

**PROPER HAND WASHING PRACTICE
AMONG SIXTH GRADE OF ELEMENTARY SCHOOL
STUDENTS IN SELAT SUB-DISTRICT, INDONESIA**



TRI SETYAUTAMI

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF PRIMARY HEALTH CARE MANAGEMENT
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY
2011**

COPYRIGHT OF MAHIDOL UNIVERSITY

Copyright by Mahidol University

Thesis
entitled
**PROPER HAND WASHING PRACTICE
AMONG SIXTH GRADE OF ELEMENTARY SCHOOL
STUDENTS IN SELAT SUB-DISTRICT, INDONESIA**



Ms. Tri Setyautami
Candidate



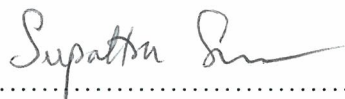
Prof. (Emeritus) Santhat Sermsri,
Ph.D.
Major advisor



Assoc. Prof. Jiraporn Chompikul,
Ph.D.
Co-advisor



Prof. Banchong Mahaisavariya,
M.D., Dip.Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University



Lect. Supattra Srivanichakorn,
M.D., M.P.H. (Health Development),
Dip.Thai Board of Preventative Medicine
(Epidemiology)
Program Director
Master of Primary Health Care
Management
ASEAN Institute for Health Development
Mahidol University

Thesis
entitled
**PROPER HAND WASHING PRACTICE
AMONG SIXTH GRADE OF ELEMENTARY SCHOOL
STUDENTS IN SELAT SUB-DISTRICT, INDONESIA**

was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Primary Health Care Management

on
April 27, 2011




.....
Ms. Tri Setyautami
Candidate



.....
Assoc. Prof. Sithichai Egoramaiphol,
Ph.D.
Chair




.....
Assoc. Prof. Jiraporn Chompikul,
Ph.D.
Member



.....
Prof. (Emeritus) Santhat Sermsri,
Ph.D.
Member



.....
Prof. Banchong Mahaisavariya,
M.D., Dip.Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University



.....
Lect. Supattra Srivanichakorn,
M.D., M.P.H. (Health Development),
Dip.Thai Board of Preventative Medicine
(Epidemiology)
Director
ASEAN Institute for Health Development
Mahidol University

ACKNOWLEDGEMENTS

This thesis would not have been possible without the help and support of many people. I express my deep sincere gratitude and appreciation to my major academic and thesis advisor, Prof. (Emeritus) Santhat Sermsri, Ph.D., for his kind supervision, valuable guidance and support of my thesis. I thank and appreciate to my thesis co-advisor Assoc. Prof. Jiraporn Chompikul, Ph.D., for her valuable advice and encouragement, and also for Mr. Peregrine W.F. Whalley as my language advisor. I admit that without their kind help and keenness, the completion of this thesis would not have been possible. I am very grateful to them for their precious time and adequate consultations, whenever I faced problem during my study time. I would like to thank to external examiner, Assoc. Prof. Sithichai Egoramaiphol, Ph.D., for his kind advice.

My great appreciation to the director of AIHD Dr. Supattra Srivanichakorn, M.P.H., and all the lectures, MPH M office staffs, AIHD and Library staffs, the staff of the ASEAN house, and all my friends of MPH M batch 25.

Special recognition to the government of Republic of Indonesia in particular Ministry of Health, DHS-2 project, Kalimantan Tengah Provincial Health Office, Kapuas district local government and the Head of Kapuas District Health Office dr. Hj. Ani Handaningroem, for the opportunity of undertaking this study, and also to Indonesian Cultural Communications for their helpfully technical assistance.

I wish to express my profound indebtedness to families, friends and staff for their support and pray for me. I do appreciate for Kapuas District Educational Office; and Selat, Melati, and Pulau Telo Primary Health Centers, for their support during data collection.

My deepest heartfelt appreciation to my beloved husband dr. Jum'atil Fajar, MHIthSc; parents, and children for their love, believe, support, constant encouragement and prays for me. Finally, I would like to dedicate this thesis for them.

Above to all, Alhamdulillah, I am grateful and thank to Allah SWT for everything bless in my life.

Tri Setyautami

PROPER HAND WASHING PRACTICE AMONG SIXTH GRADE OF
ELEMENTARY SCHOOL STUDENTS AT SELAT SUB-DISTRICT, INDONESIA

TRI SETYAUTAMI 5338129 ADPM/M

M.P.H.M.

THESIS ADVISORY COMMITTEE : SANTHAT SERMSRI, Ph.D.,
JIRAPORN CHOMPIKUL, Ph.D.

ABSTRACT

This descriptive and cross-sectional study was conducted to describe hand washing practice before eating and after visiting the toilet among sixth grade elementary school students, the prevalence of proper hand washing, and the association with related factors such as socio-demographics, knowledge, attitude, subjective norms, perceived control, and availability of proper hand washing facilities. Data were collected by using a self administered questionnaire from 274 students at 7 public elementary schools in Selat sub-district, which were randomly selected by proportion from 5 villages. Chi square, correlation, and multiple logistic regression tests were used to analyze the association and to predict factors related to proper hand washing.

There are 9 different ways of hand washing which were combined from two main activities, i.e., washing hands before eating food and after visiting the toilet, and three possible practices such as washing hands by using water and soap, water only, and not wash hands. Only 40.5% of respondents washed their hands by using water and soap at those two critical moments. Attitude, perceived control, and availability of facilities (water, soap, and hand washing stands) were significantly associated with hand washing practice. By adjusting other factors, positive attitude (Adjusted Odds Ratio [AOR] = 2.23, 95% CI = 1.03-4.85), availability of clean water (AOR = 4.31, 95% CI = 1.96-9.48) and soap (AOR = 5.39, 95% CI = 2.30-12.64) at hand washing stands were significant predictors of proper hand washing.

Conclusion : The hand washing practice and prevalence of proper hand washing should be a matter of greater concern. Hand washing promotion should be more effective in schools and better facilities need to be made available in order to increase the prevalence of proper hand washing among elementary students.

KEY WORDS : PROPER HAND WASHING / ELEMENTARY STUDENTS /
SELAT INDONESIA

102 pages

CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
LIST OF TABLES	viii
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
CHAPTER I INTRODUCTION	
1.1 Rationale and justification	1
1.2 Research questions	5
1.3 Research objectives	5
1.4 Conceptual framework	6
1.5 Operational definitions	7
1.6 Limitation of the study	9
1.7 Expected outcome	9
CHAPTER II LITERATURE REVIEW	
2.1 Global situation about some diseases which can be prevented by hand washing	10
2.2 Proper hand washing : definition, importance, advantages and prevalence	11
2.3 Children as agents for behavioral change	15
2.4 Theory of Planned Behavior and Integrated Behavior Model	16
2.5 Attitude, social norms, perceived control and knowledge	22
2.6 Socio-demographic characteristics related to proper hand washing ...	23
2.7 Facilities for hand washing	24
CHAPTER III RESEARCH METHODOLOGY	
3.1 Study design	26
3.2 Study population, sample and study sites	26

CONTENTS (cont.)

	Page
3.3 Sample size and sampling technique	30
3.4 Research instrument	33
3.5 Data collection and pre-test	36
3.6 Data management and analysis	37
 CHAPTER IV RESULTS	
4.1 Hand washing practice and proper hand washing	39
4.2 Socio demographic characteristics	44
4.3 Knowledge about proper hand washing	46
4.4 Attitude toward proper hand washing	47
4.5 Subjective norms of proper hand washing	49
4.6 Perceived control of proper hand washing	51
4.7 Proper hand washing facilities	52
4.8 Association between independent variables and hand washing	55
4.9 Predictors of proper hand washing	61
 CHAPTER V DISCUSSION	
5.1 Discussion of the research result	64
5.1.1 Hand washing at schools	64
5.1.2 Association between socio demographic characteristics and hand washing	68
5.1.3 Association between knowledge and hand washing	71
5.1.4 Association between attitude and hand washing	72
5.1.5 Association between subjective norms and hand washing	73
5.1.6 Association between perceived control and hand washing	74
5.1.7 Association between availability of facilities and hand washing	75
5.2 Discussion of the research methodology	76

CONTENTS (cont.)

	Page
CHAPTER VI CONCLUSION AND RECOMMENDATIONS	
6.1 Conclusion	80
6.2 Recommendations	81
REFERENCES	83
APPENDICES	89
Appendix A Questionnaire (English version)	90
Appendix B Supplement Results	97
BIOGRAPHY	102

LIST OF TABLES

Table	Page
2.1 Cost effectiveness ratio of interventions against diarrhoeal diseases	13
3.1 Schools randomly selected for study	32
3.2 Reliability test of two pre-test	37
4.1 The 9 variations of hand washing practice at schools	41
4.2 Grouping of hand washing at schools	43
4.3 Final group of hand washing at schools	43
4.4 Socio demographic characteristics	44
4.5 Level of knowledge about proper hand washing	46
4.6 Number and percentage of respondents by correct answers to questions about knowledge of proper hand washing	47
4.7 Number and percentage of respondents by level of attitude toward proper hand washing	48
4.8 Number and percentage of respondents by answer to each question about attitude to proper hand washing	48
4.9 Number and percentage of respondents by level of subjective norms to proper hand washing	49
4.10 Number and percentage of respondents by questions about subjective norms regarding proper hand washing	50
4.11 Number and percentage of respondents by level of perceived control to proper hand washing	51
4.12 Percentage of respondents by each question regarding perceived control of proper hand washing	52
4.13 Clean water for washing hands at schools	53
4.14 Availability of clean water at hand washing stand	53
4.15 Soap for washing hands at schools	54
4.16 Availability of soap at hand washing stand	54

LIST OF TABLES (cont.)

Table	Page
4.17 Hand washing stand facilities at school	54
4.18 Availability of hand washing stand at schools	55
4.19 Association between socio-demographic characteristics and hand washing	56
4.20 Association between knowledge, attitude, subjective norms, perceived control and hand washing	58
4.21 Association between facilities and hand washing	60
4.22 Correlation coefficients of some variables	61
4.23 The model of multiple logistic regression of proper hand washing	62
B1 The frequencies of proper hand washing at schools	97
B2 Human resources of information about proper hand washing	97
B3 Activities at school related to proper hand washing	97
B4 Reasons for not washing hands	98
B5 Places of standard hand washing stand at schools	98
B6 Grouping of hand washing at home	98
B7 Association between proper hand washing at home and at school	99

LIST OF FIGURES

Figure	Page
1.1 The incidence of diarrhea per 1000 population in 12 sub-districts of Kapuas in 2009	3
1.2 The proportion of diarrhea cases of children under 5 among sub-districts in Kapuas in 2009	4
1.3 Conceptual framework	6
2.1 The F diagram of disease transmission and control	12
2.2 Theory of Reasoned Action and Theory of Planned Behavior	19
2.3 Integrated behavior model	20
2.4 Model constructed for this study	21
3.1 Number of population by sub-district in Kapuas district, in 2009	27
3.2 Total number of elementary school students by sub-districts in Kapuas district in 2009	28
3.3 Kalimantan Tengah province, Indonesia	28
3.4 The map of Kapuas district in Kalimantan Tengah province	29
3.5 The map of twelve sub-district in Kapuas, including Selat sub-district	29
3.6 The map of Selat sub-district and study area	30
3.7 Sampling technique used in this study	32
4.1 Distribution of 9 variations of hand washing at school	41
B1 Scatterplot of hand washing vs knowledge	99
B2 Scatterplot of hand washing vs attitude	100
B3 Scatterplot of hand washing vs subjective norms	100
B4 Scatterplot of hand washing vs perceived control	101

LIST OF ABBREVIATIONS

AIDS	Acquired Immuno Deficiency Syndrome
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
DALYs	Disability-Adjusted Life Years
GSHS	Global School-based students Health Survey
HIV	Human Immuno-deficiency Virus
IBM	Integrated Behavior Model
KR	Kruder Richardson
OR	Odds Ratio
PPPHW	Public-Private Partnership for Hand Washing with Soap
QD	Quartile Deviation
SARS	Severe Acute Respiratory Syndrome
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
WHO	World Health Organization

CHAPTER I

INTRODUCTION

1.1 Rationale and justification

One of the Millennium Development Goals is to reduce mortality rates by 66% in children under five by 2015. Children around the world, especially in developing countries, face serious problems due to diseases and death. According to the World Health Organization (WHO) report in 2009, the leading causes of death of children under 5 years worldwide were acute respiratory infections and diarrhea (1). In Indonesia, in 2008, pneumonia and diarrhea respectively accounted for 3.8% and 3.5% of all deaths (2). Diarrhea was the main cause of diseases suffered by inpatients in hospital in 2006 (3).

Diarrhea and upper respiratory infections are also commonly transmitted in the school environment. In 2005, 84% of all children of elementary school age were enrolled in primary school (4), and the potential is high for transmission of diseases between students and also to the community. Students may also have to be absent because of illness, and miss learning opportunities, or even drop out of school.

Many studies have found that hand washing with soap is the most effective, easy and inexpensive way to prevent diseases like diarrhea and upper respiratory infections (5, 6). It is also able to prevent skin infections, intestinal worms, SARS (Severe Acute Respiratory Syndrome) and avian flu, and even assist the health of the people living with HIV/AIDS. It may save a million lives (6).

Proper hand washing with soap is washing hands using clean running water and soap, which is done at critical moments such as after using toilets, after cleaning a child and before handling food (7). The Centers for Disease Control and Prevention (CDC) - a United States government agency that focuses on public health - determined the standard in time within 20 seconds of rubbing soap (8).

Unfortunately, most people do not practice hand washing correctly in their daily lives. The prevalence of hand washing with soap in developing countries is still

low, ranging around 0-20% (9). A study in Indonesia in 2007 reported that only 23.2% of the total population had correct hand washing habits, which should be done with soap before having meals and after defecating (10). In Bogota, Colombia, 33.6% of primary students always or very often washed hands with soap and clean water before eating and after using a toilet (11).

It is difficult to change behaviour. People who have knowledge about health do not automatically change their habits or adopt healthy life styles. Formative studies about hand washing behaviour have been conducted in order to understand how to motivate and encourage hand washing as a routine life style habit. One such study suggests that hand washing with soap is rare, but can be automated, habitual and established during childhood (12).

Global Hand Washing Day is the campaign annually held on 15th October, to transform the theory of hand washing with soap into an automatic behavior in homes, schools and communities worldwide. This campaign was initiated by the Public-Private Partnership for Hand Washing with Soap (PPPHW), a coalition of international hand washing stakeholders. The aims of this campaign are to reduce the incidence of diarrhea and pneumonia in poor communities by the public-private partnership promoting hand washing (7). In Indonesia, this annually campaign was held firstly in 2008 (13).

This campaign uses targets school children because they are the most effective agents for behavior change. School children are usually enthusiastic and open minded to new ideas. Late childhood and early adolescence (ages 6-15) are critical periods for building skills and positive habits (14).

To encourage and teach young school children positive behaviour, elementary schools should implement positive behaviour programs to improve student awareness, knowledge, and development, by involving them as active participants, rather than passive targets of health programs (15). By teaching them at a young age, they will be able to understand and form enduring positive habits lasting into adulthood. Encouraging millions of school children to practice proper hand washing behavior, will lead to them take this behavior into adulthood, and will contribute to two of the Millennium Development Goals : education and health (16).

Kapuas District is a district in Kalimantan Tengah province, Indonesia. Since decentralization was implemented in 2002, local government especially district government, has had more responsibility for local government including health.

One of the health problems in Kapuas District is that in 2009 the incidence of diarrhoea among children under five was 104 per 1000 population, and children under five represented 40% of all diarrhoea cases. The rate of upper respiratory infection cases among the children under five was 34.5% of all upper respiratory infection cases (17).

Selat sub-district is the most densely populated in Kapuas, with 26.6% of total district population living there. Therefore, in 2009 it had the highest number of diarrhoea incidence in Kapuas, about 40 per 1000 population, compared to other sub-districts (see Figure 1.1). The proportion of diarrhoea cases of children under five in Selat sub-district was also the highest, which was 40.05% of total diarrhoea cases among children under five in Kapuas (see Figure 1.2).

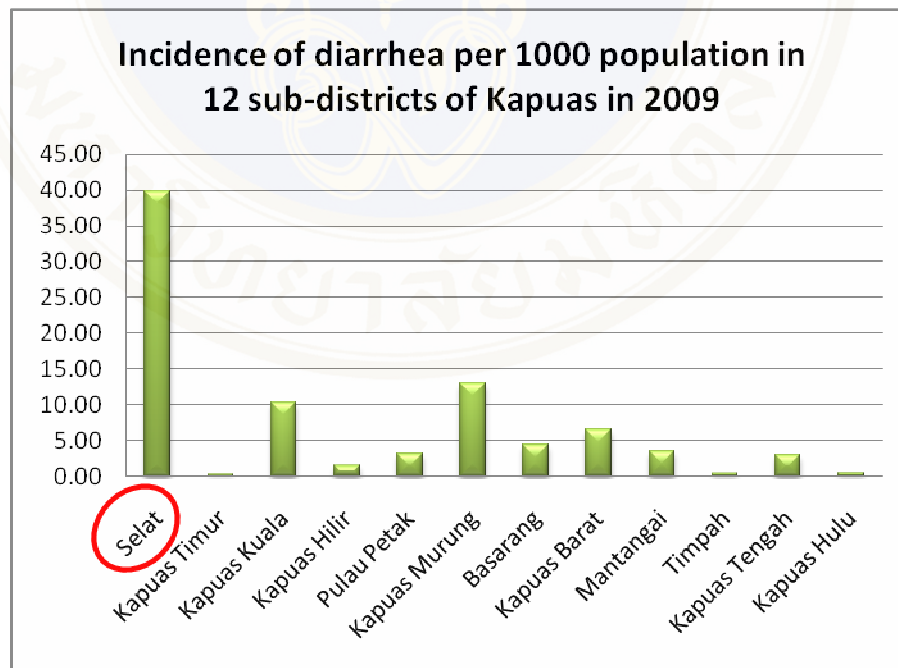


Figure 1.1 The incidence of diarrhoea per 1000 population in 12 sub-districts of Kapuas in 2009

Source : Kapuas District Health Office, 2009 (17)

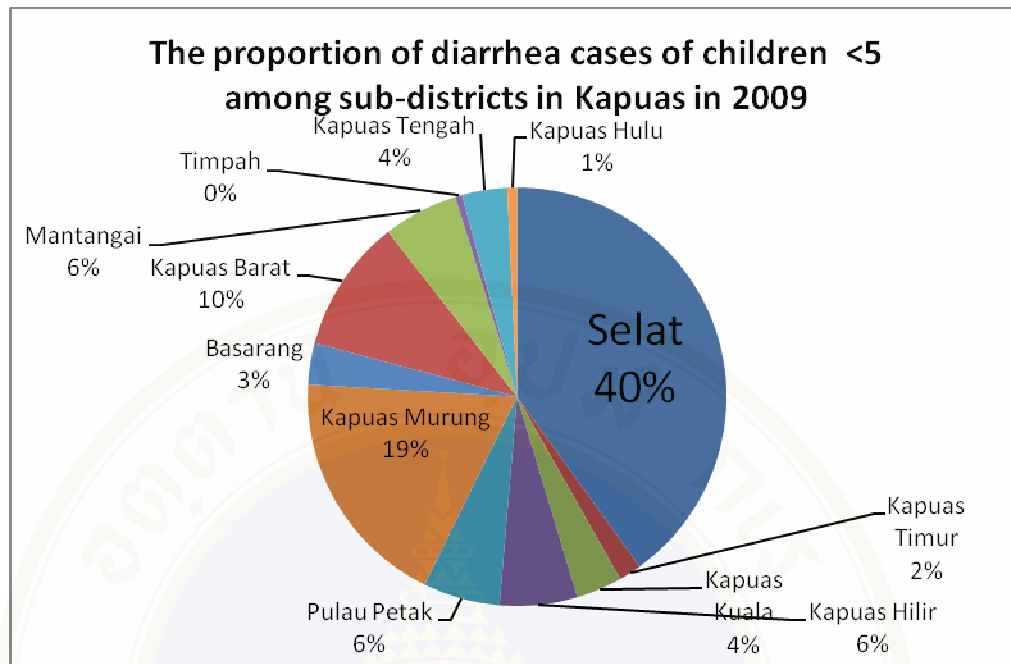


Figure 1.2 The proportion of diarrhea cases of children under 5 among sub-districts in Kapuas in 2009

Source : Kapuas District Health Office, 2009 (17)

Selat sub-district also has the most public elementary schools (19.5% of all public elementary schools), and the most elementary school students in Kapuas (25% of all elementary students) (18). This situation is potential for transmission of diseases between students and also to the community.

Therefore it is important to study hand washing practices and related factors among elementary students in the Selat sub-district. Hitherto, there has been no study about hand washing habits of elementary students in the Selat sub-district. This will, therefore, be the first study and will be able to be used as baseline data for further policy action and initiatives by local government, health professionals, and other stake holders, for school-based hygiene intervention program in Kapuas district. It may also generate information useful to the Global Hand Washing Day campaign for reducing morbidity caused by diarrhoea and pneumonia through washing hands with soap.

1.2 Research Questions

1.2.1 What is hand washing practice and the prevalence of proper hand washing among sixth grade elementary school students in Selat sub-district, Indonesia?

