaviour, so the improvement of the environmental hygiene in the communities and families is also important for the disease prevention.

3. The effect of health education

The students in the primary and middle schools are ready to accept new ideas and foster good health habits. Health education for the students can not only improve the health consciousness of themselves but also that of our whole nation. As required by the outline of health education of our nation, health education course should be taught in school. This study shows that even a short period of health education can achieve significant effect in disease prevention and health quality improvement. On the other hand, the improvement of health consciousness and health quality can help to maintain and better the environmental hygiene.

4. Social and economic effects

a. The model role of the demonstrative points

The implementation of intervention measures in the demonstrative points played a model role for other schools which did not apply intervention measures. These schools decided to voluntarily learn the successful experiences from the demonstrative points and improve the environmental hygienic condition of their own.

b. Influence on the environmental hygiene of the community and family

The health consciousness of the leadership was greatly increased, and it made the base for improving the health condition in rural areas on the whole. The improvement of the teachers and students' health consciousness had a positive effect on the environmental hygiene of the communities and families.

c. Besides the social effect, the economic effect was also obtained through the intervention measures. The incidence rates of the intestinal infectious diseases and parasitosis and the class absence rate due to illness were greatly decreased. It not only saved the parents' hospital costs and working time, but also guaranteed the students' health and the normal process of education.

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Table 1. Comparison of the flies densities in rural schools before the intervention measures (flies per box)

school type		spot	time (month)					total	mean(flies per box)
			May	Jun	Jul	Aug	Sep		
demonstrative school	primary	beside lavatory	174	427	681	905	909	3096	123.8
		campus	146	348	519	701	709	2423	96.9
		canteen	61	80	130	113	100	484	19.4
	middle	beside lavatory	579	770	995	994	1108	4446	177.8
		campus	605	908	519	684	823	3539	141.6
		canteen	457	473	627	827	909	3293	131.7
		beside dorm	172	237	492	686	649	2236	89.4
	total		2194	3243	3963	4910	5207	19517	111.5
control school	primary	beside lavatory	183	346	922	1042	1021	3584	143.4
		campus	116	235	751	799	798	2699	107.9
		canteen	127	345	242	135	135	984	39.4
	middle	beside lavatory	161	360	1105	1149	1081	3856	154.2
		campus	801	1380	538	662	821	4202	168.1
		canteen	271	601	874	813	786	3345	133.8
		beside dorm	10	195	190	79	26	500	20.0
	total		1669	3462	4622	4679	4688	19100	109.1

Table 2. Comparison of the flies densities in rural schools after the intervention measures (flies per box)

school type	spot	time (month)					total	mean(flies per box)	
		May	Jun	Jul	Aug	Sep			
demonstrative school	primary	beside lavatory	154	197	286	338	344	1319	52.8
		campus	114	190	193	216	192	905	36.2
		canteen	62	103	117	106	85	473	18.9
	middle	beside lavatory	397	398	439	447	627	2308	92.3
		campus	399	444	190	200	318	1551	62.0
		canteen	284	364	271	297	375	1591	63.6
		beside dorm	44	67	129	157	156	553	22.1
	total		1454	1763	1625	1761	2097	8700	49.7
control school	primary	beside lavatory	270	1581	927	1194	1522	5494	219.8
		campus	191	1096	868	1162	2345	5662	226.5
		canteen	115	1206	294	414	1459	3488	139.5
	middle	beside lavatory	196	1611	1102	1226	1579	5714	228.6
		campus	760	1030	672	1230	2720	6412	256.5
		canteen	342	1301	852	1509	2186	6190	247.6
		beside dorm	54	68	120	149	223	614	24.6
	total		1928	7893	4835	6884	12034	33574	191.9

Table 3. Comparison of the round worm infection rates of the rural primary and middle school students

school type		before taking medicine			after taking medicine		
		examining numbers	infected numbers	infection rate	examining numbers	infected numbers	infection rate
demonstrative schools	primary	1761	251	14.25	1776	61	3.44
	middle	1111	119	10.71	1343	29	2.16
	total	2872	370	12.88	3119	90	2.87
control schools	primary	1008	216	21.43	1226	140	11.42
	middle	578	94	16.26	783	55	7.02
	total	1586	310	19.54	2009	195	9.71

