HEALTH RISK BEHAVIOR SURVEY OF SCHOOL AGE CHILDREN IN TWO INDONESIAN VILLAGES

SIGIT MULYONO

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by

Sigit Mulyono

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ABSTRACT

The study problem: Personal health practices and behaviours established in childhood can affect health in childhood and later life. There has been no comprehensive study to date of the health status and health risk behaviours of school-age children in Indonesia.

Objective: To explore the relationships between health risk behaviours and nutritional status, level of physical activity, and prevalence of injury in children aged 6-12 years old.

Methods: This study used a descriptive cross-sectional design, with simple random sampling of children in grades 1-6 in the four elementary schools of the two participating villages in Indonesia. Data were collected using five structured questionnaires, administered to 99 children and their parents and teachers.

Results: Immunization was incomplete for 39.4% of the children. GI problems and infections were common health problems. Overall, 34.3% had low height-for-age, indicating chronic undernutrition. Low family income, difficulty eating and hunger were associated with low height-for-age. Only 35.4% of the children met recommended physical activity levels. Low calorie intake and disliking physical activity were associated with lower activity levels, while joining a sports team, older age, and support from a teacher or other individual were associated with higher activity levels. Sports and other injuries were common and were associated with more physical activity, poor swimming skills and unsafe environments.

Recommendations: Community health nurses can play a key role in developing, implementing, and evaluating strategies to address the risk factors identified in this study. Interventions should be directed to children, their parents, teachers and communities, to health care providers, and to government.

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CHAPTER 1: INTRODUCTION

This chapter is divided into three sections. The first section presents the background of the study. Section two describes the statement of the problem and rationale for the study. Section three outlines the purpose of the study and presents the research questions.

Background of the Study

Personal health practices and behaviours established during childhood can contribute to leading causes of mortality and morbidity, and to social problems later in life (Kann et al., 1996). The status of children's health reflects the quality of health for the next generation. School-age children between the ages of 6 to 12 are a particularly important population to study because children's health concepts and many of their health behaviours develop during school-age (Mott, James, & Sperhac, 1990). School-age children need the attention of health care providers so that they can learn health-promoting behaviours. However, little is known about the school-age population in Indonesia. For this reason, the health status of children and the health and risk behaviours of children aged 6 to 12 years old need to be studied in order to develop a health risk behaviour profile for school-age populations.

The demographics in Indonesia are noteworthy in that the number of school-age children exceeds the number of children under the age of 5 years. According to the Indonesian central bureau of statistics (Departemen Kesehatan, 1998), school-age children aged 5 to 14 years comprise 40.3% of the total population in Indonesia, while children younger than five years constitute 20.5% of the total population. Most school-

age children live in rural areas (71.2%) rather than in urban areas (28.8%) (WHO, 1995a). Almost all school-age children aged 7 to 12 years receive formal education, with 94.9% of male children and 95.3% of female children attending school (Departemen Kesehatan, 1998).

There have only been a few studies conducted on the health risk behaviours of school-age children in developing countries. However, the studies that have been conducted on health risk behaviours indicate that children aged 6 to 12 are at risk for malnutrition (Murphy, Galloway, & Beaton, 1995), anemia (George, Kumar, Lal, & Sreedevi, 2000), Vitamin A deficiency (Sommer, Tarwotjo, Hussaini, & Susanto, 1983), low levels of physical activity (Centers for Disease Control [CDC], 2000), and injury (Kazar, Ihasz, Kosa, & Pestessy, 1992).

In Indonesia the rate of malnutrition in school-age children is high (Hermina, Hidayat, Afriansyah, Samilar, & Susanto, 2000). The risk to health is further compounded because almost half of Indonesian school-age children have anemia (Departemen Kesehatan, 1995) and in one district 81.4% of children had helminthic diseases (Hidayat, Hermina, & Luciasari, 1998). In another Indonesian study, Budiman and Saraswati (1989) found that there is a relationship between poor nutrition and incidence of disease, particularly gastrointestinal (GI) infection and pneumonia. All these conditions can lead to increased child morbidity and mortality (George et al., 2000; Murphy et al., 1995; Sommer et al., 1983).

Other factors found in the literature that impact on the nutrition status of school-age children include food intake (Murphy et al., 1995), family income and socio-

economic status (Syafiq, 1994), parental education, specifically mother's level of education (Hupkens, Knibbe, van Otterloo, & Drop, 1998; Syafiq, 1994), and family size (Pelto et al., 1991).

In addition to the increased risk of disease, nutrition problems of school-age children negatively affect learning skills, which are very important for achieving formal educational success (Lopez et al., 1993). Regarding school performance issues, a number of studies have found that breakfast consumption affected school performance (Lopez et al., 1993; Soemantri, 1989) and learning concentration in the classroom (Saidin, Krisdinamurtirin, & Murdiana, 1991). Although there is scant data available, this relationship is probably even more pronounced in developing countries where it is aggravated by an insufficient overall food intake and poor nutrition status.

Physical activity is correlated with good health (Pate et al., 1995). However, studies conducted in developed countries revealed an inverse relationship between age and level of physical activity. Sallis (1993), for example, showed that between the ages of 6 to 16 years, males decrease their physical activity by about 2.7% per year, whereas females decrease theirs by about 7.4% per year. Little is known about the physical activity levels of school-age children in Indonesia.

Injury is indeed a health problem for school-age children. Kazar and colleagues (1992) conducted a study of childhood injuries in Hungary. Results showed that the rate of accidents appeared to be low in early childhood, but that there was a significant increase in injuries among school-age children. This is comparable with Scotland, where the peak incidence of injuries was in the 10-to-12-year age group (Stark, Wright, Lee, &

Watt, 1996). In North America, injuries are the leading cause of mortality and morbidity among children and youth (CDC, 2000; Health Canada, 1999).

In Canada, the types of injuries among school-age children include broken or dislocated bones, sprains, strained or pulled muscles, cuts, punctures or stab wounds, concussions or other head or neck injuries, bruises or internal bleeding, and burns (King, Boyce, & King, 1999). This is somewhat similar to a study conducted in Ghana that found that the most common mechanisms of childhood injury resulting in hospitalisation were pedestrian knockdowns (40%), falls (27%), and burns (17%) (Abantaga & Mock, 1998). Hammarstrom and Janlert (1994) investigated school-age children in northern Sweden and found that most injuries occurred during sporting activities (boys: 34%, girls: 46%).

Poor safety habits are likely to be an important factor in injuries sustained by school-age children. For example, Rodriguez and Quintero (1992) surveyed 146 Puerto Rican school-age children; only 7.5% of the children used bicycle helmets. Nonfatal injuries have many impacts on society, on the health care system, and on individuals including long-term hospitalisation, long-term disability and impairment, decrease in quality of life, inability to work, absence from school, and developmental delay. No studies of injury rates or safety practices have been done with school-age children in rural Indonesia.

Statement of the Problem and Rationale for the Study

Previous studies and anecdotal evidence suggest that school-age children in developing countries are at risk of malnutrition, level of activity, and injury leading to mortality and morbidity. Researchers have also shown that children aged 6 to 12 years old are in a critical time period for forming positive behaviours related to health (Mott, James & Sperhac, 1990). However, a comprehensive health risk behaviour survey of school-age children living in Indonesian villages has not yet been conducted.

Research Questions

This study was designed to address the following questions:

1. What is the health status of school-age children in rural Indonesian villages in terms of immunization status, the prevalence of diseases, and nutrition status?
2. How physically active are school-age children in rural Indonesian villages?
3. What is the prevalence of injuries amongst school-age children in rural Indonesian villages?
4. What are the factors associated with undernutrition in school-age children in rural Indonesian villages?
5. What are the factors associated with level of activity in school-age children in rural Indonesian villages?
6. What are the factors associated with injury in school-age children in rural Indonesian villages?

7. What is the association between school performance and nutrition status, physical activity, and injury in school-age children in rural Indonesian villages?

Overview of the Study

This study utilized a descriptive cross-sectional design to survey a sample of school-age children and their parents in two Indonesian villages. Information was obtained about food consumption patterns, levels of physical activity, and prevalence of injury. This study described the prevalence of possible risk factors for malnutrition, level of activity, and low safety levels for this population. Possible risk factors included in the assessment were identified from both the literature and known determinants of health, such as the physical environment, the social and economic environment, personal health practices, and health services. Finally, this study explored the relationships between health risk behaviours and nutrition status, level of physical activity, and prevalence of injury.

If modifiable risk factors for unhealthy behaviour can be identified, this can serve as a basis for planning the content of community health promotion programs. Health care professionals and teachers may be able to use results from this health risk behaviour survey to establish preventative programs and update health education programs. This is particularly useful for school-age children since school is a natural setting that plays a large role in shaping health behaviours in this formative age group.

CHAPTER 2: LITERATURE REVIEW

There has been little research carried out on school-age children in Indonesia or in other comparable developing countries. However, this chapter will present a brief review of the literature that does currently exist. The chapter is divided into six sections: an overview of determinants of health; nutritional status of children, physical activity profile of children; safety practices and incidence of injury among children; school performance; and finally, a summary.

Determinants of Health

The Determinants of Health framework offers an explanation as to how various factors, other than biologic factors and genetic makeup, work together to influence the health of populations, including childhood health and injury rates. This framework explains that the health of populations is influenced by a number of determinants including: Social and Economic Environment, which encompasses income, education and literacy, employment, and factors in the social environment; Physical Environment, comprising active living, availability of nutritious foods, and safe environments; Personal Health Practices, namely physical activity, healthy eating, safety practices, and trends in body weight; and Health Services, consisting of immunisation, health expenditures and the provision of services, access to and utilisation of health services, unmet health-care needs, and alternative care (Health Canada, 1999). These factors should all be included when assessing health risks and health risk behaviours.

Nutritional Status

Nutritional Status and Nutrition Requirements of School-Age Children

Nutritional status is influenced by the utilisation of nutrients. It can be determined by the correlation of information obtained through a careful medical and dietary history, a through physical examination and appropriate laboratory investigations (Robinson & Lawler, 1986). In general, nutritional status is classified into two categories – normal and malnutrition. Malnutrition is a health impairment resulting from a deficiency, excess, or imbalance of nutrients (Robinson & Lawlor, 1986).

School-age children have a continuing need for an adequate diet to provide building materials for growth, to furnish energy, and to regulate the metabolic processes in the body. The nutrition requirement of school-age children is relatively high compared to the needs of infants or adolescents. Between the ages of 11 to 14 years, there is a need for increased calories for energy (2,700 kcal for boys and 2200 for girls), and a need for increased protein, iodine, magnesium, vitamin A, vitamin B, and vitamin E (Robinson & Lawler, 1986).

Height-for-age, weight-for-height, and weight-for-age are anthropometric measures that have been used widely as indicators of nutritional status. Low height-for-age is frequently associated with poor socio-economic status, chronic poor nutrition and high morbidity from infectious diseases (WHO, 1995b). It estimates nutritional problems that may be related to past or concurrent factors that affect nutritional intake and illness rates. Weight-for-height, in comparison, indicates current nutritional levels, generally the

result of weight loss associated with a recent period of starvation or severe disease. Weight-for-age reflects current conditions resulting from inadequate food intake or past episodes of undernutrition or poor health conditions, and is best used for sequential individual measurement. Of the three indicators, height-for-age is the most useful as an index of nutritional status of population groups as it estimates past or chronic nutritional status (Gibson, 1990).

Nutritional Problems of School-age Children

The World Health Organization (WHO, 1995a) reported that three-quarters of children's deaths each year are related to mild to moderate malnutrition. It has been estimated that globally 226 million children are shorter than they should be for their age; this is a greater number than can be accounted for by genetic variation (WHO, 1995a). The evidence of malnutrition is not confined to developing countries but also exists in industrialized countries. In most regions of developing countries, malnutrition rates have been falling over the last two decades; however, malnutrition is still a significant problem (WHO, 1995a).

According to conceptual frameworks developed by the UNICEF Nutrition Strategy (UNICEF, 1990), malnutrition is attributed to immediate causes (individual level) such as diseases, underlying causes (household or family level) including inadequate access to food in a household, and basic causes (social level) including an unhealthy environment. Primary dietary risk behaviors in Western countries differ from those found in developing countries. In Western countries, dietary problems include

being overweight, being underweight or losing weight too rapidly, and having a diet that is high in fat. In comparison, the prevailing dietary problems in developing countries, including Indonesia, tend to be related to low body weight and to inadequate intake of energy, protein, fat, vitamin A, and iron (UNICEF, 1990).

Nutritional Status of School-age Children in Indonesia

Several descriptive studies of the overall nutritional status of school-age children in Indonesia were found. Syafiq (1994) conducted a study of food consumption patterns of Indonesian school children in East Jakarta whose nutrition status and socio-economic backgrounds were different. He used a cross-sectional design that included a large baseline survey, followed by an in-depth study of school children between the ages of 8 and 10 years. The sample for the baseline survey was 677 households in East Jakarta; multistage random sampling was used. According to the baseline survey, the percentage of children with low weight-for-height, height-for-age, and weight-for-age were 7.5%, 21.3%, and 18.2% respectively. For the in-depth study, 60 children were divided into two groups: 31 children with normal height-for-age, and 29 children with low height-for-age. A 72-hour recall was used to determine food consumption patterns of school children. In summary, average energy and protein intake of normal height-for-age schoolchildren were significantly higher than for school children with lower height-for-age. Both groups still had inadequate energy intakes of protein. Family income and parental education, especially mothers' education, seemed to be the socio-economic variables most closely associated with nutritional status and nutrition intake of school-age children. Both groups

had relatively unstructured mealtimes and food patterns. The authors concluded that nutrition education should, therefore, be targeted to school children and their mothers to improve nutritional status.

Gross, Landfried, and Herman (1996) conducted a survey of the nutritional status of 89 school-age children working and living in the streets of Jakarta. The distribution of height-for-age relative to the National Centre of Health Statistics (NCHS) reference standard indicated that 52% of the children were below the third percentile. Comparison of data collected from those street children with data from other school-age children living in poor areas of Jakarta showed that the street children actually weighed more and were taller.

Astuti (1997) conducted an experimental study of the nutritional status of 543 primary school children in grades 1 through 6 in one Indonesia village in Bengkulu, a province in Sumatra. They assessed the effectiveness of food donation programs for improving nutritional status of elementary students. Using a pre- and post-test experimental design, children were randomly assigned to receive food donations or not receive food donations. They used anthropometric measures to examine nutritional status and then compared results with WHO and NCHS reference standards. According to weight-for-age, the nutritional status of the 543 children prior to the feeding program intervention was as follows: 11.0% had severe malnutrition, 22.8% had moderate malnutrition, 33.1% had mild malnutrition, and 33.0% had adequate nutrition. They found no significant difference in the nutritional status of children who had used the food donation program compared to those who had not used the program.

Similarly, Meme, Kogi-Makau, Muroki, and Mwadime (1998) studied the effectiveness of a food donation program for children aged 5 to 10 years in the Nyambene District in Kenya. Using 24-hour recall, they assessed the children's nutritional status and energy and protein intake. When they compared children who could avail of the food donation program with those who could not use the program, they found no significant difference in the prevalence of malnutrition between the two groups. This implies that there are many factors related to preventing malnutrition. The findings of this study and that of Astuti (1997) in Indonesia suggest that a feeding program is only part of the solution to the problem of malnutrition.

Hermina, Hidayat, Afriansyah, Samilar, and Susanto (2000) studied food consumption behaviors of elementary school children participating in "PMT-AS" – a food donation program. They conducted a cross-sectional study of 60 children and their mothers. Participants were randomly selected at two elementary schools (grades 1 to 3) at the villages of Ciheuleut and Pasir Geok in the Bogor district of Indonesia. Data were collected through interviews with students and their mothers. Nutrition intake was measured using 24-hour recall. Results showed students did not consume either the quality or quantity of food needed for a healthy diet. Their food consumption patterns were relatively stagnant and unvaried; vegetables were seldom consumed and there were few sources of protein available. Snack foods consumed at school offered even less variety and were relatively unhealthy. The average energy intake for children 5 to 9 years old was 56.4% lower than Dietary Reference Values (DRV) and protein intake was

60.8% lower than standard DRVs. Similarly, 10-year-old children had energy intakes that were 54.1% lower than DRV and protein intakes that were 47.6% lower than DRV.

Nutritional Status of School-Age Children in Other Developing Countries

Studies of nutritional status amongst children in other developing countries have also been conducted. For example, Awate, Ketkar, and Somaiya (1997) examined the nutritional status of school-age children (5 to15 years old) in rural India. They collected data about habits, dietary patterns, past and present illnesses, family history, and clinical assessments. Their study revealed that the prevalence of various nutrition disorders was 47.42%; anemia and Vitamin A deficiency were the most commonly occurring disorders.

Murphy, Calloway, and Beaton (1995) examined the prevalence of inadequate intake for school-age children and toddlers in villages in Egypt, Kenya, and Mexico. They measured food consumption for 2 days per month for approximately one year; they used household observations. They found that school-age children and toddlers had inadequate nutrition intake, indicating low levels of energy, protein, fat, vitamins, and minerals. According to anthropometric measurement, school-age children from all three locations weighed less and were shorter than the standards set in developed countries as assessed by negative Z-scores for height and weight.

Owolabi, Mac-Inegite, Olowoniyan, and Chindo (1996) conducted a comparable study. They studied the nutritional status of children in northern Nigerian villages and assessed the impact of soya beans on nutrition. The sample consisted of 240 children aged between 2 to 15 years old. Anthropometric data were used to determine nutritional

status, which was then compared with NCHS as reference. Twenty-four-hour recall was used to assess nutrition intake. The study found that malnutrition was generally more pronounced in school-age children in three communities. According to weight-for-height ratios, the percentage of severe malnutrition of school-age children between the ages of 6 to 15 years old in the Kaya, Makera and Kurmin Masara villages were respectively 20.4%, 23.7%, and 5.7% when compared to NCHS standards. This might be attributed to cultural and religious practices in these areas; children, especially boys, are allowed to wander around and fend for themselves after the age of six years. Results also showed that communities producing and using soya beans had higher rates of normal nutrition. Soya beans are important in the diets of children living in these villages, especially in periods of economic recession when animal protein sources are very expensive.

Malnutrition, Morbidity, and Mortality

Illness can be both a cause and consequence of malnutrition (UNICEF, 1990). In 1989, Budiman and Saraswati investigated nutritional status as an indicator of disease incidence in the Pekalongan district of Indonesia using secondary data such as information gathered from nurses, midwives, doctors, district level statistics, public health records, and school reports. This study found that the higher the prevalence of poor nutritional status, the higher the incidence of diseases in school-age children for the district area. There was a significant correlation between acute poor nutrition (height-for-weight) and all diseases studied from August to December 1988. This finding suggests

that nutritional status might be a useful indicator of disease prevalence in school-age children.

Hagel, Lynch, Di Prisco, Perez, Sanchez, Pereyra, and Soto-de-Sanabria (1999) also found a significant relationship between one health problem – helminthic infection – and poor nutritional status in school-age children living in slum areas in Caracas, Venezuela. They found a significant negative relationship between helminthic infection and growth rates.

In terms of mortality, WHO estimates that malnutrition was associated with over half of all child deaths that occurred in developing countries in 1995. Even if a child is slightly underweight, the mortality risk is still increased (UNICEF, 1990).

Pelletier (1994) analysed 28 epidemiological studies of the relationship between malnutrition and mortality. He concluded that the relationship is consistent across diverse world populations. Evidence supports the hypothesis that malnutrition and infection have multiplicative effects on child mortality.

Factors Associated with Nutritional Status

As previously discussed, mother's level of education has a significant impact on the likelihood of healthy food being prepared for children. Hupkens, Knibbe, van Otterloo, and Drop (1998) examined whether more educated mothers were more likely than less educated mothers to place importance on health aspects above preferences of family members in their choice of food. Data were gathered from three groups of women: a) low education level – elementary and lower vocational training; b) middle educational

level – undefined; and c) high level education – higher vocational training and/or university. The data indicated that the high level education group was significantly more likely to take health into account as compared to low or middle education level mothers.

Household size is also widely regarded as a risk factor for malnutrition in developing countries. In 1991, Pelto and colleagues examined the relationship between household size, food intake, and the anthropometric status of school-age children in an area in highland Mexico. They found that children from larger households, defined as having 11 or more members, were significantly shorter and consumed diets of poorer quality when compared to WHO standards.

Other risk factors for malnutrition in children have been identified. Poor maternal nutritional status will have detrimental effects on the growth of the fetus and will affect child's subsequent growth through childhood into adulthood (WHO, 2000). Socio-economic status has also been identified as a risk factor for malnutrition among school-age children (Smith & Haddad, 2000). Income level affects the ability to effectively secure food for the children in a family since low income can restrict the ability to purchase food. Health history has been found to be related to children's nutritional status. Disease or infection can cause loss of appetite, malabsorption of essential vitamins, and metabolic change (Whitney & Rolfes, 2002).

Physical Activities

Physical Activity Level

Level of physical activity is also an important factor that must be considered in child health. However, as with dietary behaviour, there are marked differences between western and developing countries, with little research being conducted in the latter. For example, in western countries a significant portion of children's physical activity is structured, such as gym class and sports teams. However, in developing countries like Indonesia this type of activity is rare while outdoor unstructured activities are quite common.

It has been well documented that exercise and a moderate level of leisure-based physical activity can improve general health and psychological well being; they can also lower morbidity and mortality from chronic diseases, such as cardiovascular and circulatory system diseases. In spite of evidence that physical activity is positively correlated with good health, studies reveal an inverse relationship between age and level of physical activity with younger school children being more active and older children being more sedentary. For example, Sallis (1993) conducted an epidemiological study of physical activity and fitness in children and adolescents in the United States. Results showed that males were about 15% to 25% more active than females but, as age increased, a consistent decline in physical activity was seen in both sexes. However, between the ages of 6 and 16 years, males decreased their physical activity by about 2.7% per year whereas females decreased their physical activity by about 7.4% per year. The

factors that contribute to this decrease in activity among aging children are not well understood and need further investigation.

Factors Associated with Physical Activity Level

There have been several studies of the factors associated with physical activity levels in western countries. Trost et al. (1997) conducted a prospective study of the determinants of physical activity for 202 rural fifth-grade predominantly African-American children. Results showed a significant correlation between enjoyment of physical education in school and vigorous physical activity. Involvement in a community sports team was also significantly correlated with medium vigorous physical activity.

Another factor associated with physical activity level is the level of encouragement to participate in physical activity. Biddle and Goudas (1996) conducted an analysis of children's physical activity levels and its association with adult encouragement. They investigated 147 children in South England. Self-reports were used for measuring physical activity level. Findings showed that teacher and parental encouragement were significantly associated with children's physical activity levels.

Access to sports facilities has also been found to be significantly associated with children's participation in physical activity. Stucky-Ropp and DiLorenzo (1993) investigated the determinants of exercise levels in children in an American midwestern state. The purpose of the study was to explore the factors that may effect a child's level of physical activity. They assessed 242 children from fifth and sixth grades and collected data through interviews and questionnaires for parents and children. Results showed that

support for children's physical activity, children's enjoyment of physical activity, and access to sports facilities were significantly associated with children's physical activity levels.

Gottlieb and Chen (1985) studied the relationship between socio-cultural factors and sporting activities for seventh- and eighth-grade students in Texas. A self-administered questionnaire was given to the students and participating schools were chosen for their geographic location and their ethnic mix. The study found that knowledge of cardiovascular health, parental exercise, sex, father's occupation and ethnicity were significantly related to the overall frequency of exercise. Interestingly, parental exercise had a stronger influence on the frequency of exercise among girls than among boys. Girls were more likely than boys were to participate in running, swimming, dancing, skipping rope, tennis, roller-skating and volleyball. However, boys were more likely than girls were to participate in team sports, competitive sports events, and non-aerobic activities.

Uitenbroek (2000) conducted both quantitative and qualitative research in order to explore issues in exercise behaviour in Dutch children. A computer assisted telephone interview approach was used to collect the data. Uitenbroek identified five areas that were important in shaping exercise behaviour: health-related factors; factors related to available facilities; issues of behavioural change; issues of health information and promotion; and miscellaneous issues, such as the weather and lack of money.

Safety Practices and Injury

Injury is indeed a health problem for school-age children. Injuries are the leading cause of mortality and morbidity in children in many countries. In the United States, injuries cause more deaths among children and young adults than diseases do. In 1996, for children between the ages of 4 to14 years, 52% of all deaths were caused by injury, and 17% of hospitalisations were related to injury. Unintentional injury rates for children aged 5 to 9 years old was 10 per 100,000, while the rate for children aged 10 to 14 years was 12 per 100,000. At all ages, boys were more likely to be injured than girls were. According to "Trends in the Health of Canadian Youth, 1999," over 35% of Canadians in grades 6, 8, and 10 reported at least one injury for which they had been treated by a doctor or nurse (King et al., 1999). Over 40 percent had been treated for more than one injury. Injuries were more prevalent among students in higher grades and boys were more likely than girls to be injured at all grade levels.

Another study of accidents conducted by Kazar et al. (1992) lasted for a period of one year in County Vas, Hungary. This research found that the rate of accidents appeared to be low in early childhood, but that childhood injury was significantly associated with increasing age. This is comparable with Scotland, where the peak incidence of injuries occurred in children aged 10 to12 years old (Stark, Wright, Lee, & Watt, 1997).

Types of Injuries Sustained

There are distinct differences between types of injuries sustained in western countries and those sustained in developing countries. In Canada, the most common type

of injury for school children was a sprained, strained or pulled muscle (Health Canada, 1999). In rural areas in Indonesia, such as the villages of Kuripan and Cibentang, most childhood injuries are related to activities on or near local rivers and dams (Fakultus Ilmu Nursing Universitas Indonesia, 2000a,b). However, a valid comparison cannot yet be made between the types of injuries sustained in these two countries since very little research of this type has been carried out in Indonesia.

In addition to differences between countries, there is a difference between sexes. Girls are more likely than boys to experience sprains, strains, pulled muscles and bruises or internal bleeding, but boys are more likely to have broken bones, head or neck injuries, cuts, and punctures or stab wounds. Vorko and Jovic (2000) studied school-age injuries in the Koprivnica, Croatia. They found four classifications: (1) dislocation, sprain and strain injuries mostly of legs of both age groups of boys (7-10 years and 11-14 years) in house activities; (2) arm fractures of all boys in house activities; (3) open wounds, mostly of the head in younger boys at school, and open wounds in younger boys in road traffic accidents; and (4) contusions, mostly of the arms, in older girls at school and contusions in older boys in road traffic accidents. Their findings showed that injuries sustained by school-age children occur both in the home and outside the home.

The British Columbia Injury Research and Prevention Unit (BCIRPU) elaborates on how different types of injuries are associated with specific areas of the body. According to their research, motor vehicle accidents are the major cause of blunt thoraco-abdominal trauma and head injuries; sports are most closely associated with extremity fractures, sprains, and strains; and house fires are mainly responsible for bodily burns and

inhalation injuries. It was also noted that most comas and brain damage are related to near-drowning experiences while general falls are the cause of most head injuries, fractures, and blunt traumas (BCIRPU, 2002).

Abantaga and Mock (1998) conducted a study of trauma-related hospitalisation of paediatric patients in an urban area of the sub-Saharan countries. They reviewed 677 children admitted to the Komfo Anokye Teaching Hospital in Kumasi, Ghana from August 1995 to July 1996. The results showed that the most common types of injury were pedestrian knockdowns (40%), falls (27.2%), and burns (17.6). The annual rate of injury of injury was 230 per 100,000 children.

Place Where Injury Occurred

Childhood injuries occur in a variety of places. Hammarstron and Janlert (1994) investigated school accidents in the northern part of Sweden. They found that the relative risk of school injury compared with spare-time injury was 1.8 for boys and 2.6 for girls of compulsory school-age. Most injuries occurred during sporting activities (boys: 34%, girls: 46%). According to Health Canada (1999), places where students are commonly injured include home, school, sports facilities, and streets/roads. In addition, over half of all injuries occurring in school involved students playing games and participating in playground activities. Furthermore, for boys and girls, risk of sports injury increased with increasing school grade.

Another study of childhood accidents in Hungary conducted by Kazar et al. (1992) found that home accidents accounted for the majority of accidents, especially in

early childhood. However, after age 7, the incidence of school and sports/playground accidents exceeded those at home. Road accidents also increased and were a high risk factor for all age groups studied.

Injury as a Risk Factor for Morbidity, Mortality, and Social Costs

In Indonesia where seat belts and bicycle helmets are seldom used, accidents are the eighth cause of death (5.63 per 100,000 population) (Departemen Kesehatan, 1996). The mortality rate due to accidents and injuries increased from 1986 (4.7%) to 1995 (5.2%). In rural areas, such as the village of Kuripan in Indonesia, where there is less traffic and fewer traffic accidents, the leading cause of injury resulting in death of school-age children is drowning in rivers and dams (Fakultus Ilmu Nursing Universitas Indonesia, 2000a,b).

Awareness of risks and subsequent attitudes towards physical activity are also a factor in childhood injury. Rodriguez and Quintero (1992) conducted a study of bicycle-related accidents in Puerto Rico. Approximately 600 children under the age of 15 years die each year from injuries sustained while riding bicycles. Almost 80% of these deaths involved trauma to the head; nearly 25% of all significant brain injuries in children were bicycle related. Their case-control study of accidents among bicycle riders experiencing a crash demonstrated that safety helmets reduced the risk of head injury by 85% and brain injury by 88%. In spite of these statistics, bicycle helmet use in Puerto Rico has not yet received the necessary publicity to increase their use. Rodriguez and Quintero also surveyed 146 Puerto Rican school children evaluated at a university hospital paediatric

clinic from January to March 1991. Only 7.5% of the children in the sample used bicycle helmets.