1.2.2 What factors are related to proper hand washing by these students?

1.3 Research Objectives

1.3.1 General Objective

To describe hand washing practice and the prevalence of proper hand washing and related factors among sixth grade elementary school students in Selat sub-district, Indonesia

1.3.2 Specific Objectives

1.3.2.1 To describe the hand washing practice among sixth grade elementary school students and the prevalence of proper hand washing

1.3.2.2 To describe the factors related to proper hand washing practice, namely : socio-demographic characteristics (gender, religion, ethnicity, role of students at home, and parental occupation), knowledge, attitude, subjective norms, perceived control, and availability of proper hand washing facilities at school (clean water, soap and hand washing stands)

1.3.2.3 To examine the association between proper hand washing practice and the related factors.

1.4 Conceptual Framework

The proposed conceptual framework of this research is shown in the Figure 1.3 below. The dependent variable is hand washing practice , which consists of proper, less proper and not proper hand washing practice , which is influenced by independent variables such as socio demographic characteristics, knowledge, attitude, subjective norms, perceived control and availability of proper hand washing facility .

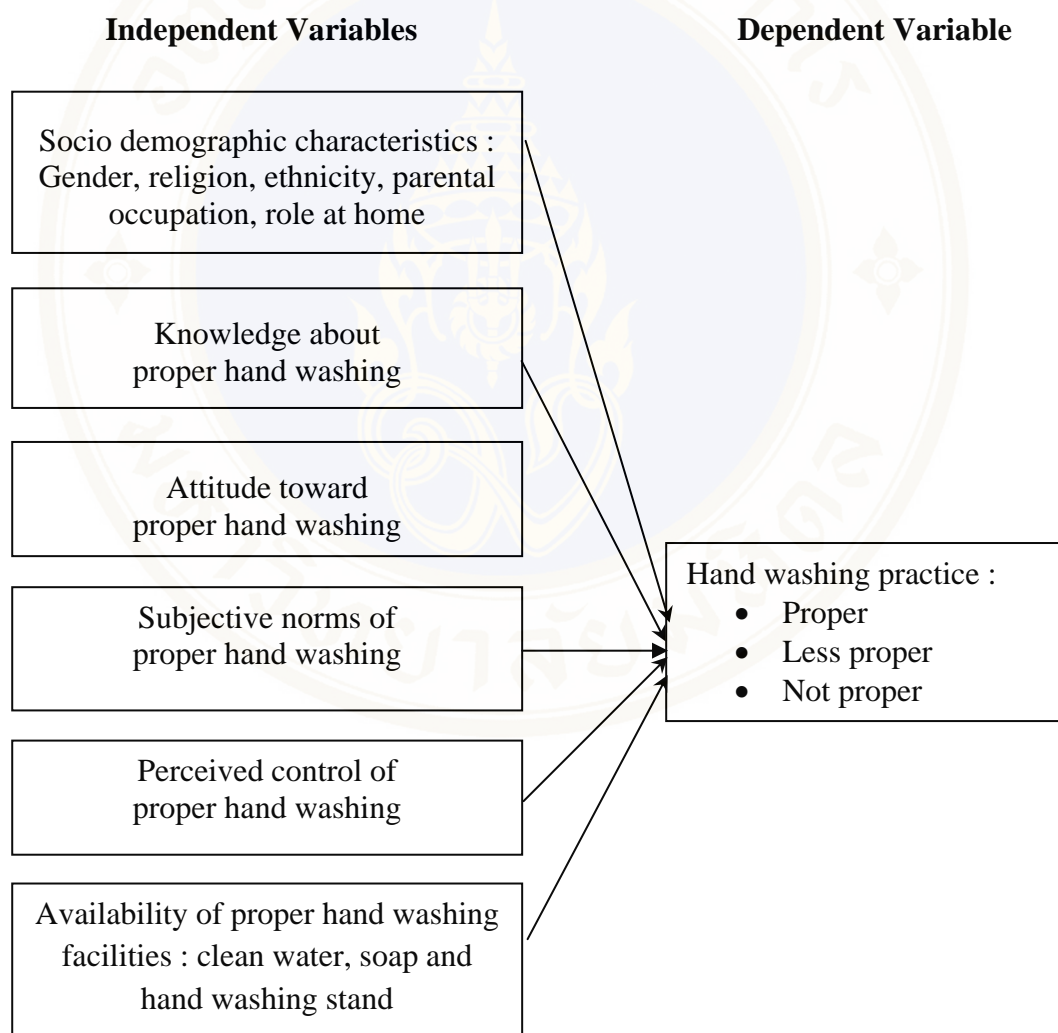


Figure 1.3 Conceptual framework

1.5 Operational Definitions

1.5.1 Hand washing practice

In this study, hand washing practice is hand washing which is done by the students at school before eating and after visiting toilet, which divided into three categories : proper, less proper and not proper hand washing practice.

Proper hand washing practice is hand washing using clean water and soap, which is done at both critical points : before eating and after using toilets.

If students wash their hands by using water only or water and soap before eating or after visiting toilet, or using water only at both situations, it is less proper hand washing

If students do not wash hands before eating or after visiting toilet, but they wash hands using water and soap or water only before eating or after visiting toilet, it is not proper hand washing.

If students do not wash hands at all in both critical time, it is not washing hands.

1.5.2 Socio demographic characteristics

In this study, socio demographic characteristics of the students are :

1.5.2.1 Gender , means gender of the students who are male (boy) or female (girl).

1.5.2.2 Religion, means a student's religion such as Islam, Christian, Catholic, or other.

1.5.2.3 Ethnicity, means a student's ethnic group such as Banjarnese, Dayaknese, Javanese, or other.

1.5.2.4 Role of students at home, means role of students helping parents at home such as preparing food, taking care of younger sibling, none or other. This study more concerned with role helping parents prepare food, since related to wash hands before handling food.

1.5.2.5 Parent's occupation, means occupation of father, such as government worker (civil servant, police, etc), non-government worker (merchant, farmer, etc) and unemployed.

1.5.3 Knowledge of proper hand washing

In this study, knowledge means general concepts and understanding about the definition of proper hand washing , proper hand washing as a means of preventing some diseases, and the critical times for proper hand washing, and was considered into high and low level.

1.5.4 Attitude toward proper hand washing

In this study, attitude refers to students' beliefs that performing proper hand washing is good or bad due to the positive or negative outcomes, and was considered into positive, neutral and negative level.

1.5.5 Subjective norms of proper hand washing

In this study, subjective norms refers to students' beliefs about the expectations of others (parents, teachers, friends) in performing proper hand washing, and their motivation to live up to others' expectations, and was considered into positive, neutral and negative level.

1.5.6 Perceived control behaviour of proper hand washing

In this study, perceived control behaviour refers to students' perceptions about how easy or difficult it is to perform proper hand washing, and was considered into high and low level.

1.5.7 Availability of proper hand washing facility

In this study, it refers to the availability of facilities related to proper hand washing at school, such as clean water, soap and hand washing stand. Availability of those facilities was considered into available and not available.

1.6 Limitations of the study

This research was not based on direct observation or practical intervention, but on respondents' answers to a questionnaire. It is possible that respondents over reported their hand washing practice.

The definition of proper hand washing in this study is not based on strict criteria from CDC, which is within 20 seconds for rubbing soap and using towel or toilet paper.

Since there are geographical obstacles in the area of study and this condition influenced the selection of sampling technique, this study was confined only to the particular or specific geographical setting and population under study. Therefore, the result of this study may not be generalized to public schools and the whole area of Selat sub-district, Indonesia.

1.7 Expected Outcome

The findings of this study will provide descriptive data about the hand washing behaviour and related factors of elementary school students, which can be used as baseline data for further policy action and initiatives by local government, health professionals, and other stakeholders, for school-based hygiene intervention program in areas similar to this study. This study also can be used as basic information for the Global Hand Washing Day campaign there. The aim of this campaign is to reduce morbidity caused by diarrhoea and pneumonia through washing hands with soap.

CHAPTER II

LITERATURE REVIEW

Having regard to the objectives of this study, the literature review will cover :

- 2.1 Global situation about some diseases which can be prevented by hand washing
- 2.2 Proper hand washing : definition, importance, advantages and prevalence.
- 2.3 Children as targets and behavioural change agents
- 2.4 Theory of Planned Behaviour and Integrated Behaviour Model
- 2.5 Knowledge, attitude, subjective norms and perceived control about proper hand washing
- 2.6 Socio-demographic characteristics related to proper hand washing
- 2.7 Hand washing facilities

2.1 Global situation about some diseases which can be prevented by proper hand washing

In 2009 the WHO reported that the leading causes of death for children under 5 years of age worldwide were acute respiratory infections and diarrhoeal diseases. These diseases were also the leading overall causes of loss of healthy life years (1). In Indonesia, the mortality rate for children under five is still high, and was 44 per 1,000 live births in 2007 (3). In 2008, pneumonia and diarrhoea respectively caused 3.8% and 3.5% of all total deaths (2). In 2006, diarrhoea was the main cause of diseases suffered by inpatients in hospital (3).

Diarrhoea claims the lives of about 2 million children under the age of five every year . Millions of children live in communities with little or no access to safe water and adequate sanitation, making prevention of food- and water-borne diarrheal infections extremely difficult. Repeat episodes are inevitable in the absence of safe

water and improved hygiene practices. Without these, diarrhoea will remain a leading global health threat for the world's children (19).

School aged children are also vulnerable to several diseases transmitted in the school environment. Each year an average of 20,000 children under the age of 5 are hospitalized because of flu-related complications (20). In 2008, almost 3 out of 10 (15 million) school-aged children (aged 5–17 years) in the United States missed school in the previous 12 months due to illness or injury (21). Diarrhoea and upper respiratory infections are common diseases in school settings. Worldwide, 84% of all children of primary school age were enrolled in primary schools in 2005 (4). This situation demonstrate the potential for transmission of diseases between school children and also to the community, and the effects can be very serious. Children suffering from diseases are often disadvantaged by absenteeism which in turn can lead to missed learning opportunities, even dropping out of school. Parents also suffer by missing work because they have to take care of their sick children.

2.2 Proper Hand washing : definition, importance, advantages and prevalence

Proper hand washing is washing hands with soap and running clean water (7, 22). If soap and clean water are not available, alcohol-based products can be used. The CDC determined that the strict standard in time for rubbing soap is within 20 seconds (8). Washing hands with water alone, a common practice around the world, is significantly less effective than washing hands with soap (7).

Proper hand washing should be done at critical moment such as : after going to the toilet, before preparing or eating food , and after changing diapers or cleaning up a child who has gone to the bathroom. Proper hand washing should also be done before and after attending to someone who is sick, after blowing noses, coughing, or sneezing, after handling animals or animal waste, after handling garbage, and before and after treating cuts or wounds (8).

Hands are the vectors that carry disease-causing pathogens from person to person. They can be spread through direct or indirect contact with surfaces. Hand

washing with soap interrupts the transmission of disease. If hands are not washed, the hands that have been in contact with faeces, human excreta (like nasal excretions), contaminated food, or water can transport viruses, bacteria and parasites. This is shown below in the Figure 2.1 (7).

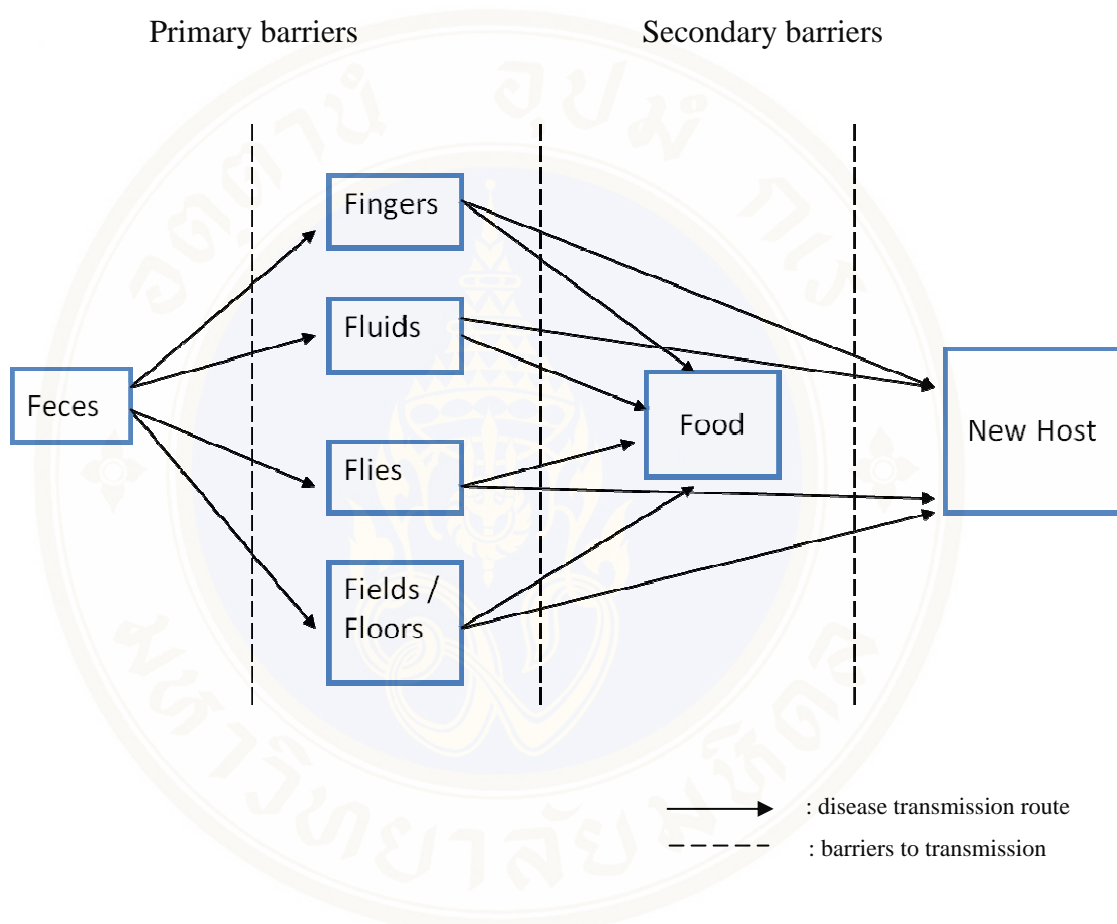


Figure 2.1 The F diagram of disease transmission and control by Wagner and Lanoix

Source : PPPHW, 2009 (7)

Washing hands with water alone, a common practice around the world, is significantly less effective than washing hands with soap. Proper hand washing requires soap and only a small amount of water. Faecal pathogens lodge in the natural oils of hands, and water alone will not dislodge them. Using soap adds to the time spent washing, removes the oils carrying most germs, and leaves hands smelling pleasant. The clean smell and feeling that soap creates are incentives for its use. With proper use, all soaps are equally effective at rinsing away disease-causing germs (7, 22).

Many strategies have been applied to reduce diarrhoea such as hand washing with soap, hygiene education and sanitation, improving water supply, and water quality. A systematic review about these strategies, which was published in 2005, suggests that hand washing with soap is the most effective way of reducing diarrhoea morbidity by 40% compared to other methods (5). It also found that interventions to promote hand washing with soap were associated with a decreased the risk of diarrhoeal disease by 47%. Hand washing was also associated with a 48-59% reduced risk of more severe diarrhoea outcomes (6).

Hand washing with soap is the single-most cost-effective health intervention to prevent the spread of disease. Disability-adjusted life years (DALYs) are used to measure the burden of disease and the effectiveness of health interventions by combining information on years of life lost and years lived with a disability. Remarkably, hand washing with soap has been shown to be the most effective way to avert DALYs associated with diarrheal diseases. Hand washing is also much less expensive than immunization; for instance, one DALY requires investment in measles immunization anywhere from US\$250 to US\$4,500. This is not to say that immunization is not essential; it is simply to point out the tremendously inexpensive life-saving opportunities being missed by the widespread failure to invest in hand washing promotion. Soap is already available in most households in the world; cost is not the chief barrier to hand washing with soap (7).

As Table 2.1 (cost-effectiveness ratio) below shows, every US\$3.35 invested in hand washing programs yields one DALY; gaining that same year through latrine promotion would cost US\$11.00; or through household water connection, more than US\$200.00 (7).

Table 2.1 Cost-effectiveness ratio of interventions against diarrheal diseases (7)

Interventions against diarrheal disease	Cost in US \$
Children Immunizations	1,658 to 8,274
Rotavirus Immunizations	1,402 to 8,357
Measles Immunizations	257 to 4,565
Oral Rehydration Therapy	132 to 2,570

Table 2.1 Cost-effectiveness ratio of interventions against diarrheal diseases (7)
(cont.)

Interventions against diarrheal disease	Cost in US \$
Breastfeeding promotion program	527 to 2,001
Latrine construction and promotion	≤270
Home connections water supply	223
Hand pump or stand post	94
Water sector regulation and advocacy	47
Latrine promotion	11,15
Hygiene promotion (including Hand washing)	3,35

Hand washing with soap is the most effective, easy and inexpensive way to prevent diseases like diarrhoea (5, 6). Hand washing can also prevent respiratory tract infections such as pneumonia, skin infections, intestinal worms, SARS and Avian Flu, and benefits the health of people living with HIV/AIDS. Hand washing is effective in preventing the spread of disease even in overcrowded, highly contaminated slum environments (7, 23). Interventions to promote hand washing might save a million lives (6).

In school settings, studies about hand washing programs in elementary schools suggest that it can reduce the absenteeism rate of school children (24-26).

Even though hand washing has been scientifically proved to be the easiest and most inexpensive way to prevent transmission of diseases, most people do not practice it in their daily lives. Studies conducted in many countries have reported that the prevalence of hand washing with soap in developing countries is still low, ranging from 0-20% (9). A review of formative research by Curtis et al. in 2009 in eleven countries suggests that on average only 17% of child caregivers practiced hand washing with soap after visiting the toilet, and hand washing habits were not generally inculcated at an early age (12). The Indonesia National Basic Health Research in 2007 found that only 23.2% of the total population above 10 years in households had correct behaviour in hand washing, which is done with soap prior to having meals, preparing the meals, after defecating, after cleaning the infants or children, and after holding poultry or animals (10). The Global School-Based Student Health Survey (GSHS) in

Indonesia in 2007 found that 4.3% of adolescent students never or rarely washed their hands before and 2.6% never or rarely washed their hands after using the toilet or latrine during the past 30 days (27). A study of elementary students in Bogota, Columbia in 2009, suggests that only 33.6% of elementary students always or very often washed their hands with soap and clean water before eating and after using toilets. However, the research did not study the real practice of hand washing by students in schools (11). Studies in Kerala and Kenya in 2006-2007 reported that less than one-fourth of school children observed washed their hands with soap in the school study (28). Yalcin in Turkey in 2004 found that 42.4% of adolescent students had proper hand washing which defined as washing hands equal or more than 20 seconds, using water and soap, and hand washing frequencies scores were more than 20 seconds (hand washing in six condition such as after toilet, before eating, after eating, entering home, clean house, after sneezing / coughing) (29). Vivas et al. studied in Ethiopia in 2010 and found that 63.8% of school children washed hands by water only (30). A study about hand washing behaviour in rural Bangladesh in 2008 suggests that the study subjects reported washing their hands more frequently than they were observed to. This finding demonstrates that asking people about their hand washing behaviour may not provide a valid assessment (31).

2.3 Children as agents for behavioural change

In attempting to transform the idea of hand washing with soap from theory into an automatic behaviour in homes, schools and communities worldwide, the Public-Private Partnership for Hand washing with Soap, a coalition of international hand washing stakeholders, initiated the Global Hand Washing Day campaign held annually every 15th October. The goals of this partnership are to reduce the incidence of diarrhoea and pneumonia in poor communities through public-private partnerships promoting hand washing with soap (7).

Children are the target of this campaign, since children are likely to be the most effective agents for behaviour change. They are still enthusiastic, energetic and open minded to new ideas. During school, late childhood and early adolescence (ages

6–15) are critical periods of opportunity for building skills and positive habits (14). The elementary school period is the most opportune time for development. It is therefore important to teach positive behaviours early in life. By teaching children at a young age, they are better able to understand and will form enduring positive attitudes lasting into adulthood, and can become effective agents for behavioural change in families and communities.

To encourage and teach young school children about positive behaviour, elementary schools should implement positive behaviour programs to improve student awareness, knowledge, and development, by involving them as active participants, rather than passive targets of health programs (15) .

With this in mind, hand washing with soap should be properly and effectively taught to children. They can then take this idea from their schools to their families and communities. Encouraging millions of school children to practice proper hand washing behaviour, will lead them to adopt this behaviour into adulthood in the future, and will contribute to two of the Millennium Development Goals : education and health (16)

2.4 Theory of Planned Behaviour and Integrated Behaviour Model

Theory of Planned Behaviour

Based on the Theory of Planned Behaviour (TPB) , the best predictor of behaviour is a person's intention to perform (or not to perform) that behaviour (32). Intention is an indication of a person's readiness to perform a given behaviour, and it is considered to be the immediate antecedent of behaviour (33). For example, to predict whether an individual will perform hand washing, the simplest approach is to ask whether he or she intends to do so.

According to the theory, a person's intention is a function of three basic determinants. They are :

1. Personal nature, i.e. attitude towards the behaviour;
2. Social influence, i.e. the subjective norm;
3. Perceived difficulty of performing the behaviour, i.e. perceived behavioural control (34).

Attitude reflects personal judgment that performing a behaviour is good or bad. It is influenced by an individual's beliefs about behaviour outcomes and outcome evaluation. Those who believe that performing a behaviour will lead mostly to positive outcomes will hold positive attitudes towards performing that behaviour. Whereas a person who believes that performing a behaviour will mostly lead to negative outcomes will hold a negative attitude.

The second determinant of intention is subjective norms. Subjective norms reflects the perception of a person of the social pressure from important others to perform or not to perform the behaviour. It is a function of belief about expectations of others (normative belief) and an individual's tendency to live up to these others' expectations (motivation for compliance). Important others can be parents, teachers, peers, doctors, etc. Thus, a person who believes that certain referents think he or she should perform a behaviour, and is motivated to meet the expectations of those referents, will hold a positive subjective norms. Conversely, a person who believes these referents think he or she should not perform the behaviour will have a negative subjective norm. A person who is less motivated to comply with those referents will have a relatively neutral subjective norms (32, 34). Subjective norms may be an important construct in the development and adoption of a culture of hygiene and self-care within school settings (35).

