Published by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
german cooperation
DEUTSCHE ZUSAMMENARBEIT
SEAMEO INNOTECH

RESEARCH

Indonesia // Fit for School Program Assessment Study (FIT-PAS) 2012–2014

FIT FOR SCHOOL

Tables

Figures

Acronyms

BLK	Balai Laboratorium Kesehatan
BMI	Body Mass Index
DMFT or dmft	Decayed, Missing, Filled Teeth (permanent/deciduous)
EHCP	Essential Health Care Package
FIT	Fit for School
FIT-HOS	Fit for School Health Outcome Study
FIT-PAS	FIT Program Assessment Study
FKG UNPAD	Facultas Kedokteran Gigi, Universitas Padjadjaran (Padjadjaran University Faculty of Dentistry)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HWWS	Individual handwashing with soap
Lao PDR	Lao People's Democratic Republic
LabKes	Laboratorium Kesehatan
MoE	Ministry of Education
PEO	Provincial Education Office
PUFA or pufa	Pulp involvement, Ulceration, Fistula, Abscess (permanent/deciduous)
SEAMEO INNOTECH	Southeast Asian Ministers of Education Organization Regional Center for Educational Innovation and Technology
STH	Soil-transmitted helminth
UKS	Usaha Kesehatan Sekolah (School Health Program Team)
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

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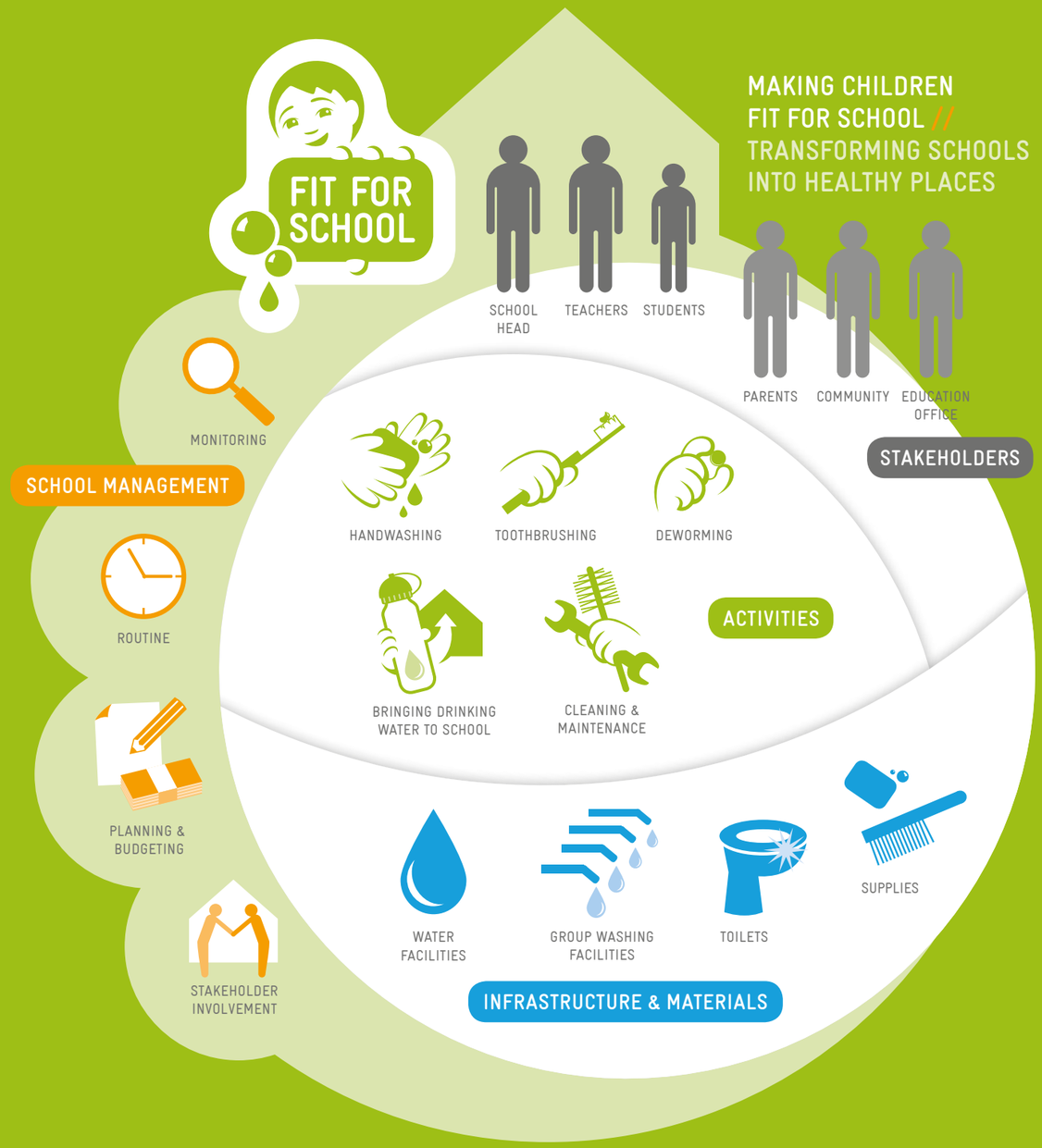


Summary

The Regional Fit for School (FIT) program is a joint school health program of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Southeast Asian Ministers of Education Organization Regional Center for Educational Innovation and Technology (SEAMEO INNOTECH), and relevant government agencies in four partner countries in the region – Indonesia, Lao People's Democratic Republic (Lao PDR), Cambodia and the Philippines. The regional FIT program aims to improve access to water, sanitation and hygiene (WASH) facilities in schools, and to initiate positive change in hygiene behaviour through the implementation of daily group handwashing with soap, daily group toothbrushing with fluoride toothpaste and school-based bi-annual deworming as part of the integrated national deworming program. In Indonesia, the regional FIT program started on Regional level in November 2011 and implementation in West Java by the Provincial Education Office (PEO) and the Usaha Kesehatan Sekolah (UKS) started in October 2012. During the research and development phase, 12 primary schools in Bandung City and Indramayu district were selected as official model schools of the program covering around 7,000 school children. Replication and scale up initiatives in West Java and other parts of Indonesia are under way.

To assess the effect of program interventions, a comprehensive FIT Program Assessment Study (FIT-PAS) was conducted with three major components: a WASH survey, which assessed the status of water, sanitation and hygiene resources in schools, a behavior study in Cambodia, which investigated independent handwashing practices and social norms of primary school children, and a Health Outcome Study. In 2012, baseline data was collected by a trained local research team from nine schools that implemented the FIT interventions in Bandung City and Indramayu district, and the same number of control schools, defined the nearest same size school, that implemented the existing government school health programs. The follow-up survey was done two years after.

The FIT-PAS showed that two years after program implementation, the FIT program improved access to handwashing facilities, water and soap in schools, as well as access to clean and functional toilets in schools. There was a clear impact of the daily group toothbrushing on oral health. The progression of dental caries on permanent teeth was 24 % lower among FIT schoolchildren than control schoolchildren. There was a very low prevalence of STH infection in both FIT and control schoolchildren at baseline and follow-up, which indicated that the national deworming program is working well. The percentage of thin children (1 in 4 children being thin) did not significantly differ between FIT model and control schools, nor between baseline and follow-up. On the other hand, prevalence of childhood obesity increased in intervention and control schools which indicates that childhood obesity is becoming a public health problem in the Indonesia. The study also built research capacity and improved the collaboration between education and health sectors, and with academia. This intersectoral approach is necessary to effectively address public health issues for children in the Southeast Asian Region.

1. Introduction

The Fit for School Program

Access to water, sanitation and hygiene (WASH) in schools remains a challenge in many parts of Southeast Asia. Poor hygiene is associated with the development of several childhood diseases, such as soil-transmitted helminth (STH) infection, dental caries, diarrhoea, respiratory tract infection and malnutrition, as well as poor educational outcomes. In Indonesia, the burden of these preventable diseases is high. The 2010 Demographic and Health survey revealed that around a third of 6–14 year-old children are stunted and 10 % of boys and 8 % of girls are underweight in West Java province [1]. The 2002–2009 soil-transmitted helminth (STH) infection survey conducted by the Ministry of Health found that 32 % of elementary school children in Indonesia suffer from STH infections [2]. According to the World Health Organization report in 2008, 86 % of 6-year old children in Indonesia have dental caries [3].