Injury not only affects death and morbidity, but also health and social costs. For example, in Canada, the total cost of injuries from childhood falls costs $630 million per annum (Health Canada, 1999). Comparably, the cost of hospital treatments for all school accidents in Scotland is estimated at £134.76 per year (Stark, Wright, Shiroyama, & Lee, 1997). However, in Indonesia, individuals pay for their own health care since there is no national health care program. Families must pay for treatment of injuries sustained and for any resulting consequences; if families cannot pay, the standard of health care may be jeopardized.

Social costs of injury must also be considered. Since injuries have an enormous impact on individuals and their families in terms of pain, grief, and suffering, it is impossible to measure these losses simply in terms of economic costs.

Effects of Socio-Economic Status and Sex on Injury

Socio-economic status (SES) refers to social or economic factors or to a combination of both social and economic factors. According to Health Canada, distribution of wealth is more important than the overall wealth of the society in determining mortality and health in a society (Health Canada, 1999).

One of the most important risk factors for childhood injuries is poverty (Roberts & Pless, 1995). This would be true in Indonesia as well. Children who live in poverty-stricken areas may also lack safety support such as standard bicycles and approved

bicycle helmets, adequate shelter, and proper protective clothing. In addition, children in poverty are likely to be without a regular source of health care for prevention and treatment services (CDC, 2000). In 1989, Joly, Foggin, Zvagulis and Pless reported on a study on traffic injuries among children in Montreal. The findings revealed that male and female children of all ages residing in low-income areas had higher rates of injury than children from middle and upper-income areas of the city.

In addition to SES, sex also has been shown to play an important role in risk of injury among children between the ages of 6 and 12 years. Research into children's injuries has consistently shown that boys are more at risk of injury than girls (CDC, 2000; Health Canada, 1999; Smith & Pless, 1994). This may reflect the level of participation as well as the type of activities in which boys and girls participate (Vorko & Jovic, 2000). Hence, in order to obtain an accurate understanding of the impact of injuries and the associated risks, it is imperative that researchers consider the differences between boys and girls.

School Performance

School performance has been shown to be influenced by learning disabilities, parent's education and income level, and a child's socio-cultural and physical environments (Canadian Youth Foundation, 2003). Although there are many factors associated with school performance, this study investigated the effects of nutritional status on the school performance of children in two rural Indonesian villages since no research has been previously done in this area. Saidin, Krisdinamurtirin, and Murdiana

(1991) studied the relationship between eating breakfast and learning concentration in classes in Bogor, Indonesia. The sample of this study consisted of school-age children in grades 4, 5, and 6 with the age range being 9 to 14 years old. Results indicated that children who did not eat breakfast and children who had anemia had lower learning concentration levels than children who ate breakfast and did not have anemia. This study also noted significant differences in energy intake levels, as measured by calorie consumption over a 24-hour period.

Lopez and colleagues (1993) studied the effects of breakfast omission and cognitive performance in Santiago, Chile. The sample was 279 children from low socio-economic level backgrounds. They found that children with low height-for-age had significantly lower scores in the attention test irrespective of having received breakfast or not.

Arnelia, Karyadi, Muljati, and Lamid (1995) conducted a study of the impact of malnutrition on intelligence quotient (IQ) scores of Indonesian school-age children who had previously experienced malnutrition, as measured by weight-for-age. They also studied the impact of breakfast patterns on learning. The study compared school-age children who had a prior history of malnutrition (i.e., they had been affected between the ages of 3 to 5) with school-age children with no history of malnutrition. Results showed that there was a statistically significant difference in the average IQ score for children who had a history of malnutrition. Their scores were 13.7 points lower than scores of children who never experienced malnutrition when they were young. Breakfast patterns

were shown to have a statistically significant effect on learning, concentration, and cognitive performance.

Hidayat, Hermina, Lusciasari, Tato, and Susanto (1998) conducted a study in the Tangerang district of West Java that looked at the effects of a deworming control program on the nutritional status and learning among Indonesian elementary school children aged 8 to 10 years. This was an experimental study and the sample comprised 166 elementary school children. Results showed that among the experimental group, there was less prevalence of worm infection, higher nutritional status, better school attendance rates, and more pronounced learning acceptance compared to the control group.

Moock and Leslie (1986) studied childhood malnutrition and schooling in the Terai region of Nepal. They assessed nutritional status by measuring weight-for-age, height-for-age, weight-for-height, and hemoglobin levels. When looking at the effect of nutritional status on schooling, children's median height-for-age was found to be the single best predictor of whether or not a child was enrolled in school and of age-adjusted grade attainment. The importance of height as a determinant of school enrolment and school performance depends on the general level of nutrition in a population. In impoverished environments, height is a good indicator of overall long-term nutritional status.

Summary of the Literature

Undernutrition is a common problem in Indonesia, as elsewhere in the developing world. Studies in Indonesia have identified low height-for-age in 21.3% to 52% of the children in the sample, and inadequate energy intake and poor quality diets. Malnutrition is associated with both increased morbidity and mortality. Factors associated with poor energy and nutrient intake include mother's level of education, household size and socio-economic status.

Physical activity in school-age children has not been studied in developing countries. Factors associated with levels of physical activity in children in western countries include: enjoyment of physical education in school, involvement in a community sport team, encouragement of adults, and access to sports facilities. There is an inverse relationship between activity levels and age, with younger school children being more active and older children being more sedentary.

Injury is a significant health problem for school-age children, with injuries being a leading cause of morbidity and mortality in children in many countries. There are distinct differences in the types of injuries sustained by children in western countries and those sustained in developing countries, with pedestrian knockdowns, falls, burns and drowning being common in the latter. Childhood injuries occur in a variety of places, including sports facilities, homes, school, playgrounds and streets. Factors associated with childhood injury include failure to use safety devices such as helmets, and lower socio-economic status. Boys tend to be more physically active than girls and consequently sustain higher rates of injury than girls.

There are many factors that may impact on school performance, including learning disabilities, family and physical environment, malnutrition and poor eating patterns.

While there have been a number of studies on nutrition in Indonesia, there has been no comprehensive assessment of the needs of school-age children related to activity levels or injury, or the factors and inter-relationships associated with these outcomes, nutrition and school performance.

CHAPTER 3: METHODOLOGY

The chapter on methodology consists of nine sections. Section one provides an overview of the study design; section two provides definitions of terms used in the study; section three describes the study population and setting; and section four explains the sample selection. Section five describes the sample size of the study; section six discusses the data collection procedure; section seven describes the instruments used in the study; and section eight discusses ethical considerations. Finally, section nine describes data management and analysis.

Overview of the Study Design

This study used a descriptive cross-sectional design. Participants consisted of 99 school-age children and their parents who lived in the participating villages of Cibentang and Kuripan, and 24 teachers who were in charge at Cibentang and Kuripan Elementary Schools. Data were collected by interview, using structured questionnaires with closed- and open-ended questions related to risk factors associated with health status, dietary intake, level of activity, and injury among school-age children.

Definitions

The terms used in this study are defined as follows:

Health problems: Diseases/illnesses that the children had, as identified by the parents. These included wounds, pneumonia, GI tract problems, asthma, anemia and infections.

Health complaints: Symptoms that the children exhibited, as identified by the parents. These included nausea and vomiting, fever, indigestion, and dizziness.

Nutritional status: Height-for-age, weight-for-age and weight-for-height were used as indicators of nutritional status. Height, measured in centimetres, and weight, measured in kilograms, were compared for the child's age, measured in years, to international growth reference curves.

Undernutrition: Any condition caused by deficient food, energy, or nutrient intake or by an imbalance of nutrients (Sizer & Whitney, 1997).

Normal weight and underweight: Children whose weight, transformed into Z scores, fell 2 standard deviations (SDs) below the World Health Organisation international standard (WHO, 1995b) were classified as underweight. Children whose weight was within 2 SDs of the international standard were classified as normal weight.

Physical activity: Physical activity in this study consisted of athletic or recreational activities, including sports, physical education classes, and walking to and from school.

Injury: Injury in this study referred to physical harm or damage inflicted on the body by an external force, such as lacerations, broken bones, and sprains.

Puskesmas (community health services): Health services available in the community and provided for community members of all ages. Professional health care providers were physicians, midwives, and nurses. As the core of health services, the Puskesmas is responsible for the health status of the people in the villages. The Puskesmas implement a number of improvement programs that involve health promotion, prevention, and education.

Posyandu (village health services): Community programs for mother and children under age 5. The Posyandu are comprised of health professionals such as midwives and nurses, and are assisted by cadres.

Cadres (community health workers): Cadres are usually women from the local community who are considered to have adequate ability to support health care providers in conducting health programs. Cadres are responsible for managing the activities of the Posyandu.

Study Population and Setting

The participants in this study were selected from the four elementary schools in the villages of Cibentang and Kuripan, in the sub-district of Parung, Bogor district,West Java province. These villages are under the management of Puskesmas Putat Nutug. The population of school age children (5 to 14 years old) in the villages of Cibentang and Kuripan is 2,426 children (BPS & Bappeda, 1999). Those villages were selected as the site of this research because they are the sites of a linked research project between Memorial University of Newfoundland School of Nursing in St. John's, Newfoundland, Canada and the University of Indonesia Faculty of Nursing in Jakarta, Indonesia. Children met inclusion criteria if: a) they resided in Cibentang or Kuripan; b) they were presently in grade 1 to 6; c) they were between the ages of 6 to 12 years; d) they were enrolled in a regular style classroom; and, e) their parents had given informed consent to participate in the study. There were no specific exclusion criteria. The interviews were conducted with the children and teachers at their schools and with the parents in their

own homes. All of the teachers associated with participants were also asked to participate.

Sample Selection

Simple random sampling was used to select the participants. In order to achieve representation of the target population, the investigator obtained a list of 1372 identification (ID) numbers of all eligible elementary school students in the two schools in each of the villages. Stratified random sampling was used, with three strata comprising grades 1 and 2, grades 3 and 4, and grades 5 and 6. Computer generated random numbers were used to randomly select students' ID numbers for each individual stratum. Selected students within each stratum were then assigned a study code number.

The investigator met village and neighbourhood leaders, directors of schools, classroom teachers, and community health nurses who work in the villages to explain the study, the inclusion criteria for participants, and the data collection process. The role of the leaders and the school directors was to facilitate entry into the school system. The teachers were responsible for providing the investigator with a list of ID numbers of all children who met the first four inclusion criteria. The investigator did not obtain a class list of names. Subsequently, the teacher approached parents whose children had been randomly chosen to be in the study to ask their permission to be contacted by the investigator. This permission was obtained via a letter for parents that was sent home with the students (see Appendix A for an English translation of the letter). If the teacher knew that the parents were unable to read, the teacher visited the parents at home and

explained the content of the letter to them. The investigator also asked teachers to determine a convenient time for meeting with participants.

Sample Size

The total number of participants was 99 students and their parents. A sample of 99 children would have 80% power to detect the true proportion of underweight children, $\pm$ 5%, (α = .10). This was based on the assumption that 67% of the children were underweight, as found by Nurhaeni (2001) in her study of children under age 5 in villages in the same Indonesian district. The sample size was calculated using the formula found in Snedecor and Cohran (1967); Statistics Canada also uses this formula for sample size calculations for population based surveys (Power, 2001).

Twenty-four teachers from Cibentang and Kuripan Elementary Schools also participated in this study.

Data Collection Procedure

Once parents agreed to be contacted, the investigator visited parents at home to explain the study, obtain formal informed consent (see Appendix B for an English translation of the consent form), and collect parent data through interviews. Explanation of the study was given to the participants at the initial stage of the research and at any point during the process if needed. Information given included discussion of the data collection procedure, instruments to be used, physical examinations, and the amount of time required for the data collection. The explanation was given in the local language

using a level of language consistent with the participants' level of understanding. The investigator also explained that the participant had a right to withdraw from the study at any time. Assurance of confidentiality was also given at each stage of the research. Interviews with parents were held at their homes using structured questionnaires with closed- and open-ended questions. The mother was interviewed in most cases; however, the fathers or other legal guardians of some children were also interviewed.

Children whose parents had agreed to be in the study were contacted at school the day after their parents were interviewed. Verbal assent was obtained from the child. The interview was held in a quiet counselling room; children were interviewed using the data collection instruments. Food models and photographs were used to help them recall the food that they had consumed in the previous 24 hours. No children were interviewed on a Monday, so weekend dietary intake was not included.

Anthropometric measures of height and weight for the children were recorded. Body weight was measured to the nearest 0.1 kg using a bathroom weighing scale. Subjects were weighed without shoes and wearing a minimum of clothing. Before using the weighing scale, accuracy was checked using calibration weights. Height was measured to the nearest 0.1 cm using a standard measuring device. Subjects stood on a horizontal surface, chin tucked in, stretched upwards to their full extent so that so that the face was horizontal and the eyes were focused forward. Heels, buttocks and shoulders were in contact with the wall. The height was then read from the markings on the device.

Instruments

The investigator designed the instruments for this study based on a review of the literature and in consultation with content and questionnaire design experts. There were six instruments that measured risk factors, health behaviour and health status of children aged 6 to 12. The instruments were: demographic data (student, 5 items; parents, 6 items); health history (parent, 5 items); perceived health status (student, 1 item); dietary history (student, 8 items; parent, 10 items); physical activity (student, 14 items; parent, 7 items); and safety practice and injury (student, 14 items; parent, 4 items). In addition, a short 4-item instrument that included items about school performance, school attendance, and physical activity was given to the student's teacher to complete. The parents were shown the instrument at the initial parent interview. These instruments were translated into the Indonesian language. The tools can be found in Appendices C (student questionnaires), D (parent questionnaires), and E (teacher questionnaire).

All instruments were tested for ease of use and for clarity of the questions. In November 2001, a pilot study of the instruments and data collection procedures was done at Cibetung Muara village because it shares many of the same characteristics as Kuripan and Cibentang. Three participants were chosen as a trial sample. The investigator obtained feedback from the children, their parents, and teachers. Minor revisions were made to the questionnaires. The report from the pilot study can be found in Appendix F.

Ethical Considerations

The ethical issues in this study involved human dignity and justice, beneficence, and informed consent related to the age of the children under 19 years of age. The ethical principle of beneficence was not violated; parents and children were not harmed or exploited by this study. Children were asked for their assent; however, data collection was carried out only after the parents gave informed consent. There was no risk or discomfort involved in participation in this study. Parents and children may have been inconvenienced by the 30 minutes required for data collection. However, there were possible benefits from the study. The study provided participants with an opportunity to better learn about the health of their children. When possible, parents were given a brief report about their child (e.g., height, weight, nutrition level, level of participation in physical activity, and safety practices). In addition, one child had an acute illness and was referred to the appropriate health care services as soon as possible. Also, a summary of the results will be sent to teachers who can then share it with parents.

To ensure confidentiality, the investigator disguised each participant's identity by a code number; no name was entered in the database for analysis. Data has and will be reported in such a way that individuals cannot be identified.

Informed consent was fundamental to this study. The investigator carried out a home visit to the parents who had agreed to be contacted. The investigator gave verbal and written explanations to the children and parents who were selected to participate in this study. Verbal explanations were given to illiterate participants. The investigator explained the details of the study in the local language. The parents who understood and

wanted to participate gave written consent; illiterate parents used a thumbprint to indicate their permission. Parents also gave consent for their child to participate, but the investigator also obtained verbal assent from the children. Both parents and children had the right to refuse participation in the study. They also had the right, at any time, to withdraw from the study.

Teachers also gave consent to share information about the children. Parents were aware that teachers would be giving information and had the opportunity to prevent teachers from sharing information with the researcher if they wished.

The study proceeded only with the approval of the Human Investigation Committee of Memorial University of Newfoundland and the Ethics Committee (Komite Etik) of the University of Indonesia's Faculty of Medicine, and permission of the local health departments in Indonesia. Letters of permission can be found in Appendix G.

Data Management and Analysis

The data resulting from the survey tools were categorised, coded, and then analysed. The investigator was responsible for data analysis, with assistance of the co-supervisors of the study, one of whom is a nurse epidemiologist. Height-for-age, weigh-for-age, and weight-for-height were processed using Anthropometrics software, which automatically calculated values based on entered data (WHO, 1999). Anthropometric calculations were based on the growth reference curves developed by the National Centre for Health Statistics (NCHS) that are recommended by the World Health Organisation for international use. Children whose anthropometric values, transformed into Z-scores, were

below or above 2 SDs relative to the accepted international standard were classified as abnormal (WHO, 1995b). The energy and nutrient intakes estimated via the recall were computed using Excel software. Local food compositions were used for nutrient analysis, conversion, and calculation (Departemen Kesehatan, 1995; Nio, 1992; Waspadji, Suyono, Sukardji & Rahimy, 1997).

The Statistical Package for the Social Sciences (SPSS) 9.0 was used for descriptive analysis and testing of associations. Content analysis was used to analyse open-ended questions. Frequencies and proportions were used to describe categorical data; means and standard deviations were used to describe continuous data. Odds Ratios (ORs) were used to describe the magnitude of association between risk factors and nutrition status, physical activity level, and prevalence of recent injury. Fisher's Exact Test (FET) was used to test the significance of relationships between those variables.

CHAPTER 4: RESULTS

The research findings from this investigation are presented in four sections. The first section contains a summary of the characteristics of the sample: parents' demographic characteristics, children's demographic characteristics, and family structure. Section two addresses the first two research questions by providing a detailed description of medical history, nutrition status, physical activity, and injury amongst school-age children. The third section addresses the remaining four research questions by describing the relationship between health status, physical activity, injury, and potential risk factors. Finally, a summary is presented in the fourth section.

Characteristics of the Sample

A total of 102 parents whose children met the inclusion criteria were approached about participating in this study. Three refused, so the final sample size was 99 parent-child dyads. Forty-nine dyads were from Cibentang and 50 were from Kuripan.

Parent's Demographic Characteristics

In 92 interviews, the mother was the principal source of information. The remaining seven parents/caregivers included grandmothers, aunts, and fathers. Table 1 presents the socio-demographic characteristics of the mothers/caregivers and their families. Eighty-five participants (85.9%) in the study were Sundanese. In terms of the mother's educational level, 45.5% (n = 45) of mothers had only 1 to 5 years of formal

education. Twenty mothers (20.2%) reported that they had received no formal education at all.

Table 1: **Parents' Socio-Demographic Characteristics**

Categories		**n[1]**	**%[1]**
Mother's Education Level (In years)	None	20	**20.0%**
	1 – 5	45	**45.5%**
	6 – 12	33	**33.3%**
	13 – 15	1	**1.0%**
Employment Status	Mother employed	45	**45.5%**
	Mother not employed	54	**54.5%**
	Father employed	76	**76.8%**
	Father not employed	23	**23.2%**
Family Income (In Rupiahs/month)	< 200,000	31	**31.3%**
	200,000 – 350,000	48	**48.5%**
	350,000 – 600,000	17	**17.2%**
	> 600,000	3	**3.0%**
Cultural Group	Sundanese	85	**85.9%**
	Javanese	2	**2.0%**
	Betawi	10	**10.1%**
	Other	2	**2.0%**

[1]n and % are the number and percentage of parents with the identified maternal education level, maternal and parental employment status, family income, and cultural group at the time of the interview

Participants were asked if the mother and father were working, either through self-employment or through employment outside the home. Seventy-six fathers (76.8%) and 45 mothers (45.5%) reported that they were working. They were not asked what their

jobs were. Concerning parents' income level, nearly half of the parents, 48.5% (n = 48) reported their household income to be in the range of Rp 200,000-350,000 per month and 31% (n = 31) identified their income as less than Rp 200,000 per month. The median income in Indonesia is Rp 377,000 per month (Departemen Kesehatan, 1999b).

Children's Demographic Characteristics

Table 2: **Grade Categories and Mean Age of Children**

Grade Level	Male		Female		Total	
	Mean Age (SD)[1]	n (%)[2]	Mean Age (SD)[1]	n (%)[2]	Mean Age (SD)[1]	n (%)[2]
1 - 2	8.14 (± 1.06)	21 **(36.2%)**	7.36 (± 0.81)	11 **(26.8%)**	7.88 (± 1.04)	32 **(32.3)**
3 - 4	10.00 (± 1.10)	16 **(27.6%)**	9.94 (± 1.20)	17 **(41.5%)**	9.97 (± 0.20)	33 **(33.3)**
5 - 6	11.71 (± 0.56)	21 **(36.2%)**	11.31 (± 0.95)	13 **(31.7%)**	11.56 (± 0.13)	34 **(34.3)**
Total	--	58 **(100.0)**	--	41 **(100.0)**	--	**99** **(100.0)**

[1]Mean age, with standard deviation, of male and female children within the identified grade level

[2]n and % are the number and percentage of male and female children within the identified grade level

Students were selected from four elementary schools with a similar proportion from each grade level: 27 students (27.3%) from Cibentang I, 22 students (22.2%) from Cibentang II, 24 students (24.2%) from Kuripan I, and 26 students (26.3%) from Kuripan

II. Table 2 shows that there were 58 boys (58.6%) and 41 girls (41.4%) involved in the study with fewer boys than girls in grades 3-4 and the opposite in the other grade levels.

Table 2 also presents the children's grade categories and age characteristics. The average age of children at every grade level fell within the expected age range for that grade level, but male students were slightly older than female students. Specifically in grades 1 to 2, male students, on average, were nearly one year older (mean 8.14, range 6 to 10 years) than female students (mean 7.36, range 6 to 8 years). This difference was statistically significant ($p = .042$).

Family Structure

Table 3: **Family Structure: Number of Children and Family Size**

Categories		n[1]	%[1]
Number of children in household	1 – 3	41	**41.4%**
	4 – 6	43	**43.4%**
	7 – 9	15	**15.2%**
Number of members in household	3 – 5	41	**41.4%**
	6 – 8	44	**44.4%**
	9 – 11	13	**13.1%**
	> 12	1	**1.0%**

[1]n and % are the number and percentage of parents with the identified number of children and members in their household

The structure of participants' households is presented in Table 3. The majority of households, 43.4% (n = 43), had four to six children, while 15.2% (n = 15) had at least

seven children. Some households were comprised not only of the parents and children but also other family members such as grandparents and aunts. The majority of households, 44.4% (n = 44), consisted of six to eight individuals, while only one percent (n = 1) had more than 12 members.

Description of Medical History, Nutrition Status, Physical Activity, and Injury Amongst School-Age Children

Medical History

Immunization Status

Sixty-three percent of mothers (n = 63) reported that their children had health cards. Most mothers knew the immunization status of their children. Of the 99 children, 53.5% (n = 53) were reported as having complete routine preschool childhood standard immunization (DPT, Polio, BCG, Measles), while 39.4% (n = 39) were reported as having incomplete immunization. Only 7.1% (n = 7) of mothers indicated that they did not know their child's immunization status.

Routine immunization includes giving a tetanus immunization booster to children twice, once in grade 1 and later in grade 6. For the children in grade 1 and grade 6, parents reported that 78.9% (n = 30 of 38) had previously received their tetanus immunization booster. The majority of mothers whose children had received the appropriate tetanus booster, 81.3% (n = 26 of 30), reported that the reason for immunization was the government immunization program.

Medication Use and Vitamin Supplementation

Ten (10.1%) parents reported that they gave medication to their children when they were sick. Of these parents, 7 reported that they administered medication to their children once per day. Nine parents did not know whether the medication given had side effects. The appropriateness of the medications used was not assessed.

Twenty-three parents (23.2%) reported that they gave vitamins to their children. Only 5.1% (n = 5) of the children were given vitamin A supplements, while 9.1% (n = 9) were given B complex supplements, and 9.1% (n = 9) were given multivitamin supplements. Of the 23 parents who reported giving their children vitamin supplements, most reported that they gave the supplements daily. Health services and schools were the main sources of vitamin A and B complex supplements, while multivitamin supplements were mainly purchased and provided by the parents.

Children's Health Problems in the Previous Six Months

According to parents, every child reported at least one episode of illness in the six-month period prior to the interview. Ninety-seven children (98.0%) had reported more than one episode of illness. There were variations, however, in illness frequencies. Table 4 presents reported health problems in the previous six months. Open wounds, pneumonia, GI tract problems, mouth sores and dental problems were the five most frequently occurring health problems in school-age children. Open wounds, pneumonia, and GI problems were reportedly experienced 2 to 6 times in the previous 6 months by 41.6% (n = 41), 60.7% (n = 60), and 48.5% (n = 48) of the 99 participants, respectively.

Table 4: **Children's Health Problems in the Previous Six Months**

Disease	0 episodes		1 episode		2 – 6 episodes		> 6 episodes	
	n[1]	%[1]	n[1]	%[1]	n[1]	%[1]	n[1]	%[1]
Open Wound Infection	16	**16.2%**	28	**28.3%**	41	**41.6%**	4	**4.0%**
Pneumonia	19	**19.2%**	16	**16.2%**	60	**60.7%**	4	**4.0%**
GI-Tract Problems	24	**24.2%**	22	**22.2%**	48	**48.5%**	5	**5.0%**
Mouth Sores	32	**32.3%**	25	**25.3%**	38	**38.5%**	4	**4.0%**
Dental Problems	54	**54.5%**	12	**12.1%**	29	**29.2%**	4	**4.0%**
Helminth Infection	78	**78.8%**	10	**10.1%**	11	**11.1%**	0	-
Asthma	79	**79.8%**	8	**8.1%**	11	**11.1%**	1	**1.0%**
Anemia	94	**94.9%**	5	**5.1%**	0	-	0	-
Ear Infection	95	**96.0%**	4	**4.0%**	0	-	0	-
Skin Infection	97	**98.0%**	2	**2.0%**	0	-	0	-
Eye Infection	98	**99.0%**	1	**1.0%**	0	-	0	-
Mixed Pain	98	**99.0%**	1	**1.0%**	0	-	0	-

[1] n and % are the number and percentage of children who reported the identified number of episodes of the listed diseases in the six months prior to the interview.

Children's Health Complaints

Table 5 summarizes the distribution of children's complaints of personal health-related symptoms in the previous six months, as reported by their parents. According to parents' reports, every child had at least one complaint. Fever, indigestion, lack of appetite, diarrhea, dizziness and nausea/vomiting were common complaints. Fifty children (50.3%) had 2 to 6 occurrences of fever in the previous 6 months. Fifty-seven

children (57.6%) had 2 to 6 occurrences of indigestion problems in the previous 6 months.

Table 5: **Children's Health Complaints as Reported by Parents**

Health Complaints	0 times		1 time		2 – 6 times		> 6 times	
	n[1]	%[1]	n[1]	%[1]	n[1]	%[1]	n[1]	%[1]
Fever	19	**19.2%**	27	**27.3%**	50	**50.3%**	3	**3.0%**
Indigestion	27	**27.3%**	13	**13.1%**	57	**57.6%**	2	**2.0%**
Lack of Appetite	37	**37.4%**	10	**10.1%**	43	**43.3%**	9	**9.0%**
Diarrhea	41	**41.4%**	24	**24.0%**	33	**33.2%**	1	**1.0%**
Dizziness	46	**46.5%**	12	**12.1%**	35	**35.4%**	6	**6.1%**
Nausea/Vomiting	48	**48.5%**	17	**17.2%**	34	**34.3%**	0	-
Difficulty Chewing or Swallowing	51	**51.5%**	17	**17.2%**	28	**28.2%**	3	**3.0%**
Constipation	85	**85.9%**	3	**3.0%**	10	**10.1%**	1	**1.0%**

[1] n and % are the number and percentage of parents who reported their children complained of the listed health-related symptoms the identified number of times

A total of 30 children (30.3%) had experienced weight loss of greater than 10% of their body weight in the previous 6 months. Parents reported that more boys (32.8%; n = 19 of 58) than girls (26.8%; n = 11 of 41) had experienced weight loss. Table 6 summarizes the distribution of the reasons for weight loss, by gender. The three main reasons identified by the parents for weight loss in boys were fever (31.6%; n = 6 of 19), low appetite (26.3%; n = 5 of 19), and stomach ache (21.1%, n = 4 of 19). The two main reasons for weight loss in girls were fever (54.5%; n = 6 of 11), and nausea (18.2%; n = 2 of 11).

Table 6: **Weight Loss of More than 10% in Children by Gender**

Reason for Weight Loss	Male		Female	
	n[1]	%[1]	n[1]	%[1]
Fever	6	**31.6%**	6	**54.5%**
Low appetite	5	**26.3%**	1	**9.0%**
Stomach ache	4	**21.1%**	0	-
Typhoid	1	**5.3%**	1	**9.0%**
Chronic open wound	1	**5.3%**	0	-
Broken bone	1	**5.3%**	0	-
Liver	1	**5.3%**	0	-
Nausea	0	-	2	**18.2%**
Helminth infection	0	-	1	**9.0%**

[1]n and % are the number and percentage of 19 boys and 11 girls with the parent-identified reasons for weight loss of more than 10% of body weight in the previous 6 months

Weight and Height Status of Children

Table 7 summarizes the anthropometric evaluation of the children categorized using the National Center for Health Statistics (NCHS) standards. It shows the distributions of *height-for-age*, *weight-for-age*, and *weight-for-height* for different grade levels. The NCHS reference was used with a conventional cut-off point: Children with a Z score of less than 2 SD were classified as "low" and those with a Z score between -2 SD and +2 SD were classified as "normal" (WHO, 1995b). About one-third (34.3%, n = 34) of all children had a low height-for-age, compared to 40.4% (n = 40) who had low weight-for-age. Only 20.2% (n = 20) had low weight-for-height. Younger children were more likely to have exhibited undernutrition compared to older children for all indicators.

This distinction was most pronounced for height-for-age. Nearly one half, 46.8% (n = 14), of children in grades 1 – 2 had low height-for-age, compared to 27.3 % (n = 9) of children in grades 3 - 4 and 29.4% (n = 10) of children in grades 5 - 6. Figures 1, 2, and 3 show the same information.