If attitude and subjective norms are positive, the intention to perform a specific behaviour will be strong. However, it has often been found that attitudes and subjective norms only partially predict an individual's intention, and also the relation between intention and behaviour may be weak.

To improve the predictive value of the theory, Ajzen (1985; 1988; 1991) expanded the model to the theory of planned behaviour, by adding the construct of perceived behavioural control. According to the theory of Planned Behaviour, perceived control is determined by control beliefs concerning the presence or absence of facilitators and barriers to behavioural performance, weighted by the perceived power or impact of each factor to facilitate or inhibit the behaviour. Thus, a person who holds strong control beliefs about the existence of factors that facilitate the behaviour will have high perceived control over the behaviour. Conversely, a person who holds strong control beliefs about the existence of factors that impede the

behaviour will have low perceived control over the behaviour (32). Therefore, perceived control reflects individual perceptions about how easy or difficult it is to perform a specific behaviour. The stronger the perceived control, it more likely to act on that intention, including the face of obstacles (34) .

As a general rule, the more favourable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behaviour in question (33).

Other factors, including demographic and environmental characteristics, are assumed to operate through model constructs and do not independently contribute to explain the likelihood of performing a behaviour.

Personality traits, intelligence, demographic variables, values, and other variables of this kind are considered "background factors" in the TPB. They are not neglected but assumed to influence intentions and behaviour indirectly by affecting behavioural, normative, and/or control beliefs. The components of the TPB are assumed to mediate the effects of background factors on intentions and actions. The theory acknowledges that background factors can provide valuable information about possible pre-cursors of behavioural, normative, and control beliefs, information not provided by the theory itself. Conversely, with the aid of the TPB it becomes possible to examine why a given background factor influences behaviour by tracing its effects via the more proximal antecedents of the behaviour (33).

Figure 2.2. below shows the Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (32).

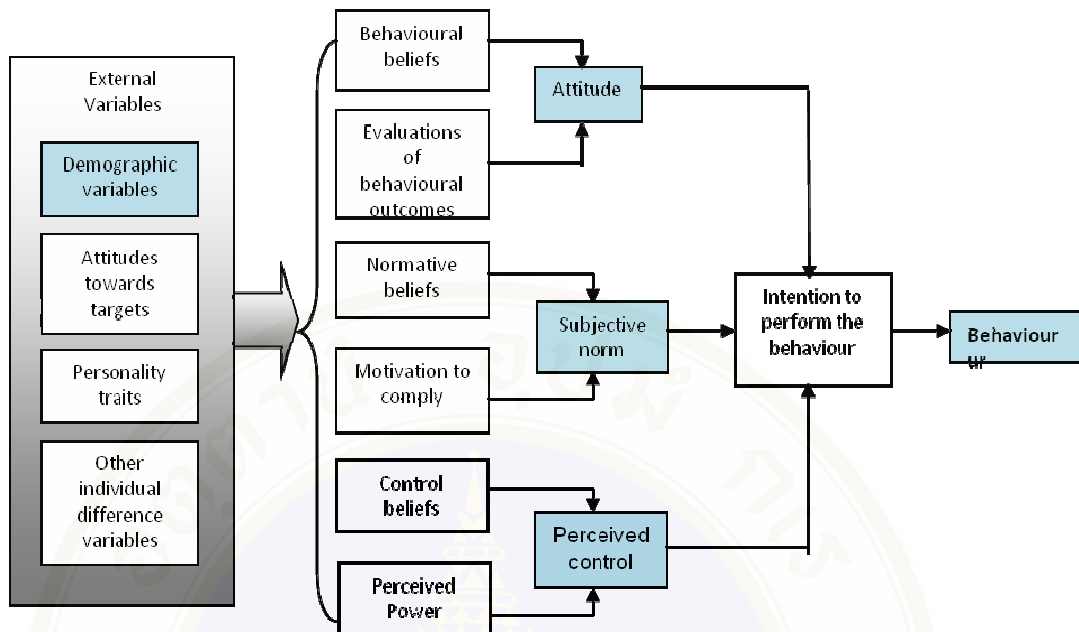


Figure 2.2 Theory of Reasoned Action and Theory of Planned Behaviour*

**Note : Upper light area shows the Theory of Reasoned Action; entire figure shows the Theory of Planned Behaviour*

Source : Karen, 2008 (32)

Knowledge, or correct factual information, plays no direct role in the TPB. Although information in the form of behaviour-relevant beliefs is a central component of the theory, whether that information is correct or incorrect is immaterial. What matters is whether the information works for or against performance of the behaviour (33).

Integrated Behavioural Model

Another model which can be used to explain behaviour is The Integrated Behavioural Model (IBM) (see Figure 2.3 below) (32). As in The TRA/TPB, the most important determinant of behaviour in the IBM is intention to perform the behaviour. Without motivation, a person is unlikely to carry out a recommended behaviour. Four other components directly affect behaviour (Jaccard, Dodge and Dittus, 2002). Three of these are important in determining whether behaviour intentions can result in behavioural performance. First, even if a person has a strong behavioural intention, she needs knowledge and skill to carry out the behaviour. Second, there should be no or few environmental constraints that make behavioural performance difficult or

impossible (Triandis, 1980). Third, behaviour should be salient in habitual, so that intention becomes less important in determining behavioural performance for that individual (Triandis, 1980).

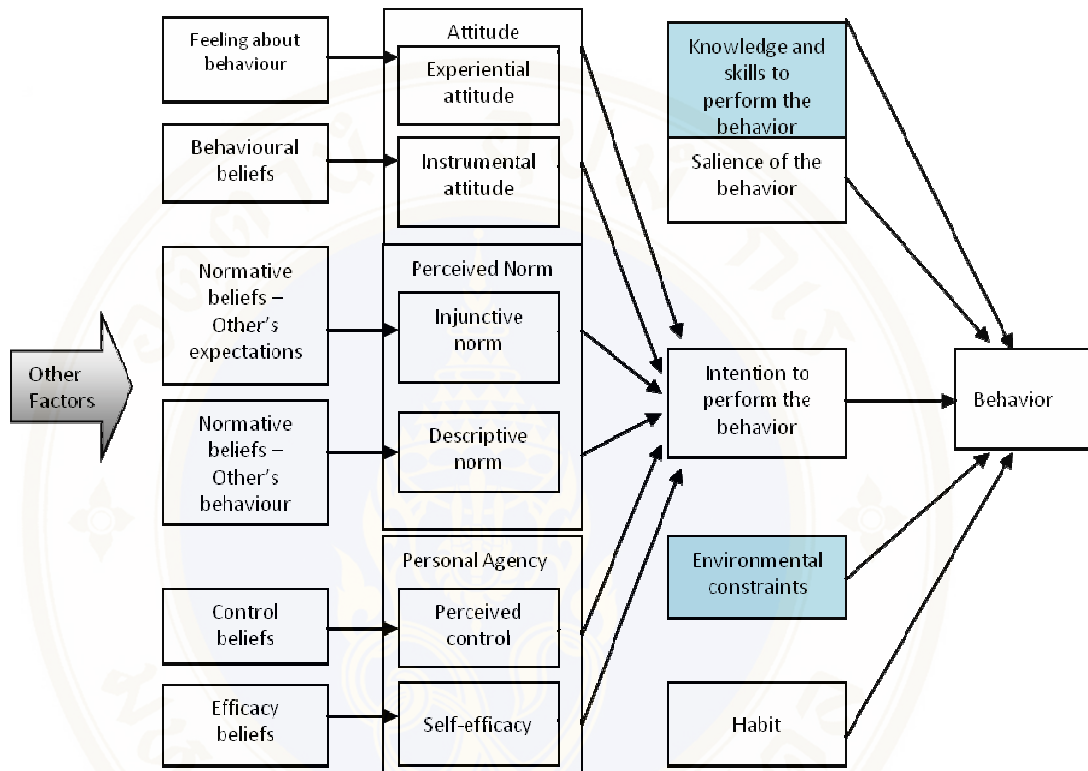


Figure 2.3 Integrated Behavior Model

Source : Karen, 2008 (32)

Thus, a particular behaviour is most likely to occur if :

1. A person has a strong intention to perform it and the knowledge and skill to do so,
2. There is no serious environmental constraint preventing performance,
3. The behaviour is salient,
4. The person has performed the behaviour previously.

As noted in the descriptions of the TRA and TPB, other demographic, personality, attitudinal, and individual difference variables may be associated with behaviours, but their influence is indirect, through the theoretical constructs. They are

considered distal variables. Thus, certain demographic groups may be more likely than others to engage in a behaviour, because there are demographic differences in the proximal variables. For example, individuals in certain demographic groups may be more likely than other demographic groups to hold beliefs about positive outcomes of a behaviour, and thus hold more positive attitudes and stronger intentions to carry out the behaviour. Therefore, these variables are external variables, because they are not considered to have a direct effect on intention or behaviour.

Model constructed for this study (based on related theory)

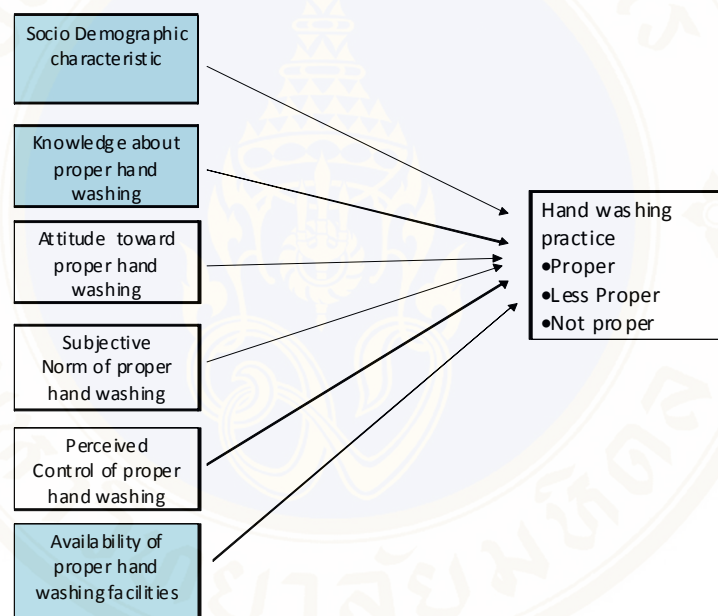


Figure 2.4 Model constructed for this study (based on related theory)

Based on The TRA/TPB and IBM theory/ models, the model constructed for this study is as in Figure 2.4 above. Socio demographic, knowledge, attitude, subjective norms, perceived control and facility directly influence hand washing practice.

2.5 Attitude, social norms, perceived control and knowledge about proper hand washing

A study in Bogota Colombia published in 2009 about hand washing by elementary school children, suggests that all of the three basic determinants of hand washing practice (personal attitude, subjective norms and perceived control), except knowledge about hand washing, were found to be significant predictors of hand washing intention. A high level of control over the behaviour was the strongest predictor. Perceived control reflects a person's beliefs regarding internal and external factors that may facilitate or impede performance of a behaviour. For hand washing, external factors include, for example, availability and accessibility of clean and secure hand-washing facilities and ample time. An individual's abilities and aptitude to perform a behaviour given appropriate conditions may be important internal factors. Indeed, in this example of youth, forgetfulness, along with laziness and lack of time, were the most commonly cited reasons for not washing hands (11).

Another study about hand washing practice by medical students after the SARS epidemic in Hongkong in 2005 suggests that attitudes to hand washing and perceptions of infection risk were not significantly associated with hand washing practice, whereas peer behaviour might be a significant factor (36).

Wisedjinda et al. in their study among Thai medical students in 2009, found that total score of attitude had significant correlation with hand washing, in the practices concerning influenza H1N1 (37).

A formative study in United Kingdom by Schimdt et al. among primary school children found that the children had knowledge about hand washing. Reasons for hand washing stated by year 6 children were to remove dirt and germs, to prevent germs going into their mouths when eating, and to prevent illness. Hand washing after visiting the toilet was infrequently mentioned, and mostly only after probing. Most children, especially those with an Asian or Middle-Eastern background, thought that hand washing was most important before eating and reported this as the occasion when their parents most frequently told them to wash their hands. The teachers said that in most cases children all washed their hands in the classroom before the lunch

break under the supervision of the teacher. Although as one teacher said “The children wash their hands before lining up for lunch but it is often a quick run under the tap.” (38).

Another formative study of school children in Senegal by Sidibe et al. in 2007, found that although children did not generally practice hand washing with soap, they knew all about the health problems associated with not washing their hands. In their essays, most of the children correctly mentioned the critical times for hand washing (before eating and after using the toilets). Although diseases were mentioned often by pupils, their concerns were primarily related to the fact that this could result in medical bills for their parents, and that being ill would mean they would miss school and not see their friends (16).

A hand washing study by Lopez et al. reported that the most often cited sources of information about hygiene and hand washing were parents (88.5%), followed by schools (66.7%), then the media (56.8%). Students informed by their parents were twice as likely to practice proper hand-washing behaviour than students who did not mention parents as a source of information (OR=2.1; 95% CI=1.5, 3.0) (11).

A formative study of elementary students in the United Kingdom in 2009 found that virtually all children said that their parents instructed them to wash their hands, but older siblings and wider family members were also mentioned. Year 6 children frequently mentioned that their own common sense prompted them to wash their hands. School teachers and other adults were only mentioned after further probing (38).

2.6 Socio-demographic characteristics relating to hand washing practice

Sex, ethnicity, religion, parental occupation and the role of children at home

A survey of hygiene behaviour of adolescents in the Pacific found that by logistic regression analysis, frequent hygiene behaviour including washing hands before eating and after visiting toilet were significantly associated with gender, school affiliation and parental occupation (39). The study by Yalcin et al. in Turkey about

hand washing by adolescent students also found that females were more associated with proper hand washing (29). Another study by Lopez et al. about hand washing by elementary students in Bogota, Colombia, suggested that gender was not associated with hand washing behaviour (11).

Ethnicity was one of the determinants of hand washing by college students in this study in Texas, and African-American students had a significantly higher rate of hand hygiene practice compared with Caucasian, Asian, and “other” students (40).

Religion is another motivation for proper hand washing (12). Curtis VA et al. in their review of qualitative study in eleven countries in 2009, found that religion was one of respondents’ long-term objectives relevant to hand washing with soap. Some respondents said that they, as Moslems, had been taught from childhood that one must first wash with water and use soap after leaving the latrine (12). Allegranzi et al. in 2009 found that religious faith and culture can strongly influence hand hygiene behavior in health care workers and potentially affect compliance with best practices. Starting in childhood, the inherent nature of hand hygiene, which is strongly influenced by religious habits and norms in some populations, could be shaped in favor of an optimal elective behavior toward hand hygiene (41).

The role of elementary school students at home was considered in Lopez’s study. Nearly 40% of the students reported caring for younger siblings and 60% preparing food at home. However there was no significant relationship between the roles at home and proper hand washing practice at school. This is important because school-aged children are receptive to learning, changing their behaviour and adopting new healthy habits. Therefore, they are able to act as agents for health change in the context of their particular socio-environments (11).

2.7 Facilities for hand washing

Facilities that affect proper hand washing include the availability and functionality of water, soap and toilets (12, 16). Findings from Kenya and Kerala, India have shown that children wash their hands more often after using the toilet when

there are more water taps and when there is water in or near the toilet. Thus, in schools where fewer children had to share one tap in or near the toilet block, they were more likely to wash their hands. In Kenya, when water for hand washing was located in the toilets, then the toilets tended to be cleaner ($p < 0.004$) and a greater proportion of girls ($p < 0.0001$) washed their hands than boys. In Kerala, most schools had water in or near the toilet. Children also use toilets that are clean and maintained (defined as not having visible urine or faecal matter in the cubicle). The children aged 11 to 16 there also repeatedly said that they needed water for drinking, toilet, urinals, and hand washing with enough taps or water points that were functioning and were conveniently located. They also said that they needed toilets and urinals that function and are clean and well-maintained with doors and latches inside the toilets (28). Yalcin et al in Turkey found that the presence of some complaints about toilets in school affected proper hand washing among adolescent students (29). A formative study of school children in Senegal explained that the children said that the toilet / washing facilities were scary places that smelt bad so they were in a rush to get out, and preferred not to linger to wash hands (16).

Provision of soap is crucial for hand washing. A formative study in primary schools in Dakar found that only ten out of the 100 schools made soap available to pupils. Actually the students were motivated to wash their hands with soap, because they were really keen to have nice smelling hands. Even one month after a behaviour trial was carried out there, in one of the classrooms the school children got together to contribute to replacing the soap (16).

Lopez et al. explained that about 7% of the students reported that their school had clean water and soap available and accessible on a regular basis. Having adequate bathroom facilities at school was positively associated with washing hand “very often” and always “before eating and after using the toilet” (OR = 2.7; 95% CI = 1.9, 3.9). When asked about actions that could be taken to improve their hand-washing behaviour and increase their control over performing the behaviour, some of the students suggestions were visible soap dispensers, and access to hand-washing facilities in and near school cafeterias (11).

CHAPTER III

RESEARCH METHODOLOGY

3.1 Study design

This study was a cross-sectional and descriptive study to determine hand washing practice and the prevalence of proper hand washing by elementary school students at school, and the related factors such as : socio-demographic characteristics, knowledge, attitude, subjective norms, perceived behaviour control, and availability of proper hand washing facilities at school.

3.2 Study population , sample and study sites

The study population is the six grade of public elementary school students in Selat sub-district, Kalimantan Tengah province. According to the data from the Kapuas District Educational Office, in 2008/2009 there were 70 public elementary schools with 1248 grade six students, spread through 16 villages (42).

The sample comprised sixth grade public elementary school students attending schools when the data collection was conducted during January 2011, and who agreed to participate in this study. This study selected grade six students because reading and comprehension competency at this grade enables them to complete the questionnaire within the time available.

The study was conducted in Selat sub-district, Kapuas district, Kalimantan Tengah Province, Indonesia (see Figure 3.3 – 3.6). The Selat sub-district was purposively selected because it is the most densely populated sub-district in Kapuas (90,527 people or 26.57% of total population of Kapuas) (see Figure 3.1). It also has the most public elementary schools (70 schools or 18.7% of all elementary schools) and the most public elementary school students (8,829 pupils or 24% of all elementary school students, see Figure 3.2) in Kapuas district (18). In 2009, Selat sub-

district had the highest number of diarrhea cases in Kapuas, 45.97% of all diarrhea cases. The proportion of diarrhea cases of children under five in Selat sub-district was also the highest, which was 40.05% of total diarrhea cases among children under five in Kapuas (17)

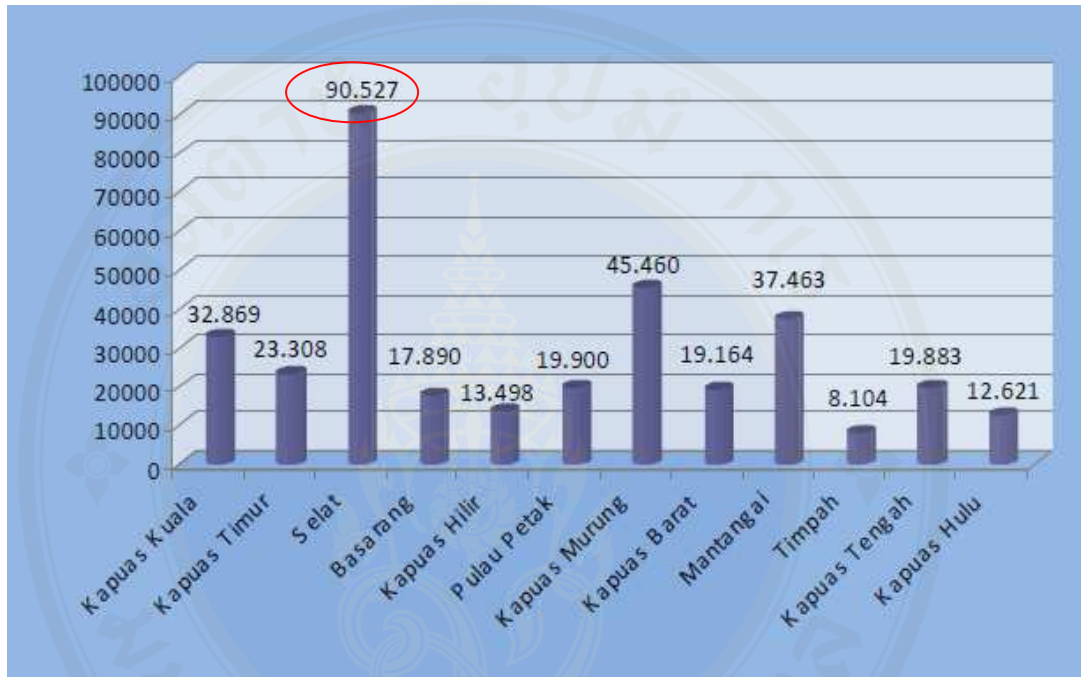


Figure 3.1 Number of population by sub-district in Kapuas district in 2009

Source : BPS, 2009 (18)