The Regional Fit for School (FIT)program targets to improve the school environment by supporting schools with the institutionalization of WASH in Schools strategies to address the burden of hygiene related diseases. FIT is a joint school health program of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the Southeast Asian Ministers of Education Organization Regional Center for Educational Innovation and Technology (SEAMEO INNOTECH), and relevant government agencies in four partner countries in the region – Indonesia, Lao People's Democratic Republic (Lao PDR), Cambodia and the Philippines. FIT works to support capacity development within the Ministries of Education (MoEs) in implementing an integrated WASH program. The program aims to improve access to WASH facilities in schools and initiate positive change in hygiene behaviour through implementation of daily group handwashing with soap, daily group toothbrushing with fluoride toothpaste and school-based bi-annual deworming as part of the integrated national deworming program. All interventions of the program have demonstrated their positive effects on the health status of children in numerous studies around the world. [4–7]

The FIT program started in the Philippines as the Essential Health Care Program (EHCP), which was implemented by Philippine Department of Education. It currently reaches more than 2 million elementary school and pre-school children around the country. The FIT program currently collaborates with SEAMEO INNOTECH and the MoEs in Cambodia, Indonesia, Lao PDR and Philippines to consolidate the learning and support the ministries to scale-up of the program. During its research and development phase in 2012 – 2015, the program supported the Ministries to fine-tune the implementation in 10 model schools in Cambodia, nine model schools in Indonesia and 22 model schools in Lao PDR. The second program phase (2015 – 2018) is designed to establish national guidelines for WASH in Schools and national scale up (2015 – 2018).

In Indonesia, the FIT program was launched in November 2011 and implementation was started in West Java by the Provincial Education Office (PEO) and the Usaha Kesehatan Sekolah (UKS) in October 2012. There were 12 primary schools and around 7,000 children in Bandung City and Indramayu district that became FIT model schools, 9 schools of which became the study schools,

The FIT interventions have been managed by members of the education sector, such as school administrators, school principals and teachers, with support from students, parents and the wider school community. In the beginning, GIZ supported the organization of meetings for school heads from participating schools for orientation and to learn from each other and exchange first-hand implementation experiences. In time, the school heads were able to establish a regular "implementers' forum" on their own which showed stronger implementation and program ownership.

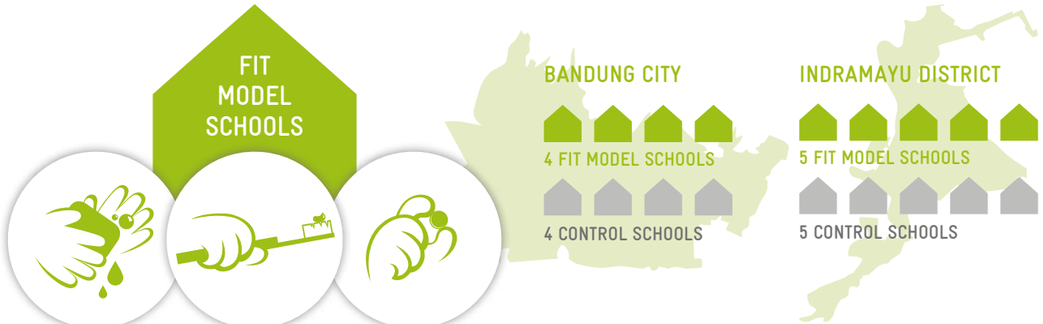
The Fit for School Program Assessment Study // FIT-PAS

To assess the impact of the program interventions, a comprehensive FIT Program Assessment Study (FIT-PAS) was conducted in Indonesia. The FIT-PAS included school-level and child-level research activities, to evaluate the program implementation and its impact on the school environment and child health and education. The study comprised three major components, as shown in Figure 1. The WASH survey assessed the accessibility and quality of WASH facilities in schools (Chapter 2). The FIT Health Outcome Study (FIT-HOS) investigated children's parasitological, nutritional and oral health status of primary school children, as well as their school attendance and performance (Chapter 3).

The FIT-PAS was done in the context of a regional study using similar protocols in Indonesia, Lao PDR and the Philippines.

			Data collection included:
FIT-PAS	School	→ Water, Sanitation and Hygiene (WASH)	Assessment of WASH facilities in schools
	Child	→ Handwashing Behaviour	Observation of handwashing practices after latrine use and interview on handwashing norms, one only in Cambodia
		→ Child Health: Parasitological, Nutritional and Oral Health Status	Collection of stool specimen, weight and height measurements, oral health examinations and interviews

FIT Program Assessment Study Framework // Figure 1



The FIT interventions were implemented in four model schools in Bandung City and five model schools in Indramayu District. Selection of FIT model schools was done by the Provincial Education Office and was based on accessibility, safety, school size, and a supportive school administration. Children in FIT model schools practised handwashing with soap and toothbrushing with 0.3 ml of fluoride toothpaste (containing 1,450 ppm of free available fluoride) as daily group activities. Every six months, they also received a single dose of albendazole (400 mg tablet), a deworming tablet, as part of a mass drug administration campaign against STH.

For each model school, the nearest school with similar parameters in terms of size was assigned as the control school. Children in control schools only received the regular government health education programs and biannual deworming as part of the national deworming campaign. Selection of schools was done in close collaboration with government partners, in particular the West Java PEO.

The list of the schools is provided in the Annex 1.

The FIT-PAS was developed and implemented in close collaboration with a broad range of national, regional, and international partner institutions. In Indonesia, the study was implemented from September 2012 to September 2014 by the West Java PEO and UKS, the National Ministry of Health (MoH), the Bandung City and Indramayu local governments, University of Padjajaran Faculty of Dentistry (FKG UNPAD), University of Indonesia, University College London (UCL) and GIZ. Research collaboration with other international universities and organizations was also established in the course of the research. Investigators, key officials and experts reviewed the findings and provided recommendations for further data analysis. This report presents an overview of the Indonesia FIT-PAS results. The detailed analysis and discussion of findings produced and reviewed by the consortium of research investigators from the aforementioned institutions will be published in a separate scientific paper.

2. Water, Sanitation & Hygiene Survey

WASH

The WASH survey was conducted by a trained local representative from GIZ. At baseline, the UNICEF WASH in Schools Monitoring package (Module 2) was used.

During the course of program implementation, the importance of looking at functionality and cleanliness of toilets and establishing a uniform criteria to assess these had been realized. A refined WASH survey tool (Annex 2) had been developed for the follow-up survey accompanied by a training of new data collectors for the follow-up study. While the new survey method allowed for a more accurate and in-depth assessment of facilities, the change in methodology meant that comparison between baseline and follow-up figures could not be done. Thus, only comparisons between intervention and control schools were made.

This modified WASH survey tool measured:

- The number of handwashing facilities (individual facilities and group handwashing stations), and availability of water and soap
- The number, accessibility, functionality and cleanliness of sanitation facilities.

The WASH survey tool is shown in the Annex 2. The descriptions of the WASH indicators are provided in the Annex 3.

Handwashing Facilities

Before the start of the FIT program, both model schools and control schools had limited availability of handwashing facilities (Table 2), yet access to handwashing facilities was slightly better in model schools. Model schools had an average of seven individual handwashing facilities per school compared to three individual handwashing facilities in control schools, and none of the schools had group handwashing stations. Twenty-two percent of all schools did not have access to running water at all, which concerned one model school and three control schools. When viewed against the total number of students, an average of 111 students and 144 students had to share one handwashing facility in model schools and control schools, respectively.

As part of the FIT program, model schools had built group handwashing stations to allow students to practice handwashing and toothbrushing in groups. Model schools in Indonesia adapted the design of group handwashing facilities to their needs. Instead of a single valve to control water flow across the entire length of the group handwashing station, several individual faucets (slots) were installed, so that students could also use the facility to wash hands individually at critical times and for ablution beforeprayer.

Two years after program implementation, the school children from model schools had significantly better access to handwashing facilities, water and soap. Model schools had built an average of five group handwashing stations per school (with each station containing several water slots); while, in control schools only one small station was built. It was positively noted that model schools even went beyond intended program activities by also building more handwashing facilities for individual use. As a result, model schools had an average of 103 handwashing slots per school (individual handwashing facilities and the group handwashing slots combined) compared to an average of nine handwashing slots in control schools. To put this in relation, six students had to share one handwashing slot in model schools, in contrast to 74 students sharing one handwashing slot in control schools (Table 2). Interestingly the activities around access to washing facilities had a spillover effect on the control schools: in control schools, access to washing facilities doubled compared to baseline situation, but issues of functionality and soap availability still existed.