Table 7: **Nutrition Status by Grade Level**

Categories		Grade 1 – 2 n (%)[1]	Grade 3 – 4 n (%)[1]	Grade 5- 6 n (%)[1]	Total n (%)[1]
Height-for-age	Low	15 (**46.8%**)	9 (**27.3%**)	10 (**29.4%**)	34 (**34.3%**)
	Normal	17 (**53.1%**)	24 (**73.7%**)	24 (**70.6%**)	65 (**65.7%**)
Weight-for-age	Low	14 (**43.8%**)	14 (**42.4%**)	12 (**35.3%**)	40 (**40.4%**)
	Normal	18 (**56.3%**)	19 (**57.5%**)	22 (**64.7%**)	59 (**59.6%**)
Weight-for-height	Low	8 (**25.0%**)	7 (**21.2%**)	5 (**14.7%**)	20 (**20.2%**)
	Normal	24 (**75.0%**)	26 (**78.8%**)	29 (**85.3%**)	79 (**79.8%**)

[1]n and % are the number and percentage of children in the specified grade level who had low or normal height-for-age, weight-for-age, and weight-for-height.

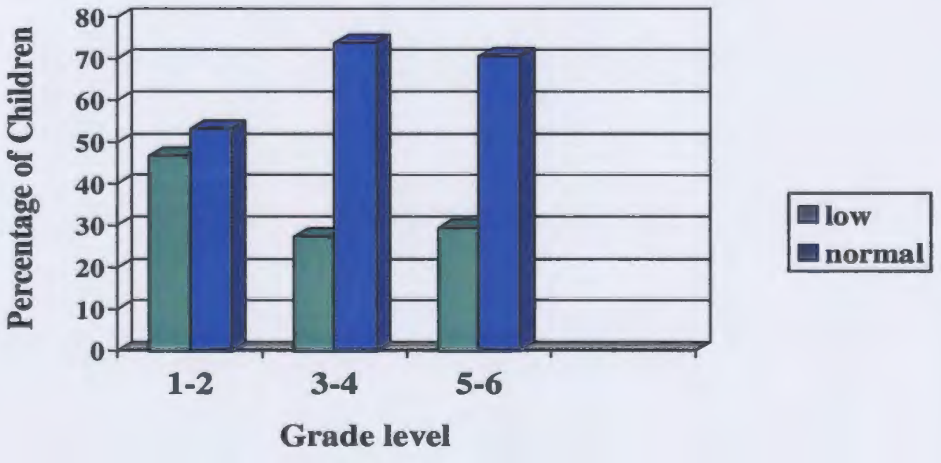

Figure 1: Bar Graph of Current Height-for-Age by Different Grade Levels

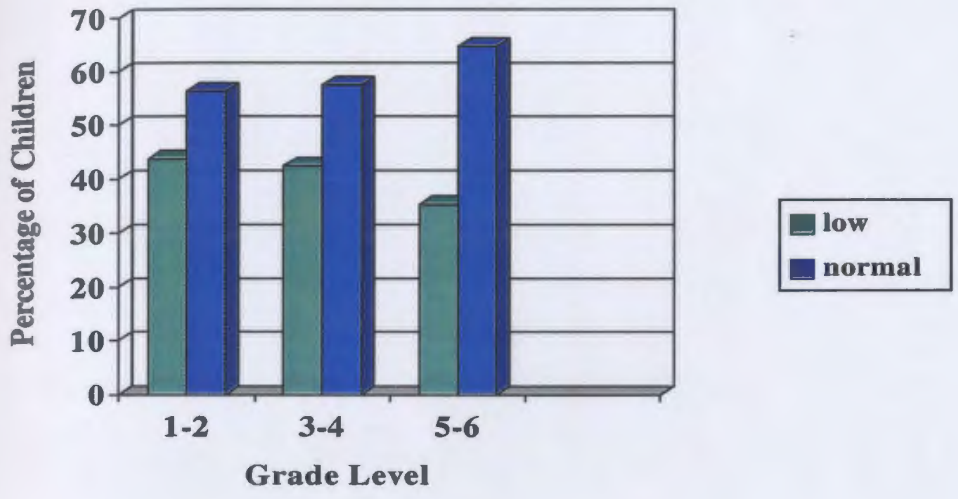

Figure 2: Bar Graph of Current Weight-for-Age by Different Grade Levels

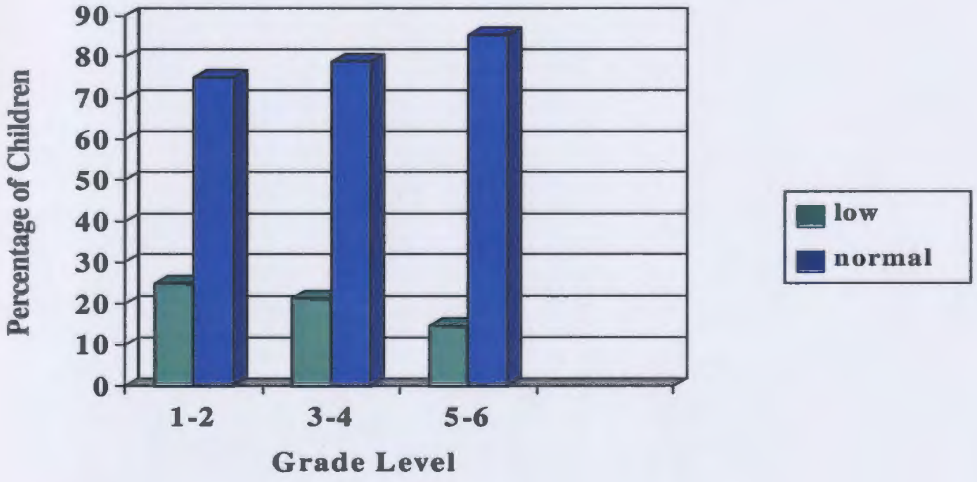

Figure 3: Bar Graph of Current Weight-for-Height by Different Grade Levels

Nutrition Intake

Both parents and children were asked questions about the children's dietary history. Only 16.2% (n = 16) of the children said that they discussed their dietary history

with their parents prior to the children's interviews; 3.0% (n = 3) of the children said that they discussed food with their parents in that same time frame.

Table 8: **Energy Adequacy of Children Based on WHO Standards**

Age[1] (Years)		Kcal/day		Intake/kg/day	
Sex	Age	Actual Intake[2] Mean (SD)	Recommended Intake [3]	Actual Intake[2] **Mean (SD)**	Recommended Intake [3]
Boys	6 – 7	865.2 (± 267.0)	**1850**	50.0 (± 17.8)	90
	7 – 10	954.3 (± 265.1)	2100	47.6 (± 16.2)	78
	10 – 12	927.4 (± 318.5)	2200	36.0 (± 13.8)	36.5
Girls	6 – 7	1015.2 (± 441.7)	1750	58.1 (± 30.2)	85
	7 – 10	949.0 (± 357.4)	1800	45.1 (± 21.7)	67
	10 – 12	1010.3 (± 339.8)	1950	39.1 (± 11.4)	33

[1] Age of male and female children

[2] Mean kcal intake/day and kcal intake/kg body weight/day, reported with the standard deviation, for the identified age groups of boys and girls calculated from the 24-hour dietary recall

[3] WHO recommended daily requirement of energy in kcal for boys and girls in the three identified age groups

Similar proportions of parents, 58.6% (n = 58), and children, 52.5% (n = 52), reported that the children ate regularly. Similarly, most parents, 55.6% (n = 55), and children, 55.6% (n = 55), reported that children ate three times per day. Only 20.2% (n = 20) of the children stated that they did not eat breakfast. All children had experienced hunger and had gone for a whole day with nothing to eat at least once in the previous six months. Some children, 44.4% (n = 44), reported getting hungry and having nothing to eat once per day in the previous six months. Similarly, 39.4% (n = 39) reported getting

hungry and having nothing to eat two times per day in that same time frame.

Table 8 presents the children's energy intake compared with the WHO recommendations (1985). The average daily calorie intake per person was lower than the standard requirement for every age, regardless of sex. Furthermore, the average calorie intake per kilogram of body weight per day for most children was lower than the recommended intake. However, girls aged 10 to 12 years old had a higher than recommended daily calorie intake per kilogram of body weight.

Table 9: **Protein Adequacy of Children Based on WHO Standards**

Age[1] (Years)		Grams of protein/day		Grams of protein/kg/day	
Sex	Age	Actual Intake[2] Mean (SD)	Recommended Intake [3]	Actual Intake[2] Mean (SD)	Recommended Intake [3]
Boys	6 – 7	29.8 (± 12.9)	21	1.7 (± 0.8)	1.0
	7 – 10	30.5 (± 8.9)	27	1.5 (± 0.6)	1.0
	10 – 12	30.5 (± 11.0)	34	1.2 (± 0.4)	1.0
Girls	6 – 7	31.7 (± 17.0)	21	1.9 (± 1.2)	1.0
	7 – 10	27.7 (± 13.1)	27	1.3 (± 0.8)	1.0
	10 – 12	31.2 (± 13.8)	36	1.2 (± 0.4)	1.0

[1] Age of male and female children

[2] Mean grams of protein intake/day and grams of protein intake/kg body weight/day, reported with the standard deviation, for the identified groups of boys and girls, calculated from the 24-hour dietary recall

[3] WHO recommended daily requirement of protein in grams for boys and girls in the three identified age groups

Table 9 presents the children's protein intake compared with the WHO recommendations (1985). Most of the reported daily protein intakes reached the

recommended levels, except for those of children aged 10 to 12 years old, who, regardless of sex, did not meet the minimum daily requirement. However, when considering daily protein intake per kilogram of body weight, all children had acceptable levels of protein intake. The primary source of protein was animal protein, constituting 29.8% of mean daily protein intake.

Tables 10 and 11 summarize foods that children liked and disliked as reported by both parents and children. Interestingly, children reported a greater variety of liked and disliked foods than parents reported. Thirty-three (33.3%) parents reported noodles as a food their children liked. However, 62.6% (n = 62) of children listed noodles as a food they liked. Similar proportions of parents, 18.2% (n = 18), and children, 12.1% (n = 12), stated that children did not like salted fish. Likewise, similar proportions of parents, 18.2% (n = 18), and children, 12.1% (n = 12), reported that children did not like food that was not tasty.

Forty-nine parents (49.5%) reported that no one had priority for eating in the family. Fifty parents (50.5%) reported that parents have priority for eating at home. Of these fifty parents, 54% (n = 27) reported that the father was first priority, 34% (n = 17) reported that children were the second priority, 8.0% (n = 4) reported that the mother was third priority, and only 2.0% (n = 1) reported that the grandfather and grandmother were fourth priority.

Table 10: **Foods Children Liked as Reported by Parents and Children**

Types of Food	Parents		Children	
	n[1]	%[1]	n[1]	%[1]
Noodles	33	**33.3%**	62	**62.6%**
Tofu /Tempe	7	**7.1%**	9	**9.1%**
Fish	6	**6.1%**	5	**5.1%**
Egg	5	**5.1%**	2	**2.0%**
Mangos	4	**4.0%**	3	**3.0%**
Vegetable	3	**3.0%**	3	**3.0%**
Water melon	1	**1.0%**	0	-
Crackers	1	**1.0%**	2	**2.0%**
Chocolate	1	**1.0%**	0	-
Chicken	0	-	14	**14.1%**
Bread/Roti	0	-	11	**11.1%**
Dried beans	0	-	5	**5.1%**
Oranges	0	-	4	**4.0%**
Fried rice	0	-	2	**2.0%**
Tomatoes	0	-	1	**1.0%**
Rambostan	0	-	1	**1.0%**

[1]n and % are the number and percentage of parents and children that reported that children liked the identified foods

Table 11: **Foods Children Disliked as Reported by Parents and Children**

Types of Food	Parents		Children	
	n[1]	%[1]	n[1]	%[1]
Salted fish	18	**18.2%**	12	**12.1%**
Vegetable	8	**8.1%**	4	**4.0%**
Shrimp	4	**4.0%**	5	**5.1%**
Stink bean	3	**3.0%**		
Lamb	2	**2.0%**	2	**2.0%**
Tofu/ tempe	2	**2.0%**	4	**4.0%**
Milk	1	**1.0%**	0	-
Chicken	1	**1.0%**	2	**2.0%**
Fermented peanut cake	0	-	7	**7.1%**
Aubergines	0	-	4	**4.0%**
French beans	0	-	3	**3.0%**
Bitter gourd	0	-	3	**3.0%**
Banana	0	-	2	**2.0%**
Carrots	0	-	2	**2.0%**

[1] n and % are the number and percentage of parents and children that reported that children disliked the identified foods

Fifty-one parents (51.5%) reported that their children had difficulty eating. Table 12 presents the reasons children had difficulty eating as reported by both parents and children. Parents and children reported that children had difficulty eating because of stomach ache, nausea, and low appetite, but they ordered their importance differently. For example, 11.1% (n = 11) of parents reported that the most common reason for eating

difficulties was stomach ache, while 17.2% (n = 17) of the children stated that the main cause of their difficulty in eating was because they felt full.

Table 12: **Reasons Children had Difficulty Eating as Reported by Parents and Children**

Reason children have difficulty eating	Parent		Children	
	n[1]	%[1]	n[1]	%[1]
Stomach ache	11	**11.1%**	14	**14.1%**
Nausea	10	**10.1%**	6	**6.1%**
Low appetite	10	**10.1%**	13	**13.1%**
Feel full	7	**7.1%**	17	**17.2%**
Fever	6	**6.1%**	2	**2.0%**
Sore mouth	3	**3.0%**	2	**2.0%**
Did not like food	2	**2.0%**	0	-
Lack of food besides rice	1	**1.0%**	1	**1.0%**
Don't know	0	-	2	**2.0%**

[1]n and % are the number and percentage of parents and children that reported the identified reasons for children having had difficulty eating in the six months prior to the interview

Table 13 presents the frequency of children's food intake as reported by parents. All parents reported that children ate rice every day with a mean intake of 69 grams (SD = 29.7). Most children, 76.8% (n = 76) had daily protein intake from fish with an average intake of 27.4g (SD = 9.4). Twenty-eight children (28.3%) drank milk every week with an average intake of 108 ml.

Table 13: **Food Check List Reported by Children**

Food	Daily n (%)[1]	Weekly n (%)[1]	Monthly n (%)[1]	Yearly n (%)[1]
Rice	99 (100%)	-	-	-
Noodles	19 (19.2%)	76 (76.8%)	4 (4.0%)	-
Fruits or fruits juice	12 (12.1%)	33 (33.3%)	49 (49.5%)	5 (5.1%)
Vegetable	61 (61.6%)	33 (33.3%)	1 (1.0%)	-
Dried beans and peas	28 (28.3%)	61 (61.6%)	5 (5.1%)	-
Beef	1 (1.0%)	9 (9.1%)	16 (16.2%)	54 (54.5%)
Fish	76 (76.8%)	21 (21.2%)	1 (1.0%)	-
Poultry	3 (3.0%)	49 (49.5%)	39 (39.4)	6 (6.1%)
Organ meat	2 (2.0%)	32 (32.3%)	19 (19.2%)	2 (2.0%)
Eggs	21 (21.2%)	72 (72.7%)	3 (3.0%)	-
Peanut butter or nuts	2 (2.0%)	6 (6.1%)	3 (3.0%)	1 (1.0%)
Milk(ml)	7 (7.1%)	28 (28.3%)	19 (19.2%)	-
Cheese	-	7 (7.1%)	3 (3.0%)	10 (10.1%)
Butter or Margarine	2 (2.0%)	11 (11.1%)	8 (8.1%)	2 (2.0%)
Oil	98 (99.0%)	1 (1.0%)	-	-
Sugar, jam, jelly, syrup, honey(ml)	35 (35.4%)	51 (51.5%)	3 (3.0%)	-
Candy	68 (68.7%)	28 (28.3%)	-	-
Crackers	70 (70.7%)	21 (21.2%)	-	-

[1]n and % are the number and percentage of children that reported daily, weekly, monthly, and yearly intake of the identified foods

Physical Activity

Children's Participation in Physical Activity

Both parents and children were asked questions about the level of both parents' and children's participation in physical activities. Only 16.2% (n = 16) of the children said that they discussed physical activity with their parents prior to the interview, while 6.1% (n = 6) of the parents said that they discussed physical activity with their children prior to the interview.

Only 10.1% (n = 10) of fathers reported participating in football games. Of these 10 fathers, 80.0% (n = 8 of 10) participated for at least 60 minutes. One mother (1.0%) reported participating in jogging for a 30-minute duration. Similarly, one mother (1.0%) reported participating in volleyball for the same duration – 30 minutes.

Table 14 summarizes the types of children's physical activities. Tai chi was the most common children's activity reported by parents, 88.9% (n = 88), and children, 73.7% (n = 73). Every school offered a tai chi class at least once per week. Three other activities children engaged in were football, skipping, and swimming. Twenty-four children (24.2%) reported that they had joined a sports team once in the previous 12 months, while 11 children (11.1%) reported that they had joined a sports team at least twice in that same time frame.

Only 3 children (3.0%) reported that they had not participated in any physical activity, and 7 children (7.1%) reported that they had engaged in one physical activity. Twenty-eight children (28.3%) reported that they participated in two physical activities, 35 children (35.4%) reported that they participated in three, and 14 children (14.1%)

reported that they participated in four. Likewise, 10 children (10.1%) reported that they participated in 5 activities, whereas only 2 children (2.0%) reported participating in 6 physical activities.

Table 14: **Types of Children's Physical Activities**

Activities	Parent reports	Children reports
	n (%)[1]	n (%)[1]
Tai chi	88 (88.9%)	73 (73.7%)
Football	47 (47.4%)	50 (50.4%)
Skipping	40 (40.4%)	48 (48.4%)
Swimming	37 (37.3%)	53 (53.5%)
Riding bicycle	31 (31.2%)	45 (45.5%)
Jogging	6 (6.1%)	16 (16.1%)
Softball	5 (5.0%)	6 (6.1%)
Dancing	2 (2.0%)	2 (2.0%)
Volleyball	-	7 (7.1%)
Table tennis	-	1 (1.0%)
Badminton	-	1 (1.0%)
Basketball	-	1 (1.0%)

[1] n and % are the number and percentage of parents and children that reported participating in the identified activities in the six months prior to the interview

Table 15: **Duration of Children's Physical Activities as Reported by Parents and Children**

Activities	Duration in minutes	n (%)[1]	
		Parents	Children
Tai chi	0 – 30	37 (42.0%)	40 (54.8%)
	31 – 60	48 (54.5%)	31 (42.5%)
	61 – 120	3 (3.4%)	2 (2.7%)
Football	0 – 30	5 (10.6%)	8 (16.0%)
	31 – 60	25 (53.2%)	1 (2.0%)
	61 – 120	17 (36.2%)	41 (82.8%)
Skipping	0 – 30	14 (35.0%)	21 (23.8%)
	31 – 60	18 (45.0%)	2 (4.2%)
	61 – 120	8 (20.0%)	25 (52.1%)
Swimming	0 – 30	13 (35.1%)	31 (58.5%)
	31 – 60	18 (48.6%)	-
	61 – 120	6 (16.2%)	22 (41.5%)
Riding bicycle	0 – 30	11 (35.5%)	29 (64.4%)
	31 – 60	16 (51.6%)	10 (22.2%)
	61 – 120	4 (12.9%)	6 (13.3%)
Jogging	0 – 30	1 (16.7%)	6 (37.5%)
	31 – 60	3 (50.0%)	7 (43.8%)
	61 – 120	2 (33.3%)	3 (18.8%)
Softball	0 – 30	2 (40.0%)	2 (33.3%)
	31 – 60	2 (40.0%)	4 (50.0%)
	61 – 120	1 (20.0%)	1 (16.7%)
Dancing	0 – 30	1 (50.0%)	1 (50.0%)
	31 – 60	-	-
	61 – 120	-	1 (50.0%)

[1]n and % are the number and percentage of parents and children that reported the children participated in the listed activities for the identified duration per week in the 6 months prior to the interview

Table 15 summarizes the duration of children's physical activities as reported by parents and by children. According to parents' and children's reports, every child participated in a physical activity at least once per week for a 30-minute duration. Fifty-one children (51.5%) reported that during the previous seven days they had participated at least 1 to 2 times in physical activity that made them breathe hard and had at least a 20-minute duration.

Participation in Physical Activity in Physical Education Classes

Table 16: **Time Actually Spent Exercising in Physical Education Classes**

Minutes Spent Actually Exercise in Classes	**Children**		**Teachers**	
	n[1]	**%**[1]	**n**[1]	**%**[1]
0-10	12	**12.1%**	3	**3.0%**
11 – 20	4	**4.0%**	15	**15.2%**
21 – 40	43	**43.4%**	26	**26.3%**
41 – 60	10	**10.1%**	43	**43.4%**
> 60	30	**30.3%**	12	**12.1%**

[1]n and % are the number and percentage of teachers and children who reported that children spent the identified number of minutes actually exercising in PE classes

Most children, 87.9% (n = 87), attended weekly Physical Education (PE) classes in school. However, there were variations in how long they actually spent exercising in PE classes. Table 16 displays the amount of time that was actually spent exercising during PE classes, as reported by children and teachers. The majority of children, 43.4% (n = 43), said they spent 21 to 40 minutes actually exercising in PE classes. However, the majority of teachers, 43.4% (n = 43), said that the children spent 41 to 60 minutes actually exercising in PE classes.

The Distance from Children's Home to School

Table 17 summarizes the distance from children's houses to their schools. Fifty-six parents (56.5%) reported that their children lived 500 meters or less from school. Eighteen parents (18.2%) reported that this distance was over 1000 meters. All parents reported that their children walked to school, with the children walking this distance at least twice daily.

Table 17: **The Distance from Home to School as Reported by Parents**

Distance from School (meters)	**n[1]**	**%[1]**
< 100	4	**4.0%**
100 – 500	52	**52.5%**
501 – 1000	25	**25.2%**
1001 – 1500	18	**18.2%**

[1]n and % are the number and percentage of parents who reported that their children lived within the identified distance from school at the time of the interview

Physical Activity and Inactivity Factors

Time spent watching television and playing electronic games.

Figures 4 and 5 summarize the time children spent watching television and playing electronic games, respectively, as reported by parents and children. The majority of parents, 64.6% (n = 64), and children, 79.8% (n = 79) reported that children watched television more than 120 minutes per day. Data also revealed that 20.2% (n = 20) of

parents and 25.9% (n = 25) of children reported that children spent more than 30 minutes per day playing electronic games.

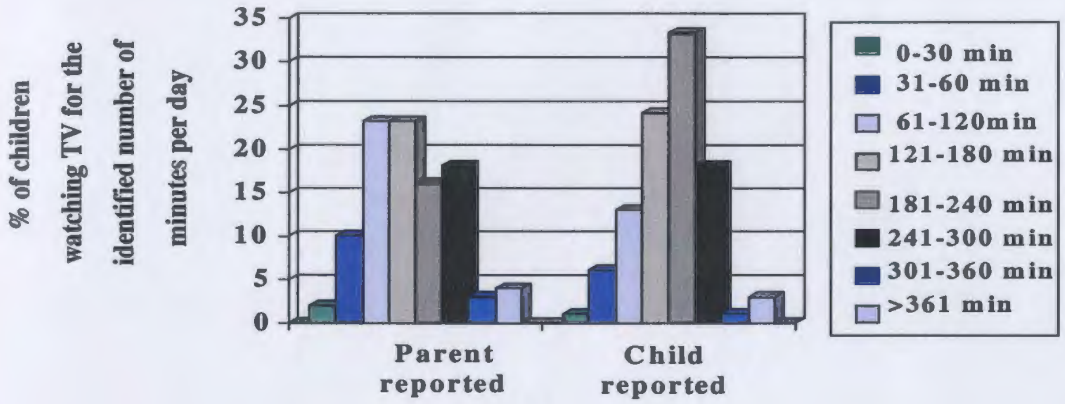

Figure 4: Bar Graph of Minutes Spent per Day Watching Television as Reported by Parents and Children

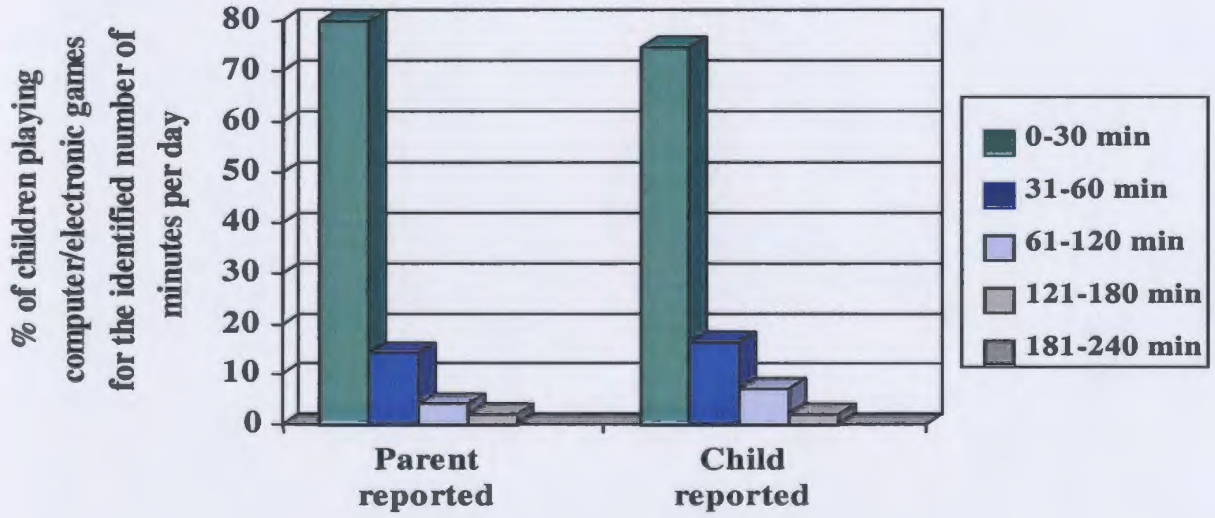

Figure 5: Bar Graph of Minutes Spent per Day Playing Computer/Electronic Games as Reported by Parents and Children

Availability of sports facilities.

In the Cibentang and Kuripan villages, there are no indoor sports facilities. Children usually used schoolyards, spaces in their homes, streets, and traditional village-style sports facilities for doing physical activity. Only 12.1% (n = 12) of parents used sport facilities in the villages, whereas 43.4% (n = 43) of children availed of these facilities. Similar proportions of parents, 58.6% (n = 58), and children, 54.5% (n = 54), stated sports facilities in the village were inadequate for their needs.

Sources of encouragement for physical activity.

Table 18: **Persons Identified as Encouraging Children to Exercise**

Person Encouraging Children to Exercise	Parent report		Child Report	
	n[1]	%[1]	n[1]	%[1]
No one	64	**64.6%**	47	**47.5%**
Immediate family member	17	**17.2%**	13	**13.1%**
Teacher	10	**10.1%**	25	**25.3%**
Friend	6	**6.1%**	12	**12.1%**
Other family member	2	**2.0%**	2	**2.0%**

[1]n and % are the number and percentage of parents and children who reported that children received encouragement to exercise from the identified source

Table 18 presents the sources of encouragement for physical activity as reported by parents and children. The majority of parents, 64.6% (n = 64), and children, 47.5% (n = 47), reported that children had no one supporting their involvement in physical activity.

However, 17.2% (n = 17) of parents reported that immediate family provided the most encouragement, while 25.3% (n = 25) of children reported that the teacher was the most significant source of support.

Children's perception of doing physical activity.

Table 19 summarizes children's own perceptions of doing physical activity. Seventy children (70.7%) reported that they rarely or never liked participating in physical activities, while a smaller proportion of children, 24.2% (n = 24), reported that they often liked participating in physical activities. In terms of PE classes, 54.5% (n = 54) of children reported that they rarely or never liked PE classes, while 35.4% (n = 35) of children reported often liking participating in PE classes.

Table 19: **Children's Reports of Liking Physical Activity and PE Classes**

Categories	Children like doing physical activity		Children like participating in PE classes	
	n[1]	%[1]	n[1]	%[1]
Never or rarely	70	**70.8**	54	**54.5**
Often	24	**24.2**	35	**35.4**
Almost always	3	**3.0**	5	**5.1**
Always	2	**2.0**	5	**5.1**

[1]n and % are the number and percentage of children who reported that they liked doing physical activity and participating in PE classes with the identified frequency

Even though most children disliked doing physical activity, ninety-five children (96.0%) reported that engaging in physical activity was important. Children stated that

the reasons for doing physical activity were that it made them healthy (84.8%; n = 84); that it increased muscle mass (4.0%; n = 4); that it increased strength (3.0%; n = 3); and that it was fun (2.0%; n = 2). Only 14.1% (n = 14) of children reported that their parents exercised regularly. However, 23.2% (n = 23) of children stated that their parents' physical activity level affected their own level of participation in physical activity.

Injury

Types of Injury

Table 20: **Types of Children's Injuries as Reported by Parents and Children**

Type of Injury	Parent report		Child report	
	n[1]	%[1]	n[1]	%[1]
Laceration	85	**86.1%**	97	**97.9%**
Sprains	53	**53.6%**	74	**74.1%**
Burning	35	**35.4%**	57	**57.6%**
Near drowning	18	**18.2%**	34	**34.3%**
Broken bones	7	**7.1%**	7	**7.1%**
Strains	3	**3.0%**	10	**10.1%**

[1] number and percentage of parents and children who reported that children had experienced the identified type of injury in the six months prior to the interview

Similar proportions of parents, 93.9% (n = 93), and children, 98.0% (n = 98), reported that children had sustained injuries at least once in the previous six months. Table 20 summarizes types of child injuries reported by both parents and children. Parents and children reported that lacerations, sprains, and burns were the most common types of injury among children. Eighteen parents (18.2%) and 34 children (34.3%)

reported that children had experienced near drowning at least one time in the previous six months. Fourteen parents (14.1%) and 32 children (32.3%) listed swimming in rivers as the primary cause of near drowning.