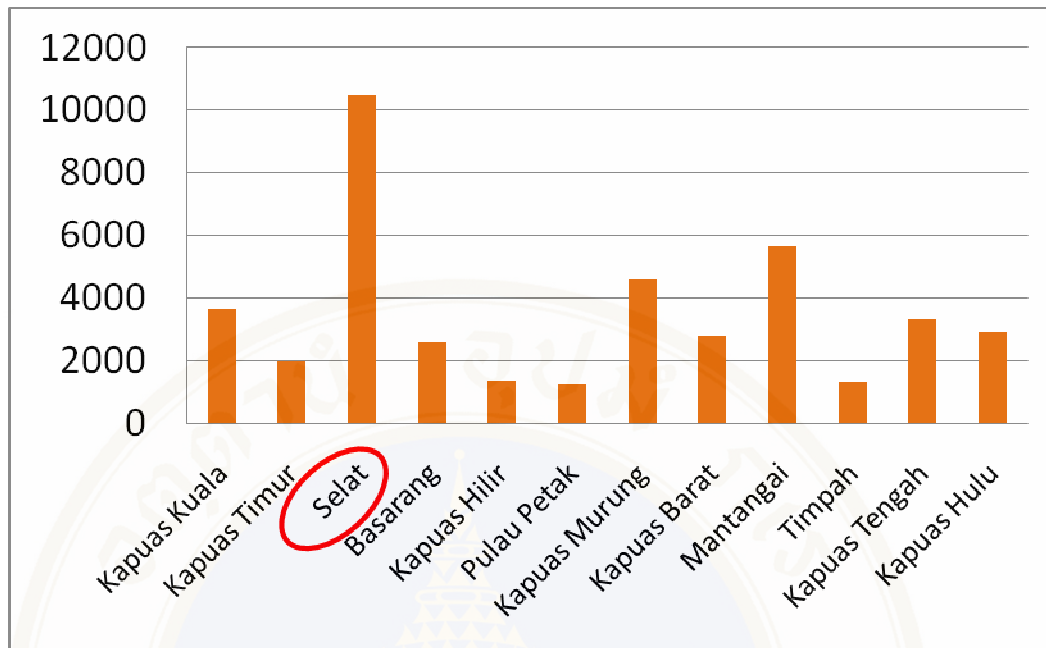


Figure 3.2 Total number of elementary school students by sub-districts in Kapuas district in 2009

Source : BPS, 2009 (18)



Figure 3.3 Kalimantan Tengah province, Indonesia

Source : Google map

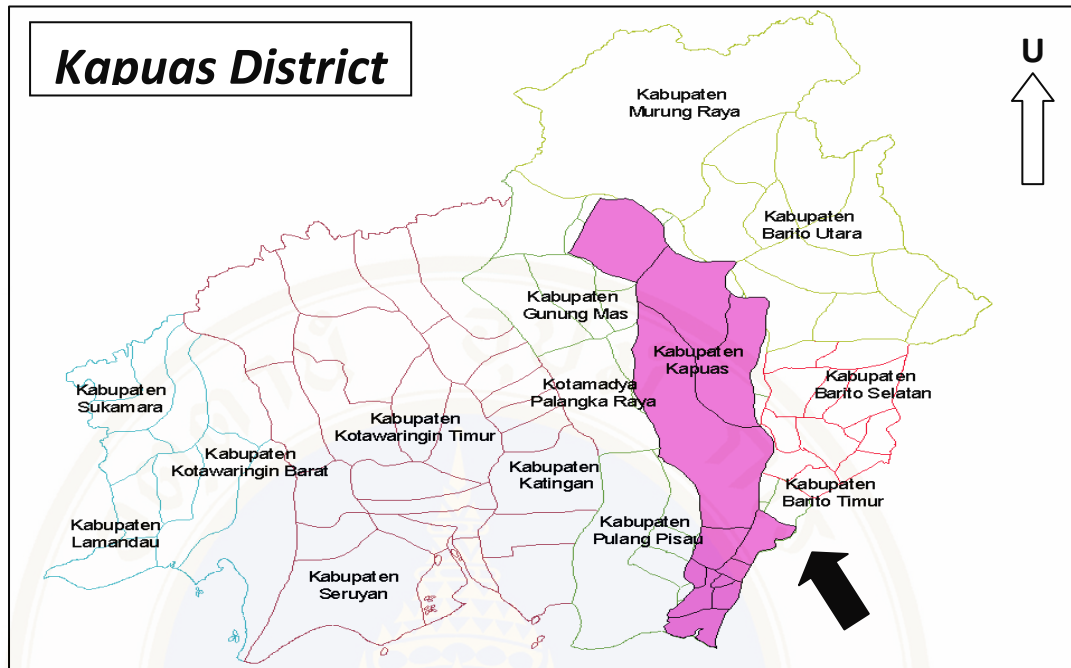


Figure 3.4 The map of Kapuas District in Kalimantan Tengah Province

Source : Kapuas District Health Office, 2008 (43)

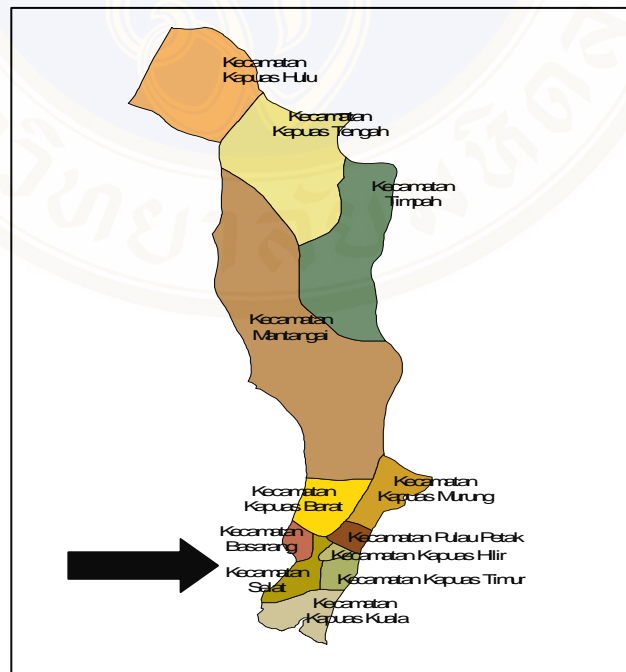


Figure 3.5 The map of twelve sub-districts in Kapuas, including Selat sub-district

Source : Kapuas District Health Office, 2008 (43)

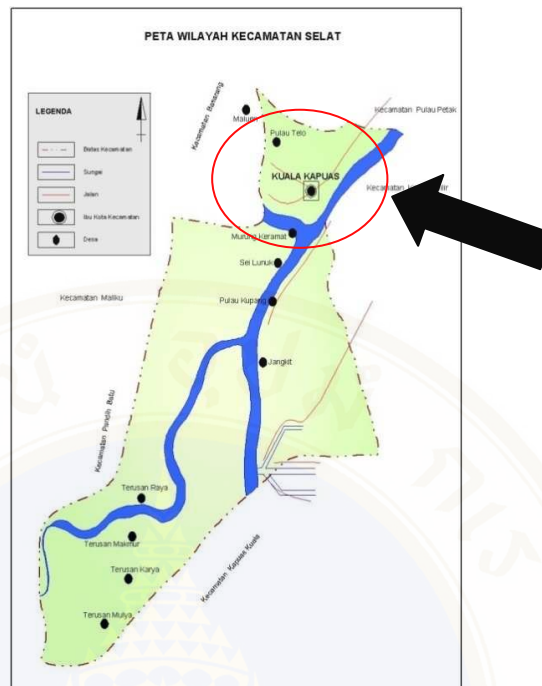


Figure 3.6 The map of Selat sub-district. The black arrow shows the location of 5 villages
Source : Kapuas District Health Office, 2008

3.3 Sample size and sampling technique

The Selat sub-district consists of 16 villages most of which are not quite easy to reach, because of geographical obstacle (the Kapuas river) (see Figure 3.6). Only 5 of 16 villages are easy to access. They are Selat Hilir, Selat Tengah, Selat Dalam, Selat Hulu and Pulau Telo village. Therefore, these 5 villages have also been purposively selected for this study.

In these 5 villages, there are 23 public elementary schools with 4,387 grade one to six students and 645 sixth grade students (42). Since the outcome data collected was categorical data, and the number of population was known, the sample size was therefore calculated using the following formula (44) :

$$n = \frac{Z^2 NP (1-P)}{Z^2 P(1-P) + (N-1) E^2}$$

Which is $N = 645$

$$Z = 1.96$$

$$E = 0.05$$

$P = 0.336$ (from previous study about prevalence of proper hand washing in elementary students in Bogota Colombia) (11)

$$n = \frac{(1.96)^2 (645) (0.336) (1-0.336)}{(1.96)^2(0.336)(1-0.336)+(645-1)(0.05)^2}$$

$$n = \frac{522.81}{2.467} = 211.921 \approx 212$$

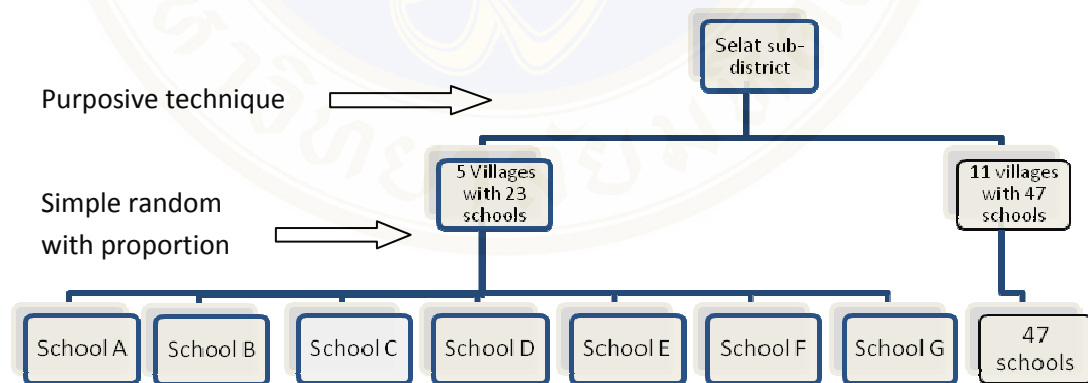
This 212 samples was added by 10% to prevent information loss from incomplete data or if there was some participants would withdraw from this study. Therefore, the total samples would be around 234 students.

From these 5 villages the schools were selected randomly by using proportion as below :

Table 3.1 Schools randomly selected for study

Village	Number of schools	Number of schools selected randomly by proportion	Name of selected schools	Number of 6 th grade students
Pulau Telo	2	1	SDN 1	41
Selat Hilir	8	2	SDN 4	52
			SDN 5	34
Selat Hulu	4	1	SDN 7	27
Selat Dalam	2	1	SDN 1	32
Selat Tengah	7	2	SDN 1	43
			SDN 2	45
			Total	274

Sampling technique used in this study can be explained as Figure 3.7 below :

**Figure 3.7** Sampling technique used in this study

Since all sixth grade students in selected schools were involved in this study, therefore the total respondents from 7 selected schools was 274 students, more than 234 respondents.

3.4 Research instrument

The instrument used for collecting data was a self-administered structured questionnaire. The questionnaire had been tested on a sample which was similar to the target population for reliability, before the final draft was drawn and used to collect the necessary data for this study. For validity, three experts thoroughly examined the questionnaire.

The questionnaire had 7 parts as below :

Part 1. Socio-demographic characteristics

This part consisted of 5 questions :

1. Gender, divided into 2 groups : boys and girls
2. Religion, divided into 3 groups : Islam, Christian, Catholic, other
3. Ethnicity, divided into 4 groups : Banjarnese, Dayaknese, Javanese, other
4. The role of children at home, divided into 4 groups : helping food preparation, taking care of younger sibling, none of those 2 roles, other
5. Occupation of parents, divided into government worker (such as civil servant, police/army), non government worker (such as farmer, merchant, restaurant, tailor), unemployed and other

Part 2. Hand washing practice at school

In this part the respondents asked 2 questions about hand washing at school at the two critical times : before eating and after visiting toilet.

Hand washing practice at both critical situations would be described by scoring, by using formula as below :

$$\boxed{\text{Total score}} = \boxed{\begin{array}{c} \text{score of hand washing before eating} \\ + \\ \text{score of hand washing after visiting toilet} \end{array}}$$

Scoring was used to differentiate the combinations of hand washing practice at schools, from the best to the worst practice. Both of the situations “before eating” and “after visiting toilet” were considered have the same importance. Washing hands used water and soap was given score 3, used water only score 2, and not wash hands score 1.

After scoring, then those hand washing practice would be grouped as proper, less proper, not proper and not washing hands, based on the operational definition (see Chapter 1). Finally the hand washing were grouped as final group : proper, less proper and not proper for analysis by using Chi Square. Scoring was used for correlation test. For further analysis by using multiple logistic regression, those three final group were considered as only two big groups : proper and not proper hand washing, since proper hand washing was the aim in this study. Less proper and not proper group were merged.

Additional questions were about the frequencies (2 questions) and the place for hand washing at schools (2 questions), and also hand washing practice at home (4 questions) . Therefore the total of questions was 10.

Part 3. Knowledge of proper hand washing

After modifying some questions due to reliability test, the final questions of Knowledge part for data collection was 6 numbers. In this part the respondents asked 6 questions about the definition of proper hand washing, transmission of some infectious diseases, critical times needed for proper hand washing, and health outcomes associated with proper hand washing. Score 1 was for correct answer and 0 for wrong answer. Median was used as cut of point.

The summed score was categorized into two groups :

- High level of knowledge : if the total score $>$ median
- Low level of knowledge : if the total score \leq median

The respondents also asked 2 questions about the source of information about proper hand washing such as from people (parents, friends, teachers) and media (television, posters) and 1 questions of hand washing promotion at school.

Part 4. Attitude to proper hand washing

After modifying questionnaire due to reliability test, final questionnaire for data collection in attitude part consisted of 5 questions. In this part, the respondents were asked 5 questions about attitudes to proper hand washing before eating and after using toilets, regardless of their own practices. The answers provided were agree (score 3), neutral (score 2) and disagree (score 1). The 25 and 75 percentile of total score was taken as cutting point to categorize attitude into three groups :

- Positive attitude : if the total score > 75 percentile
- Neutral attitude : if the total score $25 \leq x \leq 75$ percentile
- Negative attitude : if the total score < 25 percentile

Part 5. Subjective norms of proper hand washing

After modifying some questions due to the result of reliability test, in this part the respondents were asked 8 questions about willingness to comply with expectations of others such as parents, teachers and friends regarding proper hand washing. The categories of answer were agree (score 3), neutral (score 2) and disagree (score 1). The 25 and 75 percentile of total score was taken as cutting point to categorize subjective norms into three groups :

- Positive subjective norms : if the total score ≥ 75 percentile
- Neutral subjective norms : if the total score $25 < x < 75$ percentile
- Negative subjective norms : if the total score ≤ 25 percentile

Part 6. Perceived control behaviour of proper hand washing

After modifying some questions based on reliability test, in this part each respondent was asked 6 questions about the degree of difficulty associated with proper hand washing . The categories of answer were agree (score 3), neutral (score 2) and disagree (score 1). The median of total score was taken as cutting point to categorize perceived control into two groups :

- High level of perceived control : if the total score $>$ median
- low level of perceived control : if the total score \leq median

Part 7. Availability of proper hand washing facilities

In this part each respondent were asked 3 questions about the place where the students could find clean water and soap for hand washing (2 questions) , and the shape of hand washing stand at schools. . Then each facility was considered into two categories :

1. Availability of clean water at hand washing stand : available and not available
2. Availability of soap at hand washing stand : available and not available
3. Availability of hand washing stand : available and not available

One last additional question was for the reason of not washing hands at schools. Therefore the questionnaire contained a total of 45 questions.

3.5 Data collection procedure and pre test

The data collection was conducted after obtaining approval from the Ethic Committee of Mahidol University on 27 December 2010.

The questionnaire originally was prepared in English and then translated into Indonesian language. Before data collection, a pre-test had been done twice on a sample of students (n = 33 and 32) at another school in which the students were similar to the target population. Data collected in this two pre-tests were tested for reliability using Cronbach Alpha and Kuder-Richardson (KR) coefficient.

Pre-test and data collection included the following steps :

1. Asking permission from the head of Kapuas District Educational Office, Health Office and also the principals of selected schools
2. Informed consent was obtained by using Research Project Summary Statement and Informed Consent approved from Ethic Committee Mahidol University (COA No 2010/130.2712)
3. Collecting data from the students
4. Editing and verifying the questionnaire for data analysis

The result of reliability test of two pre-tests is shown in table below :

Table 3.2 Reliability test of 2 pre-tests (Cronbach alpha and KR coefficient)

Variables	Pretest 1 (no of questions)	Pretest 2 (no of questions)	After modifying some questions for data collection
Knowledge	0.31 (9)	0.20 (15)	0.17 (6)
Attitude	0.34 (7)	0.11 (9)	0.47 (5)
Subj Norm	0.65 (9)	0.67 (9)	0.71 (8)
Perc Cont	0.44 (6)	0.29 (9)	0.62 (6)

This study used a self administered questionnaire. In order to minimize bias, it was emphasized to the respondents that this was not examination. Therefore, they were expected to be honest and they did not need to write down their names in the questionnaire. Teachers were not allowed to enter the class during data collection. The researcher led the informed consent and data collection processes by herself to minimize bias caused by misunderstanding. There was one assistant (health worker) for each school for distributing and collecting the questionnaires and informed consent forms.

3.6 Data management and analysis

After examining and correcting returned questionnaires, then the data was edited, coded and entered into a computer for analysis. The data collected was processed and analyzed by using Epidata version 3.2 and Minitab version 14.

Descriptive statistics was used for frequency and percentage distribution, median, and quartile deviation (QD) of dependent and independent variables. Chi-square and correlation tests were used to describe the association between dependent and independent variables and the strength of association. Logistic regression was used to predict proper hand washing from independent variables. The level of significance was at 0.05.

The association between two categorical variables is measured by Chi square test (45). Therefore, the associations of the dependent (hand washing practice) and all independent variables were determined by Chi square.

In the other hand, to ascertain the strength of association of those variables, this study used correlation test for dependent and some independent variables. For this purpose, only numeric variables were involved, because correlation coefficient (r) is the numerical measure of the strength of the linear relationship between numerical variables (46).

In this study, the dependent variable (hand washing practice) was considered as categorical variable (proper, less proper and not proper hand washing). By using scoring this variable also could be as numerical variable. Some other independent variables such as knowledge, attitude, subjective norms and perceived control were not only as categorical, but also numerical variables. Therefore for hand washing practice, knowledge, attitude, subjective norms and perceived control could be analyzed by using both Chi-square and correlation test. However, since the socio-demographic and availability of facility were categorical variable, they could only be analyzed by using Chi-square test.

Logistic regression is the type of regression analysis that is usually employed when the dependent variable is dichotomous (46). In this study, the dependent variable was dichotomous : proper and not proper hand washing. Multiple logistic regression was also used to predict the odds (probability) of membership in one of the groups, based on the combination of the predictor (45). Therefore in this study, prediction of the odds of proper hand washing could be measured based on the combination of independent variables as predictors.

Logistic regression also has no assumptions about the distributions of the variables. The variables do not have to be normally distributed, linearly related, or of equal variance within each group. It requires each respondent must be independent (45). Therefore in this study each respondent was asked only one time and there was no follow up.

CHAPTER IV

RESULTS

This study was conducted to describe the hand washing practice and the prevalence of proper hand washing among grade six elementary school students in Selat sub-district, Indonesia. Data were collected by self administered questionnaires in January and February, 2011, from 274 students in 7 schools. Because of inconsistent responses, 16 respondents were excluded, which left 258 ones for analysis.

The research aim was to describe hand washing practice and the prevalence of proper hand washing, ascertain and identify the socio-demographic characteristics, levels of knowledge, attitudes, subjective norms, perceived control, availability of proper hand washing facilities at school, and their relationships with proper hand washing. The research results are presented in 9 parts as follows :

- 4.1 Hand washing practice and proper hand washing
- 4.2 Socio-demographic characteristics
- 4.3 Knowledge about proper hand washing
- 4.4 Attitude toward proper hand washing
- 4.5 Subjective norms to proper hand washing
- 4.6 Perceived control to proper hand washing
- 4.7 Facilities of proper hand washing at schools
- 4.8 Association between independent variables and hand washing
- 4.9 The predictors of proper hand washing

4.1 Hand washing practice and proper hand washing

Table 4.1 shows the various hand washing practices at schools. There are 9 different ways of hand washing which were combined from two main activities, i.e., washing hands before eating and after visiting toilet, and three possible practices

such as washed hands by using water and soap, water only and not wash hands. Due to the Global Hand Washing campaign, those two critical times (before eating and after visiting the toilet) were considered of equal importance (7). Washing hands using soap was given the score 3 points, using water only 2 points, and not wash hands 1 points. The highest total score was for washing hands by using water and soap before eating and after visiting a toilet, because this is the best practice. The lowest score was for not washing hands in either situations, since this is the worst. Total scores for each of hand washing combination practice was calculated using the formula explained in Chapter 3.

After scoring, the 9 hand washing variations among the respondents were :

1. Respondents who washed hands using water and soap in both situation : before eating and after visiting toilet. This group was considered to follow the best practice and so –called proper hand washing group, and comprised 40.5% of all respondents (see Table 4.1 and Figure 1).
2. Respondents who washed hands using water and soap before eating, but used water only after visiting a toilet : 4.3% of all respondents.
3. Respondents who washed hands using water only before eating, but used water and soap after visiting a toilet : 3.5% of all respondents.
4. Respondents who did not wash hands before eating, but washed hands using water and soap after visiting a toilet : 2.7% of all respondents.
5. Respondents who washed hands using water only in both situations : before eating and after visiting a toilet : 23.7% of all respondents.
6. Respondents who washed hands using water and soap before eating, but did not wash hands after visiting a toilet : comprised 1.9% of all respondents.
7. Respondents who washed hands using water only before eating, but they did not wash hands after visiting a toilet : comprised 1.2% of all respondents.
8. Respondents who did not wash hands before eating, but washed hands using water only after visiting a toilet : 15.2% of all respondents.
9. Respondents who did not wash hands at all in either before eating or after visiting a toilet : 7.0% of all respondents.