Aside from counting the number of handwashing facilities, the functionality of these facilities in terms of availability of running water and soap was determined. In FIT model schools, 87 % of handwashing slots had water and soap available, compared to only 10 % of the handwashing slots in control schools. This means that children in FIT model schools had better opportunities to practice proper handwashing compared to those from control schools (Table 2).

Access to handwashing facilities in schools at baseline, 2012 // Table 1

Indicator	Fit model schools	Control schools
Percentage of schools with handwashing facilities with running water (%)	89 %	67 %
Average number of individual handwashing facilities per school (n)	7	3
Average number of students sharing one individual handwashing facility per school (n)	111	144

Access to handwashing facilities with water and soap at follow-up, 2014 // Table 2

Indicator	Fit model schools	Control schools
Total number of handwashing slots (n)	103	9
Percentage of handwashing slots with water and soap (%)	87 %	10 %
Average number of students sharing one water slot per school (n)	6	74

Toilet Facilities

Before the start of the FIT program, all study schools had limited access to proper sanitation facilities. At baseline, there were differences in the sanitary conditions between model and control schools (Table 3). Model schools had significantly more toilets compared to control schools (an average of nine versus four toilets, respectively), and of these, a higher percentage of toilets was accessible to children in the model schools (79 % of toilets in model schools versus 67 % of toilets in control schools). As a result, an average of 95 children shared one toilet in model schools, compared to 171 students sharing one toilet in control schools.

At baseline, there were less fully functional toilets in model schools (90 %) compared to control schools (98 %). However, there were more clean toilets in model schools (93 %) compared to only 25 % in control schools.

At follow-up, the average number of toilets per school and the average percentage of toilets accessible to children remained similar to the baseline circumstances: model and control schools had an average of ten and six toilets per school, respectively. The number of children sharing one toilet remained almost the same in model schools (99 children sharing one toilet), but in control schools, this ratio improved from 171 to 110 students sharing one toilet.

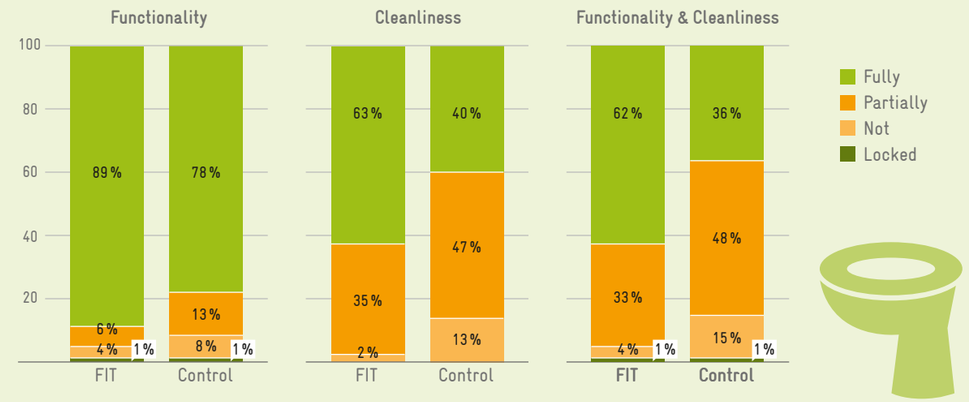
Model schools had a higher percentage of fully functional toilets compared to control schools (89 % versus 78 % of toilets, respectively). Furthermore, 63 % of toilets in model schools were fully clean, compared to 40 % of toilets in control schools. When considering both qualities, 62 % of the toilets in FIT model schools were both fully clean and fully functional in contrast to 36 % of toilets in control schools (Figure 2).

Access to toilets at baseline, 2012 // Table 3

Indicator	Fit model schools	Control schools
Average number of toilets (n)	9	4
Average number of students sharing a toilet (n)	95	171
Percentage of toilets accessible to children (%)	79 %	67 %
Percentage of fully functional toilets (%)	90 %	98 %
Percentage of fully clean toilets (%)	93 %	25 %

When comparing the two study locations, it was observed that there was a higher proportion of functional toilets in Indramayu schools compared to Bandung schools (93 % vs. 73 %, respectively). Children had access to at least one fully clean and fully functional toilet in all eight Bandung City schools and in eight out of the 10 Indramayu schools.

Condition of toilets in FIT model and control schools at follow-up, 2014 // Figure 2



3. The Health Outcome Study

The third FIT-PAS component was the FIT-HOS. The study's original design and protocol was developed in the Philippines by the Department of Education, where a similar study had been conducted from 2009 to 2012 [8]. The original design and tools were applied. The Indonesian FIT-HOS was approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran, Bandung, Indonesia, and is registered with the German Clinical Trials Register maintained by the University of Freiburg (DRKS-ID: DRKS00004486).

A total of 570 randomly selected first grade students aged six- to seven-years old had been assessed during the baseline survey (281 in FIT model schools and 289 in control schools). 486 children were available for follow up examination in September 2014 (248 in FIT model schools and 238 in control schools). The follow-up rate was 85 % (Table 4).

Data collection took place on the school grounds, using a standard data collection form:

→ **Registration and stool collection**
Registration of children for the study included taking their names and birthdate, identification, securing the signed consent form (baseline survey) and taking stool specimens for parasitological examination.

→ **Anthropometric measurement**
Height and weight measurements of the children were taken using the methodology of Cogill [9].

→ **Oral examination**
A clinical oral examination was performed according to World Health Organization (WHO) (Basic methods 4th edition) [10] and the methodology by Monse et al [11].

→ **Interview**
Children were interviewed about oral and abdominal pain at the time of the interview and sociodemographic background information.

The standard data collection tool is provided in the Annex 4.

Data collection for the FIT-HOS was performed by a field research team, which included representatives from the Faculty of Dentistry – University of Padjadjaran (FKG UNPAD), the West Java School Health Team (TP UKS), the Bandung City Health Office and the Indramayu District Health Office. The field research team underwent an intensive three-day training on data collection methods. Calibration exercises were done to ensure consistency of assessment among researchers within the team, and among different country teams. Height and weight measurement and oral examination techniques were calibrated with experienced researchers and a WHO consultant to ensure reliability of assessment.

Number of FIT-HOS participants in FIT model & control schools // Table 4

Period (Year)	FIT model schools	Control schools	Total
Baseline (2012)	281	289	570
Follow-up (2014)	248	238	486

Parasitological Status

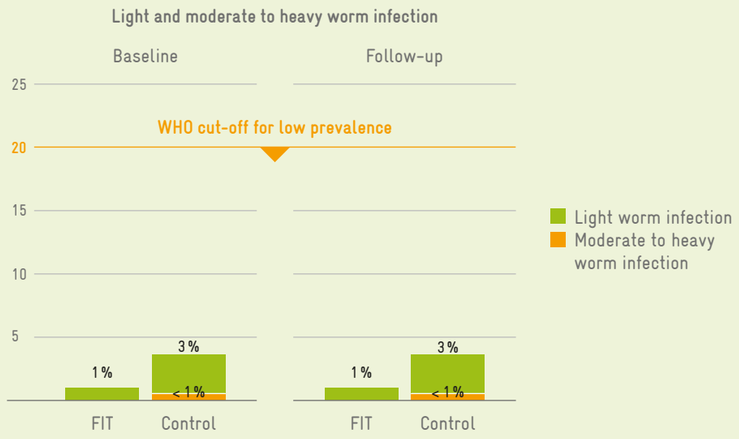
Soil-transmitted helminth (STH) parasitic infections are among the most common infections worldwide and affect the poorest and most deprived communities [12]. They are transmitted by eggs present in human faeces, which in turn contaminate soil in areas where sanitation is poor. The main species that infect people are the roundworm (Ascaris species), the whipworm (Trichuris species) and the hookworms (Necator americanus and Ancylostoma duodenale) [13]. An STH infection can cause undernutrition, anemia, and increased school absenteeism, compromised attention and memory, and poor school achievement (14).