Table 4. Comparison of the summer diarrhoea incidences of the students before the intervention

school type		subjects	infected numbers	infection rate(%)
demonstrative schools	primary	412	46	11.17
	middle	221	13	5.88
	total	633	59	9.32
control schools	primary	404	54	13.37
	middle	184	12	6.52
	total	588	66	11.22

Table 5. Comparison of the summer diarrhoea incidences of the students after the intervention

school type		subjects	infected numbers	infection rate(%)
demonstrative schools	primary	1123	87	7.75
	middle	610	42	6.88
	total	1733	129	7.44
control schools	primary	1203	213	17.71
	middle	536	107	19.96
	total	1739	320	18.40

Table 6. Comparison of the eligibility rates in dental health of the primary and middle school students before the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	817	119	14.57
	middle	429	157	36.59
	total	1246	276	22.15
control schools	primary	882	135	15.31
	middle	437	144	32.95
	total	1319	279	21.15

Table 7. Comparison of the eligibility rates in dental health of the primary and middle school students after the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	1711	628	53.63
	middle	579	394	68.05
	total	1750	1022	58.40
control schools	primary	1162	219	18.85
	middle	688	294	42.73
	total	1850	513	27.73

Table 8. Comparison of the eligibility rates of hand cleanness of the primary and middle school students before the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	816	395	48.41
	middle	429	286	66.67
	total	1245	681	54.69
control schools	primary	882	434	49.21
	middle	437	239	54.69
	total	1319	673	51.02

Table 9. Comparison of the eligibility rates of hand cleanness of the primary and middle school students after the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	971	708	72.92
	middle	479	403	84.13
	total	1450	1111	76.62
control schools	primary	962	549	57.07
	middle	588	425	72.28
	total	1550	974	62.84

Table 10. Comparison of the health knowledge popularised rates of the primary and middle school students before the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	1129	585	51.82
	middle	511	226	44.23
	total	1640	811	49.45
control schools	primary	863	254	29.43
	middle	422	152	36.02
	total	1285	406	31.59

Table 11. Comparison of the health knowledge popularised rates of the primary and middle school students after the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	1012	818	80.83
	middle	602	549	91.20
	total	1614	1376	84.70
control schools	primary	924	385	41.67
	middle	356	152	42.70
	total	1280	537	41.95

▲ Table 12. Comparison of the health behaviour formation rates of the primary and middle school students before the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	1002	668	66.76
	middle	396	205	51.77
	total	1398	873	62.45
control schools	primary	846	346	40.90
	middle	421	137	32.54
	total	1267	483	38.12

Table 13. Comparison of the health behaviour formation rates of the primary and middle school students after the intervention

school type		total number	eligible number	eligibility rate(%)
demonstrative schools	primary	791	652	82.43
	middle	497	459	92.35
	total	1288	1111	86.26
control schools	primary	924	414	44.81
	middle	356	155	43.54
	total	1280	569	44.45

Table 14. Comparison of the class absence rates due to illness for the primary and middle school students before the intervention

school type		total number	absence number	absence rate(%)
demonstrative schools	primary	655	148	22.60
	middle	332	86	25.90
	total	987	234	23.71
control schools	primary	694	181	26.08
	middle	353	98	27.76
	total	1047	279	26.64

Table 15. Comparison of the class absence rates due to illness for the primary and middle school students after the intervention

school type		total number	absence number	absence rate(%)
demonstrative schools	primary	1401	168	11.99
	middle	955	95	9.95
	total	2356	263	11.16
control schools	primary	1300	299	23.00
	middle	1033	150	14.52
	total	2333	449	19.25

Table 16. Comparison of the trachoma prevalence rates for the primary and middle school students before the intervention

school type		total number	infected number	infection rate(%)
demonstrative schools	primary	1667	437	26.22
	middle	1141	560	49.08
	total	2808	997	35.31
control schools	primary	1018	368	36.15
	middle	653	213	32.62
	total	1671	581	34.77

Table 17. Comparison of the trachoma prevalence rates for the primary and middle school students after the intervention

school type		total number	infected number	infection rate(%)
demonstrative schools	primary	1431	370	25.86
	middle	1364	334	24.49
	total	2795	704	25.19
control schools	primary	1235	380	30.77
	middle	807	293	36.31
	total	2042	673	32.96