Table 4.1 The nine combinations of hand washing at schools

Group No	Before eating		After visiting a toilet	Total score	n	%
1	Water and soap	+	Water and soap	6	104	40.5
2	Water and soap	+	Water only	5	11	4.3
3	Water only	+	Water and soap	5	9	3.5
4	Not wash hands	+	Water and soap	4	7	2.7
5	Water only	+	Water only	4	61	23.7
6	Water and soap	+	Not wash hands	4	5	1.9
7	Water only	+	Not wash hands	3	3	1.2
8	Not wash hands	+	Water only	3	39	15.2
9	Not wash hands	+	Not wash hands	2	18	7.0
				Total	257	100.0

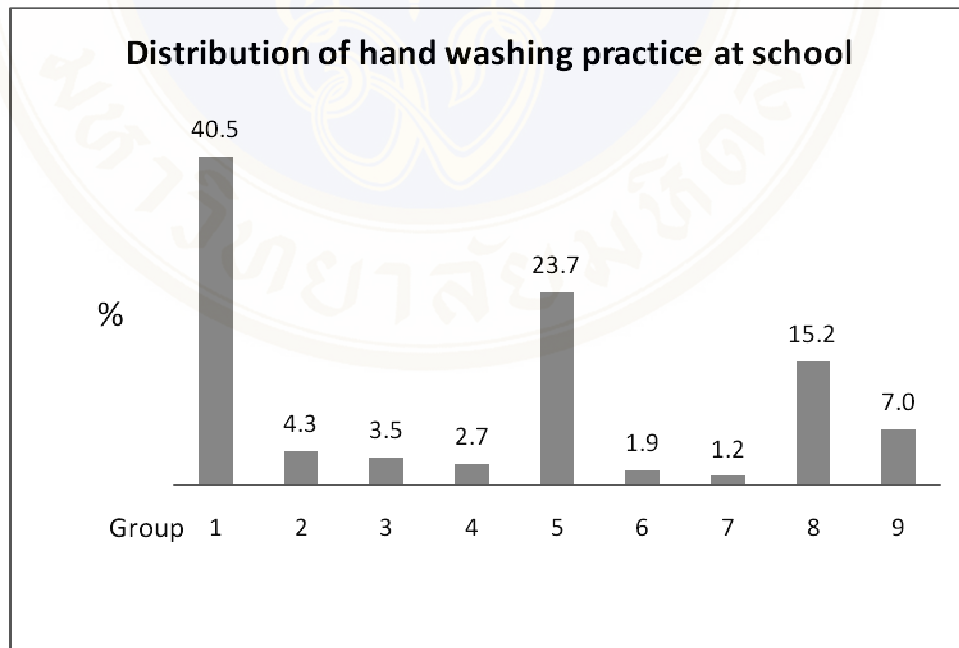


Figure 4.1 The distribution of hand washing practice at schools

From the distribution in Figure 4.1 , 40.5% of the respondents washed hands properly in both situations, this was the largest group . The second largest group (23.7%) comprised the respondents who washed hands using water only in both situations. The third largest group (15.2%) comprised the respondents who did not wash hands before eating, but washed hands using water only after visiting a toilet. The worst practice of hand washing (not washing hands in either critical situations) was practiced by 7.0% of the respondents.

Regarding proper hand washing definitions, proper hand washing is washing hands using water and soap at critical moments such as before eating and after visiting a toilet. Therefore, respondents with hand washing practice group 1 was considered into “PROPER” hand washing group . This is the best practice of hand washing, since respondents used water and soap for washing hands in both critical times. This group was 40.5% of total respondents.

Respondents with hand washing practice group 2 and 3, they did not do proper hand washing in both critical times. They did proper hand washing only in one critical times : before eating or after visiting toilet, and then using water only. Although respondents group 5 had total score 4 and this was less than group 2 and 3 (total score 5 respectively), they washed hands using water only in both situations. Therefore, these respondents in 2, 3 and 5 were considered as “LESS PROPER “ hand washing group. This group was 31.5% of total respondents.

Respondents with hand washing practice group 4 and 6, they washed hands using water and soap in only one critical time (before eating or after visiting toilet), but they did not wash hands before eating or after visiting toilet. Moreover, respondents with hand washing practice group 7 and 8 washed hands by using water only before eating or after visiting toilet, but they did not washed hands before eating or after visiting toilet. Therefore, these respondents with hand washing practices group 4, 6, 7, 8 were considered as “NOT PROPER” hand washing group. They had the same characteristics which they did not wash hands before eating or after visiting toilet, but they washed hands using water and soap or water only before eating or after visiting toilets. This group comprised 21.0% of total respondents.

The last one was the respondents who did not wash hands at all in both critical times, and this is the worst practice. Therefore they were considered as “NOT WASH HANDS” group, which was only 7.0% of total respondents.

The distribution of those groups is shown in Table 4.2 below :

Table 4.2 Grouping of hand washing at schools

Group of hand washing before eating and after visiting toilet	Number	Percent
Proper hand washing (no 1)	104	40.5
Less proper hand washing (no 2,3,5)	81	31.5
Not proper hand washing (no 4,6,7,8)	54	21.0
Not wash hands (no 9)	18	7.0
Total	257	100.0

According to the aim of this study, so for the association and further analysis, the “NOT WASH HANDS” group was included into “NOT PROPER” hand washing. Although this group did not wash hands at all, but for analysis this was included into the “NOT PROPER” because the size of the group was very small. Therefore the three final groups of hand washing in this study for association analysis are as shown in Table 4.3 below.

Table 4.3 Final group of hand washing

Group of hand washing before eating and after visiting toilet	Number	Percent
Proper hand washing (no 1)	104	40.5
Less proper hand washing (no 2,3,5)	81	31.5
Not proper hand washing (no 4,6,7,8, 9)	72	28.0
Total	257	100.0

4.2 Socio demographic characteristics

The socio demographic factors of the grade six elementary school students in Selat sub-district were identified for the purposes of this study as gender, religion, ethnicity, role at home, and parental occupation. Table 4.4 shows the socio demographic characteristics of the 258 respondents.

Of the 258 respondents, 53.5 % were boys and 46.5 % girls. The mean of age was 11.5 years, with more than half (56.6%) were 11 years, 37.2% more than 11 years, and the rest were less than 11 years (6.2%). Most of them were Muslim (85.2%), and the rest were Christian (12.3%) and Catholic (2.5%). With regard to ethnicity, more than half (58.4%) were ethnic Dayaknese, 22.6% were Banjarnese, 13.2% Javanese, and 1.95% were Sundanese. Other minor ethnic groups such as Sumatranese and Sulawesinese comprised 3.9%.

Regarding their roles at home, almost quarter of respondents helping parents preparing food only (24.0%), taking care sibling only (24.0%), and other only (27.1%). The rest respondents had combination between three of those roles.

Around one third (35.0%) of the respondents' parents were government workers, 63.8% were non government workers, and 1.2% were unemployed.

Table 4.4 Socio demographic characteristics

Characteristics	Number	Percent
	n = 258	
Gender		
Boys	138	53.5
Girls	120	46.5
Age		
< 11 years	16	6.2
11 years	146	56.6
>11 years	96	37.2
Mean = 11.5 Min. = 10 Max.=17		

Table 4.4 Socio demographic characteristics (cont.)

Characteristics	Number	Percent
	n = 258	
Religion		
Islam	218	85.2
Christian	36	12.3
Catholic	2	2.5
Ethnicity		
Dayaknese	110	58.4
Banjarnese	58	22.6
Javanese	34	13.2
Sundanese	5	1.9
Other	10	3.9
Role at home		
Taking care sibling only	62	24.0
Prepare food only	62	24.0
Taking care sibling and prepare food	15	5.8
Taking care sibling and Other	10	3.9
Prepare food and Other	25	9.7
Taking care sibling and prepare food and Other	3	1.2
No role	11	4.3
Other only	70	27.1
Cleaning house	55	21.3
Not specify	13	5.0
Helping parents at market	2	0.8
Parental occupation		
Government workers	90	35.0
Civil servant	64	24.8
Police / army	20	7.9
Government company	6	2.3

Table 4.4 Socio demographic characteristics (cont.)

Characteristics	Number n = 258	Percent
Non Government workers	164	63.9
Merchant	50	19.4
Farmer	47	18.2
Laborer	22	8.5
Driver	10	3.9
Miner	6	2.3
Service shop	5	1.9
Other	7	2.7
Not specify	18	6.9
Unemployed	3	1.2

4.3 Knowledge about proper hand washing

Table 4.5 below shows that less than half of the respondents (47.5%) had high knowledge levels (47.5%) since they could correctly answer more than four questions; more than half (52.5%) had low levels of knowledge and were able to answer correctly equal and less than four questions. The maximum score was 6, minimum score 3, and the median was 4.

Table 4.5 Level of knowledge about proper hand washing

Level of knowledge	n=258	Percent
High (total score > median)	122	47.5
Low (total score ≤ median)	135	52.5
Max. total score = 6	Min. total score = 3	Median = 4 QD = 0.5

Table 4.6 shows the number and percentage distribution of respondents who correctly answered the knowledge questions about proper hand washing. Less than one fifth of the respondents (16.1%) correctly answered the definition of proper

hand washing, which is washing hands not only with clean water. Almost all of the respondents could correctly answer that the critical time for washing hands is before eating and after visiting the toilet (99.2% and 93.7% respectively). Most (98.8%) also correctly answered that the advantage of washing hands is disease prevention. When asked about diseases which can be prevented by washing hands, about half (58.4%) correctly answered that common cold can be prevented by hand washing and three quarters (79.8%) correctly answered that the diarrhoea can be prevented by hand washing.

Table 4.6 Number and percentage of respondents by correct answers to questions about knowledge of proper hand washing

Questions about Knowledge	n	Correct answer
		%
1. Proper hand washing is washing hands using clean water	254	16.1
2. Critical time for hand washing is before eating	255	99.2
3. Critical time for hand washing is after visiting the toilets	252	93.7
4. The advantage of hand washing is disease prevention	257	98.8
5. Common cold can be prevented by proper hand washing	250	58.4
6. Diarrhea can be prevented by proper hand washing	252	79.8

4.4 Attitude toward proper hand washing

Table 4.7 shows the number and percentage of respondents by level of attitude. Based on total score of attitude towards proper hand washing, the respondents were divided into three groups by using the 25 and 75 percentiles, which were scores of 11 and 14 respectively. The respondents who had a total attitude score of more than 14 were considered to have positive attitudes; those with a total score from 11 to 14 neutral attitudes; and those with a total score of less than 11 negative attitudes. The minimum score was 7 and maximum score was 15.

Table 4.7 shows that 21.4% of respondents had positive attitude; 67.9% neutral attitudes; and 10.7% negative attitudes.

Table 4.7 Number and percentage of respondents by level of attitude towards proper hand washing

Level of attitude	Number (n= 258)	Percent
Positive (total score > 14)	54	21.4
Neutral (11 ≤ total score ≤ 14)	171	67.9
Negative (total score < 11)	27	10.7
Min. = 7 Max. = 15	Median = 13	QD = 1.5

Table 4.8 below shows the number and percentage of respondents by each question about attitude to proper hand washing. Most of the respondents (79.4%) disagreed that washing hands or not washing hands before eating was the same, and 85.0% disagreed that proper hand washing wastes water and soap. Approximately half of the respondents (49.4%) also disagreed that proper hand washing using water and soap needs too much time. Almost half (47.9%) disagreed that washing hands is more important for people in villages than in cities. Majority of respondents (85.9%) preferred having friends with someone who like washing hands.

Table 4.8 Percentage of respondents by answer to each questions about attitude to proper hand washing

Statements	n	Agree (%)	Neutral (%)	Disagree (%)
1. Washing hands or not washing hands before eating, is the same for me	257	9.7	10.9	79.4
2. Washing hands is more important for people in village than in city	257	20.6	31.5	47.9
3. Proper hand washing using water and soap needs much time	257	31.1	19.5	49.4
4. Proper hand washing wastes water and soap	254	5.9	9.1	85.0
5. I prefer being friends with someone who like washing hands	256	85.9	9.0	5.1

4.5 Subjective norms regarding proper hand washing

Regarding subjective norms to proper hand washing, the respondents were classified into three groups based on 25 and 75 percentiles of total scores. The 25 percentile was 21 scores and the 75 percentile was 24 scores. The respondents who had total scores of 24 or more were considered to have positive subjective norms; those with total scores between 21 and 24 neutral subjective norms; and those with total scores 21 or less regarded as negative subjective norms. Respondents with positive subjective norms regarded to higher positive motivations to live up to others' expectations. This group comprised 26.0% of the respondents. Conversely, respondents with negative subjective norms considered less beliefs about the expectations of others and negative motivations to live up to others' expectations. This group was 32.9%. Approximately 41% had neutral subjective norms (41.1%). The result is shown in Table 4.9.

Table 4.9 Number and percentage of respondents by level of subjective norm to proper hand washing

Level of subjective norms	n=258	Percent
Positive (total score \geq Q3)	67	26.0
Neutral (Q1 < total score < Q3)	106	41.1
Negative (total score \leq Q3)	85	32.9
Min. = 13 Max.= 24	Median = 22	QD = 1.5

Table 4.10 shows the number and percentage of respondents by subjective norms to proper hand washing. Most (81.4%) agreed that they washed hands because they followed teachers' advice. However, nearly similar proportions agreed and disagreed that they washed hands because they followed their buddies (33.6% and 35.4% respectively).

Almost all (98.5%) agreed that their parents expected them to wash hands before eating. Most (94.6%) also agreed that teachers expected them to do so. Meanwhile, expectations of friends to wash hands before eating was agreed by nearly three quarters (73.6%) of total respondents.

With regard to washing hands after visiting a toilet, most (92.6%) agreed that their parents expected them to do so; likewise, 88.3% agreed that teachers had similar expectations and 73.3% agreed that friends had such expectations.

Table 4.10 Percentage of respondents by questions about subjective norms regarding proper hand washing

Statements	n	Agree (%)	Neutral (%)	Disagree (%)
1. I wash my hands because I follow my teacher's advice	258	81.4	13.9	4.7
2. I wash my hands at school because I follow my buddies	257	36.6	28.0	35.4
3. My parents expect me to wash hands using clean water and soap before eating	258	98.4	1.2	0.4
4. My teachers expect me to wash my hands using clean water and soap before eating	258	94.6	3.5	1.9
5. My friends expect me to wash my hands using clean water and soap before eating	258	73.6	21.7	4.7
6. My parents expect me to wash hands using clean water and soap after visiting the toilets	257	92.6	4.3	3.1
7. My teachers expect me to wash my hands using clean water and soap after visiting the toilets	257	88.3	10.9	0.8
8. My friends expect me to wash my hands using clean water and soap after visiting the toilets	258	73.3	22.5	4.2

4.6 Perceived control of proper hand washing

Perceived control was categorised into two groups based on median of total score, which was equal to 16. The respondents who had total scores more than 16 were considered to have high levels of perceived control; those with total scores of 16 or less were low level of perceived control. Respondents with high levels of perceived control believed washing hands was easy to do. This group comprised 49.6% of the respondents. Respondents with low levels of perceived control thought that washing hands was difficult to do. This group was larger and comprised 50.4% of respondents. This is shown in Table 4.11 below.

Table 4.11 Number and percentage of respondents by level of perceived control to proper hand washing

Level of Perceived Control	Number (n=258)	Percent
High level (total score > median)	128	49.6
Low level (total score ≤ median)	130	50.4
Min. = 9 Max.=18	Median = 16	QD = 16.5

Table 4.12 shows the number and percentage of respondents by each question of perceived control regarding proper hand washing. Around three quarters of the respondents (77.1%) did not agree with statements that washing hands using clean water and soap after visiting the toilet at school was impossible. Approximately three quarters of the respondents (72.5%) also did not agree that washing hands at school was difficult to do because there was not enough clean water and soap. Most (81.8%) also did not agree with statements that washing hands using clean water and soap before eating at school was difficult. Less than a half of the respondents (48.1%) did not agree that they hesitated to ask friends to wash hands together.

On the other hand, most (88.8%) agreed that they washed their hands properly before eating at school because they wanted to do, and most (91.5%) were not ashamed to wash their hands properly after visiting a toilet.

Table 4.12 Percentage of respondents by each question regarding perceived control of proper hand washing

Statement	n = 258		
	Agree (%)	Neutral (%)	Not agree (%)
1. Washing hands using clean water and soap after visiting the toilet at school is impossible	7.8	15.1	77.1
2. Washing hands using clean water and soap before eating at school is difficult to do	6.2	12.0	81.8
3. I wash my hands using clean water and soap after using the toilet because I want to	88.8	9.3	1.9
4. I am not ashamed to be student who wash hands using soap and clean water after using the toilet	91.5	5.0	3.5
5. I hesitate to ask my friends washing hands together	18.2	33.7	48.1
6. Washing hands at school is difficult to do because there is not enough clean water and soap	7.0	20.5	72.5

4.7 Proper hand washing facilities

As shown in Table 4.13 , 65.9% of the respondents could find clean water for washing hands at a hand washing stands, 21.7% at toilets, and 8.1% at canteens. Only 2.3% were unable to access clean water at their schools.

Table 4.13 Availability of clean water for washing hands at schools

Places where students can find clean water for washing hands	Number	Percent
Toilet	56	21.7
Hand washing stand	170	65.9
Well	3	1.2
Canteen	21	8.1
Other	2	0.8
There is no clean water	6	2.3

From Table 4.13, the respondents then were considered into two categories of availability of clean water at hand washing stand : available and not available, for further analysis. This is shown in table 4.14 below :

Table 4.14 Availability of clean water at hand washing stand

Availability of clean water at hand washing stand	n	Percent
Yes	170	65.9
No	88	34.2

Table 4.15 shows the number and percentage of respondents by the availability of soap for washing hand, 68.5% of the respondents could find soap for washing hands at hand washing stands, 6.6% in their classes, 3.9%% in toilets, and 0.8% in canteen. However, 19.8% stated that there was no soap for hand washing at their schools.

Table 4.15 Availability of soap for washing hands at schools

Places where students can find soap for washing hands	Number	Percent
Toilet	10	3.9
Class	17	6.6
Hand washing stand	176	68.5
Canteen	2	0.8
Other	0	0.4
There is no soap	51	19.8

The result above then was considered into two categories of availability of soap at hand washing stand : available and not available, for further analysis. Therefore the categories is shown as Table 4.16 below :

Table 4.16 Availability of soap at hand washing stand

Availability of soap at hand washing stand	n	Percent
Yes	176	68.5
No	80	31.5

Table 4.17 shows the facilities of hand washing at schools, less than half of the respondents (40.7%) identified there were a hand wash basins at their schools, 33.0% said there were water containers, and 16.7% said there were buckets; 4.3% of the respondents stated that there were no hand washing stands at their schools.

Table 4.17 Hand washing stand facilities at school

Hand washing stand at schools	Number	Percent
Water container*	85	33.0
Hand wash basin*	105	40.7
Bucket	43	16.7
Other	14	5.4
No hand washing stand	11	4.3

*Considered as standard hand washing stand

Water container and hand wash basin were considered to be standard hand washing stand, because the shape of those hand washing stands could flow water easily compare with bucket. In the school with buckets , water could not flow easily to be used with students to wash their hands. Therefore, number of standard hand washing was $85 + 105 = 190$ (73.7%). Table 4.18 below shows the frequency of availability of this hand washing stand :

Table 4.18 Availability of hand washing stand at schools

Availability of hand washing stand	n	Percent
At schools		
Yes	190	73.7
No	68	26.3

4.8 Association between independent variables and hand washing

Chi square analysis

Chi square test was used to examine the relationship between two categorical variables (45, 46). Chi square analysis was used in this study to test the association between independent variables and hand washing. All independent variables which categorical data, and also dependent variables as categorical data, were used in this analysis.

Tables 4.19 shows no statistically significant association was found between gender, religion, ethnicity, parental occupation, and role at home preparing food only, with hand washing.

It was revealed that more girls (44.5%) than boys (37.0%) washed their hands properly . Girls more likely to washed hands properly than boys (Crude OR = 1.37).

Proper hand washing was more among Muslim students (41.7%) than non-Muslim students (35.1%).

Regarding ethnicity, the proportion was nearly similar which 43.0% of non Dayaknese students washed their hands properly compared with 38.9% of Dayaknese students.

Students with parents as government workers (42.7%) washed hands properly more than students with parents as non government workers (39.5%). There was weak association between parental occupation and hand washing practice, but not significant (p value = 0.058).

Role at home preparing food only was considered to the most important role because it was related to proper hand washing. Therefore in Chi square test, respondents were divided into two groups : preparing food only and not preparing food only. The result showed that students with role preparing food only at home less likely to wash hands properly than those who did not have this role .

Table 4.19 Association between socio demographic characteristics and proper hand washing

Socio demographic factors	n	Hand washing practice ^a			Crude OR	95% CI	P value
		Not Proper (%)	Less Proper (%)	Proper (%)			
Gender							
Boy	138	29.7	33.3	37.0	0.467	0.83-2.26	0.467
Girl	119	26.1	29.4	44.5			
Religion							
Islam	218	26.6	31.7	41.7	0.548	0.64-2.74	0.548
Non Islam	37	35.1	29.8	35.1			
Ethnicity							
Dayaknese	149	30.2	30.9	38.9	0.576	0.51-1.40	0.576
Non Dayaknese	107	24.3	32.7	43.0			

Table 4.19 Association between socio demographic characteristics and proper hand washing (cont.)