The FIT-HOS measured STH infection following the protocol of the WHO: Bench Aids for the Diagnosis of Intestinal Parasites [15]. Before each survey, parents and teachers were oriented on the correct stool specimen technique and provided with standard specimen cups. Stool specimens were collected during the school visit and were brought to the laboratory within the same day. During the baseline survey, the West Java Provincial Health Laboratory (BLK) and the Indramayu District Health Laboratory (LabKes) examined the specimens from Bandung schools and Indramayu schools, respectively. During the follow-up survey, the University of Indonesia examined specimens from both areas. Samples were examined to determine the prevalence and intensity of STH infection using the Kato-Katz method [15]. Cut-off points defined by WHO were used to classify light-, moderate-, and heavy-intensity infections [16].

The FIT-HOS study revealed that overall STH infection rates were surprisingly low in comparison to the national prevalence estimates. At baseline, the prevalence of STH infection was as low as 1 % in model schools and 3 % in control schools. The STH-prevalence in model and control schools remained the same at follow-up. None of the children in model schools had a moderate to heavy worm infection. In control schools, the percentage of heavy infections was 0.4 % and 0.5 % at the baseline and follow-up surveys, respectively. Due to the low prevalence rate of STH infections at both baseline and follow-up, differences between intervention and control schools could not be detected (Figure 3).

Most of the STH worm infections in both Bandung City and Indramayu were whipworm. Interestingly, no hookworm infections in both study locations during the baseline and follow-up surveys.

Prevalence of STH infection in FIT model & control schools // Figure 3



Nutritional Status

Malnutrition can impair a child's development and cognitive capacity [17]. To measure the prevalence of underweight and overweight in the model and control schools, the weight and height of schoolchildren were measured to determine children's weight status. Staff from the Bandung City and Indramayu Health Centers were trained in a standard approach for weight and height measurement following methods described by Cogill [9]. Weight was measured to the nearest 0.1 kilogram using a SECA digital weighing scale and height was measured to the nearest 0.1 centimeter using a microtoise. Children's height and weight were converted to Body Mass Index (BMI), which were subsequently grouped according to the sex- and age-related cut-off points by Cole et al.[18] into 'thinness grade 3', 'thinness grade 2', 'thinness grade 1', 'normal weight' and 'overweight' and 'obese'.

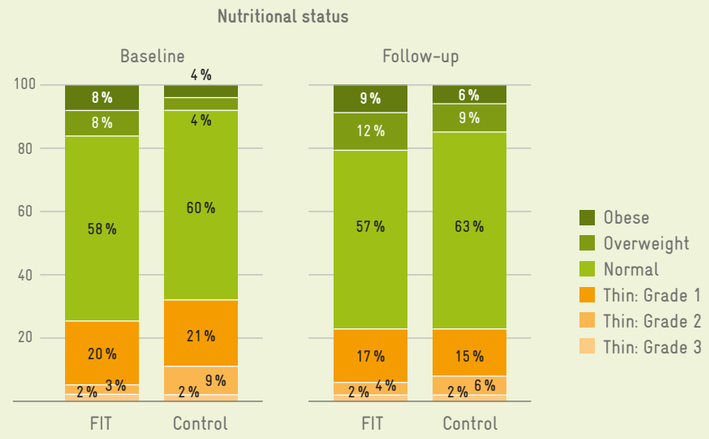
At baseline, around three out of ten children were thin. The percentage of thin children was 25 % in model schools and 32 % in control schools. At follow-up, the proportion of thin children slightly decreased to 23 % in both model and control schools (Figure 4). The prevalence of thinness did not significantly differ between model and control schools nor between baseline and follow-up.

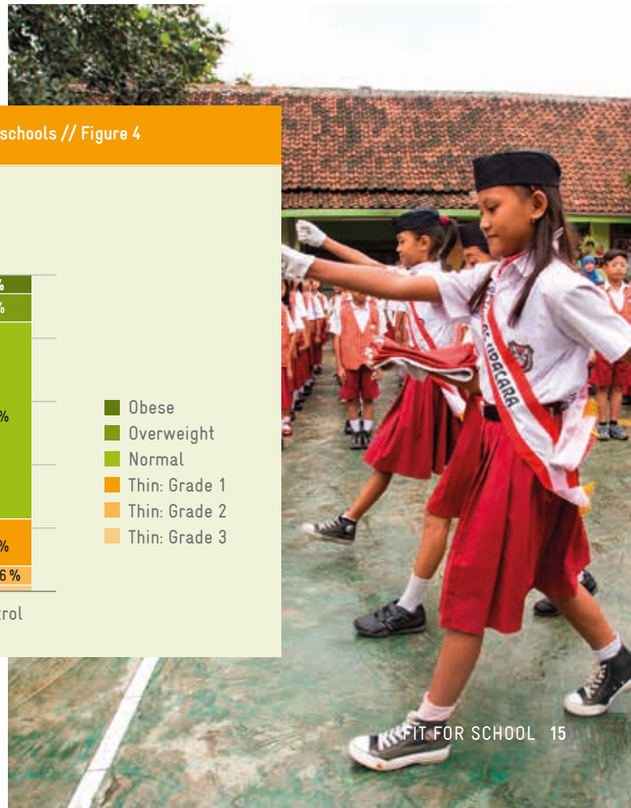
Furthermore, the FIT-HOS revealed that overweight is an emerging public health problem in Indonesia. At baseline, 12 % of the children were overweight or obese, with significantly more overweight and obese children in FIT model schools than in control schools (16 % versus 8 %, respectively). The prevalence of overweight and obesity increased at follow-up to 21% of children in FIT model schools and to 15 % of children in control schools (Figure 4).

Children were at higher risk of being thin at follow-up when they were already thin at baseline (indicating persistence of chronic condition) or when they came from larger families (as an indication of lower socioeconomic status).

When comparing the two study locations, the proportion of overweight or obese children at follow-up was higher in Indramayu schools than Bandung schools (22 % versus 13 %, respectively). The proportion of thin children was the same in both locations.

Nutritional status of children in FIT model & control schools // Figure 4





Oral Health Status

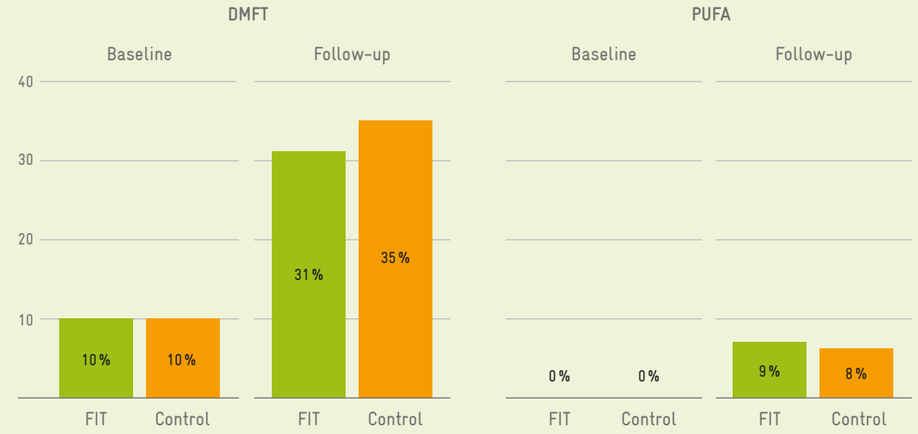
Severe dental caries and odontogenic infections are associated with underweight and poor educational attainment [19]. In the FIT-HOS, the 1997 WHO methodology [10] was used to measure the prevalence and experience of dental caries in children, expressed as the number of decayed, missing and filled teeth (dmft for the primary dentition / DMFT for the permanent dentition). Furthermore, the number of teeth with pulp involvement, ulcerations, fistula and abscesses (pufa for the primary dentition / PUFA for the permanent dentition) were scored according to the methodology of Monse et al.[11]. In this study, oral health status refers to dental caries experience (dmft/DMFT) and presence odontogenic infections (pufa/PUFA). Prior to data collection, dental examiners from the FKG-UNPAD underwent training and calibration.

At baseline, almost all children had dental caries in their primary teeth – 93 % in model schools and 98 % in control schools. A majority of children also had odontogenic infections in their primary teeth – 71% in model school compared to 83 % in control school. Since primary teeth are eventually replaced by permanent teeth, it is more relevant to report progression of dental caries and odontogenic infections in permanent teeth. At baseline, 10 % of children in both model and control schools had dental caries in their permanent teeth, but none of the children had odontogenic infections. At follow-up the percentage of children with dental caries in the permanent dentition increased to 31 % in model schools and 35 % in control schools. Moreover, 9 % of FIT schoolchildren and 8 % of control schoolchildren had odontogenic infections (Figure 5).