Sources of Injury

Table 21: *Source of Injury as Reported by Parents and Children*

Source of injury	Parent report		Child report	
	n[1]	%[1]	n[1]	%[1]
Broken glass	58	**58.6%**	75	**75.5%**
Nails	46	**46.5%**	58	**58.6%**
Sporting accident	40	**40.4%**	47	**47.5%**
Falling on the street	37	**37.4%**	50	**50.5%**
Falling from a tree	32	**32.3%**	50	**50.5%**
Playing with fire	30	**30.3%**	51	**51.2%**
Falling off a bicycle	16	**16.2%**	25	**25.3%**
Swimming in the river	14	**14.1%**	32	**32.4%**
Knife/sharp object	8	**8.1%**	11	**11.1%**
Motor vehicle accident	7	**7.1%**	2	**2.0%**
Bathing in the river	5	**5.1%**	7	**7.1%**
Quarrel/fight	4	**4.0%**	2	**2.0%**
Fire cracker	4	**4.0%**	2	**2.0%**
Cooking	1	**1.0%**	5	**5.1%**
Pushed in a river	1	**1.0%**	2	**2.0%**
Swing	1	**1.0%**	-	-
Exhaust pipes	1	**1.0%**	-	-
Hot water	1	**1.0%**	-	-

[1]n and % are the number and percentage of parents and children who reported that children's injuries in the six months prior to the interview were the result of the identified source

Table 21 summarizes sources of children's injuries as reported by parents and children. Parents reported slightly more variety in sources of injury than children reported. However, parents and children reported the same five main sources of injury, but a greater proportion of children identified each source compared to parents. The five main sources of injury were broken glass, nails, sporting accidents, falling down on the street, and falling down from a tree.

Cause of sprains and lacerations.

Similar proportions of parents, 25.3% (n = 25), and children, 32.3% (n = 32), reported that falling from a tree was the primary cause of children's sprains. Likewise, 10.1% (n = 10) of parents and 16.2% (n = 16) of children reported that the second most common cause of sprain was sporting accidents. Both parents and children listed broken glass (parents: 58.5% (n = 58), children: 75.6% (n = 75)); nails (parents: 46.5% (n = 46), children: 58.6% (n = 58)); and sporting accidents (parents: 30.3% (n = 30), children: 28.3% (n = 28)) as the three main causes of lacerations sustained by children.

Clinic Visits due to Injury

Thirty-one parents (31.3%) stated that they had taken their children to a health clinic when they were injured at least once in the previous six months. Similarly, 35 children (35.4%) reported visiting a health clinic for injuries they had sustained in that same time period. In Indonesia, there are traditional healers known as *Dukuns* – people with "supernatural" powers. Six parents reported that they took their children to the

dukun because of injuries sustained from falling from a tree (n = 5 of 6) and motor/vehicle accidents (n = 1 of 6), whereas 8 children reported they visited a "dukun" because of injuries sustained from falling from a tree (n = 5 of 8), falling on the street (n = 1 of 8), falling off a bicycle (n = 1 of 8), and sporting accidents (n = 1 of 8).

Causes of injury resulting in a clinic visit.

Table 22 summarizes the causes of injury resulting in a clinic visit as reported by parents and children. Similar proportions of parents and children reported that falling from a tree and sharp objects precipitated clinic visits.

***Table 22:* Causes of Children's Clinic Visits as Reported by Parents and Children**

Cause of Clinic Visit	Parent report		Child report	
	n[1]	%[1]	n[1]	%[1]
Falling From a Tree	8	**8.1%**	14	**14.1%**
Sharp Object	6	**6.1%**	5	**5.1%**
Motor/Vehicle Accident	4	**4.0%**	2	**2.0%**
Fight/Quarrel	3	**3.0%**	1	**1.0%**
Falling off a Bicycle	1	**1.0%**	3	**3.0%**
Exhaust Pipes from Motors	1	**1.0%**	-	-
Swing	1	**1.0%**	-	-
Hot Water	1	**1.0%**	-	-
Falling on the Street	-	-	2	**2.0%**

[1]n and % are the number and percentage of parents and children who reported that children visited clinics due to the identified cause

Safety Practice

Children's helmet use.

Table 23 summarizes children's use of motorcycle/bicycle helmets in the previous 12 months. Of the 75 children (75.8%) who rode a motorcycle in that time frame, 86.7% (n = 65 of 75) of children never wore a helmet. Only 13.3% (n = 10 of 75) of the children reported that they used a helmet; only one child (1.3%) reported always using a helmet. Similarly, of the 61 children (61.6%) who rode a bicycle in the 12 months prior to the interview, 88.5% (n = 54 of 61) never wore a helmet. Only 11.5% (n = 7 of 61) of the children reported that they wore a helmet.

***Table 23:* Children's Use of Motorcycle/Bicycle Helmets**

Helmet Used	Motor Cycle Helmet		Bicycle Helmet	
	n[1]	%[1]	n[2]	%[2]
Never wore a helmet	65	86.7%	54	88.5%
Rarely wore a helmet	3	4.0%	7	11.5%
Sometimes wore a helmet	5	6.7%	-	-
Most of the time wore a helmet	1	1.3%	-	-
Always wore a helmet	1	1.3%	-	-

[1]n and % are the number and percentage of the 75 motorcycle-riding children who wore helmets with the identified frequency in the six months prior to the interview

[2]n and % are the number and percentage of the 61 bicycle-riding children who wore helmets with the identified frequency in the six months prior to the interview

Water safety.

Table 24: **Water Safety of Children Who Swam**

Category	n[1]	%[1]
Where children swam		
I swim in a river	53	86.9%
I swim in a dam	3	4.9%
I swim in a swimming pool	5	8.2%
How well children swim		
I don't know how to swim	25	41.0%
I have beginner swimming skills	28	45.9%
I have intermediate swimming skills	6	9.8%
I have advanced swimming skills	1	1.6%
Use of life vest, tire, or floating device		
Never used a life vest	52	85.2%
Rarely used s life vest	6	9.8%
Sometimes used a life vest	2	3.3%
Company when children swim		
Friend	37	60.7%
Parents	7	11.5%
Alone	6	9.8%
Siblings	5	8.2%
With supervisor	4	6.6%
Other family member	1	1.6%

[1]n and % are the number and percentage of 61 children who reported that they swam in the previous six months with the identified swimming location, swimming ability, life vest usage, and accompaniment when swimming. Complete data were missing for one child.

Of the 99 children, 61 (61.6%) reported they had been swimming in the six months prior to the interview. Table 24 summarizes the water safety for 60 children; data was missing for one child. Most of them, 86.9% (n = 53), swam in a river, whereas only 13.1% (n = 8) swam in a dam, private swimming pool, or local swimming pool. Concerning swimming skills, 41.0% (n = 25) of the 61 children who swam said they didn't know how to swim, while only 11.5% (n = 7) had intermediate or advanced swimming skills. Regarding usage of safety devices, most of the children, 85.2% (n = 52), never used a life vest. Most children, 60.6% (n = 37), reported that they had gone swimming with a friend, whereas only 6.6% (n = 4) of the children reported that they had been accompanied by a supervisor who had swimming skills.

Street-crossing safety.

Table 25: **Children's Use of Safe Street-Crossing Techniques**

Category	n[1]	%[1]
When starting to cross the street, do you		
Look ahead and then begin to cross the streets	14	**14.1%**
Look right – left - right before crossing	56	**56.6%**
Cross directly	29	**29.3%**
While crossing the street, do you		
Continue to look ahead while crossing	20	**20.2%**
Continue to look right-left-right while crossing	52	**52.5%**
Cross the street directly	27	**27.3%**

[1]n and % are the number and percentage of children who reported that they followed the identified procedures when starting to cross the street and when crossing the street

The majority of children, 70.7% (n = 70) reported that they usually crossed the street without accompaniment. Similarly, 76.7% (n = 76) of the children reported that they crossed the street 1 to 3 times per day, and 77.8% (n = 77) reported that when crossing the street, they crossed at a major street in the village. Most children, 85.9% (n = 85), reported that they normally walked on the shoulder of the road.

Table 26: **Children's Knowledge of Safe Street-Crossing Techniques**

Category	n[1]	%[1]
When crossing, what should children do?		
Cross directly	19	**19.2%**
Stop before crossing	24	**24.2%**
Look right-left-right before crossing	42	**42.4%**
Look ahead before crossing	14	**14.1%**

[1]n and % are the number and percentage of children who reported that children should follow the identified procedure

Tables 25 and 26 summarize children's use and knowledge of safe street-crossing techniques. Fifty-six children (56.6%) reported that they implemented proper techniques when they started to cross the road (i.e., they looked right-left-right before crossing the street). However, 43.4% (n = 43) of children reported that they did not implement proper techniques when starting to cross the street. In addition, 52.5% (n = 52) of the children reported that they continued to look right-left-right while crossing the street, but 47.5% (n = 47) did not implement proper techniques while crossing the street and were not looking

for oncoming traffic. Concerning knowledge of street-crossing safety, 57.6% (n = 57) of children did not know the proper technique.

Relationship Between Health Status, Physical Activity, Injury and Potential Risk Factors

This section explores the relationship between nutrition status, level of activity, and injury with potential risk factors. To explore the relationship between nutrition status and other factors, children with a low height-for-age (n = 34) and normal height-for-age (n = 65) were compared to see if they differed with respect to parental demographics, personal health history, physical activity level, and type of injury. Children with recent weight loss (n = 30) and no weight loss (n = 69) were also compared to see if they differed in health history. To explore the relationship between physical activity and other factors, children who participated in 0 to 3 physical activities per week (n = 31) and children who participated in 4 to 6 physical activities per week (n = 68) were compared to see if they differed in source of encouragement for physical activity, access to sports facilities, and time spent watching television and playing electronic games. Children with an activity duration of 0 to 90 minutes per week (n = 31) and those with a duration of more than 90 minutes per week (n = 68) were compared using the same factors. Children with a history of sports-related injury (n = 36) and no history of sporting injury (n = 63) were compared to see if they differed in level of physical activity and type of physical activity. Results of these analyses are presented below.

Demographic Characteristics, Health Status, Physical Activity Level, Injury, and Potential Risk Factors

Demographic Characteristics and Children's Nutrition Status

Table 27: **Demographic Characteristics as Risk Factor for Low Height-For-Age**

Influences	Height-for-age				p^3	OR[4] (CI)
	Low[1]		Normal[1]			
	n[2]	%[2]	n[2]	%[2]		
Income level					.022	2.96
≤ Rp200, 000	16	**47.1%**	15	**23.1%**		(1.2 – 7.2)
> Rp200, 000	18	**52.9%**	50	**76.9%**		
Child's grade					.076	2.23
1 – 2	15	**44.1%**	17	**26.2%**		(0.9 – 5.3)
3 – 6	19	**55.9%**	48	**73.8%**		
Number of children in household					.673	1.22 (0.5 – 2.9)
> 3	21	**61.8%**	37	**56.9%**		
0 – 3	13	**38.2%**	28	**43.1%**		
Number of members in household					.673	1.22 (0.5 – 2.9)
> 5	21	**61.8%**	37	**56.9%**		
≤ 5	13	**38.2%**	28	**43.1%**		
Child's gender					.830	0.84
Male	19	**55.9%**	39	**60.0%**		(0.3 – 2.0)
Female	15	**44.1%**	26	**40.0%**		
Mother's education					>.999	1.05
≤ 6 grade	31	**91.2%**	59	**90.8%**		(0.2 – 4.5)
> 6 grade	3	**8.8%**	6	**9.2%**		

[1]34 children were classified as low weight-for-age and 65 children were classified as normal weight-for-age

[2]n and % are the number and percentage of children with normal and low height-for-age with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 27 summarizes the demographic characteristics for children with low height-for-age and normal height-for-age. Only income was significantly associated with low height-for-age. Parents who had an income level of Rp200,000 or less were more likely to have children with low height-for-age compared to parents who had an income greater than Rp200,000 (OR: 2.96, 95% CI: 1.22 – 7.19, p = .022). There was no significant difference in height-for-age by child's grade, number of children, number of people in the household, child's gender, or mother's education.

Demographic Characteristics and Physical Activity

Demographic characteristics and number of activities.

Table 28 summarizes the demographic characteristics of children who had engaged in 0 to 3 and 4 to 6 physical activities per week in the previous six months. A greater percentage of children, 37.0% (n = 27), who engaged in 3 or fewer activities per week were in grades 1 to 2 compared to 19.2% (n = 5) of 26 children who participated in 4 to 6 activities per week. However, the difference was not statistically significant (p = .142). Neither grade, gender, income level, mother's education, or number of children in the household affected the number of activities that children engaged in.

Table 28: **Demographic Characteristics as Risk Factors for the Number of Activities**

Influences	0 – 3 Activities[1]		4 – 6 Activities[1]		*P*[3]	OR[4] (CI)
	n[2]	%[2]	n[2]	%[2]		
Child's grade					.142	2.46
1 – 2	27	**37.0%**	5	**19.2%**		(0.8 – 7.3)
3 – 6	46	**63.0%**	21	**80.8%**		
Child's gender					.249	0.54
Male	40	**54.8%**	18	**69.2%**		(0.2 – 1.4)
Female	33	**45.2%**	8	**30.8%**		
Income level					.374	1.33
≤ Rp200,000	24	**32.9%**	7	**26.9%**		(0.5 – 0.4)
> Rp200,000	49	**67.1%**	19	**73.1%**		
Mother education					.613	1.46
≤ 6 grade	67	**91.8%**	23	**88.5%**		(0.3 – 6.3)
> 6 grade	6	**8.2%**	3	**11.5%**		
Number of children in household					.722	0.85 (0.3 – 2.1)
> 3	42	**57.5%**	16	**61.5%**		
≤ 3	31	**42.5%**	10	**38.5%**		

[1]number of weekly activities in which children participated in the six months prior to the interview

[2]n and % are the number and percentage of 73 children who participated in 0 – 3 activities and 26 children who participated in 4 – 6 activities in the six months prior to the interview with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Demographic characteristics and duration of physical activity.

Table 29: **Demographic Characteristics as a Risk Factor of Duration of Activities**

Influences	Duration of 0 – 90 minutes[1]		Duration > 90 minutes[1]		*P*[3]	OR[4] (CI)
	n[2]	%[2]	n[2]	%[2]		
Grade					.010	3.47
1 – 2	16	51.6%	16	23.5%		(1.4 – 8.5)
3 – 6	15	48.4%	52	76.5%		
Gender					.081	0.45
Boys	14	45.2%	44	64.7%		(0.2 – 1.1)
Girls	17	54.8%	24	35.3%		
Income level					.248	0.53
≤ Rp200,000	7	22.6%	24	53.3%		(0.2 – 1.4)
> Rp200,000	24	77.4%	44	64.7%		
Number of children In household					.663	0.80 (0.3 – 1.9)
> 3	17	54.8%	41	60.3%		
≤ 3	14	45.2%	27	39.7%		
Mother's education					> .999	0.90
≤ 6 grade	28	90.3%	62	91.2%		0.2 – 3.9)
> 6 grade	3	9.7%	6	8.8%		

[1]duration of activities in which children participated per week in the six months prior to the interview

[2]n and % are the number and percentage of 31 children who participated in physical activity for 0 – 90 minutes per week and 68 children who participated in more than 90 minutes per week in the six months prior to the interview with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 29 summarizes the demographic characteristics for children with physical activity duration of 0 to 90 minutes and greater than 90 minutes per week. Different grade

levels were also compared. A greater percentage of children, 76.5% (n = 52), who engaged in physical activity for 0 – 90 minutes were in grades 3 to 6 compared to 23.5% (n = 16) who were in grades 1 to 2 (OR: 3.47, 95% CI: 1.4 – 8.5, p = .010). A greater proportion of the children who engaged in 0 – 90 minutes of physical activity were boys, 64.7% (n = 44), than girls (35.3%, n = 24). However, this gender difference was not statistically significant (p = .081). Income, number of children in the household, and mother's education were not associated with physical activity duration.

Demographic Characteristics and Children's Injury

Table 30 summarizes demographic characteristics for the children who had been injured in the previous six months. Three types of injury were compiled into one variable. Children were compared based on whether or not they had experienced a sprain, strain, or broken bone in the six months prior to the interview. Children who had experienced such injuries were more likely to be in grades 3 to 6 compared to children who reported no such injuries (OR: 3.87, 95% CI: 1.4 – 10.5). The difference was statistically significant (p = .009). More boys, 61.5% (n = 48), had sustained injury compared to girls, 38.5% (n = 30). However, the difference was not statistically significant (p = .320). Mother's education, income, and number of children in the household were not significantly associated with children's injury.

Table 30: **Demographic Characteristics as Risk Factors of Childhood Injury**

Influences	Injury				*P*[3]	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	%[2]	n[2]	%[2]		
Grade						
1 – 2	20	**25.6%**	12	**57.1%**	**.009**	3.87
3 – 6	58	**74.4%**	9	**42.9%**		(1.4 – 10.5)
Gender						
Boys	48	**61.5%**	10	**47.6%**	.320	1.76
Girls	30	**38.5%**	11	**52.4%**		(0.7 – 4.6)
Mother's education						
≤ 6 grade	69	**88.5%**	21	**100%**	.198	-
> 6 grade	9	**11.5%**	0	**0%**		
Income level						
≤ Rp200,000	24	**30.8%**	7	**33.3%**	.797	0.89
> Rp200,000	54	**69.2%**	14	**66.7%**		(0.3 – 2.5)
Number of Children						
> 3	46	**59.0%**	12	**57.1%**	>.999	1.08
≤ 3	32	**41.0%**	9	**42.9%**		(0.4 – 2.9)

[1]children who had and had not been injured in the six months prior to the interview

[2]n and % are the number and percentage of 78 children who had been injured and 21 children who had not been injured in the six months prior to the interview with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Health History, Children's Complaints, and Dietary History with Health Status

Health History and Nutrition Status

Table 31: **Health History as a Risk Factor of Low Height-For-Age**

Influences	Height-for-age				p^3	OR[4] (CI)
	Low[1]		Normal[1]			
	n[2]	%[2]	n[2]	%[2]		
Pneumonia						
Yes	32	**94.1%**	48	**73.8%**	**.016**	5.67
No	2	**5.9%**	17	**26.2%**		(1.2 – 26.2)
Helminth Infection						
Yes	12	**35.3%**	9	**13.8%**	**.019**	3.0
No	22	**64.7%**	56	**86.2%**		(1.1 – 8.0)
Mouth Sores						
Yes	28	**82.4%**	39	**60.0%**	**.026**	3.11
No	6	**17.6%**	26	**30.0%**		(1.1 – 8.6)
Dental Problems						
Yes	10	**29.4%**	35	**53.8%**	**.033**	0.36
No	24	**70.6%**	30	**46.2%**		(0.2 – 0.9)
Immunisation						
Not complete	21	**61.8%**	25	**38.5%**	**.035**	2.59
Complete	13	**38.2%**	40	**61.5%**		(1.1 – 6.1)
GI-Tract Problem						
Yes	30	**88.2%**	45	**69.2%**	**.048**	3.33
No	4	**11.8%**	20	**30.8%**		(1.0 – 7.0)
Asthma						
Yes	9	**26.5%**	11	**16.9%**	.298	1.77
No	25	**73.5%**	54	**83.1%**		(0.7 – 4.8)
Children lost weight						
Yes	11	**32.4%**	19	**29.2%**	.819	1.16
No	23	**67.6%**	46	**70.8%**		(0.5 – 2.8)

[1]low classified children were those whose weight fell 2SD below the WHO international standard and normal classified children were those whose weight fell within 2SD of the WHO international standard

[2]n and % are the number and percentage of 65 children with normal height-for-age and 34 children with low height-for-age with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 31 summarizes the health history of children with low height-for-age and normal height-for-age. Compared to children with normal height-for-age, children who

had low height-for-age were more likely to have experienced pneumonia (OR: 5.67, 95% CI: 1.2 – 26.2), helminth infection (OR: 3.00, 95% CI: 1.1 – 8.0), mouth sores (OR: 3.11, 95% CI: 1.1 – 8.6), and GI-tract problems (OR: 3.33, 95% CI: 1.0 – 7.0). However, children who had low height-for-age were less likely to have dental problems compared to children with normal height-for-age (OR: 0.36, 95% CI: 0.2 – 0.9). The differences were statistically significant (p = .016, p = .019, p = .026, p = .048, and p = .033, respectively).

Children who had low height-for-age were more likely to have incomplete immunisation compared to children with normal height-for-age (OR: 2.59, 95% CI: 1.1 – 6.1). The difference was statistically significant (p = .035). There were no significant differences in reports of asthma or weight loss in children with low height-for-age compared to children with normal height-for-age.

Children's Complaints and Nutrition Status

Table 32 summarizes children's complaints of health problems compared in those with low height-for-age and normal height-for-age. Compared to children who had normal height-for-age, children who had low height-for-age were more likely to have experienced diarrhea (OR: 2.69, 95% CI: 1.1 – 6.7) and nausea/vomiting (OR: 2.76, 95% CI: 1.2 – 6.6) in the previous six months. The differences were significant (p = .033 and p = .033, respectively). Lack of appetite, indigestion, fever, dizziness, and difficulty chewing or swallowing were not significantly associated with low height-for-age.

Table 32: **Children's Complaints as Risk Factors of Low Height-For-Age**

Influences	Height-for-age				p^3	OR[4] (CI)
	Low[1]		Normal[1]			
	n[2]	%[2]	n[2]	%[2]		
Diarrhea						
Yes	25	**73.5%**	33	**50.8%**	**.033**	2.69
No	9	**26.5%**	32	**49.2%**		(1.1 – 6.7)
Nausea/vomiting						
Yes	23	**67.6%**	28	**43.1%**	**.033**	2.76
No	11	**32.4%**	37	**56.9%**		(1.2 – 6.6)
Lack of appetite						
Yes	26	**76.5%**	36	**55.4%**	.050	2.62
No	8	**23.5%**	29	**44.6**		(1.0 – 6.6)
Indigestion						
Yes	29	**85.3%**	43	**66.2%**	.057	2.97
No	5	**14.7%**	22	**33.8%**		(1.0 – 8.7)
Fever						
Yes	27	**79.4%**	53	**81.5%**	.794	0.87
No	7	**20.6%**	12	**18.5%**		0.3 – 2.5)
Dizziness						
Yes	15	**44.1%**	31	**47.7%**	.833	1.15
No	19	**55.9%**	34	**52.3%**		(0.5 – 2.7)
Difficulty chewing or swallowing					>.999	1.00
Yes	16	**47.1%**	32	**49.2%**		(0.5 – 2.5)
No	18	**52.9%**	33	**50.8%**		

[1]low classified children were those whose weight fell 2SD below the WHO international standard and normal classified children were those whose weight fell within 2SD of the WHO international standard

[2]n and % are the number and percentage of 65 children with normal height-for-age and 34 children with low height-for-age with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 33: **Dietary History as a Risk Factor of Nutrition Status**

Influences	Height-for-age				p^3	OR[4] (CI)
	Low[1]		Normal[1]			
	n[2]	%[2]	n[2]	%[2]		
Difficulty eating						
Yes	26	**76.5%**	34	**52.3%**	**.030**	2.96
No	8	**23.5%**	31	**47.7%**		(1.2 – 7.5)
Hungry in past week						
2-4 times	10	**29.4%**	34	**52.3%**	**.035**	2.63
One time	24	**70.6%**	31	**47.7%**		(1.1 – 6.4)
Vitamin supplements						
No	26	**76.5%**	50	**76.9%**	.100	0.98
Yes	8	**23.5%**	15	**23.1%**		(0.4 – 2.6)
Nutritional intake per kg						
Low	20	**58.8%**	36	**55.4%**	.832	1.2
Requirement	14	**41.2%**	29	**44.6%**		(0.5 – 2.7)
Number of times eating per day						
1-2	14	**41.2%**	26	**40.0%**	> .999	1.05
>2	20	**58.8%**	39	**60.0%**		(0.5 – 2.4)

[1]low classified children were those whose weight fell 2SD below the WHO international standard and normal classified children were those whose weight fell within 2SD of the WHO international standard

[2]n and % are the number and percentage of 65 children with normal height-for-age and 34 children with low height-for-age with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 33 summarizes factors related to hunger and difficulty in eating. Compared to children with normal height-for-age, children with low height-for-age were more likely to have reported difficulty eating (OR: 2.96, 95% CI: 1.2 – 7.5) and to have experienced hunger in the previous six months (OR: 2.63, 95% CI: 1.1 – 6.4). The differences were statistically significant (p = 0.030 and p = 0.035, respectively). In addition, data not included in Table 33 showed that children who had experienced dizziness were more likely to have been hungry 2-4 times in the previous week compared to children who had not experienced dizziness (OR: 1.30, 95% CI: 0.55-3.33), although the difference was not statistically significant. Vitamin supplements, nutritional intake per kg body weight, and number of times eating per day were not significantly associated with low height-for-age.

Health History and Children's Complaints of Weight Loss

Health History and Weight Loss

Table 34 summarizes the children's health history compared with weight loss of greater than 10% of their body weight and no such weight loss in the previous six months. There were three health problems significantly related to weight loss. Compared to children who had no reported weight loss, children who had experienced weight loss were more likely to have asthma (OR: 5.08, 95% CI: 1.8 – 14.4), GI-tract problems (OR: 6.55, 95% CI: 1.4 – 30.0), and helminth infection (OR: 3.05, 95% CI: 1.1 – 8.2). The differences were statistically significant (p = .002, p = .009, and p = .018, respectively). Dental problems, pneumonia, and mouth sores were not significantly associated with children's weight loss.

Table 34: **Health History as Risk Factors of Children's Weight Loss**

Influences	Weight Loss				P^3	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	% n[2]	n[2]	% n[2]		
Asthma						
Yes	12	**40.0%**	8	**11.6%**	**.002**	5.08
No	18	**60.0%**	61	**88.4%**		(1.8 – 14.4)
GI-Tract problems						
Yes	28	**93.3%**	47	**68.1%**	**.009**	6.55
No	2	**6.7%**	22	**31.9%**		(1.4 – 30.0)
Helminth infection						
Yes	11	**36.7%**	10	**14.5%**	**.018**	3.05
No	19	**63.3%**	59	**85.5%**		(1.1 – 8.2)
Dental problems						
Yes	16	**53.3%**	29	**42.0%**	.381	1.57
No	14	**46.7%**	40	**58.0%**		(0.7 – 3.7)
Pneumonia						
Yes	26	**86.7%**	54	**78.3%**	.413	1.8
No	4	**13.3%**	15	**21.7%**		(0.5 – 6.0)
Mouth sores						
Yes	21	**70.0%**	46	**66.7%**	.818	1.17
No	9	**30.0%**	23	**33.3%**		(0.5 – 2.9)

[1]children who had and had not lost 10% of their body weight in the six months prior to the interview

[2]n and % are the number and percentage of 30 children who had lost 10% of their body weight and 69 children who had not lost 10% of their body weight in the six months prior to the interview with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 35: **Children's Complaints as Risk Factors for Weight Loss**

Influences	Weight loss				*P*[3]	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	%[2]	n[2]	%[2]		
Indigestion						
Yes	27	**90.0%**	45	**65.2%**	**.013**	4.80
No	3	**10.0%**	24	**34.8%**		(1.3 – 17.5)
Nausea/Vomiting						
Yes	21	**70.0%**	30	**43.5%**	**.017**	3.03
No	9	**30.0%**	39	**56.6%**		(1.2 – 7.6)
Dizziness						
Yes	9	**30.0%**	37	**53.6%**	**.048**	2.70
No	21	**70.0%**	32	**46.4%**		(1.1 – 6.7)
Fever						
Yes	28	**93.3%**	52	**75.4%**	.051	4.58
No	2	**6.7%**	17	**24.6%**		(1.0 – 21.3)
Lack of Appetite						
Yes	23	**76.7%**	39	**56.5%**	.079	2.53
No	7	**23.3%**	30	**43.5%**		(1.0 – 6.7)
Difficulty Chewing Or Swallowing					.079	0.41
Yes	19	**63.3%**	29	**42.0%**		(0.2 – 1.0)
No	11	**36.7%**	40	**58.0%**		
Diarrhea						
Yes	20	**66.7%**	38	**55.1%**	.375	1.63
No	10	**33.3%**	31	**44.9%**		(0.7 – 4.0)

[1]children who had and had not lost 10% of their body weight in the six months prior to the interview

[2]n and % are the number and percentage of 30 children who had lost 10% of their body weight and 69 children who had not lost 10% of their body weight in the six months prior to the interview with the identified influences at the time of the interview

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 35 summarizes children's health complaints related to weight loss and no weight loss in the previous six months. Compared to children who did not report a weight loss, children who had experienced weight loss were more likely to have indigestion (OR:

4.80, 95% CI: 1.3 – 17.5), nausea/vomiting (OR: 3.03, 95% CI: 1.2 – 7.6), and dizziness (OR: 2.70, 95% CI: 1.1 – 6.7). The differences were statistically significant ($p = .013$, $p = .017$, and $p = .048$, respectively). Results showed that 93.3% (n = 28 of 30) of children with weight loss had experienced fever compared to 75.4% (n = 52 of 69) of children with no weight loss in the previous six months. However, the difference was not statistically significant ($p = .051$). Lack of appetite, difficulty chewing/swallowing, and diarrhea were not significantly associated with weight loss.

Risk Factors for Level of activity

Physical Activity and Number of Physical Activities

Table 36 summarizes the factors associated with physical activity for children who participated in 0 to 3 activities per week and those who participated in 4 to 6 activities per week. Compared to children who participated in 0-3 activities per week, children involved in 4-6 activities per week were more likely to have played electronic games (OR: 5.08, 95% CI: 1.9 – 13.6), to have joined a sports team (OR: 4.55, 95% CI: 1.8 – 11.7), and to have received more support (OR: 3.29, 95% CI: 1.2 – 8.8). The differences were significant ($p = .001$, $p = .002$, and $p = .021$, respectively).