Socio demographic factors	n	Hand washing practice ^a			Crude OR	95% CI	P value
		Not Proper (%)	Less Proper (%)	Proper (%)			
Parental occupation							
Gov. worker	89	34.8	22.5	42.7	0.058	0.68-1.94	0.058
Non gov. worker	167	24.6	35.9	39.5			
Role at home prepare food only							
Yes	62	25.8	41.9	32.3	0.116	0.34-1.15	0.116
No	195	28.7	28.2	43.1			

^aThe two categories “Less Proper” and “Not Proper” hand washing are as the reference

OR = Odds ratio

CI = Confidence interval for OR

Table 4.20 shows the association between knowledge, attitude, subjective norms, perceived control and hand washing. Regarding level of knowledge, students having low levels of knowledge more likely to wash hands properly than students having high knowledge levels. Students with high knowledge were less likely to wash hands properly than those with low knowledge. Although statistically there was significant association between hand washing and level of knowledge (p-value = 0.007), the result was illogical and this will be discussed in Chapter 5.

Students with positive attitude were nearly six times more likely to wash hands properly than students with negative attitude. Chi square test showed that there was a statistically significant association between level of attitude and proper hand washing practice (p-value = 0,001).

Regarding subjective norms, the result showed that students with neutral subjective norms were about two times more likely to wash hands properly more than

those with negative subjective norm, but there was no significant statistical association between subjective norms and hand washing.

A higher proportion of students with high levels of perceived control (54.3%) washed their hands properly than students with low levels of perceived control (26.9%). Students with high perceived control about three times more likely to wash hands properly than those with low perceived control (95% CI = 1.92-5.44). There was a significant statistically association between hand washing and perceived control (p value = < 0.001).

Table 4.20 Association between knowledge, attitude, subjective norms, perceived control and hand washing

Variables	n	Hand washing practice ^a			Crude OR	95% CI	P value
		Not Proper (%)	Less Proper (%)	Proper (%)			
Knowledge							
High	122	22.9	41.0	36.1	0.71	0.43-1.16	0.007*
Low	135	32.6	23.0	44.4	1.00		
Attitude							
Positive	54	16.7	20.4	62.9	5.95	2.06-17.21	0.001*
Neutral	170	32.4	32.4	35.2	1.91	0.73-4.99	
Negative	27	25.9	51.9	22.2	1.00		
Subjective norms							
Positive	66	22.7	34.9	42.4	1.42	0.73-2.76	0.293
Neutral	106	24.5	31.1	44.4	1.54	0.85-2.77	
Negative	85	36.5	29.4	34.1	1.00		

Table 4.20 Association between knowledge, attitude, subjective norms, perceived control and hand washing (cont.)

Variables	n	Hand washing practice ^a			Crude OR	95% CI	P value
		Not Proper (%)	Less Proper (%)	Proper (%)			
Perceived control							
High	127	17.3	28.4	54.3	3.23	1.92-5.44	<0.001*
Low	130	38.5	34.6	26.9	1.00		

*Significant at $\alpha < 0.05$

^a The two categories “Less Proper” and “Not Proper” hand washing are the reference

OR = Odds ratio

CI = Confidence interval for OR

The association between facilities of hand washing at schools and hand washing are presented in Table 4.21. The facilities included availability of clean water and soap at hand washing stand, and hand washing stand.

When soap was available at hand washing stand , 35.7% of the students washed their hands properly, compare to when soap was not available there (12.2%). When soap was available at hand washing stand, students were 8 times more likely to wash hands properly (95% CI = 4.05-17.25)

Similar with the availability of clean water at hand washing stand, more respondents washed hands properly (54.4%) when clean water was available than those if clean water was not there (13.6%). Students were about 8 times more likely to wash hands properly when clean water was available at hand washing stand (95% CI = 3.83-14.94).

Regarding hand washing stand at schools, respondents washed hands properly (55.0%) more when hand washing was available. No respondents washed hands properly when hand washing stand was not available.

There was significant association between availability of soap and clean water at hand washing hand stand; hand washing stand; and hand washing at schools (p value <0.001 each).

Table 4.21 Association between facilities and hand washing

Variables	n	Hand washing practice ^a			Crude OR	95% CI	P value
		Not Proper (%)	Less Proper (%)	Proper (%)			
Availability of water at hand washing stand							
Yes	169	21.9	23.7	54.4	7.57	3.83-14.94	<0.001*
No	88	39.8	46.6	13.6	1.00		
Availability of soap at hand washing stand							
Yes	175	22.3	24.0	35.7	8.36	4.05-17.25	<0.001*
No	82	40.2	47.6	12.2	1.00		
Availability of hand washing stand at school							
Yes	189	20.6	24.3	55.0	^b		<0.001*
No	68	48.5	51.5	0.0	^b		

*Significant at $\alpha < 0.05$

^a The two categories "Less proper" and "Not proper" hand washing are the reference

^b OR could not be calculated due to insufficient sample size

OR = Odds ratio

CI = Confidence interval for OR

Correlation analysis

Table 4.22 shows that there were significant and positive correlation between total score of attitude, subjective norms, perceived control and hand washing practice (p value < 0.05). The respondents who had higher attitude, subjective norm and perceived control scores had higher hand washing practice scores. However, knowledge had a negative correlation with hand washing practices and was not significant. The scatterplot graphs of hand washing total score and these independent variables are shown in Appendix B.

Table 4.22 Correlation coefficients of variables

Variables	Hand washing	Knowledge	Attitude	Subjective Norms	Perceived control
Hand washing	1				
Knowledge	-0.061	1			
Attitude	0.210*	0.155*	1		
Subjective norms	0.148*	-0.036	-0.023	1	
Perceived control	0.274*	0.175*	0.474*	0.045	1

* p value < 0.05

4.9 Predictors of proper hand washing

Multiple logistic regression

Multiple logistic regression was used to select the independent variables which were statistically significant as predictors to proper hand washing. Table 4.23 shows the model of multiple logistic regression for proper hand washing .

Based on the result of Chi square test , only variable knowledge, attitude, perceived control, availability of clean water, soap, and hand washing stands, were significantly associated with proper hand washing . These significant variables were further analysed by using multiple logistic regression. Gender had no significant association with hand washing, but it was considered as suspected variable, therefore it was included in further analysis together with other significant ones.

When those significant variables and gender were analysed by multiple logistic regression, it was revealed that when clean water was available at hand washing stands, students were four times more likely to wash their hands properly. Similar, when soap was available at hand washing stands, students were about six times more likely to wash their hands properly. These two variables were significant predictors of hand washing when analysed together with other variables.

Students with positive attitudes were two times more likely to do proper hand washing, and significant also as a predictor of hand washing. The multiple logistic regression could not analyze the availability of hand washing stands due to insufficient sample size.

Table 4.23 The model of multiple logistic regression of proper hand washing

Factors	Proper hand washing ^a		
	Adjusted OR	95% CI	P value
Gender			
Girls	1.50	0.82-2.75	0.193
Boys	1.00		
Knowledge			
High	0.64	0.35-1.18	0.153
Low	1.00		
Attitude			
Positive	2.23	1.03-4.85	0.042*
Negative & Neutral	1.00		
Perceived control			
High	1.59	0.84-3.01	0.155
Low	1.00		
Availability of water at hand washing stand			
Yes	4.06	1.84-8.97	0.001*
No	1.00		

Table 4.23 The model of multiple logistic regression of proper hand washing
(cont.)

Factors	Proper hand washing ^a		
	Adjusted OR	95% CI	P value
Availability of soap at hand washing stand			
Yes	5.52	2.33-13.03	<0.001*
No	1.00		

*Significant at $\alpha < 0.05$,

^a The category “Not proper hand washing” is the reference

OR = Odds ratio

CI = Confidence Interval for OR

CHAPTER V

DISCUSSION

There were 258 grade six students from 7 elementary schools in Selat sub-district completed self administered questionnaires between 19 January and 1 February 2011. The results of this study are :

- There were 9 variations of hand washing practice and 40.5% of all respondents washed hands properly before eating and after visiting a toilet
- There were no significant associations between socio-demographic factors or subjective norms and proper hand washing
- There were significant associations between attitude, perceived control, availability of clean water and soap at hand washing stands, and proper hand washing at schools.

According to both the result and the methodology used in this study, the discussion part is arranged into 2 sections : the research results and the research methodology

5.1 Discussion of the research results

5.1.1 Hand washing at schools

There were 9 variations of hand washing at schools. For each two critical activities (i.e. before eating and after visiting a toilet), respondents either washed hands using water and soap, water only and or not at all. This study revealed that 40.5% of the respondents washed their hands properly using clean water and soap before eating and after visiting a toilet.

This can be compared with the study by Lopez et al. in Colombia (11), in which a self-completed anonymous questionnaire was administered to 2042 grade

eight students, 33.6% of respondents practiced proper hand washing, which was defined as washing hands “always” or “very often” with soap and clean water before eating and after using a toilet. The proportion of proper hand washing in present study was higher than in Lopez’s study perhaps because that study used different and stricter criteria. The present study, the criteria “always” or “very often” were not used. However, when this criteria is applied, only 29.9% of the respondents (77 of 257) always washed their hands properly before eating and after visiting a toilet (see Table B1 in the Appendix B). The finding in this study was also different from a study among adolescents in Turkey by Yalcin, which found that 42.4% of them had proper hand washing which defined as washing hands equal or more than 20 seconds, using water and soap, and hand washing frequencies scores were more than 20 (hand washing in six conditions such as after toilet, before eating, after eating, entering home, clean house, after sneezing/coughing) (29).

Vivas et al. found that the prevalence of hand washing with soap in different settings in 7 developing countries were still low, ranging from 0-20% (9). These findings used structured observation, therefore the results were more reliable than self reported using self administered questionnaire. Therefore, if compared to the present study and previous studies mentioned above, which used self administered questionnaire, it is understandable that the prevalence of washing hands with soap from Vivas’s et al. study was lower.

The second most common practice in this study was washing hands using water only at both critical times. This was done by nearly a quarter (23.7%) of the respondents. A study in Ethiopia by Vivas found that 63.8% of school children washed hands by water only (30). Other study by Soerachman in Indonesia revealed that 8.9% of adolescent students never / rarely used soap when washing their hands during the past 30 days (27). A baseline study for a large intervention of hand washing behavior in rural Bangladesh published in 2008 also found that the respondents in households with children under 5 years of age, generally only rinsed their hands with water in both critical times (31). Worldwide, washing hands by water only are commonly practiced (7).

The third most common hand washing practice (15.2%) was not wash hands before eating, but washing hands using only water after visiting a toilet. This finding may due to automatic reaction when contacted with feces was dirtier and

needed to wash hands more than before eating. A behavior study about hand washing with soap in Peru by Prisma in 2004 of mothers and children aged 5-11 years also suggested that the automatic reaction to the odor or appearance of feces motivated hand washing after toilet use more than the knowledge of the importance of hand washing before eating (47). Tran D' study in a Pacific also found that students washed hands after toilet more than before eating (39).

Not washing hands at all at both critical times, the worst hand washing , was the fourth most frequent (7.0%) hand washing practice. Soerachman's study of Indonesia Global School-Based Health Survey (GSHS) in 2007 among adolescents aged 13-15 years revealed that 2.6% of them were never or rarely washed hands after using toilet in past 30 days; and 4.3% of them also never or rarely washed hands before eating in the past 30 days (27).

The respondents confessed honestly about their hand washing habit. Since this study used respondent's answer in questionnaire sheets, it was possibly to assume that in real situation the students who did not wash hands at all in both critical time would be higher than 7.0%. Conversely, it is also possible that respondents they washed hands properly were fewer than 40.5%. A study in Kenya found that out of roughly 4,900 children who voted, more than half reported washing their hands in school on the previous day. However, in the observations of almost 1000 children using the toilet, less than one-fourth were observed to actually wash their hands after doing so (28). A study in Bangladesh about hand washing behavior in 2008 suggests that the study subjects reported washing their hands more frequently than they were observed to. Therefore, this finding demonstrates that asking people about their hand washing behavior may not provide a valid assessment (31). Further study to observe the students' actual hand washing practices is recommended.

The findings in the present study (i.e. that only 40.5% of the respondents claimed to wash their hands properly, and only 29.8% stated that they always washed hands properly before eating and after visiting toilets) , suggests that proper hand washing is not given a high priority at schools, and that this should be a matter of greater concern.

Table B4 in the Appendix B shows the reasons for not washing hands. These excuses were forgetfulness (81.78%), followed by laziness (13.18%), no time

(4.26%) and not interested (0.78%). Nearly eight per cent cited lack of clean water and 8.91% cited lack of soap. During data collection, it was observed that only 1 of 7 schools with reminder cues about healthy behavior in the class (see Table B5 in the Appendix B). So, this could indicate that the most frequent reason for not washing hands was forgetfulness. Schools should be more concerned about this by displaying appropriate reminders cues, so that students will always remember to wash their hands properly.

Reminders for proper hand washing are important for students. According to the Global Hand Washing Day campaign, children are the target of campaign, since they are likely to be the most effective agents for behavior change. The elementary school period is the most opportune time for development. By teaching children at a young age, they are better able to understand and will form enduring positive attitudes lasting into adulthood, and can become effective agents for behavioral change in families and communities.

This present study also revealed that parents (91.9%) were the most frequently cited as persons who reminded respondents about proper hand washing, followed by health workers (50.0%), and then teachers (34.9%) (see Table B2 in the Appendix B). This findings is quite similar to that of Lopez et al who found that the most often cited sources of information about hygiene and hand washing were parents (88.5%), followed by school teachers(66.7%), and then the media (56.8%) (11). This finding shows that the role of parent was important to inculcate positive behavior which would endure positive habits lasting into adulthood. This was also supported by finding that students who washed hands properly at home were 9 times more likely to do so at schools (see Table B7 in the Appendix B). Therefore, it is reasonable to expect that if this behavior become automated behavior at home, and the schools setting also support students to do so, students then become the effective agents for health improvement within home, schools and communities.

In the present study teachers were only mentioned by one third of the respondents compared to Lopez et al (two thirds of respondents). It means teachers were less influential in promoting proper hand washing than health workers, since most of the respondents (85.3%) answered that the activities at schools which related to hand washing came from health education by health workers, and more than one third (34.9%) said it was by teachers (see Table B3 in the Appendix B).

On the basis of this present study, therefore, teachers should be more involved in promoting proper hand washing at schools, since they are close to and interact with students' learning activities there.

Many creative ideas to promote hand washing at schools. Such as a study in Senegal among school children, which conducted hand-washing fun fairs, song and drawing competition, and letter writing campaign. This study also found that children were really keen to have nice smelling hands and they preferred the fragrant beauty soap to the odorless soap, and they enjoyed trying different colored and shaped soaps, which encourage them to use soap to wash their hands (16). Another study in urban Utah among elementary school children also found that the two intervention : involved verbal cue to action coupled with teacher modeling of hand hygiene; and involved teacher cue to action, hand hygiene education, and an opportunity for children to see the effectiveness of their hand hygiene efforts; significantly contributed to an increase in hand washing rates among children (48). These examples can be used to promote hand washing at schools by adjusted with local situation.

5.1.2 Association between socio demographic characteristics and hand washing

In this study there was no significant association between hand washing and socio demographic characteristics.

Gender and hand washing

This study revealed that more girls washed hands properly before eating and after visiting a toilet than boys, but there was no association between gender and proper hand washing. Similarly, Lopez' study in Colombia found no association between gender and hand washing (11).

Contrary to a study of hygiene behavior of adolescents in the Pacific, girls reported significantly more frequent optimal hygiene practices (including hand washing before eating and after visiting a toilet) than boys. Gender was significant as predictor of hygiene behavior when adjusted with other variables (39). Johnson et al also suggested that higher female compliance is associated with their tendency to practice socially acceptable behaviors (49). Yalcin SS et al. in their research about

hand washing and adolescents in 7 schools in Turkey, found that in being female , living at home, high knowledge level, and attending urban schools were associated with proper hand washing (29).

The lack of association between gender and hand washing in this study may have been due to younger students have the same tendency between boys and girls in practicing socially acceptable behaviors.

Religion and hand washing

This study found that higher proportion of Moslem respondents washed their hands properly (41.7%) than non Moslem students (35.1%), but there was no association between religion of respondents and hand washing at schools. This finding was different from that of Curtis VA et al. in their review of qualitative research in eleven countries , which found that religion was relevant to hand washing with soap (12). Allegranzi et al. found that in health care workers, both inherent and elective hand hygiene practices were deeply influenced by cultural and religious factors. Islam places great emphasis on cleanliness in both physical and spiritual aspects, and the Qur'an (the holy book) gives clear instructions as to how this should be carried out (41).

Unfortunately, there is no comparable research data about the impact of religious norms on hand hygiene practice among elementary students.

The possible reason for no association between religion and hand washing in this study may due to the respondents (elementary school students) were too young to understand and have engagement with their religion's values. However, Allegranzi et al. said that starting in childhood, the inherent nature of hand hygiene, which is strongly influenced by religious habits and norms in some populations, could be shaped in favor of an optimal elective behavior toward hand hygiene (41).

Ethnicity and hand washing

More non Dayaknese students washed hands properly (43.0%) than Dayaknese students (38.9%). This study revealed that there was no significant association between ethnicity and hand washing. No previous studies have evaluated hand washing by ethnic groups among elementary students.

Anderson et al found that among college students in Texas, African-American students had a significantly a higher rate of hand hygiene practice compared with Caucasian, Asian and “other” students (40).

Banjarnese students were one fifth of total respondents, and this ethnic closes to Moslem culture. In Moslem culture, left hand is consider as “unclean” and reserved solely for “hygiene” reasons, with the right hand used for offering, receiving, eating and gesticulating (41).

A possible reason for no significant association between ethnicity and hand washing in this study may be that the respondents were too young to understand and have engagement with ethnic values. There was no literature about hand hygiene by ethnic culture in Indonesia.

Parental occupation and hand washing

Regarding parental occupation, Tran D et al. in their study in the Pacific about hygiene behavior of adolescent found that certain types of frequent hygiene behavior (tooth brushing and washing hands before eating and after visiting a toilet) were significantly associated with parental occupation, when adjusted with other variables. Students whose parents were office workers and manual laborers were more likely to report performing tooth brushing and hand washing after toileting than those whose parents worked at home or did not work (39).

This study did not choose parental education as independent variable because it was assumed that most of elementary students would not understand their parents’ education, but that they would better understand about their parents’ occupation. On the other hand, parental occupation was assumed to be associated with students’ hand washing habits. In Kapuas district, government workers are assumed to enjoy higher social status than non government workers. In practice, it has been observed and reported by teachers that students whose parents were government workers were more likely to be cleaner and smarter in appearance than those whose parents were non- government worker. Therefore it was assumed that parents who were government workers would be more concerned about their children’s education and health, including hand washing practice.

Although this study found that respondents (42.7%) whose parents were government workers washed hands properly more than those with non government workers (39.5%), there was no significant association between parental occupation (government or non government worker) and hand washing. It may be due to in school setting, the respondents with parental as a government workers or non government workers had the same chance to do hand washing.

Role at home preparing food only and hand washing

This present study found that there was no association between role at home helping parents by preparing food and hand washing. Lopez et al. also found no significant association between roles of students at home such as taking care younger sibling or preparing food and proper hand washing (11). There was no significant association in this present study perhaps because the roles at home helping parents by preparing food was not the main role of students, so this role did not influence their hand washing behavior.

5.1.3 Association between knowledge and hand washing

This study found that students with high levels of knowledge were less likely to wash hands properly than those with low levels of knowledge, and there was a significant association between level of knowledge and hand washing practice (p value = 0.007). However, the level of knowledge did not reflect their behavior, since students with low level of knowledge washed hands properly more than those with high knowledge levels. Correlation test also showed that there was negative correlation between total score of knowledge and hand washing practice. Although Chi square showed that there was significant association between knowledge and hand washing, this finding was illogical.

Lopez et al. found that students' knowledge was not associated with hand washing intentions (11). AP Vivas et al. in their study about knowledge, attitudes and practices of hygiene among school children in Angolela, Ethiopia, found that although 76.7% of students reported that washing hands after defecation was important, only 14.8% reported actually following this practice (30). A formative study of school children in Senegal found that the respondents knew all about the health problems

associated with not washing their hands, but they did not generally wash their hands with soap (16).

In this study, the illogical findings of the knowledge may due to knowledge did not always relate to hand washing practice, so knowledge did not reflect the actual practice. The knowledge part of the questionnaire may also have been too easy and was not reliable to measure their knowledge. Further explanation about testing the reliability of the knowledge part can be found in the research methodology discussion.

It is interesting when found that only 16.1% of respondents answered correctly when they were asked question in knowledge part : “Proper hand washing is washing hands using clean water”. In other hands, respondents who confessed of doing proper hand washing was 40.5%. This contradiction may due to students actually did not understand what proper hand washing is. They just washed hands without understanding the meaning of proper hand washing. Therefore, it is recommended for future study to examine in more detail about the information of proper hand washing they obtain from parents, health workers, and teachers (qualitative study).

5.1.4 Association between attitude and hand washing

By using Chi-square test, this study revealed a significant association between attitude and hand washing, and students with positive attitudes were nearly 6 times more likely to washed hands properly than those with negative attitude. Correlation test showed that total score of attitude also significant and had positive correlation with total score of hand washing practice. In addition, by multiple logistic regression it was found that students with positive attitudes were 2 times more likely to wash their hands properly, and it was also significant as a predictor of proper hand washing, when analyzed together with other variables.

Lopez’s et al. study in Colombia similarly concluded that students with positive attitudes were 2.1 times more likely to have positive intentions, adjusted with other predictors (11). Even though this study was conducted to study the intentions about hand washing behavior, the result can be used to support to the present study.