The dmft/DMFT index was measured and used to compare the caries experience of children in model and control schools. Daily toothbrushing with fluoride toothpaste aims to prevent new lesions and halt or slow down progression of existing caries lesions. However, toothbrushing cannot decrease or remove existing lesions.

At baseline, the dmft index for primary teeth was 8.1 teeth per child in FIT model schools and 8.6 teeth per child in control schools. The DMFT index for permanent teeth was low in model and control schools at baseline (0.1 teeth per child in both model and control schools), because permanent dentition only started to erupt in this age group. At follow-up, the DMFT increased with 0.35 teeth in model schools and with 0.46 teeth in control schools (Table 5). This means that the progression of caries was 24 % lower in model schools than control schools. This reflects the preventive fraction, which is the difference in the mean DMFT increment between model and control schools, expressed as a percentage of the mean DMFT increment in the control group.

Prevalence of DMFT and PUFA in permanent dentition in FIT model & control schools // Figure 5



At baseline, the pufa index was 2.76 teeth per child in FIT model schools and 3.60 teeth per child in control schools. For permanent teeth, the PUFA experience was zero at baseline and increased to an average of 0.13 teeth per child in model schools and 0.09 teeth per child in control schools (Table 5).

Thin children and children of younger age developed more dental caries than children of normal weight and older children.

Caries progression was slightly higher in Bandung City compared to Indramayu, with a DMFT increment of 0.44 teeth per child and 0.38 teeth per child, respectively.

School Attendance and Performance

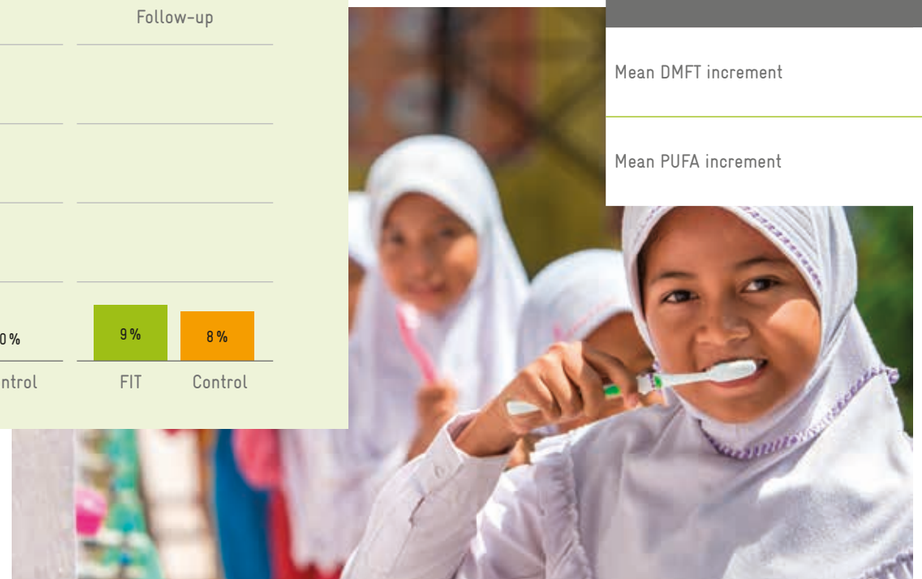
The FIT-HOS aimed to assess the impact of the FIT program on school attendance and school performance. Previous research showed that dental caries, STH infection and poor nutritional status increased absenteeism and impacted on school performance [14, 20, 21]. In the FIT-HOS, absenteeism and school grades were measured by reviewing school records. However, there were various limitations including the high proportion of incomplete data and the lack of information on other factors that could have influenced attendance and performance. For these reasons, educational data was excluded from further analysis of comparisons. The mean days of absenteeism and mean school grades in the school year 2012 – 2013 and 2013 – 2014 are presented in Table 6.

Dental caries and PUFA experience in permanent definition in FIT model & control schools, 2014 // Table 5

Indicator	Fit model schools	Control schools
Mean DMFT increment	0.35	0.46
Mean PUFA increment	0.13	0.09

School attendance and school performance of all children in the school year 2012–2013 and 2013–2014 // Table 6

Indicator	School year 2012–2013	School year 2013–2014
Mean days of school absenteeism	4.45	6.64
Mean school grade	81.76	81.77



4. Discussion and Conclusions

Discussion

The FIT-PAS was conducted to explore the effects of the FIT program on school environment and child health outcomes. Findings revealed that the FIT program successfully improved accessibility and quality of WASH facilities in schools, which has shown to be a critical factor to stimulate healthy hygiene practices and to ultimately promote health and educational performance of children.

Water, Sanitation & Hygiene

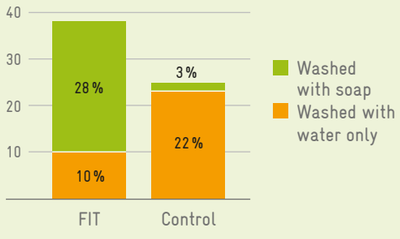
Two years after program implementation started, FIT model schools showed a significant improvement in the availability of handwashing facilities with water and soap, which is a pre-requisite for enabling children to engage in healthy hygiene practices. The promotion of WASH facilities, combined with routine hygiene activities, is seen as a key strategy for reducing student school absence and illnesses. Several studies provided evidence that improving children's access to functioning handwashing facilities and providing regular proper handwashing instructions helped to control diarrhea [22, 23] and improved attendance during an influenza outbreak [24]. Moreover, mandatory handwashing practices thrice daily have shown to significantly reduce absenteeism due to infectious illness, especially among female elementary students [24].

The FIT-PAS results in Indonesia are confirmed by the behavior study component of the FIT-PAS, which was piloted in Cambodia. This study investigated whether the FIT program was associated with norms and practices on independent handwashing with soap (HWWS) after latrine use. Results showed that the practice of HWWS was generally better in FIT model schools where 28 % of children washed their hands with soap after leaving the latrine, compared to only 3 % of the children in control schools. The low practice of HWWS in control schools was partly related to the lack of soap. This finding again highlights the relevance of ensuring adequate access to water and soap in schools in order to enable children wash their hands at critical times.

The behavior study component also found that descriptive norms for handwashing – beliefs that peers wash their hands at critical times – were more prevalent among FIT schoolchildren. Children who see their classmates wash hands, such as in the daily FIT group activities, feel encouraged to wash hands themselves.

The FIT-PAS also looked into the quality of toilets, which was used as a proxy indicator for the evaluation of school cleanliness and maintenance in general. Furthermore, children are more likely to use sanitary facilities when they are clean and well-maintained [25] making it a better indicator for toilet access. The WASH survey revealed that model schools had more fully clean and functional toilets, which could indicate that the FIT program improved the capacity of school principals, teachers and students in creating a healthy and clean school environment through proper operation and maintenance of WASH facilities in schools. The FIT program has initiated low-cost interventions to optimize existing WASH infrastructure instead of constructing new facilities. More systematic investigation of the feasibility, impact and sustainability of these interventions should be considered for possible scale-up. However, even in FIT model schools there is still room for improvement in terms of access and cleanliness of school toilets. Integration of indicators related to performance of school principals on implementation of WASH in schools is expected to make a difference.