Table 36: **Factors Associated with Number of Physical Activities Per Week**

Influences	Number of physical activities				*P*[3]	OR[4] (CI)
	0 – 3[1]		4 – 6[1]			
	n[2]	%[2]	n[2]	%[2]		
Playing electronic games						
Yes	12	**16.4%**	13	**50.0%**	**.001**	5.08
No	61	**83.6%**	13	**50.0%**		(1.9 – 13.6)
Joining a sports team						
No	54	**74.0**	10	**38.5%**	**.002**	4.55
Yes	19	**26.0**	16	**61.5%**		(1.8 – 11.7)
Support						
No	40	**54.8%**	7	**26.9%**	**.021**	3.29
Yes	33	**45.2%**	19	**73.1%**		(1.2 – 8.8)
Watching TV						
> 210 minutes	36	**49.3%**	13	**50.0%**	> .999	0.97
≤ 210 minutes	37	**50.7%**	13	**50.0%**		(0.4 – 2.4)
Sport facilities						
Not Available	32	**43.8**	13	**50.0%**	.650	0.78
Available	41	**56.2**	13	**50.0%**		(0.3 – 1.9)
Parental sports activity						
Not regular	62	**84.9%**	23	**88.5%**	.756	0.74
Regular	11	**15.1%**	3	**11.5%**		(0.2 – 2.9)
Distance to school						
0 – 500 meters	30	**41.0%**	10	**38.5%**	> .999	1.12
> 500 meters	43	**59.0%**	16	**61.5%**		(0.4 – 2.8)

[1]number of activities per week in which children participated in the six months prior to the interview

[2]n and % are the number and percentage of 73 children who participated in 0 to 3 activities and of 26 children who participated in 4 to 6 activities in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Amount of time spent watching television per day was also assessed. The median was used to categorize time spent watching television. There was no significant difference in the number of physical activities that children participated in among children who watched television for more than 210 minutes per day compared to those who watched less ($p > .999$). There was also no association found between number of

activities and availability of sports facilities, regular parental sports activity, or distance to school.

Children's Perceptions and Number of Physical Activities

Table 37: **Children's Perceptions as Risk Factors for Number of Physical Activities Per Week**

Influences	Number of physical activities				P^3	OR[4] (CI)
	0 – 3[1]		4 – 6[1]			
	n[2]	%[2]	n[2]	%[2]		
Children like physical education classes						
Dislike	46	**63.0**	8	**30.8%**	**.006**	3.83
Like	27	**37.0**	18	**69.2%**		(1.5 – 10.0)
Children like physical activity						
Dislike	57	**78.1**	13	**50.0%**	**.011**	3.56
Like	16	**21.9**	13	**50.0%**		(1.4 – 9.2)
The importance of physical activity						
No	4	**5.5**	0	**0**	**.022**	-
Yes	69	**94.5**	26	**100%**		
Parental influence on children's level of activity						
No	56	**76.7%**	20	**76.9%**	> .999	1.00
Yes	17	**23.3%**	6	**23.1%**		(0.3 – 2.9)

[1]number of activities in which children participated in the six months prior to the interview

[2]n and % are the number and percentage of 73 children who participated in 0 to 3 activities and of 26 children who participated in 4 to 6 activities in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 37 summarizes children's perceptions of physical activity for children who participated in 0 to 3 and 4 to 6 physical activities per week in the previous six months. Compared to children doing 4 to 6 physical activities, children who participated in 0 to 3 physical activities were more likely to have disliked physical education classes (OR: 3.83, 95% CI: 1.5 – 10.0) and disliked physical activity (OR: 0.329, 95% CI: 1.2 – 8.8). The differences were statistically significant (p = .006, and p = .011, respectively). Importance placed on physical activity and parental influence on children's physical activity levels were not significantly associated with children's number of physical activities.

Dietary History and Injury with Number of Physical Activities

Table 38 summarizes the dietary history and prevalence of injuries for children who participated in 0 to 3 and 4 to 6 activities per week. Sprains, strains, and broken bones were compiled into one category and were then compared for children who participated in 0 to 3 and 4 to 6 activities per week. Children involved in 4 to 6 physical activities per week were more likely to have experienced injury in the previous six months compared to children in 0 to 3 physical activities per week (OR: 9.43; CI: 1.2 – 74.1). The difference was statistically significant (p = .011). Children involved in 0 to 3 physical activities per week were more likely to have low calorie intake per kg body weight compared to children who participated in 4-6 activities per week (OR: 2.73, 95% CI: 1.1 – 6.9). This was a significant difference (p = .039). Hunger, broken bones, and low height-for-age were not significantly associated with number of physical activities.

Table 38: **Dietary History and Injury as Risk Factors for Number of Physical Activities**

Influences	Number physical activity				p^3	OR[4] (CI)
	0 – 3[1]		4 – 6[1]			
	n[2]	%[2]	n[2]	%[2]		
Injury						
Yes	53	**72.6%**	25	**96.2%**	**.011**	9.43
No	20	**27.4%**	1	**3.8%**		(1.2 – 74.1)
Calorie intake per kg						
Low	46	**63.0%**	10	**38.5%**	**.039**	2.73
Normal	27	**37.0%**	16	**61.5%**		(1.1 – 6.9)
Hunger per week						
2 – 4 times	39	**53.4%**	16	**61.5%**	.501	1.39
One times	34	**46.4%**	10	**38.5%**		(.06 – 3.5)
Broken bones						
Yes	6	**8.2%**	1	**3.8%**	.672	2.24
No	67	**91.8%**	25	**96.2%**		(0.3 – 2.0
Height-for-age						
Low	26	**35.6%**	8	**30.8%**	.811	1.25
Normal	47	**64.4%**	18	**69.2%**		(0.5 – 3.3)

[1]number of activities in which children participated in the six months prior to the interview

[2]n and % are the number and percentage of 73 children who participated in 0 to 3 activities and of 26 children who participated in 4 to 6 activities in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Health History and Children's Complaints with Number of Physical Activities

Table 39 summarizes the health history and health complaints of children who participated in 0 to 3 activities and 4 to 6 activities. GI-Tract problems, diarrhea, pneumonia, weight loss, dizziness, and anemia were not significantly associated with number of physical activities.

***Table 39:* Health History and Children's Complaints as Risk Factors for Level of activity**

Influences	Number of physical activities				p^3	OR[4] (CI)
	0 – 3[1]		4 – 6[1]			
	n[2]	%[2]	n[2]	%[2]		
GI-Tract problems						
Yes	58	**79.5%**	17	**65.4%**	.185	2.04
No	15	**20.5%**	9	**34.6%**		(0.8 – 5.5)
Diarrhea						
Yes	40	**54.8%**	18	**69.2%**	.249	0.54
No	33	**45.2%**	8	**30.8%**		(0.2 – 1.4)
Pneumonia						
Yes	61	**83.6%**	19	**73.1%**	.257	1.87
No	12	**16.4%**	7	**26.9%**		(0.6 – 5.4)
Weight loss						
Yes	20	**27.4%**	10	**38.5%**	.326	0.60
No	53	**72.6%**	16	**61.5%**		(02 – 2.2)
Dizziness						
Yes	41	**56.2%**	12	**46.2%**	.493	1.49
No	32	**43.8%**	14	**53.8%**		(0.6 – 3.7)
Anemia						
Yes	3	**4.1%**	2	**7.7%**	.604	0.51
No	70	**95.9%**	24	**92.3%**		(0.1 – 3.3)

[1]number of activities in which children participated in the six months prior to the interview

[2]n and % are the number and percentage of 73 children who participated in 0 to 3 activities and of 26 children who participated in 4 to 6 activities in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Factors associated with duration of physical activity.

Table 40: **Factors Associated With Duration of Physical Activity**

Influences	Duration of Physical Activity Per Week				p[3]	OR[4] (CI)
	0 – 90 minutes[1]		> 90 minutes[1]			
	n[2]	%[2]	n[2]	%[2]		
Joining a sports team						
No	26	**83.9%**	38	**55.9%**	**.007**	4.10
Yes	5	**16.1%**	30	**44.1%**		(1.4 – 2.0)
Distance to school						
0 – 500 meters	9	**29.0%**	31	**45.6%**	.130	0.49
> 500 meters	22	**71.0%**	37	**54.4%**		(0.2 – 1.2)
Parental sports activity						
Not regular	25	**80.6%**	60	**88.2%**	.358	0.56
Regular	6	**19.4%**	8	**11.8%**		(0.2 – 1.8)
Playing electronic games						
Yes	6	**16.4%**	19	**27.9%**	.458	0.62
No	25	**83.6%**	49	**72.1%**		(0.2 – 1.8)
Sports facilities						
Not Available	15	**48.4%**	30	**44.1%**	.828	1.19
Available	16	**51.6%**	38	**55.9%**		(0.5 – 2.8)
Watching TV						
> 210 minutes	16	**51.6%**	33	**48.5%**	.830	1.13
≤ 210 minutes	15	**48.4%**	35	**51.5%**		(0.5 – 2.7)
Support						
No	15	**48.4%**	32	**47.1%**	> .999	1.05
Yes	16	**51.6%**	36	**52.9%**		(0.5 – 2.5)

[1]duration of activities in which children participated per week in the six months prior to the interview

[2]n and % are the number and percentage of 31 children who participated in physical activity for 0 – 90 minutes per week and of 68 children who participated in more than 90 minutes per week in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 40 summarizes the factors associated with physical activity duration for the children reporting physical activity durations of 0 to 90 minutes and those reporting durations greater than 90 minutes. Children who had durations of 0 to 90 minutes were more likely to have not joined a sports team in the previous six months compared to children with durations greater than 90 minutes (OR: 4.10, 95% CI: 1.4 – 2.0). The difference was statistically significant ($p = .007$).

Distance to school, parental sports activity, playing electronic games, availability of sports facilities, watching television and support were not significantly associated with children's duration of physical activity.

Children's Perceptions and Duration of Physical Activity

Table 41 summarizes the perceptions about physical activity among children who participated in physical activities for less than 90 minutes per week and those who participated for more than 90 minutes in the same time frame. Children's attitudes towards physical activity, perceived importance of physical activity, attitudes towards physical education, and whether or not their parent's involvement in physical activities affected their own level of activity were not associated with duration of activities for children.

Table 41: **Children's Perceptions as Risk Factors for Physical Activity Duration**

Influences	Duration of Physical Activities Per Week				P^3	OR[4] (CI)
	0-90 minutes[1]		>90 minutes[1]			
	n[2]	%[2]	n[2]	%[2]		
Attitude towards physical activity						
Dislike	25	**80.6%**	45	**66.2%**	.161	2.13
Like	6	**19.4%**	23	**33.8%**		(0.8 – 5.9)
The importance of physical activity						
No	2	**6.5%**	2	**2.9%**	.587	2.28
Yes	29	**93.5%**	66	**97.1%**		0.3 – 17.0)
Attitude towards physical education						
Dislike	18	**58.1%**	36	**52.9%**	.669	1.23
Like	13	**41.9%**	32	**47.1%**		(0.5 – 2.9)
Effect of parental activity level on children's level of activity						
No	24	**77.4%**	52	**76.5%**	>.999	1.05
Yes	7	**22.6%**	16	**23.5%**		(0.4 – 2.9)

[1]duration of activities in which children participated per week in the six months prior to the interview

[2]n and % are the number and percentage of 31 children who participated in physical activity for 0 – 90 minutes per week and of 68 children who participated for more than 90 minutes per week in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Health History and Children's Health Complaints with Duration of Physical Activity

Table 42: **Health History and Children's Health Complaints as Risk Factors for Duration of Physical Activity**

Influences	Duration of physical activity				p^3	OR[4] (CI)
	0-90 minutes[1]		> 90 minutes[1]			
	n[2]	%[2]	n[2]	%[2]		
GI-Tract problems						
Yes	20	**64.5%**	55	**80.9%**	.128	0.43
No	11	**35.5%**	13	**19.1%**		(0.2 – 1.1)
Diarrhea						
Yes	16	**51.6%**	42	**61.8%**	.384	0.66
No	15	**48.4%**	26	**38.2%**		(0.3 – 1.6)
Dizziness						
Yes	15	**48.4%**	38	**55.9%**	.521	0.74
No	16	**51.6%**	30	**44.1%**		(0.3 – 1.7)
Anemia						
Yes	2	**6.5%**	3	**4.4%**	.647	1.49
No	29	**93.5%**	65	**95.6%**		(0.2 – 9.4)
Pneumonia						
Yes	26	**83.9%**	54	**79.4%**	.785	1.35
No	5	**16.1%**	14	**20.6%**		(0.4 – 4.1)
Weight loss						
Yes	9	**29.0%**	21	**30.9%**	> .999	0.92
No	22	**71.0%**	47	**69.1%**		(0.4 – 2.3)

[1]duration of activities in which children participated per week in the six months prior to the interview

[2]n and % are the number and percentage of 31 children who participated in physical activity for 0 – 90 minutes per week and of 68 children who participated in more than 90 minutes per week in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 42 summarizes the health history and health complaints of children who engaged in physical activity for 0-90 and more than 90 minutes per week. GI-tract problems, diarrhea, dizziness, anemia, pneumonia, and weight loss were not significantly association with duration of children's physical activity.

Injury and Dietary History with Duration of Physical Activities

Table 43: **Injury and Dietary History as Risk Factors of Duration for Physical Activity**

Influences	Duration of physical activity				p^3	OR[4] (CI)
	0 – 90 minutes[1]		> 90 minutes[1]			
	n[2]	%[2]	n[2]	%[2]		
Injury						
Yes	19	**61.3%**	59	**86.8%**	**.007**	4.14
No	12	**38.7%**	9	**13.2%**		(1.5 – 11.3)
Broken bones						
Yes	4	**12.9%**	3	**4.4%**	.201	3.21
No	27	**87.1%**	65	**95.6%**		(0.7 – 15.3)
Calorie intake per kg						
Low	22	**71.0%**	34	**50.0%**	.079	2.44
Normal	9	**29.0%**	34	**50.0%**		(1.0 – 6.1)
Hungry per week						
2 – 4 times	14	**45.2%**	41	**60.3%**	.193	0.54
One times	17	**54.8%**	27	**39.7%**		(0.2 – 1.3)
Height-for-age						
Low	10	**32.3%**	24	**35.3%**	.823	0.87
Normal	21	**67.7%**	44	**64.7%**		(0.4 – 2.2)

[1]duration of activities in which children participated per week in the six months prior to the interview

[2]n and % are the number and percentage of 31 children who participated in physical activity for 0 to 90 minutes per week and of 68 children who participated in more than 90 minutes per week in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals

Table 43 summarizes the injury and dietary history susceptibility of children who engaged in physical activity for less than 90 minutes per week and those who participated in physical activity for more than 90 minutes. Children who participated in physical activity for more than 90 minutes per week were more likely to have sustained an injury compared to children who participated in physical activity for 0 to 90 minutes per week (OR: 4.14, 95% CI: 1.5 – 11.3). The difference was significant (p = .007). Broken bones, calorie intake per kg, hunger, and low height-for-age were not significantly associated with duration of physical activity.

Weight loss in the previous six months was also assessed. Thirty-four percent (n = 27 of 78) of the children who had been injured experienced weight loss compared to 14.3% (n = 3 of 21) of the children who had not sustained an injury. However, this difference was not statistically significant (p = .107). Hunger, dizziness, nutritional intake per kg, distance to school, and low height-for-age were not significantly associated with childhood injury.

Physical Activity and Factors Associated with Injury

Table 44 summarizes physical activity and the factors associated with injury for children who had sustained an injury in the previous six months and those who had not. Sprains, strains, and broken bones were compiled into one category.

Table 44: **Risk Factors For Injury**

Influences	Injury				p^3	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	%[2]	n[2]	%[2]		
Duration of activity per week						
> 90	59	**75.6%**	9	**42.9%**	**.007**	4.14
0 – 90	19	**24.4%**	12	**57.1%**		(1.5 – 11.3)
Number of activities per week						
	25	**32.1%**	1	**4.8%**	**.011**	9.43
4 – 6	53	**67.9%**	20	**95.2%**		(1.2 – 74.0)
0 – 3						
Weight loss						
Yes	27	**34.6%**	3	**14.3%**	.107	3.18
No	51	**65.4%**	18	**85.7%**		(0.9 – 11.8)
Hunger						
2 – 4 times	44	**56.4%**	11	**52.4%**	.807	1.18
One time	34	**43.6%**	10	**47.6%**		(0.4 – 3.1)
Dizziness						
Yes	41	**52.6%**	12	**57.1%**	.807	0.83
No	37	**47.4%**	9	**42.9%**		(0.3 – 2.2)
Nutritional intake per kg						
Low	44	**56.4%**	12	**57.1%**	>.999	0.97
Normal	34	**43.6%**	9	**42.9%**		(0.4 – 2.6)
Distance to school						
> 500	32	**41.0%**	8	**38.1%**	>.999	1.13
0 – 500	46	**59.0%**	13	**61.9%**		(0.4 – 3.0)
Height-for-age						
Low	27	**34.6%**	7	**33.3%**	>.999	1.06
Normal	51	**65.4%**	14	**66.7%**		(0.4 – 2.9)

[1]children who had and had not been injured in the six months prior to the interview

[2]n and % are the number and percentage of 78 children who had been injured and 21 children who had not been injured in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Compared to uninjured children, children who had experienced an injury were more likely to have participated in 4 to 6 activities (OR: 9.43, 95% CI: 1.2 – 74.0) and to have engaged in those activities for more than 90 minutes per week (OR: 4.14, 95% CI: 1.5 – 11.3). The differences were statistically significant (p = .011, p = .007, respectively).

Physical Activity with Sports Injury

Table 45 summarizes the physical activities of children with and without sports injuries in the six months prior to the interview. Children who had sport injuries were compared for durations of 0 to 90 minutes and greater than 90 minutes and for 0 to 150 minutes and greater than 150 minutes. Children who had experienced a sports injury were more likely to have engaged in physical activity for more than 150 minutes per week compared to children without a sports injury (OR: 3.08, 95% CI: 1.31 – 7.21). The difference was statistically significant (p = .010). Duration of activities of greater than 90 minutes per week, number of activities, hunger, dizziness, nutritional intake per kg, and involvement in a sports team were not significantly associated with sport injuries.

Table 45: **Risk Factor for Sports Injury**

Influences	Sports Injury				P^3	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	%[2]	n[2]	%[2]		
Duration of Activities						
> 150 minutes	23	**63.9%**	23	**36.5%**	**.01**	3.08
≤ 150 minutes	13	**36.1%**	40	**63.5%**		(1.31 – 7.21)
Duration of Activities						
> 90 minutes	27	**75.0%**	41	**65.1%**	.37	0.62
≤ 90 minutes	9	**25.0%**	22	**34.9%**		(0.25 – 1.55)
Number of Activities						
0 – 3	23	**63.9%**	50	**79.4%**	.10	0.46
4 – 6	13	**36.1%**	13	**20.6%**		(0.18 –1.15)
Hungry						
2 – 4 times	24	**66.7%**	31	**49.2%**	.141	2.06
One time	12	**33.3**	32	**50.8%**		(0.9 – 4.8)
Dizziness						
Yes	21	**58.3%**	32	**50.8%**	.533	1.37
No	15	**41.7%**	31	**49.2%**		(0.6 – 3.1)
Nutritional intake per kg						
Low	19	**52.8%**	37	**58.7%**	.674	0.79
Normal	17	**47.2%**	26	**41.3%**		(0.4 – 2.6)
Sports team						
Yes	13	**36.1%**	22	**34.9%**	> .999	1.05
No	23	**63.9%**	41	**65.1%**		(0.5 – 2.5)

[1]children who had and had not sustained a sports injury in the six months prior to the interview

[2]n and % are the number and percentage of 36 children who had been injured and of 63 children who had not been injured in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Type of Physical Activity with Sports Injury

***Table 46*: Type of Physical Activity as a Risk Factor of Sports Injury**

Influences	Sport Injury				*P*[3]	OR[4] (CI)
	Yes[1]		No[1]			
	n[2]	%[2]	n[2]	%[2]		
Football						
Yes	32	**88.9%**	18	**28.6%**	**< .005**	20.0
No	4	**11.1%**	45	**71.4%**		(6.18 – 64.72)
Swimming						
Yes	29	**80.6%**	24	**38.1%**	**< .005**	6.73
No	7	**19.4%**	39	**61.9%**		(2.55 – 17.74)
Tai chi						
Yes	24	**66.7%**	49	**77.8%**	.24	0.57
No	12	**33.3%**	14	**22.2%**		(0.23 – 1.42)
Skipping						
Yes	15	**41.7%**	33	**52.4%**	.40	0.65
No	21	**58.3%**	30	**47.6%**		(0.28 – 1.48)
Volleyball						
Yes	3	**8.3%**	4	**6.3%**	.70	1.34
No	33	**91.7%**	59	**93.7%**		(0.28 – 6.35)
Jogging						
Yes	5	**13.9%**	11	**17.5%**	.78	0.76
No	31	**86.1%**	52	**82.5%**		(0.24 – 2.40)
Riding bicycle						
Yes	11	**30.6%**	18	**26.6%**	.82	1.10
No	25	**69.4%**	45	**71.4%**		(0.45 – 2.69)

[1]children who had and had not sustained a sports injury in the six months prior to the interview

[2]n and % are the number and percentage of 36 children who had been injured and of 63 children who had not been injured in the six months prior to the interview with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Factors Associated with School Performance

Health History and Dietary History with School Performance

Table 47 summarizes health history and dietary intake of children with low and high academic rankings. Children who were ranked 1 to 10 in their class were categorized as high rank and children ranked below 10 were classified as low rank. There were no significant associations between low rank or high rank with health history or dietary intake. A greater proportion of children with a low class rank, 39.0% (n = 30 of 77), had low height-for-age, compared to 18.2% (n = 4 of 22) of children who had a high class rank, but the difference was not statistically significant (p = .080). A greater proportion, 58.4% (n = 45 of 77) of children who had a low class rank had experienced hunger 2 to 4 times in the previous week compared to 45.5% (n = 10 of 22) of children who had a high class rank. This difference was not significant. Nutritional intake per kilogram, GI-tract problems, weight loss, dizziness, and pneumonia were not significantly associated with class rank.

Table 47: **Health History and Dietary History Associated with School Performance**

Influences	Ranking				p^3	OR[4] (CI)
	Low rank[1]		High rank[1]			
	n[2]	%[2]	n[2]	%[2]		
Height-for-age						
Low	30	**39.0%**	4	**18.2%**	.080	2.87
Normal	47	**61.0%**	18	**81.8%**		(0.9 – 9.3)
Hunger						
2 – 4 times	45	**58.4%**	10	**45.5%**	.334	1.69
One time	32	**41.6%**	12	**54.5%**		(0.7 – 4.4)
Nutritional intake per kg						
Low	45	**58.4%**	11	**50.0%**	.626	1.40
Normal	32	**41.6%**	11	**50.0%**		(0.5 – 3.6)
GI-tract problems						
Yes	59	**76.6%**	16	**72.7%**	.779	1.23
No	18	**23.4%**	6	**27.3%**		(0.4 – 3.6)
Weight loss						
Yes	24	**31.2%**	6	**27.3%**	.798	1.21
No	53	**68.8%**	16	**72.7%**		(0.4 – 3.5)
Dizziness						
Yes	42	**54.5%**	11	**50.0%**	.810	1.20
No	35	**45.5%**	11	**50.0%**		(05 – 3.1)
Pneumonia						
Yes	62	**80.5%**	18	**81.8%**	> .999	0.92
No	15	**19.5%**	4	**18.2%**		(0.3 – 3.1)

[1]children who were in the top ten in their class were labelled high rank and children who were not in the top ten were labelled low rank.

[2]n and % are the number and percentage of 22 high-ranked children and of 77 low-ranked children with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 48: **Other Factors Associated with School Performance**

Influences	Ranking				p^3	OR[4] (CI)
	Low[1]		High[1]			
	n[2]	%[2]	n[2]	%[2]		
Playing electronic game						
Yes	13	**16.9%**	12	**54.5%**	**.001**	5.91
No	64	**83.1%**	10	**45.5%**		(2.1 – 16.5)
School absence						
> 3 times/6 months	42	**54.5%**	6	**27.3%**	**.030**	3.20
0 – 3 times/6 months	35	**45.5%**	16	**72.7%**		(1.1 – 9.1)
Number of activities						
0 – 3	60	**77.9%**	13	**59.1%**	.100	2.44
4 – 6	17	**22.1%**	9	**40.9%**		(0.9 – 6.7)
Sports team						
No	53	**68.8%**	11	**50.0%**	.131	2.21
Yes	24	**31.2%**	11	**50.0%**		(0.8 – 5.8)
Duration of activities						
0 – 90 minutes	27	**35.1%**	4	**18.2%**	.193	2.43
> 90 minutes	50	**64.9%**	18	**81.8%**		(0.7 – 7.9)
Time spent watching television						
> 180 minutes	45	**58.4%**	10	**45.5%**	.334	1.69
0 – 180 minutes	32	**41.6%**	12	**54.5%**		(0.7 – 4.4)
Mother's education						
≤ grade 6	71	**92.2%**	19	**86.4%**	.412	1.87
> grade 6	6	**7.8%**	3	**13.6%**		(0.4 – 8.2)
Income level						
≤ Rp200,000	26	**33.8%**	5	**22.7%**	.437	1.73
> Rp200,000	51	**66.2%**	17	**77.3%**		(0.6 – 5.2)
Distance to school						
> 500 meters	33	**42.9%**	7	**31.8%**	.462	1.61
0 – 500 meters	44	**57.1%**	15	**68.2%**		(0.6 – 4.4)

[1]children who were in the top ten in their class were labelled high rank and children who were not in the top ten were labelled low rank.

[2]n and % are the number and percentage of 22 high-ranked children and of 77 low-ranked children with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Table 48 summarizes other factors for children with high and low academic rankings. Academic ranking was significantly associated with playing electronic games (p = .001) and absenteeism (p = .030). Compared to children who had a low academic ranking, children who had a high ranking were more likely to have played electronic games (OR: 5.91, 95% CI: 2.1 – 16.5). They were also less likely to have been absent more than 3 times in the previous six months (OR: 3.20, 95% CI: 1.1 – 9.1). The median was used to categorize school absence.

Number of activities, playing on a sports team, duration of activities, time spent watching television, mother's education level, parental income level, and distance to school were assessed and found to be unrelated to low academic ranking.

Demographic Characteristics and Physical Activity with School Absence

Table 49 summarizes the association between certain factors and school absenteeism. The median was used to categorize school absence in the previous six months. Children who were absent 0 to 3 times were classified as having low absenteeism and those who were absent more than 3 times were classified as having high absenteeism. Mother's education, number of activities, duration of activities, and income level were not significantly associated with school absence.

Table 49: **Demographic Characteristics and Physical Activity of Children with High and Low School Absenteeism**

Influences	School absence				p^3	OR[4] (CI)
	High[1]		Low[1]			
	n[2]	%[2]	n[2]	%[2]		
Mother's education						
≤ 6 grades	46	**95.8%**	44	**86.3%**	.161	3.66
> 6 grades	2	**4.2%**	7	**13.7%**		(0.7 – 18.6)
Number of activities						
0 – 3	38	**79.2%**	35	**68.6%**	.261	1.74
4 – 6	10	**20.8%**	16	**31.4%**		(0.7 – 4.3)
Duration of activities						
0 – 90 minutes	17	**35.4%**	14	**27.5%**	.516	1.45
> 90 minutes	31	**64.6%**	37	**72.5%**		(0.6 – 3.4)
Income level						
≤ Rp200,000	16	**33.3%**	15	**29.4%**	.829	1.2
> Rp200,000	32	**66.7%**	36	**70.6%**		(0.5 – 2.8)

[1]children who were absent 0 to 3 times in the previous six months were labelled low absenteeism and children who were absent more than 3 times were labelled high absenteeism

[2]n and % are the number and percentage of 48 children with high absenteeism and of 51 children with low absenteeism with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Nutrition Status and Health History with School Absence

Table 50 summarizes the health history of children with high and low absenteeism. Compared to children with low absenteeism in the previous six months, children with high absenteeism were more likely to have experienced dizziness (OR: 2.9, 95% CI: 1.3 – 6.5). The difference was statistically significant (p=.015). Weight loss,

low height-for-age, injury, pneumonia, and GI-tract problems were not significantly associated with school absenteeism.

Table 50: **Health History Associated with School Absenteeism**

Influences	School absenteeism				*P*[3]	OR[4] (CI)
	High[1]		Low[1]			
	n[2]	%[2]	n[2]	%[2]		
Dizziness						
Yes	32	**66.7%**	21	**41.2%**	**.015**	2.9
No	16	**33.3%**	30	**58.8%**		(1.3 – 6.5)
Weight loss						
Yes	13	**27.1%**	17	**33.3%**	.520	0.74
No	35	**72.9%**	34	**66.7%**		(0.3 – 1.8)
Height-for-age						
Low	15	**31.3%**	19	**37.3%**	.672	0.77
Normal	33	**68.7%**	32	**62.7%**		(0.3 – 1.8)
Injury						
Yes	37	**77.1%**	41	**80.4%**	.807	0.82
No	11	**22.9%**	10	**19.6%**		(0.3 – 2.2)
Pneumonia						
Yes	39	**81.2%**	41	**80.4%**	> .999	1.06
No	9	**18.2%**	10	**19.6%**		(0.4 – 2.9)
GI-tract problems						
Yes	36	**75.0%**	39	**76.5%**	> .999	0.92
No	12	**25.0%**	12	**23.5%**		(0.4 – 2.3)

[1]children who were absent 0 to 3 times in the previous six months were labelled low absenteeism and children who were absent more than 3 times were labelled high absenteeism

[2]n and % are the number and percentage of 48 children with high absenteeism and of 51 children with low absenteeism with the identified influences

[3]assessed with FET

[4]Odds Ratio (95% Confidence Intervals)

Summary of Key Results

There were 99 child-parent dyads interviewed. Almost every child had experienced at least one episode of illness in the previous six months, and 30.3% had lost more than 10% of their body weight in the past six months. Fever, indigestion and dizziness were common health complaints, and 39.4% had incomplete immunization for their age. Overall, one third (34.2%) had low height-for-age, with almost half (46.8%) of the children in grades 1-2 having low height-for-age. Hunger was common, with 44.4% of the children reporting being hungry with nothing to eat at least once per day. While protein intake was acceptable, the average calorie intake per kilogram body weight was lower than that recommended by WHO, and consumption of fruits and vegetables was low. Physical activity varied in both type and duration, with older children being more active. The majority of the children watched over 120 minutes of TV per day. Almost every child had experienced an injury in the previous six months. Swimming and street-crossing skills were poor, and helmets were rarely worn.