According to the Theory of Planned Behavior, a person's behavior is predicted well by intentions, and one of three direct determinants of an individual's behavioral intention is attitude to performing the behavior. The stronger one's beliefs that performing a behavior will lead to positive outcomes and prevent negative outcomes, the more favorable one's attitude will be towards performing the behavior in question.(32, 34) In this study, students with positive attitudes may have positive intentions, and this will lead them to positive behavior. Therefore, respondents with positive attitudes regarding proper hand washing will have positive intentions, and finally she / he may be expected to do this positive behavior.

There is no previous study about hand washing practice among elementary students which used correlation analysis. However, Wisedjinda et al. in their study about knowledge, attitude, and practices concerning influenza H1N1 among Thai medical students, found that there was significant correlation between total score of attitude and hand washing ($r = 0.270$, correlation was significant at 0.01 level)(37).

5.1.5 Association between subjective norms and hand washing

Lopez et al. found that neutral and positive subjective norms regarding hand washing were weakly, but significantly, associated with positive intentions (AOR = 1.4, 95% CI = 1.1-1.8) (11).

According to the Theory of Planned Behavior, subjective norm is one of three direct determinants of intention to do behavior. These subjective norms are a function of normative beliefs about expectations of others and the motivation to comply with others' expectations (32, 34).

In the present study, the expectations of parents, teachers and friends were considered. Based on this theory, students who believe that certain referents (e.g. parents, teachers and friends) think they should wash their hands properly will be motivated to meet the expectations of those referents, and will hold positive subjective norms. Conversely, students who believe such referents think they should not perform proper hand washing, will have negative subjective norms. And students who are less motivated to comply with those referents will have relatively neutral subjective norms.

In this study, the proportion of respondents with positive and neutral subjective norms who washed hands properly were nearly equal in number.

Respondents with neutral subjective norms (44.4%) washed their hands properly not much than those with positive subjective norms (42.4%). There was no significant association between subjective norms and hand washing in this study.

The reason for no significant association between subjective norms and hand washing in this study may be due to some students may not be sure that their parents, teachers and friends expect them to wash hands. Therefore the level of subjective norms did not influence significantly their hand washing.

More students had neutral subjective norms means that they were less motivated to do proper hand washing. This may be due to the teachers less promoting hand washing at schools (see Table 4.25 and 4.26 in Appendix B).

Subjective norms may be an important construct in the development and adoption of a culture of hygiene within school setting. If more students thought that important others at school (friends and teachers) did not expect them to do proper hand washing, they would be less motivated to do so.

However, by using correlation test, total score of subjective norms had significant and positive correlation with total hand washing score.

5.1.6 Association between perceived control and hand washing

This study found there was an association between perceived control and hand washing (p value < 0.001). Students with high perceived control were 3 times more likely to wash hands properly. Based on correlation test, total score of perceived control also had significant positive correlation with total score of hand washing practice. However, in multiple logistic regression analysis high perceived control was not significant as a predictor of proper hand washing when adjusted with other variables.

Lopez et al. found that a high level of perceived control over hand washing behaviour was strongly associated (AOR = 6.0; 95% CI = 4.8, 7.5) with positive intentions toward proper hand washing (11). Although this study was about intentions of proper hand washing, according to the Theory of Planned Behaviour, intentions are the best predictor for behaviour. Therefore this study also could be used to support the present study.

Based on the Theory of Planned Behaviour, perceived behavioural control is the individual's perception of how easy or difficult it is to perform that specific behaviour. A person with a high level of perceived control is more likely to act on that intention, including in the face of obstacles and setbacks, than a person who has a low level of perceived control. It should be noted that perceived behavioural control could also have a direct influence on behaviour. This is the case if individuals so strongly believe themselves to be unable to perform the behaviour that they do not even consider doing so (34).

However, in this present study perceived control was not significant as a predictor of proper hand washing when adjusted with other variables. This may be because perceived control was not strong enough as a predictor compared to other variables when they were taken together. There may have been other variables which were stronger predictors than perceived control.

5.1.7 Association between availability of facilities and hand washing

This study found that the availability of clean water at hand washing stand in schools had a significant association with hand washing, and students were about 8 times more likely to wash hands properly when it was available. When analyzed together with other variables, students were 4 times more likely wash their hands properly if there was clean water there.

Similarly, with the availability of soap at hand washing stands, there was a significant association with proper hand washing, and students were 8 times more likely to do proper hand washing when soap was available. By adjusting with other variables, students also were about 6 times more likely to do proper hand washing when soap was available there.

The provision of hand washing stands was another important facility. There was a significant association between the availability of hand washing stands and hand washing . However, this facility was not able to be further analyzed using multiple logistic regression due to insufficient sample size.

This finding about facilities was consistent with previous studies. Lopez et al. found that students who reported regular availability of soap and clean water were almost 3 times more likely to consistently wash their hands before eating and

after using the toilet (11). The study about the impact and sustainability of WASH (Water, Sanitation and Hygiene) project in schools research in Kenya and Kerala found that children washed their hands more often after using the toilet when there were more water taps and when there was water in or near the toilet (28).

This study revealed that when facilities were available, students were also able to wash hands properly. This finding is consistent with the Theory of Planned Behaviour and Integrated Behaviour Model. These theories explain that attitude, subjective norms and perceived control determine a person's intention to perform a certain behaviour. It should be realized, however, that individuals, given a positive intention, also must be able to perform the behaviour. This means that a person must have the necessary skills and there should be no major environmental constraints preventing behavioural performance (32, 34).

5.2 Discussion of the research methodology

This study was a cross-sectional and descriptive study. It was appropriate because its objectives were to describe hand washing practices, to determine the prevalence of proper hand washing, and to describe the study factors and to analyse the association between proper hand washing and the study factors, at a particular time.

5.2.1 Sample

The study group comprised of 274 sixth grade elementary students. The sample size was planned to number 234. This was then increased by 10% compensate for possible information loss from incomplete data or some participants withdrawing from the study. The sample size was then increased to 274 respondents, because all sixth grade students in randomly selected schools were involved to participate.

Random sampling by proportion was used to choose schools in each village, and all sixth grade students in selected schools were involved in this study. This was appropriate since each village has different number of schools.

Since there were geographical obstacles in the area of study, this condition influenced the selection of sampling technique. This study was confined only to the

particular or specific geographical setting and the specific population under study. Therefore, the result of this study may not be generalized to public schools and the whole area of Selat sub-district, Indonesia.

5.2.2 Research instrument

The self-administered questionnaire utilized for data collection was not a standardized questionnaire. The questionnaire consisted of 7 parts and 45 questions. Some questions in part II (Proper hand washing practice) needed to use jump commands to other numbers, depending on the respondents' answers. Therefore this had to be carefully explained clearly to the respondents since they had never previously encountered similar command in their learning process at schools before. Similarly parts IV, V and VI (attitude, subjective norms and perceived control), needed to be explained clearly.

This study measured the combination of hand washing practice before eating and after visiting the toilet. These two critical times for hand washing are very important (7, 8), therefore proper hand washing in both situations are imperative practice. If students wash hands properly only at one critical time (before eating or after visiting a toilet), the meaning of disease prevention is useless. This can be understood since hands are the vectors that carry disease-causing pathogens from person to person. Hand washing with soap interrupts the transmission of disease. If hands are not washed, the hands that have been in contact with faeces, human excreta (like nasal excretions), contaminated food, or water can transport viruses, bacteria and parasites (7). Therefore, this study did not measure hand washing practice at two critical moments separately.

By using calculation formula explained in Chapter 3, the total score of each hand washing practice was obtained, and this was used to categorize the 9 combinations of hand washing into three categories: proper, less proper and not proper hand washing. These 9 variations described by detail the common hand washing practice by students at schools, which combined from two main activities, i.e. washing hands before eating and after visiting the toilet, and three possible practices such as washed hands by using water and soap, water only, and not wash hands.

Therefore, this study revealed the common hand washing by the students at schools, ranging from the best to the worst practice.

A pre-test was conducted twice prior to implementation of the data collection. The first pre-test occurred on 3rd January 2011 using 33 sixth grade elementary students with similar characteristics. The reliability was unsatisfactory, which 0.31 for knowledge (9 questions), 0.34 for attitude (7 questions), 0.65 for subjective norms (9 questions), and 0.44 for perceived control (6 questions). After modifying some questions, at second pre-test was conducted on 11 January 2011 with 32 other sixth grade elementary students with similar characteristics. The second reliability test was 0.20 for knowledge (15 questions), 0.11 for attitude (9 questions), 0.67 for subjective norms (9 questions) and 0.29 for perceived control (9 questions). Since there was limitation in budget and time for conducting this study, then after modifying the final reliability test was 0.47 for attitude (5 questions), 0.71 for subjective norms (8 questions), 0.62 for perceived Control (6 questions). This final questionnaire was used for data collection.

The knowledge part was the most unsatisfactory result in reliability test. In the first pre-test, there were 9 questions about knowledge, and some of them were too easy. Therefore, to increase reliability, in the second pre-test these easy questions were deleted, and replaced with new questions which were considered to be fair (not too easy nor too difficult). So, there were 15 questions for pre-test 2. However, the reliability test of second pre-test also was not satisfactory, even less than first pre-test. Some questions were too difficult. Then after combining both questions from pre-test 1 and 2, the final knowledge questions (6 questions) was used for data collection. The reliability test of data collection was also unsatisfactory, KR 20 only 0.174. Therefore for the knowledge part, the questionnaire was not reliable and valid. This may explain the illogical finding, that fewer respondents with high knowledge washed hands properly less than those with low knowledge.

5.2.3 Statistical analysis

The characteristics of the respondents and study factors have been described. Analyses of the relationship between proper hand washing and independent variables were conducted using Chi square, correlation test and multiple logistic regression.

This study used Chi square tests, because it is most appropriate for use with categorical variables (46).

Whereas Chi square was used to determine the association between two categorical variables, correlation test was used to measure the size and direction of the linear relationship between two numerical variables (45). In Chi square, the dependent variable (hand washing practice) was as a categorical variable, which has three categories: proper, less proper and not proper; and the independent variables were also categorical variables. In correlation test, hand washing practice was as a numerical / continuous variable, therefore the total score of hand washing was used. And for independent variables, only those which also numerical variables could be used in correlation test, such as total score of knowledge, attitude, subjective norms, and perceived control. However, the scatter plot graphs showed that there were no linear relationship between dependent and some independent variables (see Figure B1-B4 in the Appendix B).

Logistic regression is the type of regression analysis that is usually employed when the dependent variable is dichotomous (46). Logistic regression allows one to predict a discrete outcome such as group membership from a set of variables that may be continuous, discrete, dichotomous, or a mix (45). This study used discrete or dichotomous variables for both dependent and independent variables, therefore logistic regression was chosen. By using logistic regression, the prediction of a discrete outcome which was dichotomous (proper or not proper hand washing) was obtained from a set of discrete variables, too (independent variables).

Logistic also has no assumptions about the distributions of the predictor variables. The predictors do not have to be normally distributed, linearly related, or of equal variance within each group (45).

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This cross-sectional and descriptive study was conducted on January 2011 using 258 sixth grade elementary schools students in Selat sub-district Indonesia, in order to describe hand washing practice and prevalence of proper hand washing, and related factors such as socio-demographic characteristics, knowledge, attitude, subjective norms, perceived control availability of proper hand washing facilities at schools. This study used self administered questionnaire as the instrument for data collection.

The results of this study showed that there were 9 combinations of hand washing practice and that 40.5% of the respondents washed their hands properly at schools.

Concerning the socio-demographic characteristics, 46.5% respondents were girls, 56.6% were 11 years, 85.2% were Moslem, 58.4% were Dayaknese, 63.9% with parental occupation as non government worker, and 24.0% helped parents at home preparing food.

Fifty three per cent of respondents had low knowledge, 67.9% neutral attitude, 41.1% neutral subjective norms, and 50.4% low perceived control to proper hand washing.

Sixty six per cent and 68.5% of respondents answered that clean water and soap were available at hand washing stand, and 73.7% stated that hand washing stand was available at schools.

Based on Chi square test, socio-demographic characteristics and subjective norms had no significant association with proper hand washing. Attitude and perceived control had a significant association with proper hand washing. Students with positive attitudes were nearly 6 times more likely to wash hands properly than those with negative attitudes. Students with high perceived control were 3 times more likely to do proper hand washing compared with those with low perceived control.

Availability of clean water and soap at hand washing stands, and hand washing stands at schools, were also significantly associated with proper hand washing. When clean water was available at hand washing stands, students were almost 8 times more likely to wash hands properly than when it was not. When soap was available at hand washing stands, students were about 8 times more likely to wash their hands properly than if soap was not available.

Using multiple logistic regression, positive attitude, availability of clean water and soap at hand washing stands were significant predictors of proper hand washing, when adjusted with other variables. Students with positive attitude were about 2 times more likely to wash hands properly; when clean water and soap were available at hand washing stands students were 4 and nearly 6 times more likely to wash hands properly, adjusted for gender, knowledge and perceived control.

6.2 Recommendations for schools, health workers, and local government

Based on findings in this study, some recommendations are suggested as follows :

1. Health promotion regarding proper hand washing should be more activated by teachers together with and supervised by health workers, in order to impress the students that this positive habit is easy to do and has positive outcomes. Therefore students will have higher attitude and perceived control toward proper hand washing. This can be implemented by using various creative ideas of health promotion at schools such as reminders cues and motivators of proper hand washing using banners, stickers and posters, in many places at schools area.

2. The facilities related to proper hand washing such as clean water, soap and hand washing stands should be more available in certain places at schools' area such as in the class, canteen and toilets . Therefore it will no barrier for all students to wash hands properly at schools at any time, and it will be easy for teachers also to be a model to promote proper hand washing at schools.

3. This finding can be used as basic information for the Global Hand Washing Campaign in Kapuas district by local government, health professionals and other stake holders, in order to encourage people to wash hands properly at homes, schools and communities, by using school children as targets for behavioural changes.

Recommendations for further research

1. This study was conducted only in some villages of Selat sub district, due to geographical obstacles. Future study about the prevalence of proper hand washing and related factors should be undertaken using better sampling techniques in order to better represent the population of Kapuas district.
2. Observational study should be conducted to observe the actual practice of proper hand washing at schools
3. Qualitative research should be conducted to understand better proper hand washing at schools and related factors, and to construct appropriate questionnaire, especially the knowledge part
4. Future study should be conducted also to construct a hand washing index for higher statistical properties.

REFERENCES

1. WHO. Child and adolescent health and development. Progress Report 2009 [Online]. Highlights. 2009 [cited 2011 Apr 13]. Available from: http://whqlibdoc.who.int/publications/2010/9789241599368_eng.pdf
2. Hasnawati, Sugito, Harry P, Rahmaniar B. Profil kesehatan Indonesia (Indonesia health profile) 2008. Jakarta: Departemen Kesehatan RI; 2009.
3. Bambang H, Bob SK, et al. Profil Kesehatan Indonesia (Indonesia health profile) 2006. Jakarta: Departemen Kesehatan RI; 2007.
4. UNESCO. Global education digest 2005. Montreal: UNESCO Institute for Statistic; 2005 [Online] [cited 2011 Apr 13]. Available from: http://www.uis.unesco.org/template/pdf/ged/2005/ged2005_en.pdf
5. Fewtrell L, Kaufmann RB, Kay D, et al. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systemic review and meta analysis. LANINF. 2005 [Online] [cited 2010 Sep 15]; 5(1): 42-52. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S1473309904012538>.
6. Curtis V, Cairncross S. Effect of washing hand with soap on diarrhoea risk in the community: a systematic review. LANINF. 2003 [Online] [cited 2010 Sep 15];3(5):275-81. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S1473309903006066>.
7. Public-Private Partnership for Handwashing with Soap (PPPHW). Global hand washing guidelines. Planners guide. 2009 [Online] [cited 2011 Apr 13]. Available from: http://www.globalhandwashingday.org/Global_Hand_washing_Day_2nd_Edition.pdf.
8. Centers for Disease Control and Prevention (CDC). Clean hands saves lives. Atlanta: CDC; 2011 [Online] [cited 2011 Apr 13]. Available from: <http://www.cdc.gov/handwashing/>

9. Scott B, Curtis V, Rabie T, Garbrah-Aidoo N. Health in our hands, but not in our heads: understanding hygiene motivation in Ghana. *Health policy plan.* 2007 July 1 [Online] [cited 2010 Sep 15];22(4):225-33. Available from: <http://heapol.oxfordjournals.org/cgi/content/abstract/22/4/225>.
10. Ministry of Health Indonesia, The National Institute for Health and Development. *Indonesia national basic health research (Riskesdas)*. Indonesia: the ministry; 2007.
11. Lopez-Quintero C, Freeman P, Neumark Y. Hand washing among school children in Bogota, Colombia. *Am J Public Health.* 2009 [Online] [cited 2010 Sep 21];99(1):94-101. Available from: <http://ajph.aphapublications.org/cgi/content/abstract/99/1/94>.
12. Curtis VA, Danquah LO, Aunger RV. Planned, motivated and habitual hygiene behaviour: an eleven country review. *Health Educ Res.* 2009 [Online] [cited 2010 Oct 8];24(4): 655-73. Available from: <http://her.oxfordjournals.org/cgi/content/abstract/24/4/655>.
13. Indonesia MoH. Hari cuci tangan pakai sabun sedunia(HCTPS) yang pertama 15 Oktober 2008: Panduan perencanaan pelaksanaan bagi pemangku kepentingan cuci tangan pakai sabun. Indonesia: the ministry; 2008 [Online] [cited 2010 Sep 15]. Available from: <http://taufiq.blog.unair.ac.id/files/2008/10/hari-cuci-tangan-sedunia-2008.pdf>
14. World Health Organization. *Skills for health: skills-based health education including life skills: an important component of a child friendly health-promoting school*. Information series on School Health Document 9. [Online] [cited 2010 Sep 15]. Available from: http://www.who.int/school_youth_health/media/en/sch_skills4health_03.pdf.
15. Chen G. Promoting positive behaviours in elementary ages. 2008 [Online] [cited 2010 Sep 15]. Available from: <http://www.publicschoolreview.com/articles/65>.
16. Sidibe M, Curtis V. Can hygiene be cool and fun? Insights from school children in Senegal. Field note. Sanitation and Hygiene series. Water and Sanitation program; 2007 [Online] [cited 2010 Sep 20]. Available from:

http://esa.un.org/iys/docs/san_lib_docs/Can_Hygiene_be_cool_and_fun_-_Senegal__2007.pdf.

17. Kapuas District Health Office. Minimum standard of service. Kapuas: the district health office; 2009.
18. BPS. Kapuas Central Statistic Bureau. Kapuas dalam angka (Kapuas in figure). Kapuas: Kapuas Central Statistic Bureau; 2009.
19. Global Health Council. Causes of child death. Washington: Global Health Council; 2010 [Online] [cited 2010 Sep 16]. Available from: http://www.globalhealth.org/child_health/child_mortality/causes_death/#diarrheab
20. Centers for Disease Control and Prevention. Seasonal flu information for schools and childcare providers. Atlanta: CDC; 2010 [Online] [cited 2010 Sep 16]. Available from: <http://www.cdc.gov/flu/school/index.htm>.
21. Centers for Disease Control and Prevention. Summary health statistics for U.S children: national health interview survey 2008. Maryland: 2009 [Online] [cited 2010 Sep 17]. Available from: http://www.cdc.gov/nchs/data/series/sr_10/sr10_244.pdf.
22. The Global Public Private Partnership for Hand Washing with Soap. FAQs [Online] [cited 2010 Sep 15]. Available from: <http://www.globalhandwashing.org/learn/faqs.php>.
23. Luby SP, Agboatwalla M, Painter J, et al. Effect of intensive handwashing promotion on childhood diarrhea in high-risk communities in Pakistan: a randomized controlled trial. JAMA. 2004 [Online] [cited 2010 Sep 19];291(21): 2547-54. Available from: <http://jama.ama-assn.org/cgi/content/abstract/291/21/2547>.
24. Sandora TJ, Shih M-C, Goldmann DA. Reducing absenteeism from gastrointestinal and respiratory illness in elementary school students: a randomized, controlled trial of an infection-control intervention. Pediatrics. 2008 [Online] [cited 2010 Sep 18];121(6):e1555-62. Available from: <http://pediatrics.aappublications.org/cgi/content/abstract/121/6/e1555>.
25. Guinan M, McGuckin M, Ali Y. The effect of a comprehensive handwashing program on absenteeism in elementary schools. American Journal of

- Infection Control. 2002 [Online] [cited 2010 Sep 18];30(4):217-20. Available from: http://www.ccbh.net/ccbh/export/sites/default/CCBH/pdf/School_Environments/Guinan_Maryellen.pdf.
26. Bowen A, Ma H, Ou J, Biihimer W, et al. A cluster-randomized controlled trial evaluating the effect of a handwashing-promotion program in Chinese primary schools. *Am J Trop Med Hyg.* 2007 [Online] [cited 2010 Sep 15];76(6):1166-73. Available from: <http://www.ajtmh.org/cgi/content/abstract/76/6/1166>.
27. Soerachman R, et al. Indonesia global school-based students health survey (GSHS). Indonesia Ministry of Health. 2007 [Online] [cited 2011 Apr 23]. Available from: http://www.who.int/chp/gshs/GSHS_Country_Report_Indonesia_2007.pdf.
28. UNICEF, International Water and Sanitation Centre, IRC, NETWAS, London School of Hygiene and Tropical Medicine. Summary of results of the study on the impact and sustainability of WASH in school research: Kenya and Kerala. 2006-2007 [Online] [cited 2010 Sep 18]. Available from: <http://www.irc.nl/redirect/content/download/143166/453192/file/SummaryoverviewA4s.doc>
29. Yalcin SS, YS, Altin S. Hand washing and adolescents: a study from 7 schools in Konya, Turkey. *Medline.* 2004 [Online] [cited 2011 Mar 29];16(4):371-6. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC15712974/> citedby?/?tool=pubmed.
30. Vivas AP, Gelaye B, Aboset N, Kumie A, et al. Knowledge, attitude and practices (KAP) of hygiene among school children in Angolela, Ethiopia. *J Prev Med Hygiene.* 2010 [Online] [cited 2011 Mar 29];51:73-9. Available from: <http://www.jpmmh.org/issues/201051205.pdf>
31. ICDDR, B. Handwashing behavior in rural Bangladesh. *Health and Science Bulletin.* 2008 [Online] [cited 2010 Sep 18];6 no 3. Available from: http://globalhandwashing.org/resources/multimedia-pdf/10.%20Handwashing_Behavior_Rural_Bangladesh.pdf.
32. Karen, G. Viswanath K. Health behavior and health education: theory, research and practice. 4th ed. San Francisco, CA: Jossey-Bass; 2008.