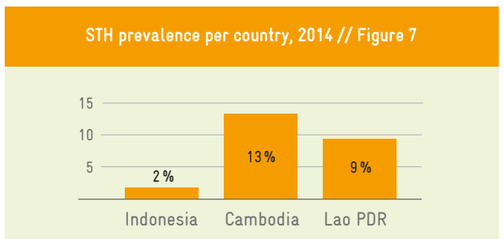
Independent handwashing after leaving the latrine, Cambodia, 2014 // Figure 6



Soil-transmitted Helminthiasis

The implementation of the bi-annual deworming program and the improved water and sanitation circumstances at model schools were expected to have a positive impact on the parasitological health of children. However the prevalence of worm infections was low in both model and control schools at both baseline and follow-up. This might indicate an effective implementation of a mass deworming program [26]. Indonesia only recently started a nationwide mass deworming program in 2014 – previously mass deworming was coordinated at the local government level and implementation was said to be irregular [27]. Previous published and unpublished reports documented relatively low STH prevalence among schoolchildren in the Bekasi (8 %), Cirebon (10 %), Sumendang (9 %), Garut (3 %) and Tasikmalaya (2 %) districts of West Java [27, 28]. Possible reasons for the low prevalence in study sites include, but are not limited to, the urban location of schools where surroundings are cemented and good hygiene practice related to ablution or washing before prayers among Muslims. One revealing observation is the absence of hookworm infection at baseline and follow-up surveys. Hookworm infection is associated with exposure to contaminated soil. In a Thai study, protective factors for STH included reduced poverty in the area, good socioeconomic position of the family, STH awareness, regular deworming, and proper hygiene and sanitation practices [29]. Factors associated with overall low prevalence of STH infections in this study could not be determined due to the small number of cases. In Lao PDR and Cambodia, where the overall STH prevalence at follow-up was 9 % and 13 %, respectively (Figure 7), children who had a previous STH infection were re-exposed to contaminated soil and re-infected even after successful mass deworming. This strongly suggests that deworming medication for STH control require integrated interventions to improve WASH in Schools in order to achieve long term, sustainable gains in helminth control and elimination [30].

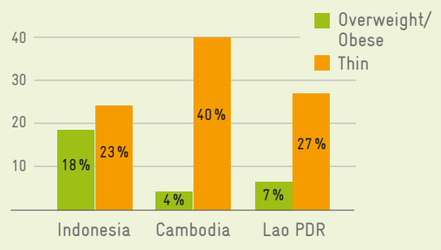
STH prevalence per country, 2014 // Figure 7



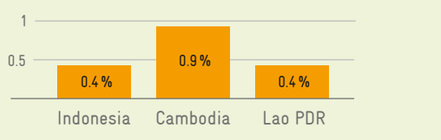
Nutritional Status

The medication against STH infection in combination with improved WASH access and hygiene practices were expected to have a beneficial effect on children's weight status. For example, in the Philippine HOS a significant increase in BMI was observed, potentially due to a 50 % reduction in moderate to heavy STH infections after one year of deworming implementation [8]. However, in Indonesia, only a slight improvement in weight status was noted after two years of implementation and this did not differ between FIT model and control schools. This might be explained by the very low prevalence of STH at baseline that could not be further reduced, and by the fact that underweight is dependent on many other external factors that were not addressed by the program.Although undernutrition is still a public health problem in Indonesia, especially in poor populations, the prevalence of obesity is emerging as a new major public health concern. The 2013 national rate of obesity in children aged five to twelve years was 20 % and a study by Soekirman et al. reported that 15 to 18 % of schoolchildren were overweight or obese [31]. These figures are similar to the proportion of overweight or obese children in the FIT-HOS. Compared to the results from Cambodia and Lao PDR, a lower prevalence of thinness and higher prevalence of overweight/obesity in Indonesia was found (Figure 8). Future studies should determine what are the interventions needed in health programs to tackle the persistent burden of malnutrition among Indonesian children.

Prevalence of thinness and overweight/obesity per country, 2014 // Figure 8



DMFT increment per country, 2014 // Figure 9



Oral Health

The burden of dental caries was extremely high in all schools. Almost all children had dental caries and the majority had odontogenic infections in their primary dentition. The average number of decayed teeth per child at baseline was 8.3 in the primary dentition and 0.14 in the permanent dentition. As children in this age group experience exfoliation of their primary teeth and eruption of permanent teeth, caries increment (progression) was measured only in the permanent dentition. After two years of daily group toothbrushing with fluoride toothpaste in school, children in intervention schools had 24 % less new caries lesions (preventive fraction) than children in control schools. This is in line with the findings from the Philippines and Cambodia. A preventive fraction as high as 37 % was seen in Lao PDR, a stronger demonstration of the preventive effect of simple daily toothbrushing with fluoride toothpaste in schools with proper implementation. According to the analysis of a systematic review, the pooled preventive fraction was 24 %, and could demonstrate, that the caries preventive effect of fluoride toothpaste increased with higher initial levels of caries, higher fluoride concentration, supervised brushing and increased frequency of brushing [32]. Considering that children in Southeast Asia have extremely high caries experience, higher levels of caries prevention may be achieved if toothbrushing with fluoride becomes a routine and is performed twice daily.

Overall, Indonesia and Lao PDR children had similar DMFT increments (Figure 9). On average, caries increment per child was 0.4 permanent teeth within two years. The increase in Cambodia was twice the number with 0.9 DMFT increment per child. In Lao PDR and Cambodia where participating schools were grouped into urban and rural areas, the DMFT increment was greater in urban schools. This is similar to findings in African children [33].

Severe dental caries has been strongly associated with low BMI in past research work and demonstrates the impact of oral health on general health [34, 35]. The same association between dental caries and low BMI has been observed in Indonesia.

Partnership

The FIT-PAS research program facilitated effective partnerships between the ministries of education and health, local and international universities and development partners. An inter-sectoral approach is necessary to effectively address public health issues. Improved health cannot be achieved within the health sector but needs collaboration with other sectors. The research results are relevant to to support government decision making and increase government and donor investments in school health and water, sanitation and hygiene (WASH) in schools.

Conclusions and Outlook

The FIT-PAS showed that after two years of implementation, the program improved access to WASH facilities in schools, including the availability of water and soap in handwashing facilities and more clean and functional toilets in schools. The FIT program improved the capacity of school principals, teachers and students in creating a healthy and clean school environment. There was also a clear impact on oral health with 24% of new dental caries lesions prevented in students from model schools compared to control schools.

There was a very low prevalence of STH infection in both FIT and control schoolchildren at baseline and follow-up. Only one to three in 100 children were infected with at least one STH parasite. This may be indicative of either an effective deworming program in the study sites or an inherently low STH burden in participating schools.

The baseline situation of underweight children (i.e. one in four children were thin) only slightly improved at follow-up. One of the known risk factors for undernutrition, STH infection, was not a contributing factor in the geographic areas where the study was conducted in Indonesia. Factors not addressed by program interventions, such as diet and socio-economic status, need to be considered in future impact studies. On the other hand, prevalence of childhood obesity in participating schools increased and was similar to other prevalence studies in the country. This confirms that childhood obesity is a public health concern in Indonesia that should be monitored closely. Implications for future school-based interventions such as physical exercise and healthy meals should be explored.

Although not a direct aim of the study, the FIT-PAS built research capacity and improved the collaboration between education, health and water-sanitation sector. An intersectoral approach is necessary to effectively address public health concerns.

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Acknowledgements // Imprint

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The research was made possible through the support and cooperation of the Provincial Education Office of West Java, the Ministry of Health, West Java School Health Team, Bandung City Health Office. Thanks are given to Indramayu District Health Laboratory who coordinated and conducted the survey in field and laboratory. Thanks go to the principals, teachers, parents, and children in the participating schools who gave their consent and time for the research activities.

Immense gratitude go to officials of Universitas Padjajaran specifically, Dr. Med. Setiawan, Vice-Rector in the field of research, community and cooperation, Dean Dr. Nina Djustiana and Dr Dudi Aripin, Vice Dean of Academic Affairs and the rest of the Health Research Ethics Committee of Universitas Padjajaran.

Acknowledgment go to Bella Monse (GIZ), Wim van Palenstein Helderman (Radboud University, Nijmegen, The Netherlands), and Habib Benzian (New York University) who contributed to the design of the study, Mitch Mijares-Majini, Jed Dimaisip, Nicole Siegmund, Rigil Munajat, Sunarno, and Katrina Javier of the GIZ Fit for School Program team who provided technical, administrative, and logistical support, and to Douglas Ball (consultant), Hanna Satyawati (consultant), Rodgelyn Amante (Fit for School Inc.), Ella Cecilia Naliponguit, Ma. Rosalia Vivien Maninang, Melanie Hora (Department of Education, Philippines), Vicente Belizario (Department of Health, Philippines), Denise Duijster (University College London) and Katrin Kromeyer-Hauschild and Roswitha Heinrich-Weltzien (University of Jena, Germany), Robert Dreibelbis (University of Oklahoma) for their expertise and contributions.