Bivariate analysis showed that low height-for-age was significantly associated with low family income, increased infections such as pneumonia and diarrhea, dental health problems, incomplete immunization, difficulty eating, and hunger. Weight loss and low calorie intake per kilogram body weight were not significantly associated with low height-for-age, however.

Older children were more physically active than younger children. Participating in more activities per week (4-6 rather than 0-3) was significantly associated with joining a sports team, getting more support from teachers or others, and liking physical education

classes and physical activity. Lower calorie intake per kilogram body weight was significantly associated with fewer activities per week. Older children and those more physically active were more likely to have had an injury, with football and swimming being the two activities most highly associated with injury.

Lower school ranking was significantly associated with playing electronic games and more frequent absence from school.

The descriptive analysis thus indicates that these school-age children have needs related to improving nutritional status, health and activity levels, and preventing injury.

CHAPTER 5: DISCUSSION

Chapter five will discuss the findings of this study. The first section will discuss the health status of school age children including immunization status, disease/illness, and nutrition status, as well as the risk factors associated with health status. The second section will discuss the level of physical activity of school age children and risk factors for level of activity. Injury and the risk factors related to injury will be discussed in section three. The effects of nutrition status, physical activity, and injury on school performance will be discussed in section four. Finally, section five will discuss the strengths and limitations of this study.

The results of the study will be discussed in relation to the research questions. The concepts of the Determinants of Health framework have guided this study in identifying the risk factors for the personal health behaviours of school age children, as well as the social, physical, and policy environments that support those health behaviours. Bivariate analysis have shown that there are risk factors associated with undernutrition, physical activity level, and injury, and that these and other factors are associated with school performance.

The Health Status of Children

The World Health Organisation defines health as not only the absence of disease, but rather as complete physical, mental and social well being. However, the present study focused solely on physical health. The status of children's physical health is important

since it can reflect the quality of overall health in the future. If children are physically unhealthy, negative patterns or illnesses may extend into adulthood. For example, unhealthy children may require additional nutrition during later developmental stages in order to achieve growth that should have occurred during earlier stages.

Measuring children's health status is critical for understanding their health needs so that appropriate child health care programs and community health policies can be implemented.

Immunization Status

The importance of children's immunization programs is well recognised throughout the world. Universal Coverage Immunization (UCI) was established in Indonesia in 1990; it aims for at least 90% DPT1 coverage, and at least 80% Polio3 and Measles coverage (Departemen Kesehatan, 1999b). Standard immunization in Indonesia includes vaccinations for BCG, DPT, Polio, and Measles. In the present study, 46.5% (n = 45) of parents reported that their children had incomplete immunization, suggesting that the immunization status of children in the Cibentang and Kuripan villages is lower than the national Indonesian targets. The reasons for incomplete immunization were not investigated. Lack of knowledge about immunization might have contributed to this low rate of coverage since some parents might still believe that immunization causes children to become sick. It is well known that vaccines effectively prevent communicable diseases, so the high rate of incomplete immunization in the present study indicates that some school age children are at high risk of developing selected health problems.

The present study found a significant association between incomplete immunization and low height-for-age (p = .035). Children who had low height-for-age tended to have had incomplete immunization in the six months prior to the interview (OR: 2.59, 95% CI: 1.1 – 6.7). Low height-for-age is associated with poorer nutrition status, which itself is associated with higher risk of lower immunity. If children also have poorer rates of immunization, this increases their risk of disease.

In a study of children under five years old in the villages of Cibetang and Kuripan – the same villages used in this study – Nurhaeni (2000) found that 82.4% (14 of 17) of children below one year of age had no or incomplete immunization for their age group. The study also showed that 28.2% (29 of 103) of children aged 1-5 years had no or incomplete immunization for their age group. Those findings indicate that immunization coverage for Cibentang and Kuripan children under the age of 5 years old was below the national target. This has implications for public health workers as well. It might be beneficial to implement a "catch-up" campaign to counter the negative effects of prior incomplete immunization. In addition, it might be necessary to give more attention to primary immunization series at younger ages.

Prevalence of Disease and Weight Loss

The present study found that school age children had a high prevalence of illness. Twelve health conditions were identified and parents, using a checklist, reported that nearly all children had more than one episode of illness in the six months prior to the interview. In the previous six months, 60 (60.7%) children experienced pneumonia 2-6

times, and 48 (48.5%) had GI-tract problems and 11 (11.2%) had sustained helminth infections.

The reported rate of helminth infection is likely to be underestimated. In a previous study in the Tangerang District, an urban area of Indonesia, 88.4% of children experienced helminth infection (Hidayat et al., 1998). It is not surprising that the rate of helminth infection for children in that study is much higher than the rate found in the present study. The present study relied solely on parental reports to assess prevalence of helminth infections, whereas the study conducted in the Tangerang District availed of laboratory technology.

Parents reported that 19.1% (n = 19) of boys and 11.1% (n = 11) of girls experienced weight loss greater than 10% of their body weight in the previous 6 months. Weight loss greater than 10% is an indicator of undernutrition (Gibson, 1990). This might indicate that children had severe periods of illness, or had sustained other health problems in previous months. Parents reported that the main causes of weight loss were fever, low appetite and stomachache. In this study three parent-reported illnesses were significantly associated with weight loss: GI-tract problems (p = .009); helminth infections (p = .018); and asthma (p = .002). In addition, three children's complaints of illnesses were significantly related with weight loss: indigestion (p = .013), dizziness (p = .048), and nausea/vomiting (p = .017). All of these symptoms including GI-tract problems and helminth infections can be easily identified by parents as being related to weight loss. However, parents did not appear to manage the children's symptoms and may have assumed that these symptoms/illnesses were a normal part of their child's development.

For example, only 10.1% (n = 10) of all parents reported that they gave medication to their children when they were sick. However, this low percentage might be the result of some health conditions not requiring medication, such as broken bones, sprains, and strains. The main implication of this finding is that parents need to know when to respond and how to take appropriate action regarding children's health complaints in order to prevent weight loss.

Measures of Nutritional Status

Childhood undernutrition is a contributing cause of mortality and morbidity, and can impede child development and school performance in developing countries (WHO report, 1995b). Beaton (1983) has also reported that undernutrition decreases the activity levels of poor children in developing countries. Previous studies in Indonesia suggest that the prevalence of undernutrition in school-age children is high and is a concern that needs to be addressed (Gross et al., 1996; Hermina et al., 2000; Syafiq, 1994). The factors associated with undernutrition must be detected in order to improve the health status of children in Indonesian villages.

Nutrition status was assessed using anthropometric measurements and dietary intake. Anthropometric measurements have been used widely as indicators for various conditions related to health and nutrition status. There are three indicators of nutrition status – height-for-age, weight-for-age, and weight-for-height. In this study, height-for-age was used as the main measure of nutrition status. Height-for-age is indicative of chronic poor nutrition and can be used as an index of nutrition status of population

groups as it estimates past or chronic nutrition status (Gibson, 1990).

Undernutrition

The distribution of the children's height-for-age in the present study compared to the NCHS reference standards indicated that 34.2% (n = 34) of the children exhibited chronic nutrition problems. The distribution of weight-for-age using the same standards indicated that 40.4% (n = 40) of the children were underweight, and using weight-for-height standards, 21.2% (n = 21) of the children were classified as having acute nutrition problems (low weight-for-height). Several studies conducted in Indonesia offered insight into the effects of rural and urban environments on the health status of children. Syafiq (1994) conducted a study in the eastern part of Jakarta, the capital city of Indonesia. The results showed that 21.3% of the children had low height-for-age, 18.2% had low weight-for-age, and 7.5% showed signs of low weight-for-height. This indicates that the nutrition status of children in the present study was lower than that of children in East Jakarta. Additionally, Gross and colleagues (1996) conducted a study of school age homeless children in Jakarta and found that more than half exhibited low height-for-age. Interestingly, the nutritional status of children living in the streets of Jakarta was worse than in the present study.

In 1989, Budiman and Saraswati conducted a comparison study in Central Java, a rural area of Indonesia comprising sub-districts of Pekalongan. Results showed that, for school age children in the sub-districts, between 0.4% to 2.3% had low height-for-age, and 8.2% to 17.7% had low weight-for-height, indicating a higher nutrition status than the children in the present study. This is surprising since the Cibentang and Kuripan

villages are located nearer to Jakarta. It is possible that the recent economic crisis has had more of an impact in rural villages than in the capital city.

Regardless of whether the district was rural or urban, children in previous studies appeared to have a higher nutrition status than the children in the present study. The only exception was Gross' study of homeless children in Jakarta. This finding suggests that nutrition status might be dependent on local environments. Hence, it is impossible to generalise data from studies conducted in Jakarta, the streets of Jakarta, or in surrounding villages to all Indonesian children. The implication of this finding is that health care professionals should develop locally relevant programs to achieve the maximum health benefits for children. Another implication is that more research needs to be conducted on both the influences of rural/urban areas and socio-economic levels as they relate to the nutrition status of children.

Dietary Intake

The National Centre for Health Statistics (NCHS) references with conventional cut-offs of 2 SD or Z-scores were used to classify the nutrition status of children as undernutrition or normal nutrition. Average energy and protein requirements were also analysed using international standards instituted by WHO (1995b). Energy and protein intake standards were based on body weight calculations. This calculation adjusts for the variations in energy requirements, which vary according to weight. The present study found that fifty-six (56.6%) children had a lower than recommended calorie intake per kilogram (kg). This indicates that the nutrition intake for school age children in the

present study was poor. Although all children did meet the required average daily protein intake per kg of body weight, inadequate calorie intake can reduce the utilisation of protein in the diet. Hence, the amount of dietary protein that could be used as a source of essential nutrients for growth and development was possibly reduced (Almatsier, 2001).

Previous studies have also identified nutrition intake of school age children in Indonesia as being poor (Astuti, 1997; Gross et al., 1996; Hermina et al., 2000). For example, Hermina et al. studied the food consumption patterns of elementary school children in the Bogor district of west Java, the same district as the present study. In this study Hermina et al. used suggested Indonesian Recommendation Dietary Allowances based on 1998 national workshops on food and nutrition. Hermina et al. used these RDAs in their study and found that students did not have acceptable health behaviours in either quality or quantity of food consumed. The average energy intake for children 5 to 9 years old was 56.4% lower and protein intake was 60.8% lower than RDA. Ten-year-old children had energy intakes 54.1% lower than RDA and protein intakes 47.6% lower than RDA. Comparison of nutrient requirements based on WHO (1995) standards and RDAs used in the study by Hermina et al. showed that the former had a slightly lower requirement than the latter. For example, WHO daily energy intake requirements for girls aged 10 to 12 years old is 1950 kcal, but the RDA based on workshop standards for girls aged 10 to 12 years is 2000 kcal (Almatsier, 2001). A direct comparison cannot be made with the present study since the standards used in the studies were different. However, the present study is consistent with previous studies that show that nutrition problems are prevalent in school age children in Indonesian villages.

Food checklists were used to show the frequency of daily, weekly, monthly, and yearly food intake. Protein intake mainly came from fish with 76.8% (n= 78) of children eating fish daily. Dried beans and eggs also contributed to daily protein intake. Twenty-eight (28.3%) children ate dried beans daily and 21 (21.2%) ate eggs daily.

Energy intake mainly came from rice, as it is a main staple food in Indonesia. Noodles were the second main source of energy intake with 19.2% (n = 19) of children eating noodles daily and 76.8% (n = 76) of children eating noodles weekly. Furthermore, 62.6% (n = 62) of children liked noodles. Oil was another important source of energy for children with 99.0% (n = 98) of children eating food containing oil daily. However, foods used as main energy sources had low amounts of vitamins and minerals.

Vitamins and minerals derived from vegetables and fruits were also summarised from the food checklists. Fruit consumption in Indonesia is dependent on season. At the time of the interviews, there were many fruits available, so it is surprising that few children reported eating fruit. Only 12.1% (n = 12) of all children ate fruit or fruit juice daily and half of the children ate fruit or juice monthly. The majority of the children, 69.7% (n = 69), ate vegetables daily. The most common vegetables that children reported eating were swamp cabbage, cassava leaves, sop, and sayur asem (mixed vegetables). This finding also shows that the frequency of vitamin and mineral intake from fruit and vegetables was low. In terms of vitamin and mineral supplements, only 23.2% (n = 23) of parents reported that they give any kind of vitamin supplement to their children. Only 5 parents (5.0%) gave vitamin A, while 9 parents (9.1%) gave vitamin B complex. Likewise, 9 (9.1%) parents gave multivitamins to their children.

The children's dietary patterns in the present study were very similar to those found in previous studies. Hermina et al. (2000) found that children included only a few vegetables in their daily intake. In that study, 66.7% of the children reported that they only incorporated two kinds of vegetables into their weekly diet. It is interesting to note that Bogor is a centre of agriculture. The findings discussed above, however, suggest that children in the villages of Cibetang and Kuripan, which are in the Bogor region, have few vegetables in their diet and do not incorporate much variety in the vegetables they do eat.

Dietary intake summaries from the food checklists indicated that children might not meet the required daily vitamin and mineral intakes in their diet, which could negatively impact their health status. This study suggests that school age children might require vitamin and mineral supplements in their diet for optimal growth and development. Strategies need to be implemented to better address the nutrition needs of children. For example, a previous study in the Bengkulu province of Indonesia found that teachers had limited information about nutrients and dietary requirements (Mudjianto, 1998). This suggests that nutrition education could be broadened to target teachers, and not only mothers and children. Additionally, a curriculum that includes healthy dietary behaviour could be implemented in elementary schools. The role of government policy is also important. For example, the current food donation program involves selling only rice at a reduced price. This program could be expanded to include fruits and vegetables, which would provide a source of vitamins and minerals.

Impact of Undernutrition

The present study found significant associations between certain illnesses – pneumonia, GI-tract problems, helminth infections, and diarrhea – and low height-for-age. Children who had low height-for-age were more likely to have experienced pneumonia compared to children with normal height-for-age (OR: 5.67, 95% CI: 1.2-26.2, p = .016). It is possible that undernutrition caused an impairment in the immunological response, consequently leaving children more vulnerable to severe infection. Budiman and Saraswati's (1989) study found a significant association between low height-for-weight – an indicator of undernutrition – and pneumonia, as well as GI-tract infection. The present study also found that children who had low height-for-age were more likely to have experienced GI-tract problems compared to children with normal height-for-age (OR: 3.33, 95% CI: 1.0-7.0, p = .048). Additionally, children in the present study who had low height-for-age were more likely to have reported helminth infections compared to children with normal height-for-age (OR: 3.00, 95% CI: 1.1-8.0, p = .019). Hagel et al. (1999) also found that there was a significant relationship between helminth infection and decreased growth rate. Finally, children in the present study who had low height-for-age were more likely to have reported diarrhea compared to children with normal height-for-age (OR: 2.69, 95% CI: 1.1-6.7, p = .033). There is still no clear evidence as to whether diarrhea is a cause or an effect of undernutrition, but findings do show that diarrhea is significantly related to undernutrition.

Although the evidence is still unclear as to whether or not illness is a cause or an effect of undernutrition, it is clear that undernutrition is a health problem for school age

children that must be addressed. Indeed if health problems lead to undernutrition, programs could be implemented to treat diseases and to detect them at an early stage, thus reducing the consequent undernutrition. If, on the other hand, undernutrition leads to health problems, it might be useful to provide food supplement programs and nutrition education for parents and children to reduce the number of childhood illnesses. In addition, community development initiatives such as a community garden could help communities use all resources available to them. Ideally, a broad-based health behaviour program would incorporate a variety of activities and strategies in order to achieve the maximum health benefits irrespective of whether or not health problems are the cause or effect of undernutrition.

Undernutrition also affects school performance and physical activity. The present study found that undernutrition impacted school performance and was related to a reduced number of physical activities. The details of these findings will be discussed in section 2 for physical activity and section 4 for school performance.

Factors Associated with Undernutrition

A number of factors associated with undernutrition, as measured by low height-for-age, were identified in this study: hunger, difficulty eating, nausea/vomiting, mouth sores and dental problems, and income level.

Hunger, defined as children feeling hungry and not having any food to eat, was significantly associated with undernutrition. The present study found that children who had low height-for-age were more likely to have experienced hunger 2 to 4 times per day

compared to children with normal height-for-age (OR: 2.63, 95% CI: 1.1 – 6.4, $p = .035$). In this study nearly all children, in the previous six months, had felt hungry during the day and had had nothing to eat at the time that they felt hungry. The high prevalence of hunger among the participants in the study may indicate that food inadequacy is a major problem for school age children in the Kuripan and Cibentang villages. Teachers, parents, and health care workers, particularly community health nurses, should be educated on both the causes and effects of hunger and should be taught to recognise it as a serious problem. Early identification and food supplements might help reduce the incidence of hunger.

A previous study by Syafiq (1994) in Indonesia used a 72-hour dietary intake recall and found that height-for-age was significantly related to energy intake. Conversely, the present study, using 24-hour recall, found that there was no significant relationship between height-for-age and energy intake. This discrepancy might be the result of several factors. One possible explanation is that the findings might have been related to the timeframe for the food recall, with the present study having used 24-hour recall while Syafiq used 72-hour recall. The 72-hour recall might have given a more accurate estimate of energy intake. Another possible explanation for this discrepancy is that stunting most likely resulted from past undernutrition, but the present study collected data on current dietary intake patterns. Height-for-age reflects past or chronic nutrition status (Gibson, 1990). Therefore, the low height-for-age exhibited in the present study might have been established during an earlier developmental stage. Sample size may also

account for differences in findings since there were 600 children in the Syafiq study and only 100 children in this study.

Difficulty eating was also identified as a risk factor for low height-for-age. Difficulty eating meant that children did not want to eat certain foods and parents had difficulty making the children eat their meals. The present study found that children who had low height-for-age tended to have difficulty eating compared to children with normal height-for-age (OR: 2.96, 95% CI: 1.2 – 7.5, p = .030). Difficulty eating negatively impacted children's diets. In the researcher's experience as a community health nurse, this problem commonly occurred in children, yet parents appeared to dismiss it as being a normal but temporary phase of child development. Perhaps parents did not know strategies to encourage children to eat. Food checklists showed that 68.7% (n = 68) of children ate candy daily and 70.7% (n = 70) of children ate crackers daily. This suggests that parents might not have understood that certain foods, like candies and chocolate, satisfy the child's hunger but do very little to improve nutrition status. Further investigation is needed to better understand problems associated with difficulty eating, and with finicky eating in particular. In the interim, parents may need education about ways to counter their children's difficulty in eating or negative eating patterns.

Nausea and vomiting were also found to be significant risk factors for low height-for-age (p = .033). In addition, children who had low height-for-age were more likely to have reported a lack of appetite compared to children with normal height-for-age. Similar to difficulty eating, parents did not attribute much importance to this symptom. Again, parental education could be employed to combat this childhood health problem.

Mouth sores and dental problems also contribute to poor nutrition status since they can make chewing difficult and also give an abnormal taste to food. The present study found that more than 50% of children had experienced mouth sores while nearly half of all children had experienced dental problems, defined as problems causing dental pain, in the six months prior to the interview. According to the Indonesian Health Profile (Departemen Kesehatan, 1999b), the average 12-year-old child experienced 2.21 dental problems per year. Additionally, 76.8% (n = 76) of the children who had dental problems in that study had not received treatment. Treatment of dental problems was not assessed in the present study. However, results from both studies suggest that mouth sores and dental problems are a common health concern for children in Indonesia.

Several studies have shown that the nutrition status of school age children is significantly related to dental problems (Abrams & Romberg, 1999; Correia et al., 1999). The present study found a significant relationship between mouth sores and dental problems with low height-for-age (p = .026 and p = .033). There is no clear evidence of cause and effect. Mouth sores might lead to difficulty eating, which in turn negatively impacts nutrition. Similarly, undernutrition might contribute to poor integrity of mucous membranes, which increases susceptibility to infections causing mouth sores. There is an indication that mouth sores and dental problems should be addressed, irrespective of whether mouth sores are the cause or the effect of undernutrition. This finding implies that children and parents need to learn proper dental care and oral hygiene. A dental hygiene program could be implemented in schools to encourage children to adopt strategies for dental care and oral hygiene. It would also be beneficial if dentists could

assess the children and give them any needed treatments on a regular basis, perhaps annually.

Other factors such as income level, mother's education, and number of people in the household are also risk factors for undernutrition. Income is one of the factors most significantly related to child health status (Health Canada, 1999). Indonesia has been in an economic crisis since 1997 (Departemen Kesehatan, 1999a) and this situation has negatively impacted the socio-economic status of communities. In addition to this, parental income reflects the economic viability of the family. In this study, nearly half of the parents reported their income level to be in the range of Rp200,000 – 350,000 per month while 31.3% (31 of 99) identified their income as less than Rp200,000 per month. In 1999, the median national income per capita was Rp377,000 (Departemen Kesehatan, 1999b). Therefore, the parental income levels were less than the national income per capita. This could have affected the family's ability to buy enough food for children. An earlier study found that there was a significant association between socio-economic status and nutrition status (James, Nelson, Ralph & Leather, 1997). Likewise, the present study found a statistically significant relationship between income level and height-for-age (p = .022). One implication of this finding is that it might be beneficial to change public policy so that more financial support is allocated to low-income families. This might increase their purchasing power, which might ultimately impact nutrition and overall health status.

The mother's level of education also has a significant impact on the likelihood of healthy food being prepared for children (Hupkens et al., 1998). The present study found

that most mothers, 90.9% (n = 90) had graduated from elementary school, but had not achieved more than a grade 6 education. However, this study did not identify a significant relationship between mother's education level and height-for-age. This finding could have been affected by the fact that very few mothers, 9.1% (n = 9), had more than a grade 6 education. Smith and Haddad (2000) suggested improvement in woman's education could contribute to the reduced undernutrition of children. Reflecting on their study, it might be beneficial to implement basic education classes targeted at parents. A previous study in Waru Jaya in the same district as the present study found that a nutrition education program for pregnant women was used to empower women to improve their nutrition status (Wiarsih, 2002). By combating the negative effects of lack of education, it was possible to positively impact women's health status.

Household size is also widely regarded as a risk factor for undernutrition in developing countries. A previous study by Pelto et al. (1991) found that children from households comprised of 11 or more members had significantly lower height-for-age ratios and consumed poorer quality foods. The range for household size in Pelto's study was 5 to 17 members, with the median being 10. The present study, however, does not show a significant relationship between household size and low height-for-age ($p = .835$). One possible explanation for this difference is that family size was not as large as it was in the previous study. Another possible explanation might be that some of the family members who resided in the home were employed and they helped to financially support the family. One implication of this finding is that large families in these Indonesian villages are not more at risk than others are, so health programs should target all families.

Summary of the Health Status of Children

The results of the present study are important for health providers. The school age children in the study exhibited a high risk of poor health, in addition to having low rates of immunization. For the school age children, there was a high prevalence of diseases, including pneumonia, GI-tract problems, mouth sores, dental problems and helminth infections. In addition, children also had a high rate of reported symptoms, including complaints of fever, indigestion, diarrhea, dizziness, and nausea/vomiting. Nearly all children had more than one episode of illness in the previous six months. Weight loss was also found to be an existing health problem.

Undernutrition is yet another health problem of concern. Thirty-four children had low height-for-age; daily energy intake among school age children was lower than the World Health Organisation recommendations. However, daily protein intake met WHO recommendations. In addition, children ate less fruits and vegetables than expected. There was a high rate of illness among children who were undernourished, but it remains unclear as to whether or not undernutrition is the cause or effect of illness. Therefore, both undernutrition and illness need to be addressed to improve the nutrition status of children in the Cibentang and Kuripan villages.

This study identified factors associated with undernutrition. Difficulty eating, nausea/vomiting, and having experienced hunger 2- 4 times in the previous six months were significantly associated with low height-for-age. Dental problems and mouth sores were also identified as factors associated with low height-for-age. Again, however, it is

impossible to determine cause and effect. Hence, dental problems and mouth sores need to be better treated while nutrition deficiencies are also being addressed.

This study also identified parents' income level as being significantly associated with low height-for-age. This finding can be useful in arguing for the implementation of government programs for low-income families, such as supplementary financial assistance, food donation programs, and reduced health care fees, as well as easier access to health care.

Physical Activity of School Age Children

The Level of Physical Activity of School Age Children

Regular physical activity is an important component of a healthy lifestyle. Increased levels of physical activity have been shown to improve general health and psychological well being and to decrease morbidity and mortality from chronic diseases, including cardiovascular diseases in adults (Centres for Disease Control, 2000). To better improve health at a later age, it is imperative to consider physical activity levels of school age children and to further analyse these levels to determine if they are associated with health status. Pate et al. (1995) suggested that in order to measure physical activity levels, it is important to investigate not only the type of physical activity and frequency, but also intensity and duration.

For the greatest overall health benefits, experts recommend that people do 20 to 30 minutes of aerobic activity three or more times a week, and also muscle strengthening activity and stretching at least twice a week (Pate et al., 1995). In the present study most school age children, 97.0% (n = 96), reported that they had engaged in physical activity in the previous six months. In terms of frequency and duration, the children in the present study were less active than recommended standards – considered inactive – and did not engage in a recommended level of aerobic activity. Only one-third of the children, 35.4% (n = 35), met recommended physical activity levels and reported participating in physical activities three times per week. In terms of duration, according to both parents' and children's reports, nearly every child participated in physical activity at least once per week for 30 minutes. However, only one-third, 32.3% (n = 32) of the children achieved the minimum requirement of at least 90 minutes of physical activity per week. With respect to intensity, more than half of all children reported that they had participated in physical activity that made them breathe heavily at least one time per week for a minimum duration of 20 minutes.

Results from the present study are similar to a comparative international study of the physical activity levels and sports involvement of young people in 12 countries (Telama, Kannas & Tynjala, 1994). Results from that study showed that the percentage of 11-year old boys who were physically active for at least two hours a week varied from 32% to 80%. However, less that 50% of girls in all the countries under study were physically active for at least two hours per week (Telama et al., 1994). Variations in findings were found in studies conducted in rural African-American communities where

67.0% of grade six children were active (Felton et al., 1998), and in Wales and Norway where 65 to 82% of children aged 11.5 to 15.5 years old were active and engaged in physical activity for more than 30 minutes per week (Nutbeam, Aar & Carford, 1989).

The present study was the first study of children's physical activity levels in the Cibentang and Kuripan villages and possibly in Indonesia. Results showed that most children were underactive, implying that level of activity is a widespread problem that needs further attention.

Several past studies have argued that boys were significantly more active than girls (Anderssen & Wold, 1992; Biddle & Goudas, 1996; Gottlieb & Chen, 1985; Trost et al., 1996). Surprisingly, the present study found that there was no statistical difference between the number and duration of activities when compared for boys and girls (p = .249 and p = .081, respectively). Boys participated in more activities but the difference was not significant. The present study indicates that there was no gender difference in the physical activity of children in the Cibentang and Kuripan villages. However, the actual type of activities that boys and girls participated in differed. Not surprisingly, no girls reported playing football in the previous six months, but they did report skipping and playing traditional softball in that same time period.

According to child developmental theory, as children develop motor skills, they become more active overall. Even though the present study found no significant difference for boys and girls, there was a difference for children in different grade levels. There was no significant statistical difference between children in grades 1-2 and 3-6 when compared for participation in 0–3 activities 4–6 times per week (p = .142).

However, when duration was assessed in the present study, findings showed that children who engaged in physical activity for less than 90 minutes were more likely to have been in grades 1-2 compared to children with a duration greater than 90 minutes (p = .010). Children who were in higher grades thus had a higher physical activity level. This finding is contrary to a previous study that found that between the ages of 6 to 16 years males decrease their physical activity level by about 2.7% per year, whereas females decrease their physical activity by about 7.4% per year (Sallis, 1993). One implication of this finding is that the types of physical activities comprising physical education classes should be matched to the childrens' developmental stages.

Factors Associated with Physical Activity

This study identified several factors associated with physical activity – perception of physical activity, parent's level of activity, encouragement, joining a sports team, and access to sports facilities. Other factors identified were time spent watching television, calorie intake, parent's income level, mother's education, and number of people in the household. One major finding of the present study was the significant relationship between children's perception of physical activity and their physical activity level. In this study perception referred to children's opinion of physical activity. Children who participated in 0-3 activities per week were more likely to have disliked physical activities compared to children who participated in 4-6 activities per week (OR: 3.29, 95% CI: 1.2 – 8.8, FET: p = .011). In addition, compared to children who participated in 4-6 activities per week, children who participated in 0-3 activities were more likely to

have disliked physical education classes (OR: 3.83, 95% CI: 1.5 – 10.0, p = .006). Children's perception of the importance of physical activity was also assessed All children who reported that they participated in 0-3 activities per week also reported that physical activity was not important. This study presents an important new finding.

Prior studies have shown that children's enjoyment of physical education class was significantly associated with participation in physical activity (Duncan, 1993; Sallis, Prochaska, Taylor, Hill & Geraci, 1999; Trost et al., 1997). The findings in the present study are consistent with previous ones in that they also showed that children's perceptions of physical education classes were significantly associated with the number of physical activities in which children participated. This finding has direct implications for physical education programs and suggests that it might be beneficial for teachers to change physical education curriculum to make PE classes more enjoyable.