33. Ajzen I. Theory of planned behavior diagram [Online]. n.d [cited 2010 Sep 20]. Available from: <http://www.people.umass.edu/aizen/tpb.diag.html#null-link>
34. Koelen MA, Van den Ban AW. Health education and health promotion. Den Haag: Wageningen Academic Publisher; 2004.
35. Rodriguez S. The importance of school-based hand washing programs. *The Journal of School Nursing*. 2002 [Online] [cited 2010 Sep 19];18(4 suppl):19-22. Available from: http://jsn.sagepub.com/content/18/4_suppl/19.short.
36. Wong TW WT. Handwashing practice and the use of personal protective equipment among medical students after the SARS epidemid in Hongkong. *The American Journal of Infection Control*. 2005 [Online] [2010 Sep 19]; 33(10). Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0196655305007777>.
37. Wisedjinda L, Hengriprasopchoke S, Karucote A, et al. Knowledge, attitude, and practices concerning influenza A H1N1 2009 among Thai medical students. Faculty of Medicine, Ramathibodi Hospital, Mahidol University [Online] [cited 2011 Apr 9]. Available from: http://beid.ddc.moph.go.th/th/images/news/cheraton2122_10_52/poster/Rassamee_poster02.pdf.
38. Schmidt WP, Wloch C, Biran A, Curtis V, et al. Formative research on the feasibility of hygiene interventions for influenza control in UK primary schools. *BMC Public Health*. 2009 [Online] [cited 2010 Sep 20];9(1):390. Available from: <http://www.biomedcentral.com/1471-2458/9/390>
39. Tran D, Phongsavan P, Bauman AE, Havea D, et al. Hygiene behaviour of adolescents in the Pacific: associations with socio-demographic, health behaviour and school environment. *Asia-Pacific Journal of Public Health*. 2006 [Online] [2011 Apr 5];18:3. Available from: <http://aph.sagepub.com/content/18/2/3.refs>.
40. Anderson JL, Warren CA, Perez E, et al. Gender and ethnic differences in hand hygiene practices among college students. *American Journal of Infection Control*. 2008 [Online] [cited 2010 Sep 18];36(5):361-8. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S0196655308000448>.

41. Allegranzi B, Memish ZA, Donaldson L, et al. Religion and culture: potential undercurrents influencing hand hygiene promotion in health care. *American Journal Infection Control*. 2009 [Online] [cited 2011 Apr 9];37(1): 28-34. Available from: [http://linkinghub.elsevier.com/retrieve/pii/S0196-6553\(08\)00489-6?showall=true](http://linkinghub.elsevier.com/retrieve/pii/S0196-6553(08)00489-6?showall=true).
42. Kapuas District Educational Office. Data sekolah dasar tahun 2010/2011 provinsi Kalimantan Tengah, kabupaten Kapuas. Kapuas: the district educational office; 2010.
43. Kapuas District Health Office. Health profile in 2008 (Profil kesehatan tahun 2008). Kapuas: the district health office; 2008.
44. Isanurug S, editor. Practical in research methodology. Nakhonpathom: ASEAN Institute for Health Development; n.d.
45. Tabachnick BG, Fidell LS, editors. Using multivariate statistics : international students edition. 4th ed. USA: Allyn & Bacon; 2001.
46. Daniel WW. Biostatistics: a foundation for analysis in the health sciences. 8th ed. Hoboken, NJ: Wiley; 2005.
47. Prisma. Behavior study of hand washing in Peru. Washington DC: Office of Health, Infectious Diseases and Nutrition Bureau for Global Health US Agency for International Development; 2004 [Online] [cited 2010 Sep 15]. Available from : http://www.phishare.org/files/2457_JP_11E_Peru_Handwashing_format.pdf
48. Snow M WGJ, Kim HS. Inexpensive and time-efficient hand hygiene interventions increase elementary school children's hand hygiene rates. *Journal of School Health*. 2008 [Online] [cited 2011 Apr 20];78(4):230-33. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18336683>
49. Johnson HD, Sholcosky D, Gabello K, Ragni R, et al. Sex differences in public restroom handwashing behaviour associated with visual behaviour prompts. *Medline Pubmed*. 2003 [Online] [cited 2011 Mar 29]. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/14738345>.



APPENDIX A

ENGLISH QUESTIONNAIRE

PROPER HAND WASHING PRACTICE AMONG SIXth GRADE OF ELEMENTARY STUDENTS AT SELAT SUB-DISTRICT, INDONESIA

ID of questionnaire :

Name of school :

Age :

Please answer the questions below according to your opinion. You may tick off (✓) or cross (X) on the proper answer to the questions.

PART I. SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Sex:
 - a. Male
 - b. Female
2. Religion:
 - a. Islam
 - b. Christian
 - c. Catholic
 - d. Other (Hindu, Budhist, Kaharingan)
3. Ethnicity:
 - a. Banjarnese
 - b. Dayaknese
 - c. Javanese
 - d. Sundanese
 - e. Other (Bataknese, Padangnese, or other)
4. Role of student at home :
 - a. Taking care younger siblings
 - b. Helping parents preparing food
 - c. Not have any role helping parents
 - d. Other : cleaning house / washing clothes, specify
.....
5. Occupation of parents
 - a. Civil servant
 - b. Farmer / gardener
 - c. Merchant
 - d. Tailor

- d. Other, please specify.....
- 12. At home, do you wash your hands before eating ?
- a. Yes → What do you use : clean water
 clean water and soap
- b. No (go to question no 14)
13. How often do you wash your hands before eating at home?
- a. Each time before eating
b. Sometimes
- 14. At home, do you wash your hands after visiting the toilet ?
- a. Yes → What do you use : clean water
 clean water and soap
- b. No (go to question in Part III)
15. How often do you wash your hands after visiting the toilet ?
- c. Each time before eating
d. Sometimes

PART III. KNOWLEDGE

Instructions: Please answer the questions below according to your knowledge. You may tick off (✓) or cross (X) on the alphabet or box of the proper answer to the questions.

16. Proper hand washing is washing hands using clean water Yes No
17. When should we wash hands ?
- a. Before eating Yes No
- b. After visiting the toilet Yes No
18. The advantage of proper hand washing is disease prevention Yes No
19. Diseases that can be prevented by proper hand washing are :
- a. Common cold Yes No
- b. Diarrhea Yes No
20. Where did you get the hand washing information? (You may choose one or more answers)
- a. School
- b. Home
- c. Health center

- d. Television
- e. Poster
- f. Other, please specify

21. Who always tells you about proper hand washing? (*You may choose one or more answers*)

- a. Parent
- b. Teacher
- c. Buddy
- d. Health worker
- e. Other, please specify
.....

22. What kind of activities in your school relate to proper hand washing? *You may choose one or more answers*)

- a. Health education from teachers
- b. Health education from health workers
- c. There are posters
- d. Other, please specify
.....

PART IV. ATTITUDE

Please tick off (✓) or cross (X) on one of the most appropriate column according to your understanding.

Statements	Agree	Neutral	Disagree
23. Washing hands or not washing hands before eating, is the same for me			
24. Washing hands is more important for people in village than in city			
25. Proper hand washing using water and soap needs much time			
26. Proper hand washing wastes water and soap			
27. I prefer being friends with someone who like washing hands			

PART V. SUBJECTIVE NORMS

Please tick off (✓) or cross (X) on one of the most appropriate column according to your understanding.

Statements	Agree	Neutral	Disagree
28. I wash my hands because I follow my teacher's advice			
29. I wash my hands at school because I follow my buddies			
30. My parents expect me to wash hands using clean water and soap before eating			
31. My teachers expect me to wash my hands using clean water and soap before eating			
32. My friends expect me to wash my hands using clean water and soap before eating			
33. My parents expect me to wash hands using clean water and soap after visiting the toilets			
34. My teachers expect me to wash my hands using clean water and soap after visiting the toilets			
35. My friends expect me to wash my hands using clean water and soap after visiting the toilets			

PART VI. PERCEIVED CONTROL

Please tick off (✓) or cross (X) on one of the most appropriate column according to your understanding.

Statements	Agree	Neutral	Disagree
36. Washing hands using clean water and soap after visiting the toilet at school is impossible			
37. Washing hands using clean water and soap before eating at school is difficult to do			
38. I wash my hands using clean water and soap after using the toilet because I want to			
39. I am not ashamed to be student who wash hands using soap and clean water after using the toilet			
40. I hesitate to ask my friends washing hands together			
41. Washing hands at school is difficult to do because there is not enough clean water and soap			

PART VII. FACILITIES OF HAND WASHING

Please answer the questions according to your understanding by tick off (✓) or cross (X) on the answers.

- 42. At your school, where is the place you can get clean water for washing hands?
 - a. At the toilet
 - b. At the washing stand
 - c. At the wheel
 - d. At the canteen
 - e. Other, please specify
 - f. There is no clean water

- 43. At your school, where is the place you can get the soap for washing hands?
 - a. At the toilet
 - b. At the class

- c. At the hand washing stand
- d. At the canteen
- e. Other, please specify
- f. There is no soap

44. What does it look like the hand washing stand at your school ?

- a. There is no hand washing stand available at my school



- e. Other (you may draw it)

.....

45. When you do not washing hands at school, what is the reason? *You may choose more than one.*

- a. Forgetfulness
- b. Laziness
- c. Lack of time
- d. Lack of interest
- e. It is not important
- f. Lack of clean water
- g. Lack of soap
- h. Other please specify.....

APPENDIX B

SUPPLEMENT RESULTS

Table B1 Frequency of washed hands properly at schools

Frequency of washed hands properly at schools	n	Percentage From 104	Percent from 257
Always	77	74.8	29.9
Sometimes	26	25.2	10.1

Table B2 Human sources of information about proper hand washing

Person*	Number	Percent
Parent	237	91.9
Teacher	90	34.9
Friend	6	2.3
Health worker	129	50.0
Other	7	2.7

*Respondents could answer more than one

Table B3 Activities at school related to proper hand washing

Activities*	Number	Percent
Health education from teacher	90	34.9
Health education from health worker	220	85.3
Posters at school	21	8.1

*Respondents could answer more than one

Table B4 Reasons for not washing hands

Reason*	Number	Percent
Forgetfulness	211	81.8
Laziness	34	13.2
No time	11	4.3
Not interested	2	0.8
Lack of clean water	20	7.8
Lack of soap	23	8.9

*Respondents could answer more than one

Table B5 Places of standard hand washing stand at schools

Name of schools	Availability of Hand washing stand	Place of hand washing stand at schools	Reminder cues of Health behaviour
SDN 4 Selat Hilir	Yes	In the class	No
SDN 5 Selat Hilir	Yes	In the class	Yes
SDN 1 Selat Tengah	Yes	In the class	No
SDN 2 Selat Tengah	Yes	In the class	No
SDN 7 Selat Hulu	Yes	In the canteen	No
SDN 1 Pulau Telo	No	-	No
SDN 1 Selat Dalam	No	-	No

Table B6 Grouping of hand washing at home

Group of hand washing before eating and after visiting toilet at home	Number	Percent
Proper hand washing	143	55.7
Less proper hand washing	99	38.5
Not proper hand washing	15	5.8
Not wash hands	0	0.0
Total	257	100.0

Table B7 Association between proper hand washing at home and at school

Hand washing at home	n	Hand washing at schools		Crude OR	95% CI	P value
		Not proper	Proper			
Not proper	114	85.1	14.9	1.00	4.87-16.71	<0.001*
Proper	142	38.7	61.3	9.03		

*significant at $\alpha < 0.01$

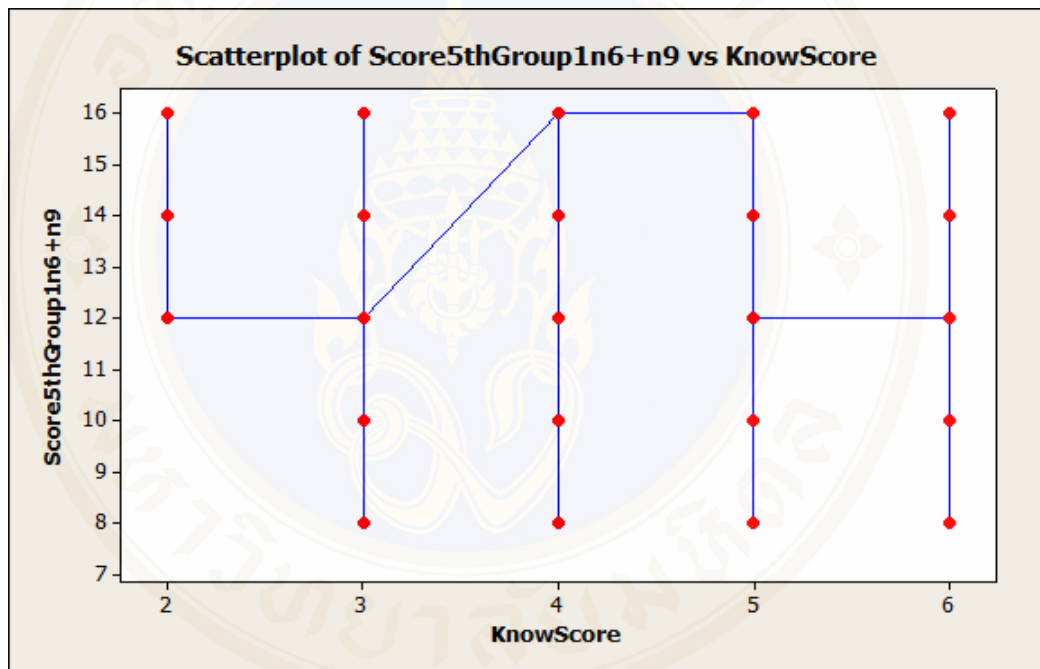


Figure B1 Scatterplot of hand washing vs knowledge

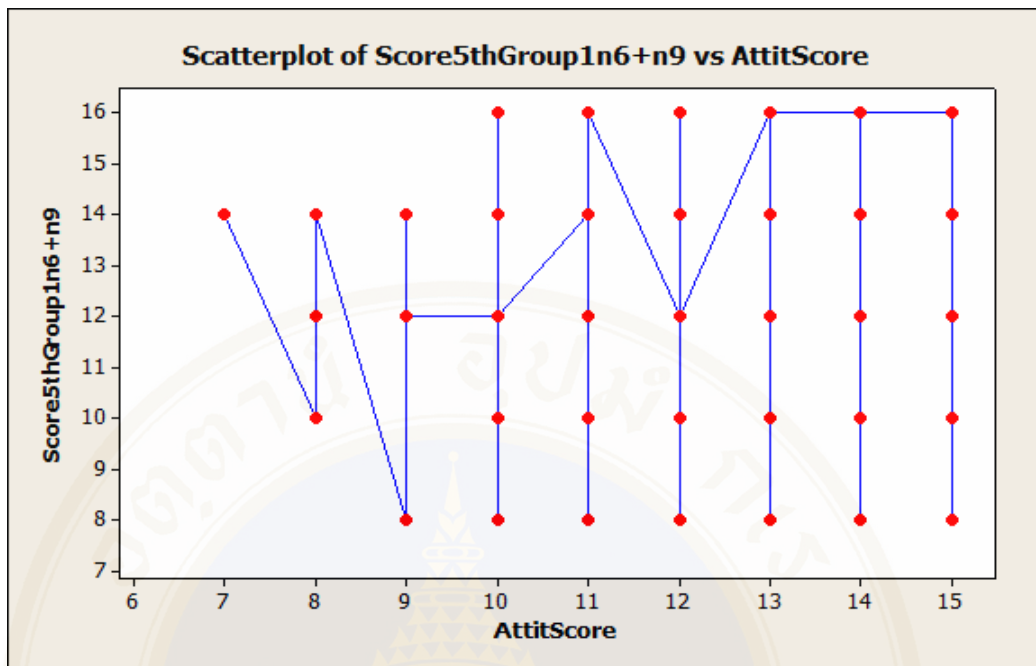


Figure B2 Scatterplot of hand washing vs attitude

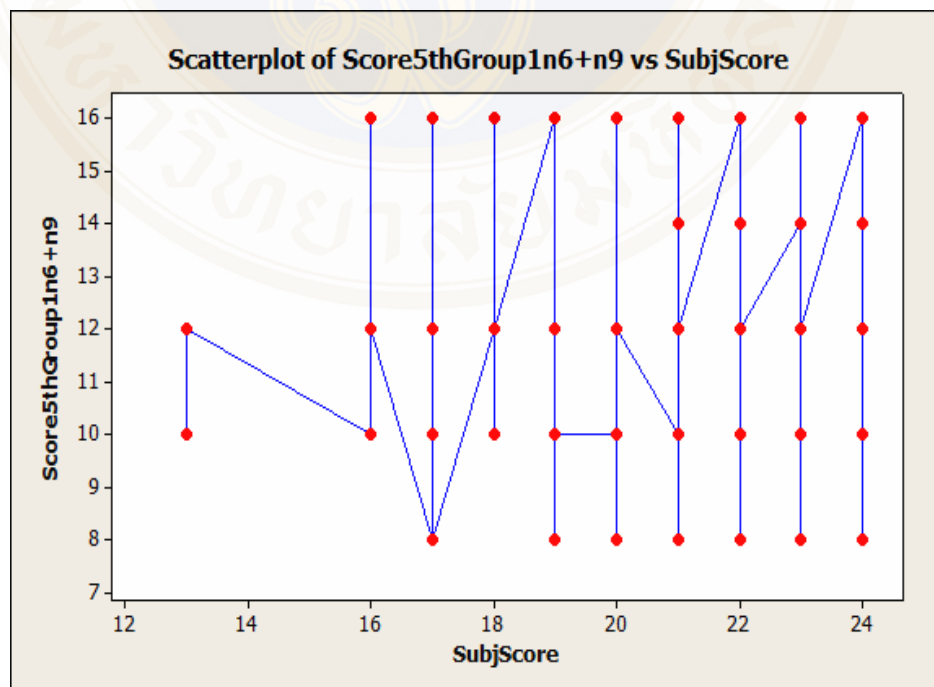


Figure B3 Scatterplot of hand washing vs subjective norms

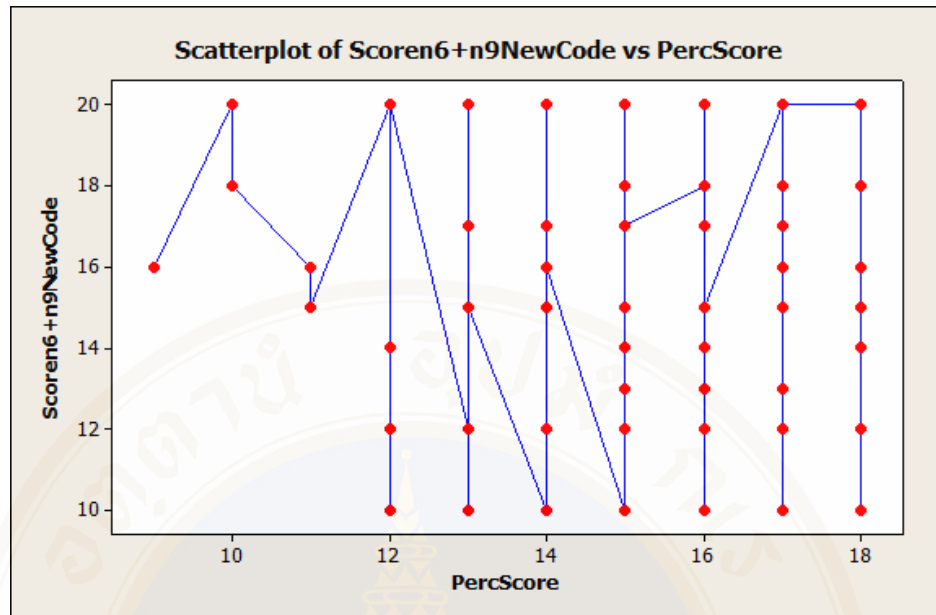


Figure B4 Scatterplot of hand washing vs perceived control

BIOGRAPHY

NAME	Tri Setyautami
DATE OF BIRTH	August 16, 1971
PLACE OF BIRTH	Magelang, Indonesia
INSTITUTION ATTENDED	University of Indonesia, Medical Faculty, 1990 - 1996 Medical Doctor Mahidol University, ASEAN Institute for Health Development, Thailand, 2010 - 2011 Master of Primary Health Care Management
RESEARCH GRANT	Indonesia Ministry of Health
PRESENT POSITION	Head of "Melati" Primary Health Center in Kapuas district
HOME ADDRESS	Jl. Kolonel Sugiono no 4 Kuala Kapuas Kalimantan Tengah 73513 Indonesia Tel. +6281349778095 E-Mail : trisetyautami@hotmail.com
EMPLOYMENT ADDRESS	Dinas Kesehatan Kabupaten Kapuas Jl. Kenanga no 42 Kuala Kapuas 73514 Tel. +6251321090, +6251323364