Special thanks go to the in-country research team members : Prima Andisetyanto, Fidya Meditia Putri, Nidhal Syarifa, Khairunnisa Lubis, Tenny Setiani D., Arlette Suzy S, E. Fitriana Sari, Rahmi Alma Farah Adang, Sri Tjahayawati, Indra Mustika, Yurika Ambar , Hening, Riana Wardani, Gilang Yubiliana, Aldilla Miranda, Fajar Fatriadi, Ame Suciati, Indra Primathena, Indah Suasani W, Nikita Irzana Utami, Annisa Rosalina, Esti Sunyaruri, Dita Hofinesia, M.Yusuf Yasin, Marini Sundari, Erwina Maya Astari, Lilis Nurliyanasari, Cut Meutia Hanief, Widi Maretha, Revini Nuita, Tansza Setiana Putri, Hannie Rohani, Eulis Yulia, Lilis Candra Dewi, Ngaisah, Marina Dewani Tanjung, Mira Karmila, Yana Kusdiana, Dyah Erani Restorika, Eti Rohaeti, Nina Yudiansih, Mardiastuti, Mokh.Iing Syafei, Martaulina Sinaga, tita Juita and encoders Cucu Zubaedah and Anne Agustina.

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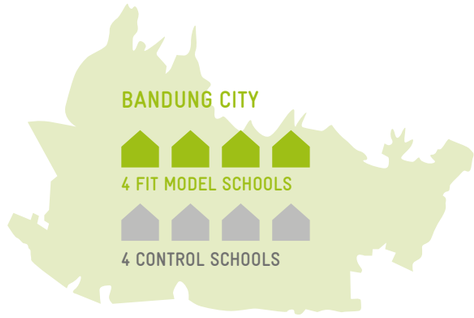
ISBN 978-3-95645-849-1

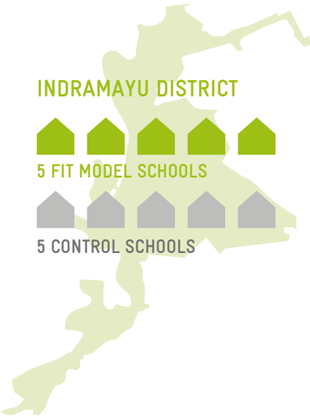
Annex

Annex 1 // List of Schools Surveyed

1. Kota Bandung // 4 Fit model and 4 control schools	
School name	**School type**
Sekolah Dasar Percobaan Negri Sabang	FIT model school
SD Kresna	FIT model school
MIN Margasari	FIT model school
SD Leuwipanjang	FIT model school
SDN Ciujung	Control school
SDN Ayudia	Control school
MI Miftahul	Control school
SDN Leuwianyar	Control school

2. Kabupaten Indramayu // 5 Fit model and 5 control schools	
School name	**School type**
SD Margadadi 4	FIT model school
SD Margadadi 5	FIT model school
SD Margadadi 6	FIT model school
SD Margadadi 7	FIT model school
Persatuan Umat Islam (PUI) Sindang	FIT model school
SDN Margadadi 1	Control school
SDN Margadadi 2	Control school
SDN Margadadi 3	Control school
SDN Margadadi 8	Control school
SDN Dermayu	Control school





Annex 2 // WASH Survey Form

Modified UNICEF WASH in School Monitoring Tool

QUESTIONNAIRE

I. School Information

School ID/Code: _____
Name of School: _____
Interview Date: _____
Gender of Principal: ☐ Male ☐ Female
District: _____
School Area
☐ Urban
☐ Peri-urban
☐ Rural

Total No. of Enrollees (SY 2013-2014): _____
No. of Boys: _____
No. of Girls: _____

Total No. of Teachers: _____
No. of Male Teachers: _____
No. of Female Teachers: _____

No. of Pupils with Physical Disabilities: _____

No. of Shifts of Classes (if applicable): _____

Grade Levels with Shifting Classes: _____

II. WASH INTERVIEW *(Ask the following questions to the principal)*

1. What is the main water source on the school ground? *(check one)*
   Apakah sumber air utama di sekolah? *(pilih satu)*
   - ☐ Piped water *(Air pipa)*
   - ☐ Rain water tank *(Tanki air hujan)*
   - ☐ Protected spring *(Mata air yang aman/terlindungi)*
   - ☐ Unprotected spring *(Mata air yang tidak aman/tidak terlindungi)*
   - ☐ Protected well/pump *(Sumur/pompa yang aman/terlindungi)*
   - ☐ Unprotected well/pump *(Sumur/pompa yang tidak aman/tidak terlindungi)*
   - ☐ Others (please specify) *Lainnya (tolong jelaskan)* _____
   - ☐ No water source available in the school *(Tidak ada sumber air yang tersedia di sekolah)*
2. For the previous week, how often was the water source functional? (*Untuk minggu sebelumnya, seberapa sering sumber air berfungsi?)*
   - ☐ 5-7 days per week *(5-7 hari per minggu)*
   - ☐ 2-4 days per week *(2-4 hari per minggu)*
   - ☐ Fewer than 2 days per week *(Kurang dari 2 hari per minggu)*
   - ☐ Only for a limited time during school hours *(Hanya untuk waktu yang terbatas selama jam sekolah)*
3. Does the school currently have materials/supplies available for cleaning latrines and/or the school compound? (Apakah saat ini sekolah mempunyai bahan untuk membersihkan jamban dan/atau lingkungan sekolah?)
   - ☐ Yes *(Ya)*
   - ☐ No *(Tidak)*
4. Can you please show me the cleaning materials? (Apakah anda bisa memperlihatkan bahan pembersih/alat kebersihan?)
   - ☐ Yes *(Ya)*
   - ☐ No *(Tidak)*

III. OBSERVATIONAL SURVEY *(Answer the following questions by direct observation of the school)*

1. *If "YES" in Item II-2, verify visually if the following cleaning materials are present.*
   DO NOT READ ALOUD OPTIONS
   - 1.1. Do you see a broom? ☐ Yes ☐ No
   - 1.2. Do you see brushes for cleaning the latrines? ☐ Yes ☐ No
   - 1.3. Do you see detergent for cleaning? ☐ Yes ☐ No
   - 1.4. Do you see buckets for cleaning? ☐ Yes ☐ No
2. Did you observe any **hygiene practice** message(s) displayed on walls, in classrooms, or in the head teacher's office that children can see? ☐ Yes ☐ No
3. Is the importance of handwashing with soap ***at critical times*** stressed in the IEC materials? ☐ Yes ☐ No
4. Is the school compound free of garbage? ☐ Yes ☐ No
5. Are there bins visible for disposing of garbage/rubbish? ☐ Yes ☐ No
6. Are teachers recording handwashing activity daily? ☐ Never ☐ Sometimes ☐ Always
7. Does each classroom have a daily group handwashing schedule? ☐ None ☐ Some ☐ All
8. Does each classroom have a group latrine cleaning schedule? ☐ None ☐ Some ☐ All
9. Is there any kind of environmental beautification in the school grounds (e.g. plants, flowers, paint, and tiles)? ☐ Yes ☐ No

For Control Schools:

10. Do you see any group hand-washing facility? ☐ Yes ☐ No

If Yes,

- 10.1. How many individual units does the facility have? (for multiple facilities, indicate all) _____
- 10.2. Ask: When was the facility built? _____
- 10.3. Ask: How often is the facility used for group-handwashing? _____

IV. Facility Observation: Sanitation Survey *(use as many sheets as necessary)*

No.	Accessibility	Functionality	Cleanliness
1	☐ Exclusively for girls ☐ Exclusively for boys ☐ For boys & girls (communal) ☐ Exclusively for female teachers & staff** ☐ Exclusively for male teachers & staff** ☐ For male or female teachers ☐ For anyone in the school	☐ Functional ☐ Partially Functional ☐ Not Functional	☐ Clean ☐ Somewhat Clean ☐ Not Clean
2	☐ Exclusively for girls ☐ Exclusively for boys ☐ For boys & girls (communal) ☐ Exclusively for female teachers & staff** ☐ Exclusively for male teachers & staff** ☐ For male or female teachers ☐ For anyone in the school	☐ Functional ☐ Partially Functional ☐ Not Functional	☐ Clean ☐ Somewhat Clean ☐ Not Clean
3	☐ Exclusively for girls ☐ Exclusively for boys ☐ For boys & girls (communal) ☐ Exclusively for female teachers & staff** ☐ Exclusively for male teachers & staff** ☐ For male or female teachers ☐ For anyone in the school	☐ Functional ☐ Partially Functional ☐ Not Functional	☐ Clean ☐ Somewhat Clean ☐ Not Clean
4	☐ Exclusively for girls ☐ Exclusively for boys ☐ For boys & girls (communal) ☐ Exclusively for female teachers & staff** ☐ Exclusively for male teachers & staff** ☐ For male or female teachers ☐ For anyone in the school	☐ Functional ☐ Partially Functional ☐ Not Functional	☐ Clean ☐ Somewhat Clean ☐ Not Clean
5	☐ Exclusively for girls ☐ Exclusively for boys ☐ For boys & girls (communal) ☐ Exclusively for female teachers & staff** ☐ Exclusively for male teachers & staff** ☐ For male or female teachers ☐ For anyone in the school	☐ Functional ☐ Partially Functional ☐ Not Functional	☐ Clean ☐ Somewhat Clean ☐ Not Clean

Accessibility:

Note on teachers' toilets: In some schools, some toilets that were constructed for students are actually used only by teachers (they are either locked, or student access to these toilets is restricted in other ways). If the survey finds such toilet compartments, then these should be counted in the table as teacher toilets, not student toilets.