Parental levels of activity and involvement in sports have been shown to be associated with the physical activity levels for children (Stucky-Ropp & DiLorenzo, 1993; Moore et al., 1991). Anderssen and Wold (1992) also found that levels of activity of parents and peer groups were strongly associated with students' physical activity levels. Conversely, Kimiecik and Horn (1998) and a review by Sallis, Prochaska and Taylor (2000) found that there was no relationship between parent's exercise behaviours and children's participation in physical activity. However, it is important to note that North American studies cannot be generalised to Indonesia. The present study found that the association between parent's and children's physical activity levels was not significant (p >.999). Children were much more physically active than their parents were.

Only 11 parents were physically active. It is likely that someone other than the parents acted as the role model for children's participation in physical activity.

Biddle and Goudas (1996) recommended that encouragement from parents and teachers impacted children's levels of physical activity. Teachers can have an influential role in improving physical activity since they can introduce physical activities, sports, exercise, and healthy behaviours into their curriculum. The present study supported the important role of teachers and found that 23.5% (n = 25) of the children reported that their teacher was the most significant source of support for participating in physical activities. Additionally, social support – defined as support from parents, other family members, teachers and friends – was significantly associated with the number of physical activities children participated in (p = .021). The present finding has several consequences for health promotion, with the main one being that teachers should be included in the dissemination of health education about physical activity. In addition, it would be beneficial to include parents in the planning and implementation stages of health programs. As a possible source of encouragement, they might be able to provide insight into the areas that need the most attention, such as dislike of physical activity.

Another important factor associated with physical activity level was participation in a sports team. This study found a significant relationship between joining a sports team in the previous six months and the number of physical activities children were involved in (p = .002), as well as the duration of the activities (p = .007). Children who participated in 0-3 activities per week were less likely to have joined a sports team compared to children who participated in 4-6 activities per week (OR: 4.55, 95% CI: 1.8

– 11.7). Furthermore, children who had a duration of 0-90 minutes were less likely to have joined a sports team compared to children with a duration greater than 90 minutes (OR: 4.10, 95% CI: 1.4 – 2.0). The present study is consistent with reports indicating that children's participation in community sports was significantly associated with moderate and vigorous physical activity (Washington et al., 2001). The present study also showed that children who joined a sports team engaged in physical activities for longer periods of time, possibly improving their health status and fitness level. This suggests that one potentially effective way to improve physical activity among youth is to establish sports team in the community through youth, fitness, or health clubs.

Other studies have suggested that access to sport facilities was a factor associated with physical activity (Sallis et al., 2000; Stucky-Ropp & DiLorenzo, 1993; Trost et al., 1997). Findings from the present study did not show a significant association between availability of sport facilities and the number of physical activities children participated in (p = .650). One possible explanation for the difference is that children may not have understood the meaning of availability or may have held differing opinions on what constituted a sports facility. In this study, sports facilities were defined as not only indoor facilities but also those created by children. In villages in Indonesia, children frequently engage in physical activity in schoolyards, rooms in their homes, streets, and traditional sports facilities.

Previous studies found that watching television negatively impacted physical activity levels for children (Crespo et al., 2001; Robinson et al., 1993; Trost et al., 1996). In the present study, similar proportions of children who participated in 0-3 activities per

week, 49.3%, and 4-6 activities per week, 50.0%, watched television for more than 210 minutes per week. Interestingly, playing electronic games, when assessed independent of watching television, was shown to have a significant relationship with physical activity (p = .001). Children who participated in physical activity 4-6 times per week were more likely to have played electronic games compared to children who participated in physical activities 0-3 times per week (OR: 5.00, 95% CI: 1.9 – 13.6). This was not the expected result. Children who were more active also played more electronic games, implying that games did not interfere with physical activity.

An interesting finding from this study indicates that calorie intake is a risk factor for decreasing physical activity levels. In the present study there was a significant difference in the number of activities based on calorie intake (p = .039). Children who participated in 0-3 activities per week were more likely to have low calorie intake per kilogram of body weight compared to children who participated in 4-6 activities per week (OR: 2.73, 95% CI: 1.1 – 6.9). The duration of the physical activities was also assessed. Twenty-two (71.0%) children who participated in physical activities for 0-90 minutes had low calorie intake per kilogram of body weight, compared to 50.0% (n = 34) of children who participated in physical activities for more than 90 minutes. This difference was not significant.

Physical activity cannot be considered in isolation from other factors such as nutrition since the nutrition status of an individual can greatly inhibit or enhance physical activity level (Hass, Murdoch, Rivera & Martorell, 1996). It is not surprising that children who have low calorie intake will decrease their physical activity level and also

the time they spend engaging in those activities. The present finding is consistent with a previous study that showed that children with low calorie intake had reduced physical activity levels (Hass et al., 1996). The implication of this result is that children with inadequate calorie intake must first improve their nutrition intake before they can maintain a healthy physical activity level. If children are able to improve their nutrition, they might be able to improve their physical activity level and the amount of time they participate in the activities.

Other factors such as income level, mother's education, and number of children are also associated with physical activity. Previous studies have found that socio-economic status affected children's physical activity behaviour. Children from a higher socio-economic status with a higher income level and better-educated mothers are more physically active (Ford et al., 1991; Gottlieb, 1985). The finding of the present study is inconsistent with these studies since mother's education level was not associated with level of physical activity. However, there was little variation in education level, as well as income and number of household members in this study. One possible explanation is that the effects of the environment were more prominent than the effects of these variables. More research needs to be conducted to better understand the factors associated with children's physical activity levels.

Summary of Physical Activity of School Age Children

The level of physical activity among school age children in the present study was low. However, when the level of physical activity for children in this study was compared

with those of children in previous studies conducted in other countries, the differences were slight. This implies that level of activity is a widespread problem that needs further attention.

In the present study, children in higher grades were more active than were children in grades 1-2. Gender was not a significant factor in this study, although boys appeared to be more active than girls were, and boys were involved in more activities for longer periods. Improving physical activity level is important, however, for both boys and girls.

Factors associated with level of activity were identified. Calorie intake and children's perception about physical activity and physical education were significantly associated with physical activity levels. The implication of this result is that children should have adequate calorie intake so they can maintain a healthy physical activity level. Establishing sports teams is a potentially effective way to improve physical activity among youth.

Playing electronic games, and watching television were also investigated, but were not significantly associated with physical activity level. It is not clear from this study whether limiting time children spend playing electronic games and watching television might encourage children to become more physically active.

Factors Associated with Childhood Injury

Injury is an important health problem among school age children. Injuries are the leading cause of mortality and morbidity in children in many countries and the school-age population is particularly vulnerable to injury (BCIRPU, 2002). By better

understanding the prevalence of injury and the factors associated with injury, it is possible to design and implement an effective injury prevention program.

Prevalence and Type of Injury

The present study found that the prevalence of injury in school age children is high. Using a checklist, six types of injury were identified: lacerations, sprains, burns, near drowning, broken bones, and strains. Almost all parents, 93.9% (n = 93), and children, 98.0% (n = 98), reported that children had sustained an injury at least once in the previous six months. Lacerations, sprains, and burns were the most common type of injury among children. In addition, 41.6% (n = 41) of children had experienced an open wound 2-6 times in the previous six months. There is no comparison data from previous studies of injury rates for school age children in Indonesia. However, this finding does suggest that it is important for health providers to address the high rate of injury among school age children in the Cibentang and Kuripan villages, possibly by offering injury prevention education.

Several studies suggest that injuries are a problem for school age children in many countries. Studies in Hungary (Kazar et al., 1992) and in Scotland (Starkt et al., 1996) found that the peak incidence of injuries occurred among school age children. In Canada, around 35.0% of students in grades 6, 8, and 10 reported having experienced injury. Forty percent of children who had experienced more than one injury had been treated by a health provider (Health Canada, 1999). In addition, the type of injuries children reported in Canada included broken bones, dislocated bones, sprains, strains, cuts, punctures or

stab wounds, and neck injuries. In the present study, eighteen sources of injury were identified by the parents and sixteen were identified by the children.

According to children, the five main sources of injury were broken glass (75.5%, n = 75), nails (58.6%, n = 58), falling down on the street (50.5%, n = 50), falling from a tree (50.5%, n = 50), and sports accidents (47.5%, n = 47). The present study did not directly investigate where injuries occurred. However, based on the reported sources of injury, it was possible to identify streets/roads/pathways, sports facilities, rivers, and homes as common places of injury. Previous studies found similar results, implying that school age children are vulnerable to injury in a variety of settings (Hammarstron & Janlert, 1994; Health Canada, 1999; Kazar et al., 1992).

According to growth and developmental theory, as school age children develop motor skills, they become more active. However, motor skills develop more rapidly than perceptive and cognitive skills. Therefore, school age children may not understand the dangers of some of their activities.

It is notable that the source of injury, such as nails and broken glass, was often the result of an unsafe environment. This might be compounded by poor safety practices, such as not wearing shoes or sandals for protection, and by children's use of outdoor areas for playing sports and engaging in physical activity. This suggests that parents or community groups might lower the rate of childhood injury by clearing dangerous debris from commonly frequented areas. Injury prevention campaigns might also be an effective way to educate children about potential sources of injury among school age children.

Factors Associated with Injury

The present study investigated the relationship between grade level and injury. Grade level was significantly associated with injury (p = .009). Compared to children who had not experienced injury in the previous six months, children who had sustained an injury were more likely to be in grades 3-6 (OR: 3.27, 95% CI: 1.4 – 10.5). The ages of children in grades 3-6 ranged from 9-12 years old. Therefore, this study is consistent with a previous study conducted in County Vas, Hungary. In that study, the rate of injury appeared to be low in early childhood with a significant increase occurring during school age (Kazar et al., 1992). Another study conducted in Scotland found that the peak incidence of injuries occurred in children in grades 4-6 (Stark et al., 1996). The present study also found that children in grades 4-6 were more at risk for injury than were younger children. One implication of this finding is that injury prevention could be implemented at schools for children in all grade levels. More focus could be given to children in higher grades to prevent injury and to change behavior patterns that might contribute to high rates of injury. In addition, younger children could be encouraged to establish safety practices at an early age, so that these practices can continue into later years.

Boys were more likely than girls to be injured, regardless of age (Health Canada, 1999). Interestingly, findings in the present study show that gender was not significantly associated with injury for children in the Cibentang and Kuripan villages (p = .320). This suggests that unsafe environmental conditions are more of a contributing factor for injury

than gender is. Hence, injury prevention programs should be directed toward both boys and girls since they both have a high risk of injury.

The present study found that the number of physical activities that children participated in and the duration of those activities were significantly associated with injury. Sprains, strains, and broken bones were compiled into one category and were then compared. Compared to children who participated in 0-3 activities per week, children who participated in 4-6 activities per week were more likely to have sustained an injury (OR: 9.43, 95% CI: 1.2 – 74.1, p = .011). In addition, children who had participated in physical activity for more than 90 minutes per week were more likely to have sustained an injury in the previous six months compared to children who participated for less than 90 minutes per week(OR: 4.14, 95% CI: 1.5 – 11.3, p = .007).

This finding suggests that it is not only the number of activities, but also the duration of those activities that affect rate of injury. This finding may have consequences for educators who might be able to introduce injury prevention into the regular curriculum. For example, teachers might encourage children to participate in physical activities but to pay attention to whether or not they are tired while being physically active.

The present study found a significant association between sports and injury. Children who had experienced a sports injury were compared based on duration, i.e. more than 150 minutes and less than 150 minutes per week. Compared to children who had not sustained a sports injury, children who had a sports injury were more likely to have reported a duration of more than 150 minutes (OR 3.00, 95% CI: 1.3 – 7.2, p = .010).

The present study found a significant association between football and sports injury ($p < .001$). Children who had a sports injury were more likely to have played football compared to children who had not reported an injury (OR: 20.0, 95% CI: 6.18 – 64.72). This finding is consistent with a previous study conducted in rural Australia that found that football was the primary cause of sports injuries in school-age children (Lower, 1996). In addition, children and parents reported that no safety devices, such as shoes and knee protection, were used when children sustained injuries.

Swimming was also found to be significantly associated with sports injuries ($p < .001$). Children who swam were more likely to have experienced an injury compared to children who had not gone swimming (OR: 6.73, 95% CI: 2.55 – 17.74). In the villages, most children swim in rivers that are often laden with dangerous debris. It may also imply that injuries might be reduced if debris were removed from rivers, or if children had less dangerous places to swim.

Safety Practices

It is well known that helmets can protect the head from injury during an accident. In a study of children's deaths in Puerto Rico, Rodriguez and Quintero (1992) investigated helmet use. They found that approximately 600 children under the age of 15 years die each year from injures sustained while riding bicycles; almost 80.0% of these deaths involve trauma to the head. Rodriguez and Quintero conducted a survey in another area of Puerto Rico and found that only 7.5% of the children used bicycle helmets.

The present study is the first study to investigate helmet use in Indonesian villages. The present study found that 13.3% (n = 10 of 75) of children used bicycle helmets, and 11.5% (n=7 of 61) used motorcycle helmets in the previous 12 months. Interestingly, the Indonesian government has only implemented policies regulating motorcycle helmet use, and not bicycle helmet use. It is not surprising that helmet used in the villages is still rare. Children and parents in the villages might be still unaware of the importance of helmets for preventing head injuries. Another possible explanation might be the cost of such safety devices. As previously noted, the average income in the villages is below the national average. Therefore, most families would have little disposable income for such devices. An additional possible explanation for why people in the villages did not obey government policy regarding motorcycle helmet use might be that penalties are unable to be enforced. More investigation is needed to better understand why children do not use motorcycle or bicycle helmets.

A campaign aimed at raising parents and children's awareness of the benefits of helmet use might be an effective way to introduce safety practices to people living in the Cibentang and Kuripan villages. In addition, local governments could implement policies making bicycle helmets more affordable for low-income families, who may not be able to afford safety devices for children.

Water safety is also of concern since children in the villages often swim in nearby rivers or dams. Rivers and dams are recognised as a hazard associated with rural living because children sometimes prefer to use them for bathing and swimming. A prior study conducted in a rural area in Tasmania showed that the most common cause of death in

children under 15 years old was drowning in dams and ponds, 32.0%, and in rivers, 21.0% (Riley, Larson, & Langford, 1996). Surprisingly, the present study found that 41.4% (n = 41) of all children reported that they had experienced a near drowning at least once in the previous six months. Twenty parents (20.2%) reported that their child had experienced a near drowning; it was not clear from the data whether parents and children defined a near drowning in the same way or if children had not told their parents of the incident. When swimming skills were assessed, 28 (45.9%) of the 61 children who had been swimming in the previous six months had beginner swimming skills and 25 children (41.0%) did not even have basic skills. In addition, when safety device usage was assessed, only 8 children (13.1%) reported that they ever used a life vest, and even then the frequency was rare. Most children reported that they went to the river with their friend. However, the most important factor is probably not whether children swim with friends or with adults, but whether their companion can swim or not. However, adults might be more likely to recognise potential hazards before they lead to injury.

These findings suggest that educational campaigns aimed at disseminating information about drowning should be implemented in the Kuripan and Cibentang villages. It would also be beneficial for children to receive basic swimming lessons as part of the school curriculum. Finally, parents and other adults in the community with swimming skills might be able to implement a volunteer chaperone program so that frequently used rivers and dams are monitored.

The last important safety practice to be assessed was safe street-crossing techniques. A previous study in an urban area of Sub-Saharan countries showed that the

most common type of injury in children was pedestrian knockdowns (40.0%) (Abantaga & Mock, 1998). This shows that pedestrians must be educated on proper street-crossing techniques. The present study is the first study to investigate the street-crossing practices in Indonesian villages. Three questions were asked to assess the level of street safety crossing knowledge and practice. Children were asked what children should do when crossing a street. They were also asked what they did when they started to cross the street and while they crossed the street. Results showed that more than half of the children reported that they implemented proper techniques when starting to cross the street, 56.6% (n =56), and while crossing the street, 52.5% (n = 52). Since the ideal situation is all children implementing safe street-crossing techniques, the proportion was still low. Although there are not many cars in the villages of Cibentang and Kuripan, there are many motorcycles since they are the main mode of transportation in the villages. This implies that school children in the Cibentang and Kuripan villages are at high risk of pedestrian accidents. This study suggests that safety practice, particularly skills associated with safe street crossing, should be incorporated into the school curriculum.

Utilisation of Health Services Due to Injury

In this study, similar proportions of parents, 31.3% (n = 31), and children, 35.4% (n = 35), reported that children went to a health clinic when they were injured at least once in the previous six months. The three most common causes of injury resulting in a clinic visit, as reported by parents and children, were falling from a tree, lacerations from a sharp object, and motor vehicle accidents. The present study did not investigate the

reasons why parents did not bring their children to a clinic when they were sick. Because the severity of injuries was not assessed, it is unknown whether earlier treatment would be beneficial for treating childhood injuries. However, there was a high frequency of wounds and infections among children in the villages, suggesting that parents need to be educated on when to bring their children to a clinic. They should also be taught standard first aid and wound care.

In Indonesia, there are traditional healers known as *Dukuns* - people with "supernatural" powers. Six parents reported that they took their children to a *Dukun* in the previous six months. This implies that health care programs might be effective if Dukuns were involved in the planning and implementation stages, since these traditional healers are afforded a level of respect in the community.

Summary of Childhood Injury

Several studies have shown that injuries are a problem for school-age children in many countries. In this study, the prevalence of injury in the children was high, although utilization of health services due to injury was low. There were various types of injuries. Football and swimming were significantly associated with injury. Higher grade level, number of physical activities per week and duration of physical activity per week were significantly associated with injury. The sources of injuries were often related to unsafe environment and poor safety practices. For example, safety helmets and life jackets were rarely used, and children had poor street crossing and swimming skills. Injury prevention

campaigns can include increasing awareness, improving access to safety devices, helping students develop appropriate skills, and cleaning up the environment.

Factors Associated with School Performance

As aforementioned, health is not merely the absence of disease but also encompasses optional functioning in all aspects of life. In this study, optional functioning in terms of school performance was assessed. There are many reasons school-age children may perform poorly in school. This section will discuss health problems, nutrition status, level of physical activity, injury, and other factors associated with school performance in school age children. School performance in the present study was indicated by ranking within the class. Children who had ranked in the top 10 of their class were considered high performance (22.2%, n = 22), and children who were not in the top 10 were considered low performance (77.8%, n = 77). It is important to investigate the factors that lead to children performing well in school, and to develop interventions that support all children performing to their full potential.

Children who had a low class rank were more likely to have low height-for-age compared to children who had a high class rank (OR: 2.87, 95% CI: 0.9 – 9.3), but the difference did not achieve statistical significance (p = .080). It is known that undernutrition in the early years can effect intellectual development and can result in impaired learning ability. For example, Arnelia et al. (1995) conducted a study of the impact of undernutrition on intelligence quotient (IQ) scores for school age children who had a prior history of undernutrition in Indonesia. Results showed that the average IQ score for children who had a history of undernutrition was 13.7 points lower than the

average IQ score for children who did not have a history of undernutrition. Further research needs to be conducted with a larger sample size to validate the association between underweight and school performance in Indonesian children.

Interestingly, health problems including dizziness, GI-tract problems, injury, and pneumonia were not significantly associated with school performance. However, school absence was found to be significantly associated with school performance ($p = .030$). The reason for school absence was not assessed. School absence did not directly cause low school performance. However, it might be that illness or health complaints contributed to children missing school and not being able to study at home. For example, the present study found that dizziness was significantly associated with school absence ($p = .015$). Children who were absent more than 3 times in the previous month were more likely to have experienced dizziness in the previous six months compared to children who were absent 0 to 3 times in the previous month (OR: 2.9, 95% CI: 1.3 – 6.5). If dizziness is associated with school absence, and absence is associated with poorer school performance, then strategies should be implemented to address dizziness, as well as absence. Health care professionals, parents, teachers, and other community members need to be involved.

A previous study conducted in Jaipur (Rajasthan) found that 18.4% of children who watched television showed decreased interest in academic studies. In another study, 10% of children who watched television decreased in class ranking (Gupta, Saini, Acharya & Miglani, 1994). Gupta et al. assessed 250 children aged 3 – 10 years old for a nine-month period. However, the present study is inconsistent with these findings and

showed that watching television was not significantly associated with school performance (p = .334). This difference might be due to sample size.

The present study also assessed the relationship between playing electronic games and school performance. No previous study has investigated playing electronic games independent of watching television. Surprisingly, children who had a high class rank were more likely to have played electronic games compared to children with a low class rank (OR: 5.91, 95% CI: 2.1 – 10.5). The difference was statistically significant (p = .001). Since there are no libraries or other formal extracurricular educational outlets available in the villages, children might have used electronic games as a means to funnel creative energy. Further research needs to be done to determine other factors possibly associated with both watching television and playing electronic games.

Summary of School Performance

In summary, this study found that absence from school was the only factor of those assessed that was associated with school performance. Further research is needed to see if addressing the health needs of the children would have an impact on absence and performance.

The Strengths and Limitations of the Study

A major strength of this study was the use of a random sampling method. This method was used to achieve representation of the target population. The investigator obtained 1,372 responses from a list of identification numbers of all eligible elementary

school students from the schools in both villages. Stratified random sampling was used, with strata being by grade level (1 to 6) with the use of random selection within each grade. Because a random sampling method was used, it is possible to generalize results from this study to children in other similar villages in Indonesia.

Another strength of this study was the strategy to improve the reliability and validity of the data by interviewing children, parents and teachers. Also, the same questionnaire was used to understand the specifics of some of the questions. The interview method was also a strength, since the investigator was able to explore answers more easily than with close-ended questions, and was also able to validate that the participants understood the questions.

A further strength of this study was that it addressed comprehensive issues that have not been previously researched on Indonesian school age children. This resulted in the development of a health risk behavior profile for the school age population in the villages of Indonesia. This study found that there are considerable health problems in school age children in Indonesian villages. The results of this study could be the basis for developing health education programs in rural communities for health care professionals, teachers, parents, and children.

This study also had limitations. The twenty-four hour recall as a method to collect dietary information was one possible limitation. This method is quick, relatively inexpensive, and can be used with illiterate individuals. However, the method relies on memory. To minimize this limitation and to improve the reliability of the data, the interview was conducted by using food models and photographs of food as an assistance

tool. Food models of various types and photographs of food were used to help participants recall the food that they had consumed in the previous 24 hours and assist respondents in assessing the portions of food they consumed. In addition, oil consumption as dietary intake was an additional strategy used to calculate total energy consumption (Zhai et al., 1993).

Another limitation was related to the survey questions, specifically those used to study the medical history of the school age children. In this study, medical diagnosis and health history were based on the parents' recall of the last 6 months and might have been inaccurate. Questions were asked of both parents and children to increase validity. The creation of simple questionnaires for use in rural communities might be useful for future research. In addition, an explanation of the signs and symptoms of illness might be helpful for parents.

In the present study, self-reports were used to measure school age children's type, frequency, and duration of the physical activity. Self-reporting instruments are the most common type of measurement used to gather information about physical activity levels (Pate, 1993; Rice & Howell, 2000; Welk, Corbin & Dale, 2000). Pate (1993) discussed both the strengths and weaknesses of self-reporting. He stated that there are clearly many uncertainties about the validity and reliability of the self-report. There are also problems associated with recall limitations and subjectivity in response to the instrument. However, in spite of the drawbacks, there are several advantages of self-reporting. One of the major benefits is that self-report of physical activity is low cost. In addition, these measures can be used easily with large numbers of individuals.

An additional limitation is that the study used a cross-sectional survey at one point in time to develop a health profile of school age children in Indonesia. This type of design precludes being able to draw any conclusions about cause and effect relationships between variables.

Overall Summary of the Study

In summary, this study assessed the health status and needs of school-age children in rural Indonesia, and found that the children had multiple health problems and complaints, were undernourished, were less physically active than recommended, and had high rates of preventable injuries. These findings suggest the need for educational campaigns and community involvement in projects to promote improved nutrition and fitness and reduce injury in this population.

CHAPTER 6: CONCLUSION AND NURSING IMPLICATIONS

This chapter contains a synopsis of this study's key findings and the implications for nursing practice, education, research, and policy that arise from the results.

Synopsis

There have only been a few studies conducted on the health risk behaviors of school-age children in developing countries. However, it is clear that health risk behaviors of school-age children need increased attention of health care providers. This is supported by the high prevalence of illness, undernutrition, injury and low physical activity levels as well as the low rate of immunization of school-age children in this study.

In this study, the descriptive analysis demonstrated that school-age children had a high prevalence of diseases, including pneumonia, GI-tract problems, mouth sores, dental problems and helminth infections. In addition, children also had a high rate of reported symptoms, including complaints of fever, indigestion, diarrhea, dizziness, and nausea/vomiting. Nearly all children had more than one episode of illness in the previous six months and weight loss was also found to be an existing health problem for children. Incomplete immunization coverage was shown to be another important health issue.

Undernutrition is yet another health problem of concern. More than one third of children had low height for their age; daily energy intake among school-age children was

lower than the WHO recommendations. However, daily protein intake met WHO recommendations. In addition, children ate less fruits and vegetables than expected.

This study identified factors associated with undernutrition. Difficulty eating, nausea/vomiting, and having experienced hunger 2-4 times in the previous six months were significantly associated with low height for age. Dental problems and mouth sores were also significantly associated with low height for age. Hence, dental problems and mouth sores need to be better treated while nutritional deficiencies are also being addressed. This study also identified parents' income level as being significantly associated with low height for age. Income support may be helpful in helping parents address nutritional deficiencies.

The level of physical activity among school-age children in the present study was low. Just over one third of the children met recommended physical activity levels. This study found that a number of factors were significantly associated with physical activity including calorie intake, children's perceptions of physical activity and physical education, injury, playing electronic games, sports teams, and support systems.

The prevalence of injury among school-age children was also high. Almost all children had sustained an injury at least once in the previous six months. In addition, 42% of children had experienced an open wound 2-6 times in the previous six months. Significant factors associated with injury were grade level, number of physical activities, and duration of physical activity. Football and swimming were significantly associated with sports injuries, which were assessed independently. In terms of injury, only one third of the injured children had been treated at a health clinic.

Safety practices also were of concern in this study, including helmet use, water safety and street crossing techniques. Nearly all children had never used motorcycle and bicycle helmets in the previous 12 months, and 41%, reported that they had experienced a near drowning incident in the previous 6 months. At the time of the interview, 30% of the children were beginner swimmers while 59% did not even have basic swimming skills. In addition, only 6% of all children who swam used a life vest or other safety device. Finally, while more than half of the children reported that they implemented proper techniques for crossing the street, the proportion was still low. This implies that the safety practices of school-age children in Cibentang and Kuripan puts them at high risk for injury.

The health status of children impacts school performance. This study found that school performance was significantly associated with school absence and the use of electronic games. Some other factors might be indirectly associated with school performance. Dizziness was significantly associated with school absence, and hunger was significantly associated with dizziness.

In conclusion, these findings are important since they provide a health behavior profile of school-age children in two rural Indonesian villages – Cibentang and Kuripan. These data can be used by community health nurses, other health care providers, school officials and village leaders to implement health prevention programs in the schools and villages in Indonesia. Community health nurses should understand and use these data for influencing health behavior formation among Indonesian school-age children.

Nursing Implications

Nursing Practice

Community health nurses working with school-age children need to be aware of the nature of the children's health behaviors. Because health behavior practices are best established during the school-age period, the assessment of children's health behavior and intervention is becoming increasingly important for public health professionals. Many health behavior problems of school-age children have specific and direct implications for nurses. The high prevalence of childhood illnesses, children's complaints of their health, malnutrition, dietary intake, level of activity, prevalence of injury, and factors associated with school performance reported by both parents and children in this study are all indicative of the scope of the problem. As an initial step, the incorporation of a comprehensive health behavior survey such as the one used in this study would provide a rich source of data for public health providers, and in particular for community health nursing practices.

The implications of this study for nursing practice will be discussed at four levels – community, group, family, and individual. As professional health care providers, community health nurses have a large role in implementing health promotion programs in the community setting. Targeting a large community, nurses and midwives could develop campaigns for improving immunization coverage, and to raise awareness of childhood undernutrition, illness, injury, level of activity, and weight loss. They could also raise

awareness about food donation programs, and also the importance of safety devices while swimming and riding a motorcycle or bicycle.

Indonesia has a food donation program that benefits selected schools in poor communities in order to improve the health status of school-age children. This study showed that school-age children need food and vitamin supplements to improve their health status. One implication of this finding is that nurses could initiate food donation campaigns based on community resources, and could encourage parents to avail of the services. To establish food donation programs, nurses could educate parents of children at elementary schools, village leaders and other influential people in the community, teachers, and government officials about the necessity of this type of program.

In Indonesia, the promotion of physical activity and environmental cleaning was established several years ago with a government program called "Friday Exercise and Clean Up." Every Friday morning before work, government employees did tai chi or some other physical activity. They also cleaned up the environment around their office. However, this program was not routinely scheduled. Nurses could initiate activities similar to "Friday Exercise and Clean Up" by targeting the public, particularly elementary school students and teachers. Nurses can give information to the public that is based on recent research that shows that the physical activity level of school-age children is low and the prevalence of injury is high because of the unsafe environment. Programs like "Friday Exercise and Clean Up" not only keep the environment clean, but also protect children from hazards such as broken glass, nails, and other sharp objects.

Nurses could also implement a campaign to promote the use of helmets among people in the community who drive motorcycles or bicycles. Nurses could lobby government officials to implement more effective laws mandating the use of bicycle helmets. While this study provided no evidence related to head injuries, studies in other countries indicate that many children die each year from head injuries as a result of motorcycle and bicycle accidents.