Functionality:

1. **Functional** - The toilet facilities are not physically broken and can be used.
2. **Partially Functional** - The toilets can be used, but there are at least some problems with the physical infrastructure (e.g. some deterioration in concrete, doors/locks coming loose, roof deteriorating, etc.) and some repair is necessary.
3. **Not functional** - The toilets exist, but are so badly damaged or deteriorated it is no longer reasonably possible to use them (e.g. squatting plate broke, door missing, roof has holes etc.)

Cleanliness:

1. **Clean** - The toilet facilities are not smelly, there are no visible feces in or around the facility, there are no flies and there is no litter.
2. **Somewhat Clean** - There is some smell and/ or some sign of fecal matter and/ or some flies and/or some litter.
3. **Not Clean** - There is a strong smell and/or presence of fecal matter and/or a significant fly problem and/ or a large amount of litter.

V. Facility Observation: Hygiene Survey *(use as many sheets as necessary)*

No.	Type of Facility	Availability	Accessibility	Purpose
1	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
2	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
3	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
4	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
5	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
6	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____
7	☐ Running water from a piped system or tank ☐ Hand-poured water system ☐ Basin / bucket ☐ Others, specify_____	Water | Soap ☐ ☐ Always available ☐ ☐ Available during group activity only ☐ ☐ Not available	☐ Physically disabled children ☐ Young children	☐ Individual handwashing ☐ Group handwashing Number of units: _____ ☐ Religious washing Number of units: _____

Type of Handwashing facility:

1. Running water from a piped system or tank such as faucet and sink, or a standpost, or a rainwater tank with a faucet
2. Hand-poured water system such as from a bucket or ladle
3. Basin / bucket handwashing is done in the water, i.e. water is not running or poured

Accessibility:

1. Facilities are accessible to children with physical disabilities means that the facilities considered the inclusion of special grips, ramps and others to accommodate children with physical disabilities, and both soap and water can be reached
2. Facilities are built with respect to appropriate dimension of intended users, and younger children can reach both the soap and water faucet

Annex 3 // Description of WASH Indicators

Indicator	Description
Toilet accessible for children	Toilets assigned for children to use and not exclusive for teacher or staff use
Functional toilets	Toilets that are not physically broken and can be used
Partially functional toilets	Toilets with physical infrastructure problems, such as deterioration in concrete and roofing and loose doors and locks
Non-functional toilets	Toilets that exist, but are so badly damaged or tereriorated that they can no longer be used
Clean toilets	Toilets without bad smell, visible feces, flies and litter
Partially clean toilets	Toilets with some smell, signs of fecal matter, flies and litter
Non-clean toilets	Toilets with strong bad smell, fecal matter, significant fly problems and litter
Fully clean and functional toilets	Toilets that are both fully clean and fully functional
Partially clean and functional toilets	Toilets that are partially clean and/or partially functional
Not clean and functional toilets	Toilets that are not clean and/or not functional
Individual handwashing facilities	Facilities intended for individual handwashing only and can only accomodate one child at a time
Group handwashing stations	Handwashing facilities meant for group activities and can accomodate a group of children or ann entire class at a time
Group handwashing slots	Number of water spouts or faucets in a group handwashing station that corresponds to the number of children the group handwashing station can accomodate at a time
Total number of handwashing slots	Combined number of group slots in a group handwashing station and number of individual handwashing facilities

Annex 4 // FIT-HOS Survey Form

Unique ID: _____ Name(Nama): _____

HEALTH OUTCOME STUDY ASSESSMENT FORM

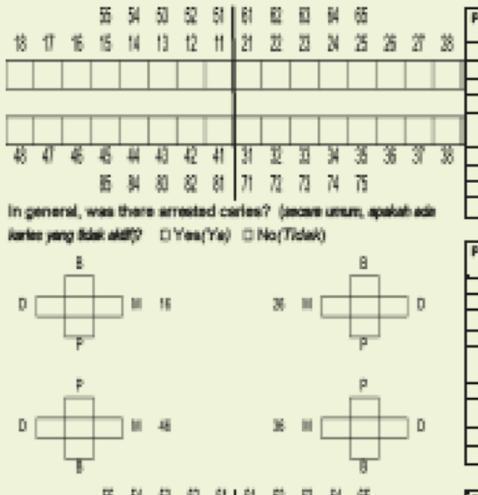
FORMULIR PEMERIKSAAN SURVEI DAMPAK KESEHATAN

Duplicate (Salinan): ☐ Yes (Ya) ☐ No(Tidak) Date (Tgl): _bln/__hr/____thn

Personal Information (Informasi Pribadi)
Gender (Jenis Kelamin): ☐ Male (Laki-laki) ☐ Female (Perempuan)
Birth date (ulang tahun): _bln/__hr/____thn
Examiner ID(ID penelitis): _____
Stool Collector ID (ID kolektor tinja): _____

Anthropometric Data (Data Antropometri)
Weight (Berat) 1: □□.□ kg. Height (Tinggi): □□□.□ cm.
Weight (Berat) 2: □□.□ kg

Dentition Status Recorder ID: _____ Examiner ID: _____



Permanent Tooth	Status	Primary Teeth
0	Sound	A
1	Decayed	B
2	Filled, with decay	C
3	Filled, no decay	D
4	Missing, due to caries	E
5	Missing, any other reason	
6	Sealant, varnish	F
7	Pulp involvement	G
8	Un-erupted tooth	
9	Not Recorded	

In general, was there arrested caries? (secara umum, apakah ada karies yang tidak aktif)? ☐ Yes(Ya) ☐ No(Tidak)

Permanent Tooth	Status	Primary Teeth
0	Sound	A
1	Decayed	B
2	Filled, with decay	C
3	Filled, no decay	D
4	Missing, due to caries	E
5	Missing, any other reason	
6	Sealant, varnish	F
7	Pulp involvement	G
8	Un-erupted tooth	
9	Not Recorded	

Permanent Tooth	Status	Primary Teeth
1	open Pulp in permanent dentition	p
2	traumatic Ulceration in permanent dentition	u
3	Fistula in permanent dentition	f
4	Abscess in permanent dentition	a

Examiner ID: _____

Do you have any problems in your mouth at the moment? (Apakah saat ini sedang ada masalah mulut?) ☐ Yes(Ya) ☐ No(Tidak)
If yes, please specify (Jika ya, tolong jelaskan?) _____
Have you experienced abdominal pain today? (Apakah hari ini mengalami sakit perut?) ☐ Yes(Ya) ☐ No(Tidak)
Number of brothers (Berapa jumlah kakak/ adik laki-laki?) _____
Number of sisters (Berapa adik perempuan?) _____
Do you have TV at home? (Apakah dirumah ada tv?) ☐ Yes(Ya) ☐ No(Tidak)
Do you have a car at home? (apakah dirumah ada mobil?) ☐ Yes(Ya) ☐ No(Tidak)
Did you eat breakfast today? (Apakah hari ni kamu sudah sarapan?) ☐ Yes(Ya) ☐ No(Tidak)
Did you eat lunch yesterday? (Apakah kemarin kamu makan siang) ☐ Yes(Ya) ☐ No(Tidak)

Remarks:
_____
_____
_____

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