School-age children as a population group should receive attention to improve their health status and to aid in the formation of positive health behaviors. Children's health concepts and many of their health behaviors develop during school-age (Mott, James, & Sperhac, 1990). Nurses could develop a comprehensive school health program based on the health needs of children identified in the present study. Such a program could involve nurses, teachers, parents, and children. Possible topics include childhood illness, malnutrition, level of activity, injury, and school performance. Nurses could suggest healthy school settings as a model for students. Nurses could also plan strategies for promoting and educating children about health behaviors such as oral hygiene, hand washing, proper diet, wound care, first aid, and safety practices. In terms of promoting physical activity, nurses could encourage teachers to modify the physical education curriculum to match the developmental stage of children. For example, older students might have a more advanced physical education curriculum than younger children because they are at a higher developmental stage. Other suggestions might be to develop support systems for children and to establish sports teams that would improve the physical activity levels of school-age children. School performance might also be an

important issue to be addressed. Nurses could inform teachers and parents that school absence, hunger, and dizziness affect children's school performance. In the present study, absence was associated with low school performance, dizziness was associated with high school absence, and dizziness was associated with hunger. Each of these problems should be addressed. Nurses could suggest to parents and teachers that children who are absent from school more than 3 days each month should be assessed to determine if the absenteeism could be lessened. Children might have a serious health problem that might otherwise go unnoticed. In addition, nurses could work with teachers to find ways to ensure that needy children receive food supplements.

Early detection at the individual level is another strategy to counter the high incidence of illness, health complaints, and weight loss among school-age children. In addition to teaching health education classes, nurses could ask children if they feel ill and conduct physical assessments on a regular basis. Periodically measuring height and weight of all children is another strategy to detect health problems. If a health problem is detected, the nurse could intervene appropriately or refer the child to health care services.

At the family level, nurses could develop basic health education programs for mothers. In this study, most mothers in the villages had only 6 years of schooling. However, the best outcomes are likely to occur if the nurse works collaboratively with the cadres in the community. Empowering cadres is a good strategy to ensure the availability of healthcare providers in rural villages. In Indonesia, cadres are community volunteers who organize health services (Posyandu) in villages. Currently, cadres are more involved with health programs for children under five years old; they have

increased the availability of health care for these children and have been successful in improving the health of children under five years old (Departemen Kesehatan, 1990). Based on their experience with children under 5 years, nurses could involve cadres in health promotion strategies for school-age children as well. Nurses could train cadres to become educators for health prevention programs aimed at school-age children. In addition, cadres and nurses could develop a community-based education program that addresses the particular needs of the mother, including decision-making, awareness of when to bring children to health care services, and children's immunization, undernutrition, personal health complaints, difficulty eating, dietary behavior, and injury prevention.

Nurses could also conduct home visits to families where children are at high risk for injury and illness and to provide families with direct nursing care when needed. For this type of program to obtain maximum benefits, village cadres should be trained to use a reporting and recording system for monitoring the health status of school-age children in the villages.

Nursing Education

Basic nursing education must continue to address health promotion across the lifespan and pay particular attention to research findings. As part of community health nursing practice, nursing students should be provided with the opportunity to assess children's needs and promote health to children, their parents, and community volunteers. Nurses who work in public health services settings need knowledge about prevalent

diseases, immunization coverage, factors associated with malnutrition, factors associated with level of activity, and prevalence and prevention of injury among school-age children living in villages.

Nursing students should be taught the importance of basic health promotion strategies in relation to health risk behaviors identified in the present study. Nursing students must be prepared to face the nature of health problems that occur in rural communities. They need to be knowledgeable about the association between level of activity, injury, and school performance with children's health problems – incomplete immunization, undernutrition, weight loss, inadequate dietary intake, difficult eating, poor nutrition, poor oral hygiene, and nausea and vomiting. In addition, schools of nursing should improve their dissemination of knowledge and skills about intervention strategies, such as developing campaign programs, working in health teams, communicating techniques, empowerment, teaching in the community, and creating health promotion materials.

During community practicum experiences, nursing students are provided with opportunities to creatively develop nursing intervention skills in a community setting. Nursing students might develop programs targeting the community, group, family, or individual. At the community level, students could develop and implement nursing interventions such as campaigns addressing immunization, nutrition education, food donation programs, physical activity, injury prevention, swimming safety, and use of safety devices.

At the group level, nursing students could create health promotion programs in elementary schools to highlight the importance of adequate food consumption, brushing teeth, hand washing, wound care, first aid, participation in physical activity, safe street-crossing techniques, and safety practices.

At the family level, nursing students could develop basic education for mothers that address when they should take their child to a clinic, as well as the same factors discussed above in relation to children's health promotion programs. At the individual level, nursing students could participate in nursing clinics in the community, which school-age children could use for physical assessment or for wound care or counseling. In addition, nursing students could develop health promotion materials such as brochures, leaflets, or pamphlets to explain healthy behaviors that might be useful for informing clients.

In Indonesia, the lowest level of public health services are located in sub-district areas and are called Puskesmas. Pukesmas are often responsible for several villages where there is a limited number of community health nurses and nurse midwives who are normally in charge of public health services. Most nursing education consists of junior high school plus an additional 3 years, and midwifery education consists of junior high school plus 4 years of formal education. Nurses and midwives need to upgrade their knowledge, possibly through a continuing education program. Findings from the present study suggest that it might be useful to disseminate the latest findings about children's health risk behaviors in continuing education programs. Through this program, nurses and midwives could share and discuss the findings of recent studies that might be

relevant in current health practices. Then they can develop health promotion programs, which focus on school-age children.

Nursing Research

The main recommendation for future researchers is to use the results of this study to develop a comprehensive health profile survey of school-age children in Indonesian villages. In terms of future research, several results from this study could be studied further. Concerning the treatment of illness, this study did not assess utilization of health care services, only in relation to injury. For example, the present study did not explain why only 10 % of mothers gave medication to their children when they were sick. Furthermore, this study found that 21% of children had experienced at least one helminth infection in the previous 6 months. Further investigation is needed to better understand this problem.

Another aspect that may warrant further research is eating problems among school-age children. Nurses need to understand what factors are associated with eating difficulties. Further studies also need to be conducted in order to understand why children do not use helmets when they ride bicycles/motorcycles. The high prevalence of childhood injury in the Cibentang and Kuripan villages implies that further research into the effects of local environment needs to be conducted.

Another suggestion for researchers is that the results of this study be used to guide the implementation and evaluation of intervention programs aimed at school-age children. In addition, it would be advantageous to study the involvement of cadres as health educators for mothers; to study the impact of using elementary school settings as a

model for behaviour formation; and, to investigate the effect of an injury prevention campaign on injury rates of school-age children.

Public Health Policy

Several findings from this study could be disseminated to politicians and administrators. It is important to promote collaboration in establishing new policies for improving children's health status, physical activity level, and school performance, and for reducing prevalence of injuries in the school-age population. The political approach might be more effective if nurses were involved in the formation of public health policies that can impact the health status of people in the community, particularly school-age children.

This study found a significant association between undernutrition (low high for age) illness, hunger, children's personal health complaints, and income level. In addition, dietary intake among school-age children is also poor. This finding suggests that local governments implement a food donation program for low-income families, which would also benefit school-age children. A food program in schools, as well as a vitamin supplement and deworming program might also be beneficial in the Cibetang and Kuripan villages.

The high prevalence of injury among school-age children in these villages was alarming. Most injuries appeared to be related to unsafe environments and to sports activities. No previous Indonesian study found this result. One recommendation based on this study is that a national injury surveillance system should be established in order to monitor the prevalence of injury among school-age children. The second

recommendation is that the government should provide safe playgrounds and adequate sports facilities, as well as ensure that environments are not hazardous.

The final recommendation concerns positive health behavior formation and calls for the development of a comprehensive curriculum to address dietary behavior, personal health, physical activity levels, injury prevention, and safety practices. This curriculum should be implemented in all grades so that information would be readily available to all children, and so that children could be encouraged to maintain positive health behaviors. This program might be effective in improving the health status of future generations.

Conclusion

This study has demonstrated that school-age children have numerous health needs, which would require multiple strategies to address. Community health nurses could play a key role in developing, implementing and evaluating interventions directed toward the children, to their parents and teachers, to local health care providers, and to the government to promote adequate nutrition, improved physical health, and both greater levels of, and safer, physical activity.

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APPENDIXES

Appendix A: Letter of Permission for Parents

Date:
Dear (Parent's name):

My name is Sigit Mulyono and I am a Master of Nursing student at Memorial University of Newfoundland in Canada. I am currently conducting a study entitled Health Risk Behavior Survey for School Age Children in Indonesia. This is a joint project between The School of Nursing at Memorial University of Newfoundland and the Faculty of Nursing University of Indonesia in Jakarta.

I am doing a study with children age 6-12 and their parents. I am interested in the eating habits, physical activity, and safety practice of children in 2 villages-Kuripan and Cibentang.

I am asking you to help me with this study. If you agree, I will visit you in your home and ask you questions about diet, physical activity, and injury. This will take less than one hour.

I will also talk to your child at school for about 30 minutes and also assess his/her weight and height. I will talk to your child's teacher about the child's school attendance and performance. All information will be kept confidential.

I hope you will agree to be contacted to participate in this study. If you wish to be contacted to learn more about the study, please send this letter back to the teacher with your signature or tell the teacher you wish to be in the study. However, if you do not want to be contacted or if you decide not to participate after our initial meeting, you are free to do so. Likewise, if for any reason during the entirety of the study you want to withdraw, you are free to do so. If you have any questions, please call me at 021-3100752.

Thank you,

Sigit Mulyono, Master of Nursing student

S. LeFort and D. Moralejo, Supervisors

Yes, I agree to be contacted by Sigit Mulyono _____

Parent's Signature

Appendix B: Informed Consent

SCHOOL OF NURSING MEMORIAL UNIVERSITY OF NEWFOUNDLAND

Consent to participate in Nursing Research

TITLE: Health Risk Behavior for Survey for School Age Children in Indonesia

PROTOCOL: N/A

INVESTIGATOR: Sigit Mulyono

SPONSOR: AUCC/ CIDA through a Tier Linkage Project in Nursing for Women's Health & Community Outreach in Indonesia between the School of Nursing at Memorial University of Newfoundland in St. John's, Newfoundland, Canada and the Faculty of Nursing at the University of Indonesia in Jakarta, Indonesia.

You have been asked to take part in a research study. You can decide whether to be in the study or not. First, you need to understand the aim of the study, what risks you might undertake and what benefits you might receive. This consent form gives details of the study.

The researcher will:

- **discuss the study with you**
- **answer your questions**
- **keep confidential any information which could identify you personally**
- **be available during the study to deal with problems and answer questions**

If you decide not to take part in the study or to leave the study at any point, you are free to do so.

1. Introduction

Health risk behaviors of school age children can influence children's health both now and in the future. Risk factors include poor dietary behavior, level of activity, and inadequate safety practices. Parents and educators can modify some of these risk factors. This is an

area that has not yet been studied in Indonesia and the results could serve as a basis for planning educational content or other community programs focusing on addressing these risk factors.

2. Purpose of study

The aim of this study is to explore health risk behaviors of school age children between the ages of 6 and 12 years old in two Indonesian villages – Kuripan and Cibentang.

3. Description of the study procedures

The investigator will initially meet with you at your home to explain this study. If you choose to participate, you will give formal agreement by signing this consent form. Your child will also be asked if they wish to participate in this study. Consent from both of you is needed for you and your child to be included in the study. If you agree to be in this study, the investigator will interview you at your home at a convenient time. Topics to be discussed include dietary behavior, injury history, health history, physical activity, and demographics. The day after your interview, your child will be interviewed at his/her school if the child agrees. Topics include all of the above with the exception of health history. This section will be replaced by health status, determined by a measure of height and weight. Also your child's teacher will be asked about your child's attendance, school performance, and physical activity.

4. Length of time

Your participation involves one visit, approximately 30 minutes in duration. This will entail both the consent phase and the interview phase. Your child's participation involves one school visit lasting 30 minutes (the consent phase and the interview with measure of height and weight).

5. Possible risks and discomforts

This study will not put you or your child at risk for harm or exploitation. There is no risk or discomfort involved in participation in this study. However, you and your child may be inconvenienced by the 30 minutes required for data collection. Your interview will be scheduled at your convenience. You and your child have the right to withdraw as participants at any point in the study.

6. Benefits

This study will provide you with an opportunity to learn about the health of your child. After data collection, the investigator will give you a brief report about your child. In addition, if your child is found to have an acute illness, the investigator will refer you to the appropriate health care services as soon as possible. If you wish to have a summary of the study, the investigator will provide you with one.

7. Liability Statement.

By signing this form, you are giving your consent to be in this study. It indicates that you understand the information given about the study. By signing this form, you are not giving up any of your legal rights. The investigator continues to have legal, professional, and ethical responsibilities to you and your child.

Signature Page

Study title: Health Risk Behavior for Survey for School Age Children in Indonesia

Name of Principal Investigator: Sigit Mulyono

To be filled out and signed by the participant:

Please indicate response with a 3.

I have read the consent Yes ___ No ___

I have had the opportunity to ask questions/ to discuss this study. Yes ___ No ___

I have received satisfactory answers to all of my questions. Yes ___ No ___

I have received enough information about study. Yes ___ No ___

I understand that I am free to withdraw from the study Yes ___ No ___

at any time Yes____No____

without having to give reason Yes____No____

without it affecting any aspect of my life Yes____No____

I understand that it is my choice to be in the study Yes____No____

and that I may not benefit.

I agree that the teacher can be asked about my child Yes____No____

I agree to take part in this study and to allow my child to take part as well.

_____ _____

Signature of participant Date

_____ _____

Signature of witness Date

Assent of minor participant

_____ _____ _____

Signature of Minor (Age) Relationship to Above Participant Date

To be signed by the investigator:

I have explained this study to the best of my ability. I invited questions and gave answers. I believe that the participant fully understands what is involved in being in the study, any potential risks of the study and that he or she has freely chosen to be in the study.

_____ _____

Signature of investigator Date

Telephone number: _____

Appendix C: Teacher Survey

Child's Code: _____ Teacher's Code: _____

Health Risk Behavior Survey
(Teacher Interview Format)

1. In the past six months, how many days was the child absent? _____

2. In an average school week, how many days does the child go to Physical Education (PE) classes? _____

3. During an average physical education (PE) class, how many minutes does the child spend actually exercising or playing sports? _____

4. Rank of student in class _____

Appendix D: Parent Questionnaire

Parents' Code:____

Health Risk Behavior Survey
(Parent Interview Format)

A. Demographic Data

1. What is your relation to the child? _____
2. How many years of schooling have you received? _____

   If applicable, how many years of school has your spouse received?

   _____
3. Are you currently self-employed or employed outside of the home?

   a. Yes b. No

   If applicable, is your spouse currently self-employed or employed outside of the home?

   a. Yes b. No
4. What is your household's annual income?

   a. < Rp200,000

   b. Rp200,000 – Rp350,000

   c. Rp350,000 – Rp600,000

   d. > Rp600,000
5. How many other children do you have? _____
6. How many family members live in your house? _____

7. What is your cultural group?

   a. Sundanis

   b. Juvanis

   c. Betawi

   d. Other _____

B. Health History of the Child

1. a. Do you have the health card for your child from the Pukesmas (Public Health Services)? Yes _____ No _____

   b Has your child had tetanus immunization?

   a) Complete primary series

   b) Not complete primary series

   c) Do not know

   c. Has your child had booster tetanus immunization? Yes _____ No _____

2. Health Problems

   a. Have you been told that your child has had any of the health problems listed below in the past 6 months? If yes, how many times has your child had the health problem?

Health problem	**Yes**	**No**	**Frequency/ Duration**
Physical disability			
Pneumonia			
Liver diseases			

Mouth sores			
GI tract problem			
Dental problems			
Anemia			
Night blindness			
Asthma			
T B Miliary			
Helminthes infections			
Open Wound infection			
Others: Specify			

b. Has your child had any complaints about any of the following in the past 6 months? How many times?

Complaint:	**Yes**	**No**	**Frequency**
Lack of appetite			
Indigestion			
Difficulty chewing or swallowing			
Fever			
Constipation			
Nausea/vomiting			
Diarrhea			
Other			

3. Has your child lost or gained more than 10% of his/her body weight in the past 6 months?

   a. Yes b. No

   If yes, explain the surrounding circumstances (Include associated illness, dietary change, and time frame). _____

4. Does your child take medication? a. Yes b. No

   If yes, What kind of medication does your child take? _____

   How long has your child been taking it? _____

   What is the reason your child takes that medication?

   _____

   _____

   What are the side effects of the medication? _____

5. Does your child take vitamin/mineral supplements? a. Yes b. No

   If yes, what kind of supplements does your child take? _____

Supplement	**Frequency**	**Sources**
a. Vitamin A		
b. Multivitamin		
c. Iron		
d. B Complex		
e. Vitamin E		

C. Dietary History

1. Does your child eat at regular times each day? a. Yes b. No

   If Yes, please fill in the following chart and skip to question 4.

	What time	Where
a. Breakfast		
b. Lunch		
c. Supper		
d. Other/snacks		

   If no, please start at question 2 and proceed.

2. How many times per day does your child eat? _____

3. When does your child eat most of his/her food? _____

4. What food does your child particularly like?

   _____

   _____

5. Are there any foods your child does not eat at all? Explain.

   _____

   _____

6. Does your child have difficulty eating? _____

   If yes, why does your child have difficulty eating?

   _____

7. Do you currently receive food for your children from a food donation program?

a. Yes b. No

If yes,

How often do you receive food for your child from a food donation program?

_____

When was the last time that you received food for your child from a food donation program? _____

8. Does anyone have priority for eating in your home? (i.e. Does anyone get to eat first?) _____

   If so, who?

   _____

   _____

9. Food intake 24-Hour Recall

   What has your child eaten in the past 24 hours?

Time of Day	Food	Amount (cups, tbs., pieces, etc…)	Description (How is the food cooked or served; does your child bring it to school, buy it, or eat it at home?)

10. Food Frequency Checklist

a) How often does your child eat the following foods?		
Food	**Size of Servings**	**Frequency: Daily, Weekly, Monthly**
Rice or other cooked grain		
Noodles		
Fruits or fruits juice		
Vegetable		
Dried beans and peas		
Beef		
Fish		
Poultry (chicken/duck)		
Organ meat		
Eggs		
Peanut butter or nuts		
Milk		
Cheese		
Butter or margarine		
Oil		
Sugar, jam, jelly, syrup, honey		
Candy		
Snack chips		

b) What specific kinds of the following foods does your child eat? Include the name of the food, whether it is fresh or frozen, and how it is prepared.
Fruits and fruit juices
Vegetables
Milk and milk products
Meats and meat alternates
Breads and cereals
Desserts
Snack foods
c) Is there anything else you can relate about your child's food/nutrient intake?

D. Physical Activity

1. Sport and other activities that you and/or your child are currently involved in and the location and duration of usual engagement in these activities.

1. Activity	How many times per week			Duration (in minutes)		
	Father	Mother	Child	Father	Mother	Child
a. Bicycle riding						
Location?						
b. Jogging or running						

Location?						
c. Football						
Location?						
d. Swimming						
Location?						
e. Basketball						
Location?						
f. Table tennis						
Location?						
g. Volleyball						
Location?						
h. Badminton						
Location?						
i. Walking						
Location?						
j. Skipping						
Location?						
k. Dancing						
Location?						
l. Tai chi						
Location?						

m. Other						
Location?						

2. Who encourages your child to exercise? (Circle more than one if necessary).

   a. No one
   b. Friend
   c. Family
   d. Other family member
   e. Teacher
   f. Others_____

3. How many hours per day does your child watch television?_____

4. How many hours per day does your child play computer/electronic Games?

   i.e. Nintendo, Sony Playstation, GameBoy, computer games

   _____

5. Do you use sports facilities? Yes _____ No _____

6. Does your child use sports facilities? Yes _____ No _____

7. Are there enough sports facilities and opportunities for your child to play sports or engage in other physical activities in your village?

   a. Yes b. No

   Comment: _____

   _____

8. How far is the distance between your house and your child's school?

   _____

9. How does your child travel to school? (Circle more than one if necessary).

   a. walk

   b. ride bicycle

   c. car

   d. motorcycle

   e. other _____

D. Safety Practices and Injury

1. In the past 6 months, has your child ever sustained an injury? a. Yes b. No

2. If yes, please complete the following chart.

Type of injury sustained	Frequency and cause of injury	Safety device in use
a. Falls or accidents?		
b. Broken bones?		
c. Sprains?		
d. Strains?		
e. Lacerations?		
f. Near-drowning?		
g. Burns?		
h. Other?		

3. Did any of the above listed injuries result in your child visiting a clinic, being hospitalized, or seeking other forms of medical treatment in the past six months?

   a. Yes b.No

4. If yes, please complete the following chart.

	Cause of Injury	How long was the hospital stay or how many clinic visits did the injury require?
a. Hospitalization due to injury		
b. Clinical visit due to injury?		
C. Other _____		

Child's Code :____

Health Risk Behavior Survey
(Student Interview Format)

A. Demographic Data

1. How old are you? _____ years
2. What is your sex? a. Female b. Male
3. What grade are you in? _____

B. Health Status

Measurement Weight _____ Height _____

Height-Age	**Weight-Age**	**Weight-Height**

C. Dietary History

1. Do you eat at regular times each day? a. Yes b. No

   If Yes, please fill in the following chart and skip to question 4.

	What time	Where
a. Breakfast		
b. Lunch		
c. Supper		
d. Others/snacks		

If No, please start at question 2 and proceed.

2. How many times per day do you eat? _____

3. At what time of day do you eat most of your food? _____

4. How often do you get hungry and have nothing to eat? _____

5. What foods do you particularly like?

_____

_____

6. Are there any foods you don't eat at all? Explain.

_____

_____

7. Do you have difficulty eating? a.Yes _____ b. No _____

   If yes, why do you have difficulty eating?

_____

_____

_____

8. Food intake 24-Hour Recall

Time of Day	Food	Amount (cups, tbs., pieces, etc…)	Description (How is the food cooked or served; do you bring it to school, buy it, or eat it at home?)

9. Food Frequency Checklist

a. How often do you eat the following foods?		
Food	**Size of Servings**	**Frequency: Daily, Weekly, Monthly**
Rice or other cooked grain		
Noodles		
Fruits or fruits juice		
Vegetable		
Dried beans and peas		
Beef		
Fish		
Poultry (Chicken, Duck)		
Organ meat		
Eggs		
Peanut butter or nuts		
Milk		
Cheese		
Butter or margarine		
Oil		
Sugar, jam, jelly, syrup, honey		

Candy		
Snack chips		

b) What specific kinds of the following foods do you eat? Include the name of the food, whether it is fresh or frozen, and how it is prepared.
Fruits and fruit juices
Vegetables
Milk and milk products
Meats and meat alternates
Breads and cereals
Deserts
Snack foods
c. Is there anything else you can relate about your food/nutrient intake?

D. Physical Activity

1. During the past seven days, how many days did you exercise or participate in physical activity that made you sweat and breathe hard for at least 20 minutes, such as basketball, soccer, running, swimming laps, fast bicycling, or similar aerobic activities? _____

2. In an average week when you are in school, how many days do you go to Physical Education (PE) classes? _____

3. During an average physical education (PE) class, how many minutes do you spend actually exercising or playing sports? _____

4. During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups.)_____

5. Please indicate the sports and other activities that you are currently involved in and the usual location and duration of engagement in these activities.

Activity	**How many times per week**	**Duration (in minutes)**
a. Bicycle riding		
Location?		
b. Jogging or running		
Location?		
c. Football		
Location?		
d. Swimming		
Location?		
e. Basketball		
Location?		
f. Table tennis		
Location?		
g. Volleyball		
Location?		
h. Badminton		
Location?		

i. Walking		
Location?		
j. Skipping		
Location?		
k. Dancing		
Location?		
l. Tai chi		
Location?		
m. Other		
Location?		

6. Who is the person supporting you to exercise?

d. No one d. Other family member

e. Friend e. Teacher

f. Family f. Others_____

7. How many hours do you watch television?_____

8. How many hours do you play computer/electronic Games? (i.e. Nintendo, Sony Playstation, GameBoy, computer games) _____

9. Do you like physical activity/physical education?

a. never b. rarely c. often d. almost always e. always

10. Do you like participating in physical education class at school?

    a. never b. rarely c. often d. almost always e. always

11. Do you think physical activity is important?

    a. Yes b. No

    Please explain. _____

12. Do your parents exercise regularly? Yes _____ No _____

13. Do your parents affect your level of participation in physical activities?

    a. Yes b. No

14. Are there enough sports facilities in your village?

    a. Yes b. No

15. How far is the distance between your house and your school?

    _____

16. How do you travel to school? (Circle more than one response if required).

    f. walk

    g. ride bicycle

    h. car

    i. motorcycle

    j. other _____

E. Safety Practices and Injury

1. When you rode a motorcycle in the past 12 months, how often did you wear a helmet?

    a. I did not ride a motorcycle the past 12 months

    b. Never wore a helmet

    c. Rarely wore a helmet

    d. Sometimes wore a helmet

    e. Most of the time wore a helmet

    f. Always wore a helmet

2. Where do you swim? Circle the appropriate response(s).

    a. I do not swim

    b. I swim in a river

    c. I swim in a dam

    d. I swim in a private swimming pool

    e. I swim in a local swimming pool

    f. Other _____

3. How well do you swim?

    a. I do not know how to swim

    b. I have beginner swimming skills

    c. I have intermediate swimming skills

    d. I have advanced swimming skills

4. Do you now take or have you ever taken swimming lessons?

a. Yes b. No

5. When you swam in the past 12 months, how often did you use a life vest, tire, or other floatation device?

   a. I did not swim in the past 12 months

   b. Never used a life vest, tire, or other floatation device

   c. Rarely used a life vest, tire, or other floatation device

   d. Sometimes used a life vest, tire, or other floatation device

   e. Most of the time used a life vest, tire, or other floatation device

   f. Always used a life vest, tire, or other floatation device

6. When you swim in swimming pools, dams, or rivers, are you

   a. Alone without a supervisor? a. Yes b. No

   b. With a supervisor/teacher? a. Yes b. No

   c. Parents? a. Yes b. No

   d. Siblings? a. Yes b. No

   e. Other Family Members? a. Yes b. No

   f. Other? _____

8. In the past 6 months, have you ever been injured? a. Yes b. No

If yes, please complete the following chart.

Type of injury sustained	Frequency and cause of injury	Safety device in use
a. Falls or accidents?		
b. Broken bones?		
c. Sprains?		
d. Strains?		
e. Lacerations?		
f. Near-drowning?		
g. Burns?		

9. Did any of the above listed injuries result in you visiting a clinic, being hospitalized, or seeking other forms of medical treatment in the past six months?

   a. Yes b. No

10. If yes, please complete the following chart.

	Cause of Injury	How long of a hospital stay or how many clinical visits resulting from the injury?
a. Hospitalization due to injury		
b. Clinical visit due to injury?		
c. Other _____		

11. How many times per day do you cross the street? _____

12. Does someone accompany you when you cross the street? _____

13. How busy is the street?_____

    i..e. major road or small village road.

14. When you walk outside, do you normally walk…? (Circle the most appropriate response)

    a. in the roadway

    b. on the shoulder

15. When you start to cross the street, what do you do? (Circle more than one response if required)

    a. look ahead and then begin to cross the street

    b. look right-left-right before crossing

    c. cross directly

16. Then while crossing the street, which of the following do you do? (Circle more than one response if required)

    a. continue to look ahead while crossing

    b. continue to look right-left-right while crossing

    c. cross the street directly

17. When you cross the street what should you do? (Circle more than one response if required)

    a. cross directly

    b. stop before crossing

    c. look right-left-right before crossing

    d. look ahead before crossing

18. Did your parents talk with you about my visit yesterday? a. Yes b. No

If yes, what topics did you discuss?

_____

Appendix F: Pilot Project Report

Participant Selection Procedure

A pilot project was conducted at Cibetung Muara village in Putat Nutug, which is the same subdistrict where the study was conducted. The characteristics of the Cibetang Muara village – i.e. socio-economic background and elementary school conditions – are similar to those of the Cibentang and Kuripan villages. Three participants were chosen by the teacher from each grade level (grade 1, grade 3, and grade 6). The teacher gave the children a letter for their parents stating that the researcher would come to their house to interview the parents, and would interview the children the days after the parent's interviews were completed. All parents agreed so the sample size was 19 (9 parent-child dyads and 1 teacher). The pilot project was conducted over a three-day period.

The Results

Data collection comprised interviewing children, parents, and the teacher. There were some minor problems with the procedure used in the pilot project. Children in each grade level had different duration times for the interview. Students in grade 1 took approximately 40 minutes, grade 3 students took approximately 30 minutes, and grade 6 students took approximately 25 minutes to complete the interview anthropometric measurements. Interviewing grade 1 students took more time because they had some difficulty remembering what they had eaten in the previous day and what activities they had participated in during the previous week. There were also some concepts that they did not understand, so during interviews they needed more explanation and examples than children in higher grades. Food models and picture aids were useful for helping

children recall the food that they had consumed in the previous 24 hours and also assess the size of the portions they had consumed. Compared to grade 1 students, grade 3 students could more easily remember what they had eaten and what activities they had engaged in without much explanation from the researcher. Finally, grade 6 students could remember nearly all past eating patterns and activities and needed very little explanation or examples. Parent interviews lasted around 40 minutes, including the time allocated to obtaining informed consent. For the teacher, data collection took around 15 minutes.

The Questionnaire

After the pilot project, the researcher implemented some minor changes to the questionnaire, namely more explanation of what the researcher was asking, and the addition of list items:

1. For question 8 in the 24-hour food recall checklist, the researcher added the ingredients after the names of food since some foods contained many ingredients. The researcher also added nutritional information for the traditional foods available in the village. In addition, more explanation on what constituted a single serving size was needed since it was a difficult concept for the pilot project participants to understand.
2. Question E, number 1 was slightly modified since it was initially concerned only with children riding a motorcycle in the past 12 months. The change reflected the fact that children can be either a driver or a passenger, and that they are at risk of injury in both cases.
3. Question E., number 8, concerned safety practice and injury. The researcher added more injuries to the list.

Appendix G: Letters of Permission